



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

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**Lecture #7 – Smallpox: Eradicating ‘The
Speckled Monster’ (1960s-70s)**

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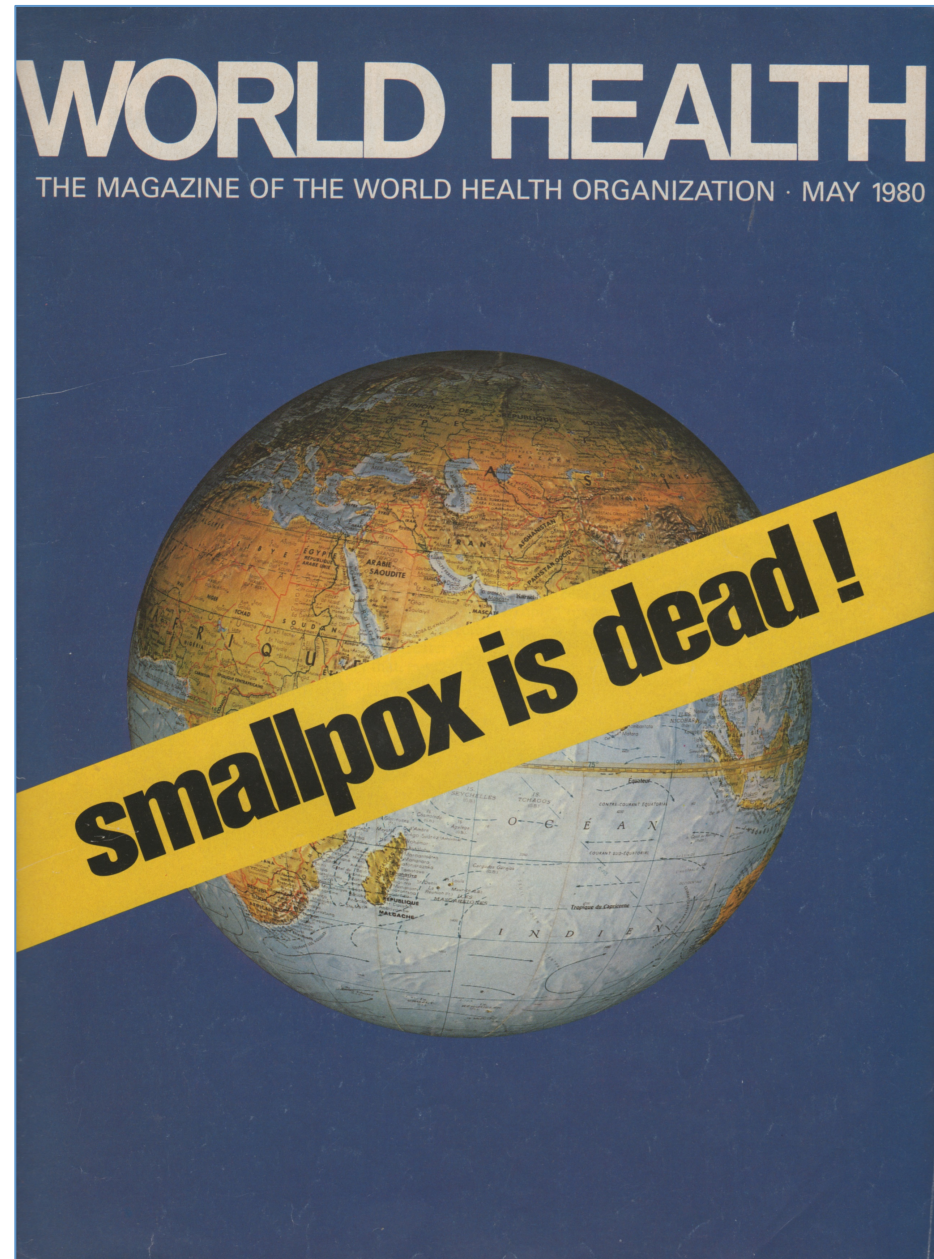
Dalla Lana School of Public Health,

University of Toronto

Living and Learning in Retirement, Course E

Class #2, October 27, 2017

Glendon College, York U., Room A002



Previous lecture slides available via:

<http://healthheritageresearch.com/clients/LLiR/>

Introduction

- Although smallpox was brought under control in Canada by the 1940s, it remained a major threat in many parts of the world into the 1960s and 1970s
- Connaught Labs played a decisive role in a sophisticated global smallpox eradication program that began in 1967
- Connaught scientists were critical in establishing a standard vaccine production method for the WHO and in assisting local producers meet it
- 40 years ago yesterday, on October 26, 1977, the last smallpox case in the world was reported – it was a man in Somalia – and smallpox was officially declared dead on December 9, 1979


THIS IS PUBLIC HEALTH: A CANADIAN HISTORY Executive Summary

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


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

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

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



Public Health Journal, November 1917



The government inspector's office, 1850

Canadian Public Health Association 1

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

Smallpox Eradication in North America

- To set the scene in North America, Canada's last naturally occurring (endemic) smallpox cases were reported in 1943, with several imported cases in 1945-46
- The last endemic cases in the U.S. occurred in 1949
- It took until 1952 for Mexico to fall to 0 endemic cases



Sanofi Pasteur Canada Archives

Table 8.6. North America: numbers of reported cases of smallpox, 1920–1952^{a,b,c}

	United States of America	Mexico ^d	Canada
1920 population (millions)	106	14	9
1950 population (millions)	152	27	14
1920	110 672
1921	108 487
1922	33 305	<i>11 966</i>	..
1923	30 890	<i>13 074</i>	..
1924	56 513	<i>12 964</i>	2 791
1925	39 381	<i>11 008</i>	1 248
1926	32 694	<i>5 477</i>	1 535
1927	37 977	<i>6 639</i>	2 845
1928	39 396	<i>8 794</i>	3 337
1929	42 341	<i>11 304</i>	1 952
1930	48 329	<i>17 405</i>	1 292
1931	30 151	<i>15 003</i>	865
1932	11 194	<i>8 456</i>	347
1933	6 491	<i>6 094</i>	100
1934	5 371	<i>9 430</i>	17
1935	7 957	<i>5 205</i>	34
1936	7 834	<i>4 651</i>	62
1937	11 673	<i>3 538</i>	59
1938	14 939	<i>3 343</i>	120
1939	9 877	<i>2 205</i>	198
1940	2 795	<i>1 341</i>	11
1941	1 396	<i>2 529</i>	26
1942	865	<i>4 115</i>	6
1943	765	<i>4 011</i>	6
1944	398	<i>3 516</i>	0
1945	346	<i>1 718</i>	5
1946	357	<i>600</i>	2
1947	176	<i>1 123</i>	0
1948	57	<i>1 541</i>	0
1949	<u>49</u>	<i>1 030</i>	0
1950	0	<i>769</i>	0
1951	0	<i>27</i>	0
1952	0	<u>0</u>	0

^a No cases were reported from any of these countries after 1951, except for 1 imported case in Canada in 1962.

^b A horizontal line beneath a figure indicates that this represents the last probable occurrence of endemic smallpox.

^c .. = data not recorded.

^d Only deaths (figures in italics) were reported between 1922 and 1943.

F. Fenner, *Smallpox & Its Eradication* (WHO, 1988)

Smallpox Again...

- **Aug 20, 1962** – When last we met, smallpox was confirmed with 14-yr-old Jimmie Orr after he had arrived in Toronto from Brazil via New York City, setting off international public health alarms
- He recovered, an earlier vaccination protecting him from the worst effects of the disease
- There were no other cases reported among the possible 2,000 contacts he had during his trip, however vaccination stations were set up in Ontario and New York for any contacts



Sanofi Pasteur Canada Archives

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

Smallpox Case Found in Toronto Sets Off Search

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

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

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

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

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

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

Mrs. Orr, another son, Joseph, 13, and a daughter, Dorothy, 9, also on the trip from Brazil earlier this month, are quarantined in the family home in Three Hills, Alta., with the victim's grandmother. They were among the dozen persons vaccinated by public health officials as a precautionary measure.

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

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

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

July total circulation 340,336 copies per day

Authorized to collect class mail by the Post Office Department, Ottawa, for the purpose of postage in advance.

TORONTO DAILY STAR

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

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

A Family Home From Brazil Brings ...

Doctor Dymond's Statement

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

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

METRO SMALLPOX ALERT AFTER BOY IS STRICKEN

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

Smallpox Again...

- While the Ontario Minister of Health stressed that there was no epidemic and no cause for alarm, Dr. Donald Henderson, then of the U.S. Centers for Disease Control, later recalled: “it was all but decided to:
 - 1) vaccinate everyone from New York City, the boy’s point of entry, to Buffalo, and
 - 2) close the Canadian border

- “Fortunately, reason prevailed – although just barely – but these events speak for themselves of the fear which smallpox engendered”

No Cause for Panic

The single case of smallpox which has slipped past international barriers into Canada does not prove that those barriers are ineffective, and it does not provide any reasonable ground for panic; quite the contrary. The massive attention which certain sections of the press have given to the episode, indeed, indicates that this case is the exception which proves that Canada is well protected from the disease. This was the first case in Canada since 1946, the first in Ontario for 28 years, the first in Toronto for 30 years. Were it not unusual, it would not have made headlines.

That a smallpox patient did manage to enter the United States and Canada despite the barriers which have been so effective for so many years will alert the guardians of those barriers; and that is good. That the patient came to Toronto may also prompt some Torontonians who have not been vaccinated in recent years to renew their protection against the disease; and that also is good. It is the continuing vaccination program, together with the international requirement for vaccination of travelers,

which has virtually eliminated smallpox from the country.

But one smallpox case does not plunge us back into the days where smallpox was a constantly present threat, demanding the mass vaccination of vast groups of people of all ages. On this continent the disease has been brought under such close control that, while the principle of universal vaccination remains sound, we can frequently afford to choose the safest time for it.

Vaccination, for infants and small children, presents a statistically small but acute danger. In rare cases it can cause brain damage, deformity or death. Years increase a person's resistance to these effects; and a parent who is aware of the risks may prefer to delay his child's vaccination until time has added to his protection. In the headline scare which could irresponsibly develop from this one smallpox case, wise parents will consult with their doctors before arranging the vaccination of infants or small children who, after all, are the least likely residents of this city to meet the infection.



1961-62 - Spreading Smallpox

- Jimmie Orr's smallpox case was not the only smallpox story at the time, but served as a kind of last smallpox straw, especially for the U.S. Public Health Service and the World Health Organization
- **1961-62** - England & Wales – 62 cases and 24 deaths, originated from an air traveller from Pakistan, prompted a vaccination rush, and also sparked UK-Pakistani race tensions in both countries
- **1961-62** – West Germany, two outbreaks, one sparked by a German engineer returning from Liberia causing 5 cases, 2 deaths (both nurses); and a German physician returning from India (initially a chickenpox diagnosis), leading to 32 cases and 1 death (a physician)

Globe & Mail, Jan 15, 1962, p. 1

Britons Wait in Line For Smallpox Vaccine; Fear Disease Gaining

London, Jan. 14 (AP)—Thousands of Britons were vaccinated at special clinics in the north of England today as doctors and nurses struggled to stop smallpox from spreading.

Police were hard-pressed to disentangle traffic jams and control queues outside one clinic in the Yorkshire industrial centre of Bradford—focal point of the smallpox scare. Medical authorities said five deaths have been confirmed in England so far, and suspect cases are under observation in hospitals. All except one of the fatalities have been in the industrial north.

A man died tonight in a hospital at Otley, nine miles from Bradford, and doctors said he displayed smallpox symptoms. In Leeds, near Bradford, a two-year-old child suspected of having smallpox was taken to hospital.

Although small-scale at present, the outbreak alarmed health officials all over Britain. It is believed to have originated with two Pakistani immigrants who entered the country in December and were in contact with hundreds of people before their smallpox symptoms emerged.

Since then smallpox has largely lost its old terror—and some health experts contend that Britain has become under-vaccinated as a result of public indifference.

One estimate is that only half the U.K. population is protected. One of the latest suspect cases admitted to hospital near Leeds was Dr. James Ainley, a pathologist who carried out a

post-mortem examination on a child who died of smallpox there a few days ago.

Globe & Mail, Jan 22, 1962, p. 1

Smallpox in Britain Sparks Hooliganism Against Pakistanis

London, Jan. 21 (Reuters)—Anti-Pakistani hooliganism broke out in the north of England at the weekend as a smallpox outbreak continued to cause alarm across the country. Official statements have said the disease was brought to Britain last month by two immigrants from Pakistan, where a smallpox epidemic is raging.

Windows have been smashed and anti-Pakistani slogans daubed on walls, a senior police officer said in Bradford, where the disease is centred. A newspaper report said hooligans have daubed Pakistani-owned stores and homes with insults like smallpox wog. (Wog is a derisive British term for natives of Middle Eastern countries.)

Pakistani bus conductors have been asked by passengers for smallpox instead of tickets. Meanwhile, the United States flew 400,000 doses of smallpox vaccine to Britain. Another 100,000 doses will follow later.

The disease has produced 18 confirmed cases, six of them fatal, in the U.K. Changes in immigration controls were urged by two Conservative members of Parliament who presented an amendment to the Government's pending Commonwealth immi-

grants bill requiring a valid vaccination certificate from every Commonwealth citizen entering Britain.

Not Spreading

Geneva, Jan. 21 (AP)—An outbreak of smallpox in Pakistan has affected only Britain seriously and there is no immediate

Hate Drive Against U.K. In Pakistan

By SHAMIM AHMED
Special to The Globe and Mail

Karachi, Feb. 18—Reports that Pakistanis suspected of carrying smallpox have been mistreated in the United Kingdom have sparked a hate campaign against 2,000 Britons, including 850 women, living in Pakistan.

The resentment, which remained subdued for more than a month, mounted suddenly this week following reports that British importers had cancelled

Globe & Mail, Feb 19, 1962, p. 15

1961-62 - Spreading Smallpox

- Common elements among these outbreaks were low levels of smallpox immunity in western Europe, and increasing international air travel from parts of the world where smallpox incidence remained high
- The Jimmie Orr case provided an opportunity to assess the vaccination status of Canadians.
- For example: When 1,119 people were vaccinated at the RCAF unit in Trenton after an Air Cadet contact with Jimmie Orr was discovered, the Commanding Officer was surprised to discover that approximately 20% of the civilian population near the base had never had the smallpox vaccine before, and in the town of Trenton, 25% of its population of 7,000 had never been vaccinated

Globe & Mail, Aug 21, 1962, p. 1

Get Smallpox Vaccination, 130 at Bible Class Urged

The Toronto Health Department last night advised anyone who attended a meeting at High Park Baptist Church last Wednesday night to get vaccinated against smallpox.

via New York. The diagnosis set off an international alarm.

Any doubt that the boy had smallpox was dispelled by laboratory tests yesterday. He has been isolated in Riverdale Hos-

self and I got vaccinated soon after I heard about his son," Mr. Comrie said. "A number of people have phoned the church for advice and have been told to see a physician."

Globe & Mail, May 12, 1961, p. 5

Spread by Jet

Urges Canada Widen Smallpox Immunity

Smallpox may be brought to Canada at any time through modern jet travel and probably less than half the population is immune to the disease, Dr. Milton H. Brown, professor of public health at the University of Toronto, warned the Ontario Medical Association annual convention yesterday.

"Clearly, the necessity to improve immunity to smallpox is apparent," he said.

Teacher Linked To Smallpox, 265 Treated

Health authorities yesterday continued precautions in Canada and the United States against the spread of smallpox brought to this continent by James Orr, 14. The boy is making good progress in Riverdale Hospital where he has been isolated since the disease was diagnosed last Saturday.

In Guelph yesterday, 265 high school teachers were vaccinated when it was discovered that a man attending the summer seminar for heads of departments in secondary schools had traveled on the train used by the Orr family from New York to Toronto overnight Aug. 11 and 12.

Globe & Mail, Aug 23, 1962, p. 1

1961-62 - Spreading Smallpox

- Other common elements were short memories in the press and the public about smallpox, and a lack of awareness of the scale of ongoing smallpox epidemics in the “developing” parts of the world
- During the Orr episode, there was little to no reference in the Toronto press to the smallpox crisis in the UK a few months earlier, nor to the major epidemics in Bangladesh and India in 1957-58 and the emergency vaccine supplies delivered, including from Connaught Labs

- 100,000+ cases in Bangladesh; Connaught supplied enough vaccine to vaccinate 1.5 million

Globe & Mail, April 22, 1958, p. 30

15,000 Pakistanis Die In Smallpox Epidemic

Karachi, April 21 (Reuters)— Medical teams today were fighting to control dual epidemics of cholera and smallpox sweeping Pakistan's Eastern Province capital of Dacca and some outlying towns. Provincial Governor Hamid All described the epidemics as a national calamity. Smallpox is reported to have taken 15,000 lives so far. British Red Cross teams were taking a consignment of vaccine to Dacca where, the governor said, the cholera showed some

signs of subsiding, but the smallpox was spreading unabated. India also has made a gift of vaccine although cholera is raging in Calcutta.

So far 17,500 people have

been inoculated in Dacca and 25,000 vaccinated. About 47,000 have been vaccinated in Mymensingh, north of Dacca, where the smallpox is mixed with a big outbreak of chickenpox.

OTTAWA, April 21—Canadian Red Cross officials said today that 5,000 doses of smallpox vaccine had been shipped to Pakistan yesterday and another 25,000 doses were being prepared for shipment today. In addition vaccine was being shipped from Britain, France, Italy, Switzerland and West Germany.

—The Press

Canadian Red Cross shipment contains 1,100,000 doses of smallpox vaccine which left Canada by air for East Pakistan to combat epidemic in Dacca district. Toronto Red Cross worker Pauline Edwards holds sample dose. Two million doses, valued at \$11,000, have been sent as a gift to the Pakistan Red Cross by Canadian Red Cross Society.



Globe & Mail, June 5, 1958, p. 4

1961-62 - Spreading Smallpox

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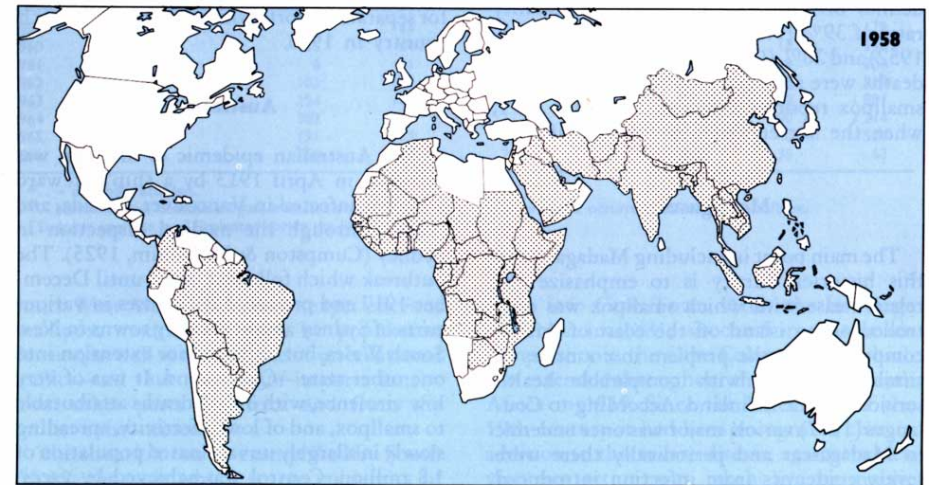
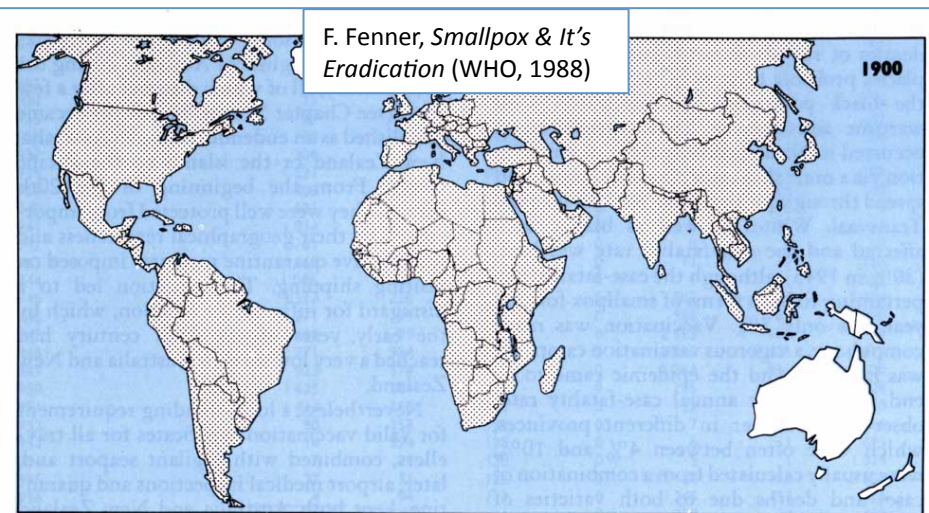
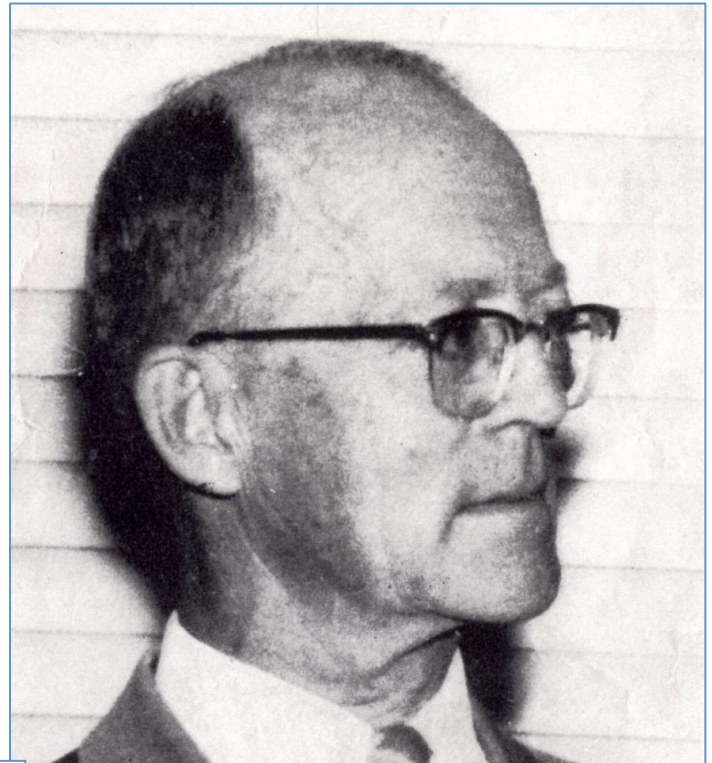


Fig. 8.16. Countries in which smallpox was endemic in 1900 and in 1958.

Endemic Smallpox,
1900 and 1958

Connaught and Upgrading Smallpox Vaccine

- **1958** – Connaught Laboratories had supplied a liquid vaccine for the Bangladesh smallpox epidemic, but it was clear that a better option, especially in tropical climates, would be a freeze dried smallpox vaccine
- **1958-62** –Bangladesh epidemic prompted research on developing a dried vaccine led by Dr. C.R Amies, who had worked at the Lister Institute in London, and was Provincial Bacteriologist in Alberta before joining Connaught in 1958



Sanofi Pasteur Canada Archives

*J. Hyg., Camb. (1962), 60, 473
Printed in Great Britain*

*With compliments,
C.R. Amies.*

473

An improved smallpox vaccine

By C. R. AMIES*

The Connaught Medical Research Laboratories, University of Toronto

(Received 6 June 1962)

INTRODUCTION

It is generally agreed that smallpox vaccines should, if possible, be distributed in the form of a lyophilized preparation. Only in this way can a standardized vaccine of proper potency at the time of use be made available throughout the world. Collier's (1955) method of preparing a partly purified dried vaccine has met with considerable success in the field (Frederiksen, Torres Muñoz & Jaurigui Molina, 1959) and there seems little doubt that a vaccine of this kind, or one derived from mammalian tissue cultures, will eventually be adopted for general use. There are, however, serious obstacles to be overcome before this can be achieved. It is

Connaught and Upgrading Smallpox Vaccine

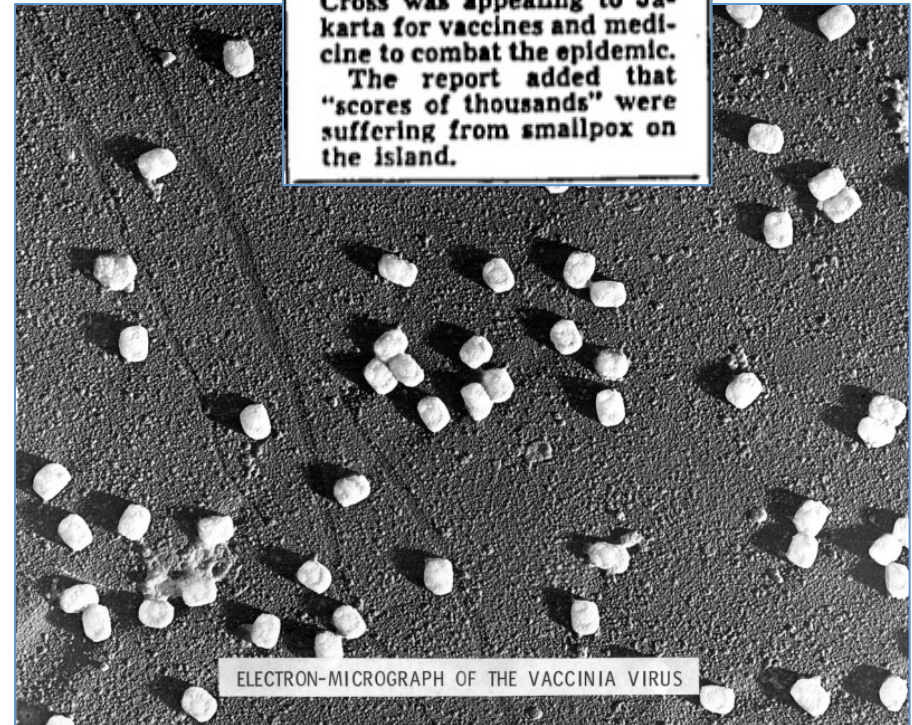
- **1961-62** – Under Amies' direction, several clinical trials underway of a freeze dried smallpox vaccine with the goal of providing vaccine for the Canadian Armed Forces, for export, for emergency stockpiles and for the WHO's fledgling smallpox eradication program
- **Early 1962** – However, Amies abruptly left Connaught to be Chief Bacteriologist at the Ontario Public Health Laboratory
- Taking over leadership of Connaught's smallpox vaccine work was Dr. Paul Fenje, who had worked with Amies since 1958 when they both joined the Labs

500 on Butung Die in Epidemic Of Smallpox

Jakarta, Sept. 23 (Reuters) — More than 500 persons have died in a smallpox epidemic on Butung Island, 750 miles north of Australia, it was reported today.

Civic leaders declared certain areas on the island had closed and the regional Red Cross was appealing to Jakarta for vaccines and medicine to combat the epidemic.

The report added that "scores of thousands" were suffering from smallpox on the island.



ELECTRON-MICROGRAPH OF THE VACCINIA VIRUS

Sanofi Pasteur Canada Archives

Dr. Paul Fenje: Defection: Yugoslavia to Connaught



Sanofi Pasteur Canada Archives

- **1915** - Born in Yugoslavia (now Serbia), Paul Fenje received his M.D. in 1940, and his DPH after World War II
- During the war, he served as a medical officer in the Yugoslavian army, was then captured in 1942 by the Hungarian army and worked as a prisoner-physician until he escaped to Budapest and joined the Yugoslavian resistance
- **1944** – He was then captured by the German SS and worked as a slave labourer in a stone quarry and was later packed onto a train and sent to a concentration camp
- **May 1945** – After liberation by the Americans, Fenje returned home, found his father, played recorder on the street to earn money, and soon focused his medical skills on public health

Dr. Paul Fenje: Defection: Yugoslavia to Connaught



Sanofi Pasteur Canada Archives

- The Communist authorities applied Fenje’s public health skills by forcing him to practice as the only doctor in a rural area with 100,000 people, travelling from village to village on horseback
- A man of many talents, including fencing, music and a mastery of 9 languages, Fenje was primarily drawn to microbiology and diagnostics, and an interest in “finding the reason or cause of why things happen” in the laboratory, rather than looking down people’s throats
- In Yugoslavia under Communist rule at the time, Fenje had little choice but to do as he was told and make the best of the situation.

Dr. Paul Fenje:

Defection: Yugoslavia to Connaught

- **1955** - Fenje was appointed Head of the Department for Medical Virology at the Pasteur Institute in Novi Sad
- **1958** - Through some “conspiratorial work,” Fenje and his family escaped from Yugoslavia and moved to Canada
- Unsatisfied with his position that increasingly kept him behind a desk, Fenje had received an invitation from the University of Edinburgh to attend a conference and do some research and he was allowed to go
- Meanwhile, his wife and two sons managed to quietly travel to Vienna and then London, where the family reunited and boarded a steamship for Montreal

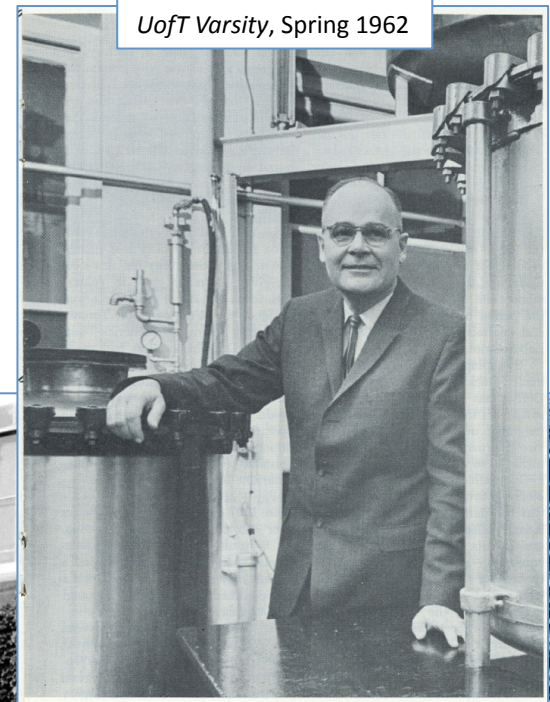
Times Colonist, May 21, 2010



- Fenje needed a job quickly and first went to the Institute of Microbiology at the University of Montreal, but they could not use him
- He next went to Toronto where he arranged to meet the Director of Connaught, Dr. J.K.W. Ferguson

Dr. Paul Fenje: Defection: Yugoslavia to Connaught

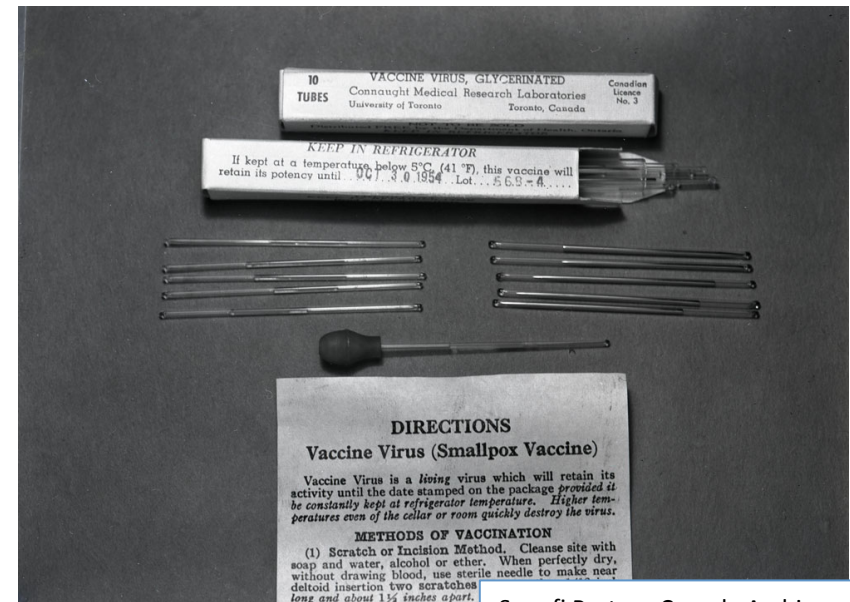
- Fenje had heard the Connaught name but did not know very much about the Labs
- Immediately impressed with Fenje's resume, and his language dexterity, and in need of someone experienced with rabies vaccine to help stem an outbreak of the disease among dogs that was spreading south, Ferguson hired Fenje on the spot
- While he would maintain this interest in rabies vaccines, the development of new smallpox vaccines increasingly consumed his time
- Fenje was immediately overwhelmed by the kindness of his colleagues and their readiness to help, and similarly overwhelmed by the availability of money for equipment, which was something quite new to him



Sanofi Pasteur Canada Archives

Dr. Paul Fenje: Upgrading Smallpox Vaccine

- **Jan 1962** – With Fenje taking the lead with smallpox vaccines at Connaught after Amies left, there was a renewed effort to improve the liquid vaccine and especially to step up development of a dried vaccine to meet growing export demands
- Vaccine shortages, pressure from the WHO to establish vaccine standards after Russian vaccine was found to be contaminated, and new outbreaks in the developing world, brought renewed urgency to Connaught's efforts
- The U.K. and German outbreaks, plus others in Sweden and Poland, sparked by infected travelers from endemic countries, capped by the Jimmie Orr case in Toronto, further intensified Fenje's efforts



Sanofi Pasteur Canada Archives



Dr. Paul Fenje: Upgrading Smallpox Vaccine

- **Dec 1962** – Fenje’s relationship with his international colleagues and his reputation among them was elevated by his presence at an International Smallpox Vaccine Symposium in Lyon, France
- However, Fenje had not yet been granted Canadian citizenship and he was nervous about traveling to Europe for fear of attracting attention in Yugoslavia

- He did not yet feel particularly confident in his position as a smallpox vaccine expert. “It seems the best people in the field of smallpox control will be present (with my exception).”
- Nevertheless, his paper, “Stability of Dried Smallpox Vaccine at Various Temperatures,” was well received

Extrait des Compte-rendus du Symposium sur la Vaccination Antivariorique
Lyon - 6/9 Décembre 1962

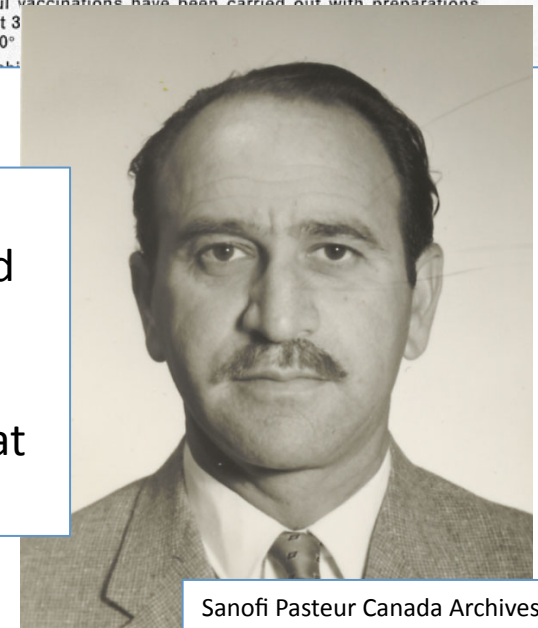
STABILITY OF DRIED SMALLPOX VACCINE AT VARIOUS TEMPERATURES

P. FENJE, Toronto

The most significant property of the dried smallpox vaccine is its stability at high temperatures. This property raises the hope that a sufficiently potent and standardized product can be made available for mass vaccination in those countries which are most endangered by endemic and epidemic smallpox. These countries, because of their climate, lack of transportation and refrigeration facilities, are obliged to use this type of vaccine. Certainly, the dried smallpox vaccine is the only suitable one for an eradication programme on a large scale.

Numerous observations exist on the stability of dried smallpox vaccine. It has been reported that successful vaccinations have been carried out with preparations kept for longer than 2 years at 30°C. The stability of the vaccine at 100°C

It is obvious that the stability



Sanofi Pasteur Canada Archives

Dr. Paul Fenje: Upgrading Smallpox Vaccine

- **1963** – After year focused almost totally on dried smallpox vaccine development, Fenje recommended routine production could begin
- Considerable progress had been made internationally in dried vaccine production over the previous decade
- However it was clear that there were wide variations in the quality of dried vaccines, in the levels of bacterial contamination, and in how much, or how little, producers did about it
- Connaught was clearly committed to being in the forefront of development work leading to the best available dried smallpox vaccine
- And the WHO was planning an expanded world-wide smallpox eradication effort, for which it would need vaccine

Advances in the Immunoprophylaxis of Smallpox¹

PAUL FENJE²

IT is a unique case in the history of medicine when a method and its means for application survive for 160 years almost unchanged, particularly when these 160 years represent a complete revolution in thought and approach to most medical problems. However, this is the case with smallpox vaccination and with the smallpox vaccine, which is even today basically prepared in a very similar way to that devised by Dr. Duquemelle in Rheims, France, in the first decade of the last century (1, 2, 3).

However, this does not mean either that the vaccine is so satisfactory that it needs no improvement or that the tremendous amount of research concentrated on smallpox vaccine was without results. Although in the last twenty years progress in this field has been less dramatic than in other fields of immunoprophylaxis of virus diseases, such as poliomyelitis or measles, laboratory research and field investigations have cleared up many points which were passed from generation to generation of medical people in some kind of mythical form, or at least in dogmatic terms (4).

One of the very much discussed and extremely controversial subjects in this field was the nature and origin of the vaccinia virus itself. At the present time, the generally accepted view is that vaccinia virus represents a separate entity in the group of the animal pox viruses, which includes both mammalian and fowl pox viruses. The interrelationship among the various members of the mammalian pox viruses is a very close one (5). Morphological differences are almost non-existent; they share several common antigens, although they appear to be serologically distinct. Nevertheless, at one point they can be differentiated: in their host range, in their ability or inability to infect and multiply in various laboratory and non-laboratory animals. Taking all this into account, it appears that vaccinia virus is most closely related to the cowpox virus from which it most probably originates. Phylogenetically the whole group derives probably from one common ancestor and its differentiation must be connected with the domestication of animals by the first agricultural settlers of the human race (6).

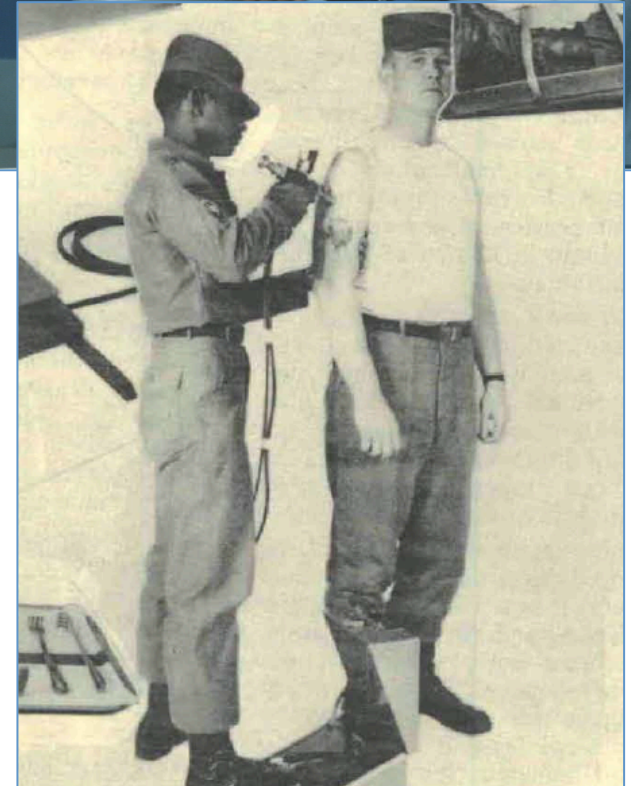
The difficulty of tracing the origin of vaccinia virus strains may be exemplified by the history of the Lister Institute's vaccine strain, which is currently used in

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Dr. Paul Fenje: Upgrading Smallpox Vaccine

- **1963-64** – The pace of smallpox vaccine work increased at Connaught, prompted by encouraging trials of freeze-dried vaccines, both for regular administration and for injection using the new Jet Injector, originally designed in the 1950s by the U.S. military to facilitate mass vaccinations
- The Canadian military was interested in the Jet Injector and in early 1965 conducted a series of trials among army inductees
- Fenje, meanwhile, struggled with limited facilities and staff; he had only two technicians available for smallpox vaccine production work, and in an emergency, perhaps three

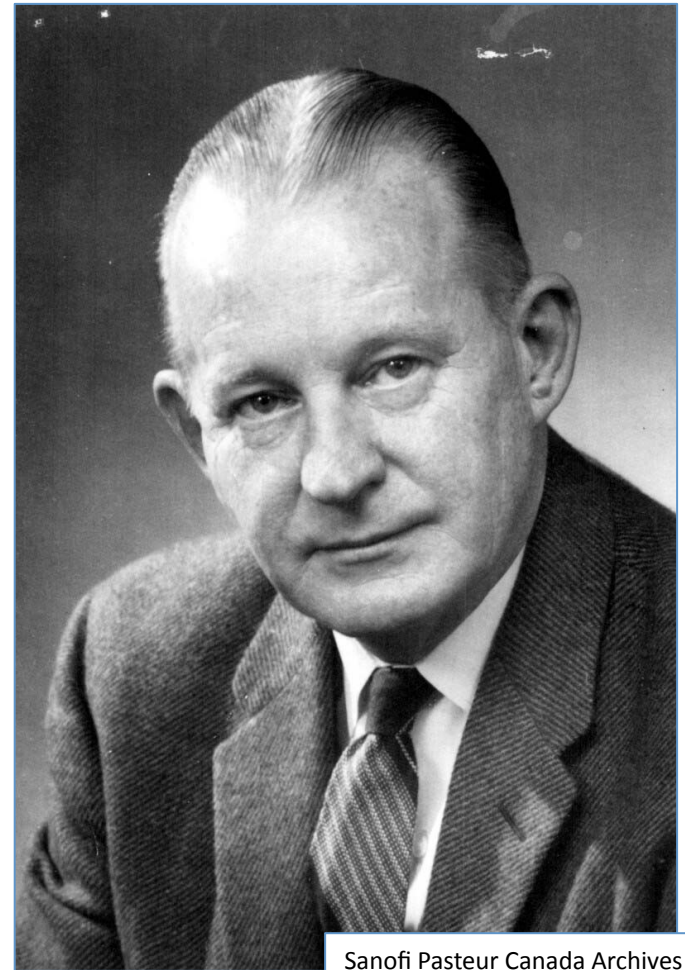
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<https://jetinjectors.com/2017/10/03/military-jet-injectors-ped-o-jet/>

New Pledge to Eradicate Smallpox

- **June 1965** – Connaught’s smallpox vaccine situation changed when Assistant Director, Dr. Robert J. Wilson (right), received a phone call from Dr. Donald Henderson, of the U.S. Centers for Disease Control, with some news
 - U.S. President Lyndon Johnson had pledged considerable financial support to the smallpox eradication program
 - Echoing an earlier pledge of President Kennedy’s, “if one could land a man on the moon in 10 years, surely one could eradicate smallpox from the earth in 10 years”
- Henderson, who had only seen 13 cases of smallpox before, including 1 in Toronto in 1962, was “abruptly” dispatched to Geneva to assume the position of global director for smallpox eradication



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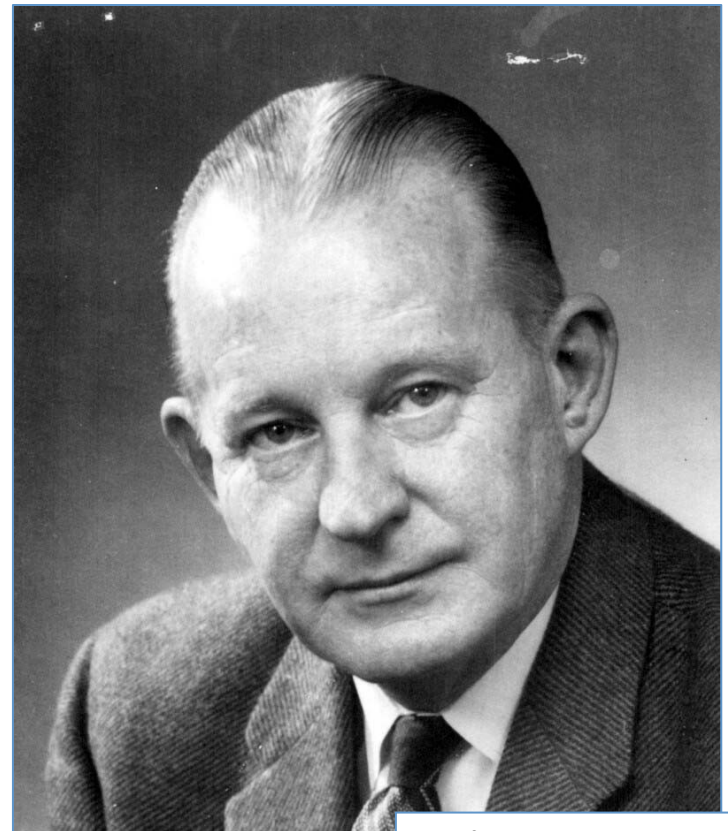
Dr. Donald H. Henderson: WHO Smallpox Eradication Director

- Donald Henderson was born in Ohio in 1928 to Canadian parents; his mother worked as a nurse in Windsor during the intense smallpox epidemic in 1924
- Henderson was quite familiar with Connaught, especially its Salk and Sabin polio vaccine work, and would work closely with Wilson and Fenje
- He later recalled when Fenje retired in 1979, “I appreciate only too well how many of the concepts in the execution of the smallpox program saw the first light of day over a glass of beer with Bob [Wilson] and Paul [Fenje]
- “What I don’t recall is whether the ideas stemmed from Wilson or Fenje, so perhaps they are better attributed to Wilje (or should it be Fenson?)”



Dr. Robert J. Wilson: Connaught's Smallpox Eradication Leader

- Robert James Wilson was born in Edmonton in 1915 (the same year as Fenje)
- **1937** - After earning an M.A. in Bacteriology and Chemistry from the University of British Columbia, Wilson moved to the University of Toronto for his M.D. in 1942 and a D.P.H. from the School of Hygiene in 1946
- **1946** – He was appointed to Connaught Laboratories and, among other research interests, including pertussis vaccine work, focused on the development and production of combined vaccines such as DPT and then DPT-Polio, which, as noted in the last class, was introduced in 1959



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Connaught's Leadership in Smallpox Eradication

- Wilson suggested Connaught assume a regional responsibility for the smallpox eradication effort, focused on Latin America, especially Brazil, where smallpox remained problematic, providing special training of local vaccine production staff
- Such training would be done in Toronto, with follow-up visits to local production labs, with Connaught scientists, particularly Fenje and Wilson, providing consultation services to overcome production problems and test batches
- As Henderson noted, “In other words, a full service vaccine production back-up for the Americas”

F. Fenner, *Smallpox & It's Eradication* (WHO, 1988)

Annual number of smallpox cases by continent, 1959-1966**

Continent	1959	1960	1961	1962	1963	1964	1965	1966	1967*
Africa	16,307	16,823	26,060	24,329	16,863	12,506	16,784	14,127	9,554
Asia	71,309	39,843	53,957	63,616	98,784	43,537	39,145	50,494	50,958
Europe	26	47	24	136	129	--	1	71	3
North America	--	--	--	--	--	--	--	--	--
South America	5,490	7,931	9,026	9,718	7,151	3,398	3,515	3,092	426
Oceania	--	1	--	--	--	--	--	--	--
Total	93,132	64,645	89,067	97,800	122,927	54,441	59,445	67,784	60,941



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Connaught's Leadership in Smallpox Eradication

- Connaught would also serve as one of two International Smallpox Vaccine Reference Centres for the eradication effort; it focused on the Western hemisphere, while another lab in the Netherlands focused on the Eastern hemisphere
- Two buildings at Connaught's Dufferin Division, including a specially designed new one (Building 79) completed in early 1966, focused the Lab's smallpox vaccine production and its international lab work

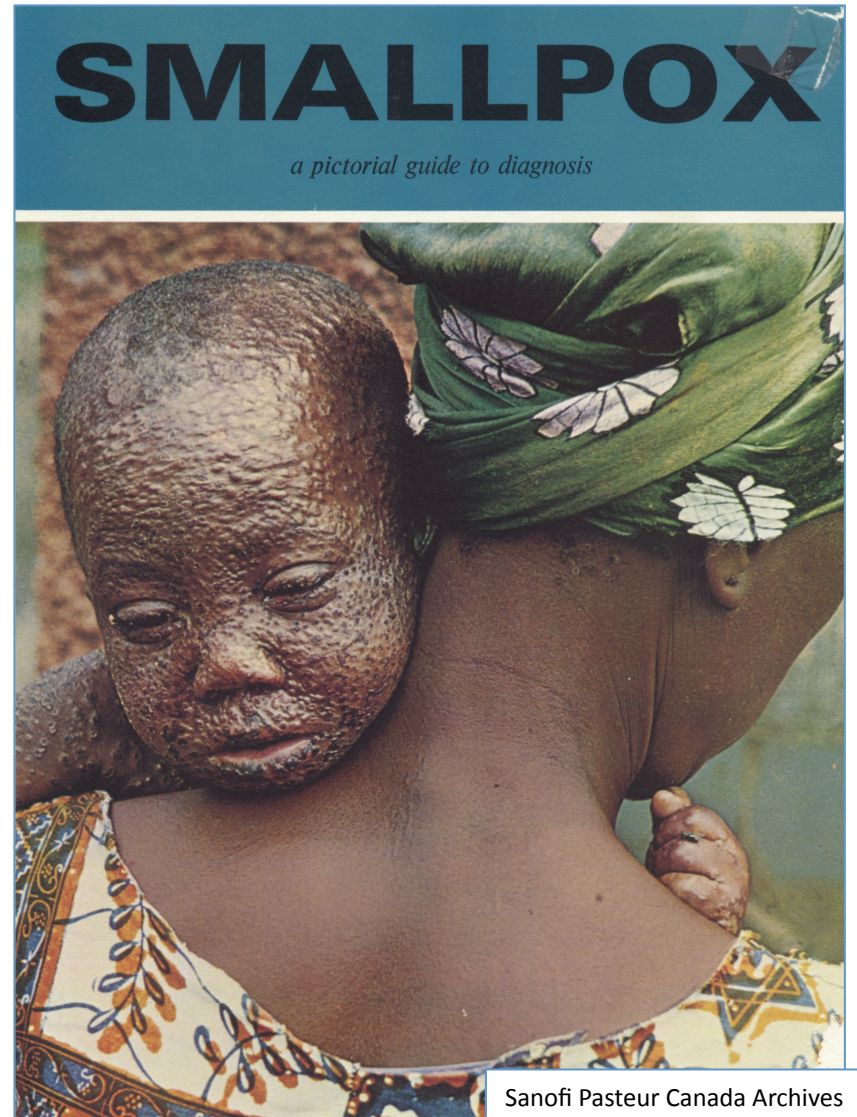


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Connaught's Leadership in Smallpox Eradication

- **Jan 31, 1967** – With formal agreements signed launching Connaught's participation in the eradication effort in Latin America, Wilson expressed to Henderson "some misgivings as to how effective our assistance will be in that part of the world, but it won't be for want of trying on our part."
- Henderson seemed more confident. "There is no doubt that you have a bit of a job ahead. I can't tell you how pleased I am however, to know that it is in your hands. The greatest failures to date that we have had with respect to eradication programmes have rested principally upon use of impotent vaccines. This is a real tragedy"



Connaught Sets The Standard

- **1967** - The most intensive year of Connaught's involvement with the eradication effort was the first, during which Wilson and Fenje visited 15 labs in 12 countries across Latin America
- Their primary focus was Brazil, where almost all smallpox cases in the Region occurred, and on the Instituto Oswaldo Cruz, a major vaccine producer, but the quality of its vaccine was problematic
- Its Director visited Connaught to study production and testing methods with Fenje in order to meet WHO standards

- Such methods and standards, based largely on Connaught's experience and initiative of Wilson and Fenje, were codified in the WHO's *Methodology of Freeze-dried Smallpox Vaccine Production*

CELEBRATING  CANADA 150



1967: Canadian smallpox vaccine becomes international standard



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Connaught Sets The Standard

- **Sept 1968** – After another trip to South America, Wilson reported to Henderson, “The WHO ‘Methodology’ was received with great enthusiasm and everyone agreed that it was a most useful document even though they do not all follow the precise procedures”
- By this time, five labs in South America were meeting, or almost meeting, the standards of adequate potency, stability and bacteriological sterility

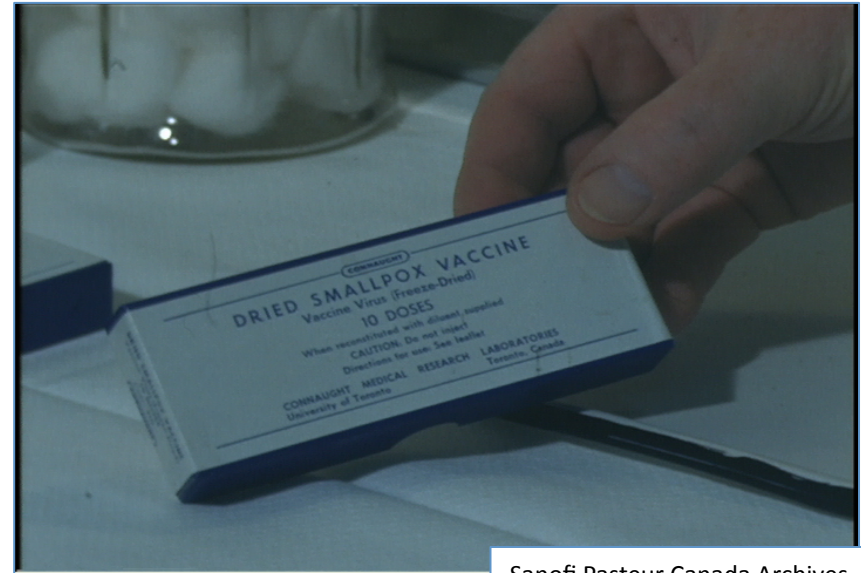
F. Fenner, *Smallpox & It's Eradication* (WHO, 1988)



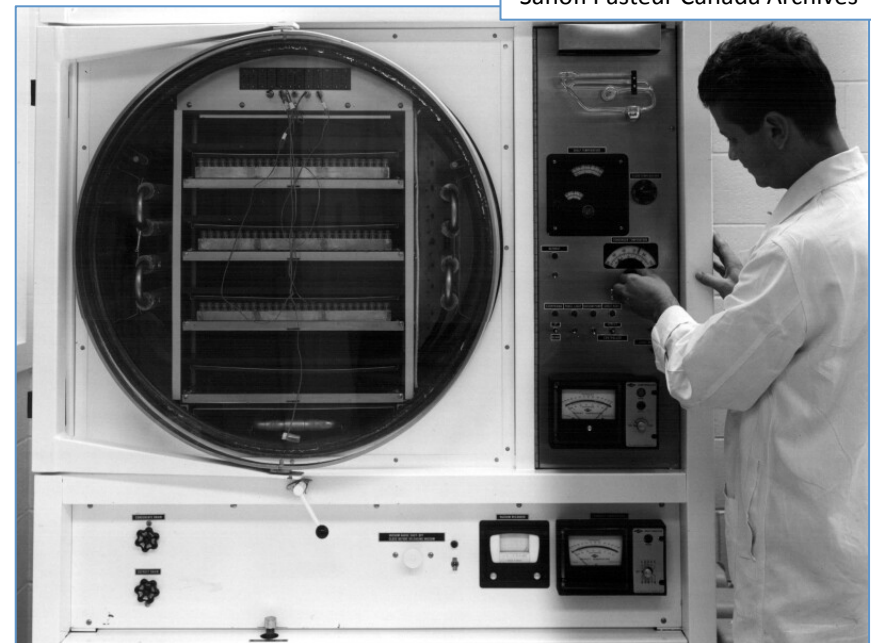
- Wilson told Henderson, “I am most gratified to see such progress in about one year and the enthusiasm these people have attacked the problem [with] in spite of economic, political and administrative chaos”

Connaught Contributes Vaccine

- Ironically, due to administrative and political complications, the Canadian government was unable to donate Connaught's vaccine to the WHO for the eradication effort
- **May 1970** - However, some unexpected press attention featuring “an eloquent presentation” by Henderson on television about the need for smallpox eradication and for vaccine, finally prompted the Canadian government to commit \$140,000 for a donation of some 7 million doses of Connaught's vaccine to the WHO
- By the time this donation was completed, Connaught's work in South America had wound down, with Brazil's last smallpox case occurring in 1971



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Connaught Contributes Vaccine

- The main focus of the eradication effort then shifted to Africa (particularly east Africa) and Asia.
- The Canadian government's donation was given over five years, totaling 35,000,000 doses between 1970 and 1974, much of it directed to African countries, although during 1972-74 it was used in 24 countries, including Bangladesh, India, Iran and Pakistan

- For Fenje, it was a major challenge keeping up with the WHO's demand for vaccine



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Connaught Contributes Vaccine

- **Feb 1971** – Henderson had been desperate for vaccine, as he stressed to Wilson, “we are in need of vaccine in fairly large supply and on a continuing basis particularly for the programme in the Congo
- “Vaccinating as if it was going out of style, consuming vaccine at a prodigious rate -- faster by far than we had anticipated earlier”
- Henderson preferred Connaught’s vaccine, “as it makes it most difficult for the field units to change from one type of vaccine to another -- more specifically from the very practical Canadian package to others which are far more cumbersome”



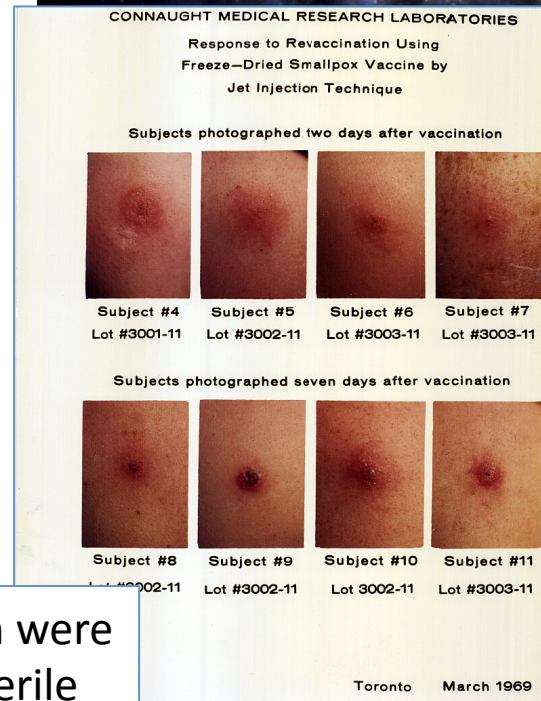
Connaught Contributes Vaccine: “The Best in the Galaxy”

- Fenje then happily told Henderson, “I have just completed the production of your order. I guess that you will shortly have on hand about 10 million doses of the best dried smallpox vaccine ever made in our galaxy”
- Henderson replied, “indeed delighted to have the ‘best dried smallpox vaccine ever made in our galaxy’ and with a continuing flow of this vaccine, I would hope that we would be battling the problem of smallpox in Sudan and Ethiopia by the end of this year”



Connaught Contributes Vaccine: “The Best in the Galaxy”

- Fenje was quite serious in his claim of galactic supremacy of his dried smallpox vaccine
- His ability to consistently prepare a sterile dried vaccine impressed the Canadian and U.S. regulators, and the WHO
- By Jan 1970, Fenje was developing a new purified liquid vaccine. “Physicians will continue to require the single dose glycerinated preparation,” Wilson noted to Henderson, “so we decided to clean it up and improve it”
- The U.S. National Institutes of Health were “fascinated that we can produce a sterile glycerinated product on a regular basis”



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Smallpox “High Emergency”

- **April-June 1972** – Demands on Connaught’s vaccine production intensified when Bangladesh was hit by the “high emergency” of a major smallpox epidemic that was spread into the country by Hindu refugees
 - As of mid-May there were more than 2,500 cases and 700 deaths
 - Connaught responded with a commitment of 5 million doses of vaccine
- As Fenje said to Wilson, “D.A. [Henderson] is urging us to cut down the time for our testing to the minimum and to shorten as much as possible the administrative process regarding vaccine delivery.”

700 deaths reported

Smallpox spreads rapidly in Bangladesh

© New York Times Service

DACCA, Bangladesh — A virulent smallpox epidemic of major proportions has broken out in Bangladesh, according to the health authorities in this transportation hub, a centre of the rapidly spreading infection.

More than 2,500 cases and 700 deaths have been reported officially in the Khulna Administrative Division and around Rangpur, in northern Bangladesh, but doctors estimate that the actual figures for the country as a whole are 10 times as large.

“The source of the infection has been traced to Hindu refugee centres in India, particularly the large camp at Salt Lake, near Calcutta,” said Dr. Sirajal Islam, Deputy Director of Health for the Khulna Division.

The disease, brought to Bangladesh by Hindu refugees returning from India, has spread to the resident Moslem population, Dr. Islam said.

The outbreak, first noted late in April, has not been reported in the press, which is government-controlled.

At least 150 new cases and 50 to 60 deaths are being discovered each day in the Khulna Division alone, according to an authoritative medical source.

A doctor working in the squalid Khulna suburb of Kalishpur, where about 45,000 refugees are crowded together, said that 50 to 70 new cases

were being reported daily in the noisome settlement of bamboo huts and tents.

Carriers take the infection elsewhere on overloaded trains, buses and boats.

In Rangpur where the northern transportation routes converge, smallpox is spreading from the Hindu refugees who fled to the Cooch Behar district in the Indian state of West Bengal, acquired the disease there and brought it back to Bangladesh, the health authorities say.

Health workers in the smallpox-ridden areas of Bangladesh place much of the blame for the epidemic on

ence in what was then East Pakistan. Upon intervention by the Indian Army last December, East Pakistan broke away and became the independent republic of Bangladesh.

The small, sparsely equipped hospital in Kalishpur has been a prime source of infection through unvaccinated visitors who get the disease from patients, said Dr. Alfred Sommer of New York, an epidemiologist for the World Health Organization assigned here by the United Nations relief mission in Bangladesh.

to the hospital, all visitors have been checked for recent marks of vaccination, which gives immunity for three years.

A public health service vaccination team—one of 3,500 operating throughout Bangladesh—stops passers-by of all ages, in Kalishpur, administering the dose with a jet gun that does the job, which is virtually painless, in a fraction of a second.



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Another Smallpox Scare

- **March-April 1972** – With global smallpox incidence sharply dropping, despite the emergency in Bangladesh, and discussions about stopping smallpox immunization in North America, there was another imported outbreak in Europe
- It spread in Fenje's native Yugoslavia when a pilgrim returned from Mecca and brought smallpox with him, causing 170 cases and 40 deaths
- There were many hemorrhagic cases, reminding Wilson and Henderson of the severe 1924 Windsor outbreak, discussed in an earlier class
- The Yugoslavia outbreak underscored the continuing danger of smallpox, raising concerns about how well prepared Canada was against the potential threat of immigrants from countries where smallpox had been reported

Globe & Mail, Apr 3, 1972, p. 4

Yugoslavia reports 22 smallpox deaths

BELGRADE (Reuter) — The confirmed death toll from Yugoslavia's smallpox outbreak reached 22 yesterday with the death of another patient in the southern province of Kosovo, which earlier reported 13 deaths.

Federal medical authorities also announced eight new cases, all in Kosovo, bringing the confirmed total in the whole country to 149.

Eighty per cent of Kosovo's

population has been vaccinated, and all Serbians will have been vaccinated within a week, officials said.

Medical teams are controlling all road, rail, river and air approaches to Belgrade, vaccinating all arrivals who have no valid vaccination certificates.

Meanwhile, in Hanover, a Yugoslav worker, who escaped from smallpox quarantine in Hanover on Friday was located yesterday at a railroad station 75 miles away, police said.

Police, who had made a nation-wide radio appeal in their search for Binak Dreshaj, 22, picked him up at the main station in Osnabruock, where his brother lives.

All people with whom he had close contact would be inoculated, but no quarantine was planned in Osnabruock, police said.

Hanover health officials were making preparations to seal off all seven quarantine centres to prevent any further escapes.

A total of 673 people who had had direct or indirect contact with the smallpox victim remained under quarantine in Hanover over the Easter weekend.

Smallpox alert covers Europe

From The Associated Press

Europe and the Middle East are on the alert against a possible spread of smallpox brought to Yugoslavia by a Moslem pilgrim bearing contaminated holy water from Mecca.

Yugoslav officials reported that 23 people had died of the disease since the first outbreak March 14. They said there were 149 confirmed cases, all in the eastern section of the country.

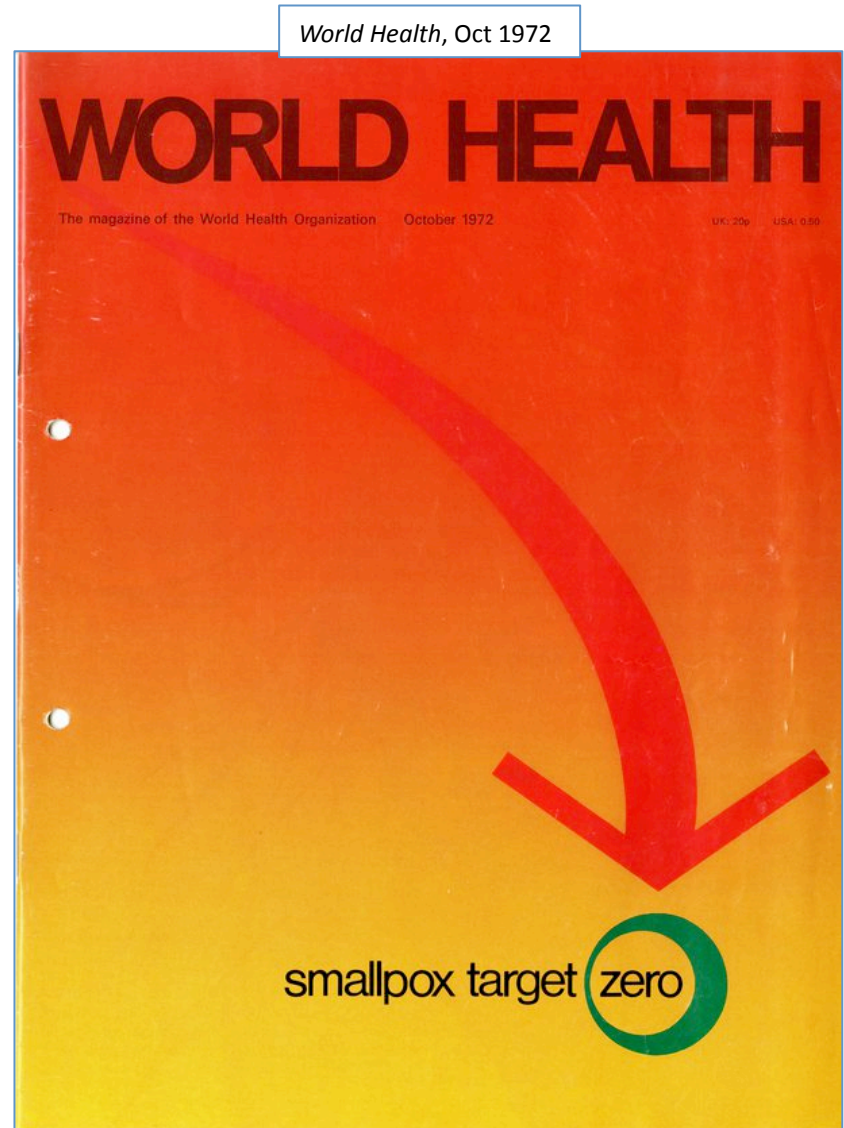
In Italy, thousands of people in towns near the Yugoslav border were inoculated as a precautionary measure.

Twenty-five confirmed cases have been reported in Syria's Deir Al Zor province since the disease was first detected 10 days ago. Three villages were isolated and the province was closed to foreigners.

Globe & Mail, Apr 4, 1972, p. 9

Expanded Immunization Program

- By the early 1970s, Wilson and Henderson hoped that the momentum gained during the smallpox campaign could be directed towards the control of other diseases in the developing world where vaccines were less accessible, ie. diphtheria, pertussis, tetanus, polio, typhoid and BCG vaccines
- A local supply of high quality vaccine was critical, but producing these types of vaccines was more complex than smallpox vaccine
- Wilson's idea was for Connaught to produce each vaccine in bulk and then ship them to various countries, where they could be processed locally and distributed at minimal cost



Expanded Immunization Program

- While Henderson was excited by the idea, there was insufficient financial or political support in Canada and the WHO to proceed at the time
- Henderson felt that it was “all very tragic as there could be no more opportune moment to launch the immunization scheme”
- Within the next two years, however, progress was made, including by UNICEF and Connaught, that evolved into the WHO’s Expanded Program on Immunization (EPI), launched in 1974



Smallpox's Last Stand: 1977, Somalia

- **1977** – Henderson had hoped that smallpox's spread would be halted by the end of 1976, thus meeting the original 10-year goal of the WHO's eradication initiative
- **March-May 1977** - However, an "explosive epidemic" began in Somalia with 280 cases reported by early May in 100 separate outbreaks, in the main city, among desert nomads, and along the border, threatening to spread into Ethiopia, where containment abilities were weaker
- **Early Oct 1977** – After 3,306 cases and an appeal for more funding and more vaccine, the Somalia outbreak was confined to 10 localities in the south, a \$32 reward offered for reporting the disease helping target vaccination efforts



Somalia epidemic

Bid to end smallpox foiled by outbreak

© New York Times Service

NEW YORK — The World Health Organization's program to wipe out smallpox around the world has been seriously hampered by an explosive epidemic of the disease in Somalia in recent weeks.

"The situation is serious," Isa Arita, director of the World Health Organization's smallpox eradication program, said at the weekend in an interview from Geneva. So long as a single case of smallpox exists, the infection can spread anywhere in the world.

Since March, Dr. Arita said, 280 cases of smallpox from 100 outbreaks had been reported in Somalia. Of these, 114 were reported in early May. However, he expressed

hope the peak of the epidemic had passed.

Of further concern, he said, are reports of four smallpox cases from two areas in Ethiopia along the Somali border. The individuals with smallpox caught their infection in Somalia, but became ill after they had arrived home.

These importations raise the potential risk that the disease could spread into areas of Ethiopia, where surveillance and containment measures are weak because of political unrest in the country.

The new outbreaks have set back by as much as six months the WHO schedule for eradicating smallpox, Dr. Arita said.

The organization had expected to stop the spread by the end of last year, a decade after beginning its program to eradicate the disease, which spreads when virus particles are passed from one human to another. If the campaign is successful, it could mark the first time that man had eradicated any natural disease.

At one point last summer, the agency's officials believed they had achieved their goal of wiping out smallpox. At that time, Ethiopia was the only country still infected. When the last case occurred there on Aug. 9 in a 3-year-old nomad girl, there were no others reported in the world.

However, the officials were jolted in September by reports of smallpox cases in Mogadishu, the capital of Somalia. By the beginning of 1977, they believed they had brought that outbreak under control. But since then, cases were found in desert areas, primarily among nomads who spread the disease as they forage for food.

Dr. Arita's predecessor, Donald Henderson, the principal architect of the smallpox eradication program, said in Geneva last January, "The last case of smallpox in the world will occur this month."

Dr. Arita said that the reason for the explosive epidemic was not known.

Somalia outbreak

WHO asks \$3.9 million to combat smallpox

GENEVA (AP) — The World Health Organization asked for \$3.9-million and donations of vaccine yesterday to fight a resurgence of smallpox half a year after the disease was believed nearly extinct.

A report to the 150-nation organization's annual meeting said WHO needed at least that amount to finance search and containment operations in Somalia where the disease in its nonfatal, milder form stubbornly lingers. The effort in that East African country occasionally involves thousands of health workers.

The report also asked member governments to continue donating smallpox vaccines to bring WHO stocks of emergency reserves to a level allowing vaccination of 200 million to 300 million people. Current reserves are enough to vaccinate 80 million people.

A draft resolution cited "considerable danger for ad-

At the start of the smallpox eradication campaign in 1967 about 20 million to 30 million people were infected, of whom about three million died, in 43 Latin American, African and Asian countries.

Early last August seven villagers in a remote area of Ethiopia were the last known cases of the disease on the globe and the WHO campaign appeared headed for final victory.

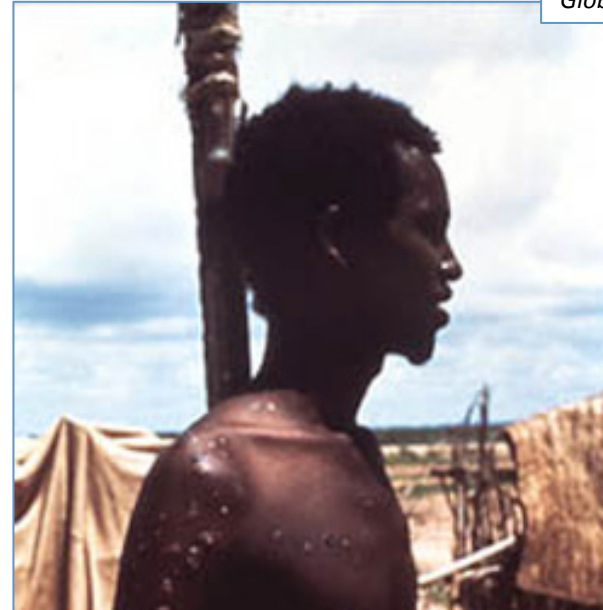
But by the end of August, Ethiopian nomads had carried the smallpox virus to Mogadishu, the capital of neighboring Somalia. During winter a Kenyan religious student brought the disease back to his village near the border of Somalia.

An intensive search in other Somali regions led to discovery of new smallpox outbreaks, and most recently the virus popped up again in two Ethiopian regions not far from Somalia, where the total number of cases had risen to

Globe & Mail, May 19, 1977, p. 3

Smallpox's Last Stand: 1977, Somalia

- **Oct 26, 1977** – The last naturally occurring smallpox case in the world was officially diagnosed in Ali Maow Maalin, a Somali hospital cook in the port town of Merca, who, ironically, had volunteered as a vaccinator for the eradication team
- However, he hadn't been vaccinated; he later said "I was scared of being vaccinated then. It looked like the shot hurt"



Sanofi Pasteur Canada Archives

The final chapter? Somali cook Ali Maow Maalin developed smallpox on October 26, 1977. Since then, no other cases have been detected in the field.

Victory in this finest international

mobilization and battle—where all the combatants can be called heroes—awaits the final dispatch: Without a hiding place in nature apart from man, an ancient enemy is vanquished.

JASON WEISFELD, M.D.

Health officials aim to isolate last smallpox

GENEVA (Reuter) — The World Health Organization said yesterday it hoped to isolate the world's last smallpox cases within a month.

The Geneva-based WHO said that at the beginning of October only 10 localities — all in southern Somalia — still had active smallpox cases capable of infecting other people.

A reward of \$32 offered for reporting smallpox had led to the detection of 40 per cent of the 940 outbreaks investigated this year, WHO said.

It added that 24 WHO personnel, 2,550 Somali national staff and 50 vehicles had been assigned to the anti-smallpox program.

"If the current efforts of the Somali Government are maintained, it should be possible to interrupt transmission of smallpox within a month," WHO's weekly epidemiological report said.

But it warned the situation was still uncertain because WHO surveillance teams were unable to operate in certain regions around the Ogaden desert, where Ethiopian and Somali-backed forces had been engaged in fighting.

The report said 3,208 cases of smallpox had been reported so far this year. Since July more than 95 per cent of the outbreaks of the disease had been in small nomadic groups in the remote desert areas.

"Transmission of the disease has often persisted undetected from four to six months in small nomadic groups," the report said.

"To combat this, locally recruited surveillance workers have been travelling on foot seeking smallpox cases and performing vaccinations."

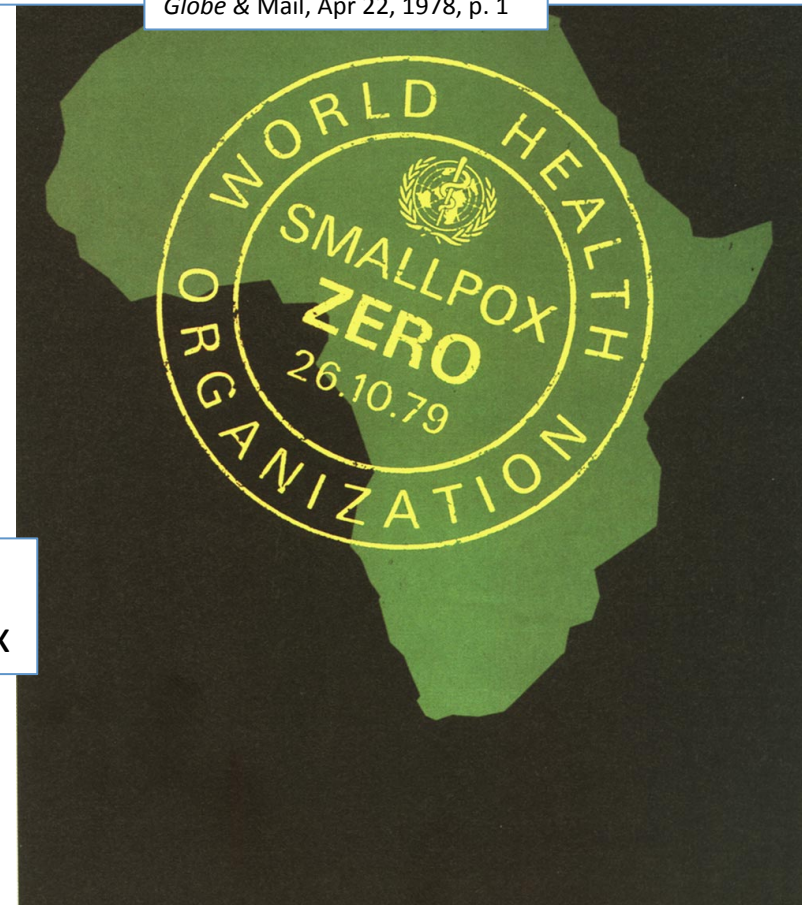
Smallpox's Last Stand: 1977, Somalia

- Ali's case proved to be mild, and like Jimmie Orr's case, and an intensive contact tracing effort, Ali didn't infect others, and no further cases occurred since
- Ali would later volunteer with the WHO's polio eradication initiative; "Somalia was the last country with smallpox. I wanted to help ensure that we would not be the last place with polio too

- **Oct 26, 1979** – Two years after Ali's case, Africa was officially declared free of smallpox



Globe & Mail, Apr 22, 1978, p. 1



Smallpox's Last Stand: Last To Die, In a Laboratory

- While the last smallpox case in Somalia marked the end of the natural disease, the smallpox threat was not yet fully vanquished
 - **Aug 1978** – At Birmingham University Medical School in England, a medical photographer was infected by the smallpox virus, which had escaped from a nearby laboratory and circulated through an air vent
 - The photographer was immediately placed in hospital and 200 of her contacts were put into isolation
- The photographer died, smallpox's last victim, but the incident and its timing, so soon after smallpox seemed to be eradicated, raised several alarms, particularly about the storage of smallpox virus in laboratories around the world

Globe & Mail, Sept 12, 1978, p. 11

Smallpox death in U.K. is first after 11 months

BIRMINGHAM, England (Reuter) — A 40-year-old British woman became the first person in the world yesterday to die of smallpox in nearly 11 months.

Janet Parker, believed by experts to have caught the virus from a research laboratory, died 15 days after it was confirmed that she had smallpox.

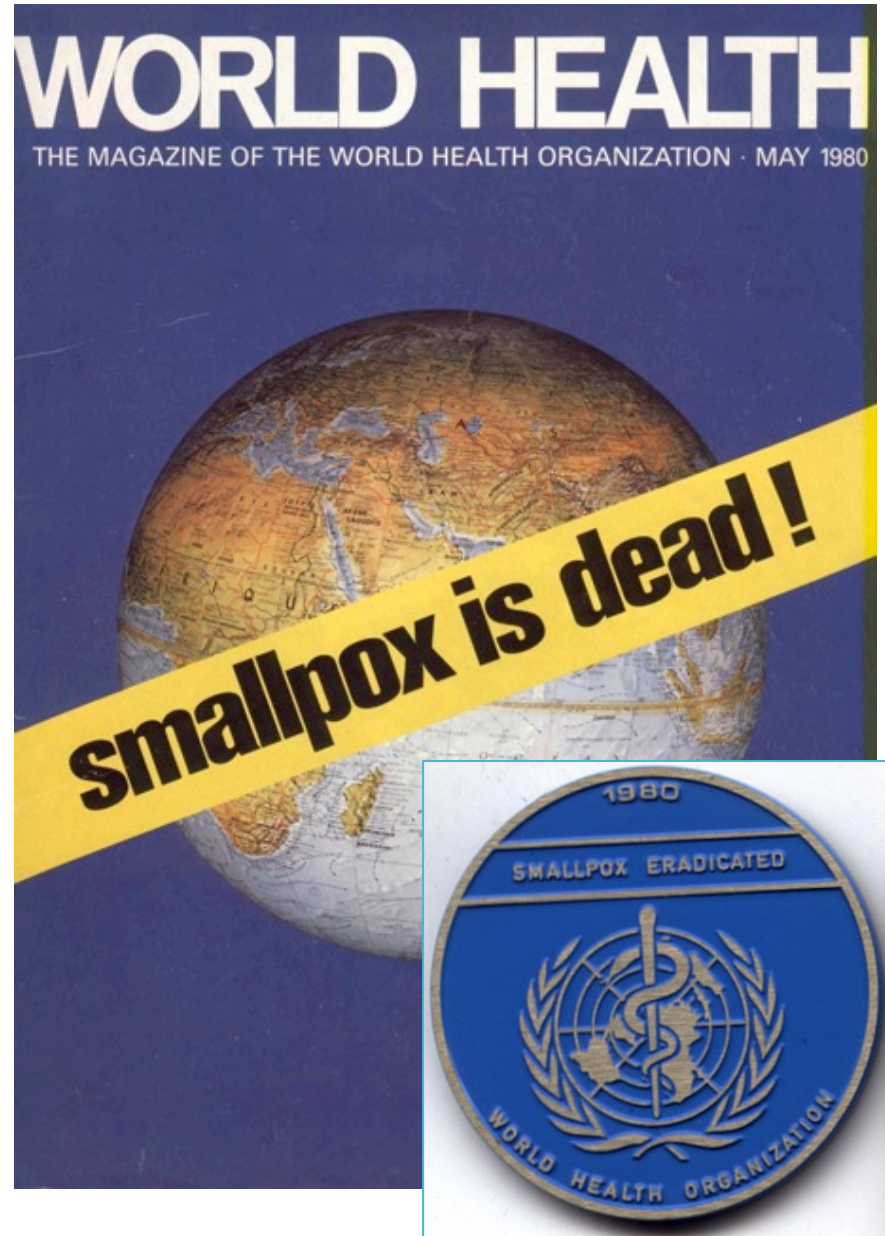
The last person to die of smallpox was a six-year-old girl in Somalia on Oct. 14 last year, the World Health Organization said.

A8★ THE TORONTO STAR, Sat., Sept. 2, 1978

Epidemic fear in U.K. after deadly smallpox virus infects woman

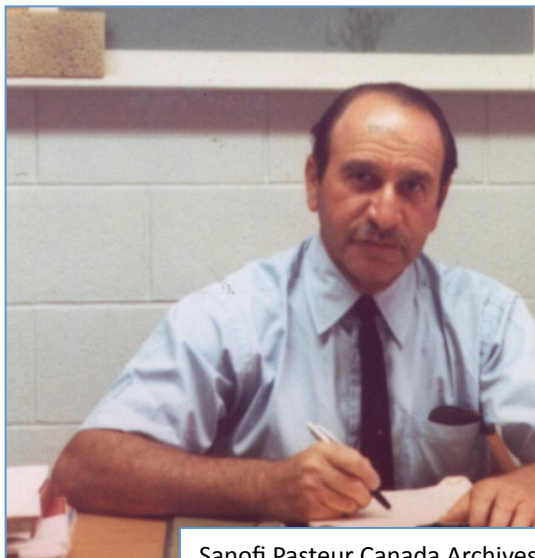
Smallpox Is Dead!

- **Dec 9, 1979** – With confirmation that there had been no naturally occurring smallpox cases anywhere on the planet since Oct 1977, smallpox was officially declared eradicated
- **May 8, 1980** – The World Health Assembly of the United Nations made it official, smallpox was dead, solemnly declaring,
- “that the world and its peoples have won freedom from smallpox, which was a most devastating disease sweeping in epidemic form through many countries since earliest time, leaving death, blindness and disfigurement in its wake and which only a decade ago was rampant in Africa, Asia and South America”



Post-Smallpox Eradication: Dr. Fenje Retires

- **Sept 1, 1979** - The timing of the declaration of global smallpox eradication coincided with Fenje's retirement, prompting reflection by his colleagues on his contributions to this unprecedented effort in medical history
- Henderson's successor at the WHO, Dr Isao Arita, said of Fenje,
- "At the beginning of the programme in 1967, the quality of many vaccines was not good. In three years, the quality had been rapidly improved... The supply of quality vaccine has, in fact, been one of the major elements which led to the successful eradication of the disease.



Sanofi Pasteur Canada Archives

Dr. Paul Fenje retires

On September 1, 1979, Dr. Fenje retired on the 21st anniversary of his appointment to the staff of the Laboratories, following in the tradition of many of his former and contemporary colleagues who devoted a lifetime of service to Connaught and to their fellow man.

participated in this medical miracle.

All of us at Connaught join in wishing him and Lilli a long, healthy, happy and productive new life in British Columbia — meritorum causa.

R.J. Wilson,
M.A., M.D., D.P.H.

He obtained his medical degree from the University of Zagreb and after serving for a time as a District Medical Officer, proceeded to qualify for a Diploma in Public Health and as a Specialist in Microbiology. His training was particularly applicable to his subsequent responsibilities at Connaught where, in 1958, he commenced his studies on smallpox and rabies vaccines which were to bring to him, to Connaught and to Canada international recognition. His many publications include the first visualization of the rabies virus by electron microscopy and the first licensed rabies vaccine of tissue culture origin.



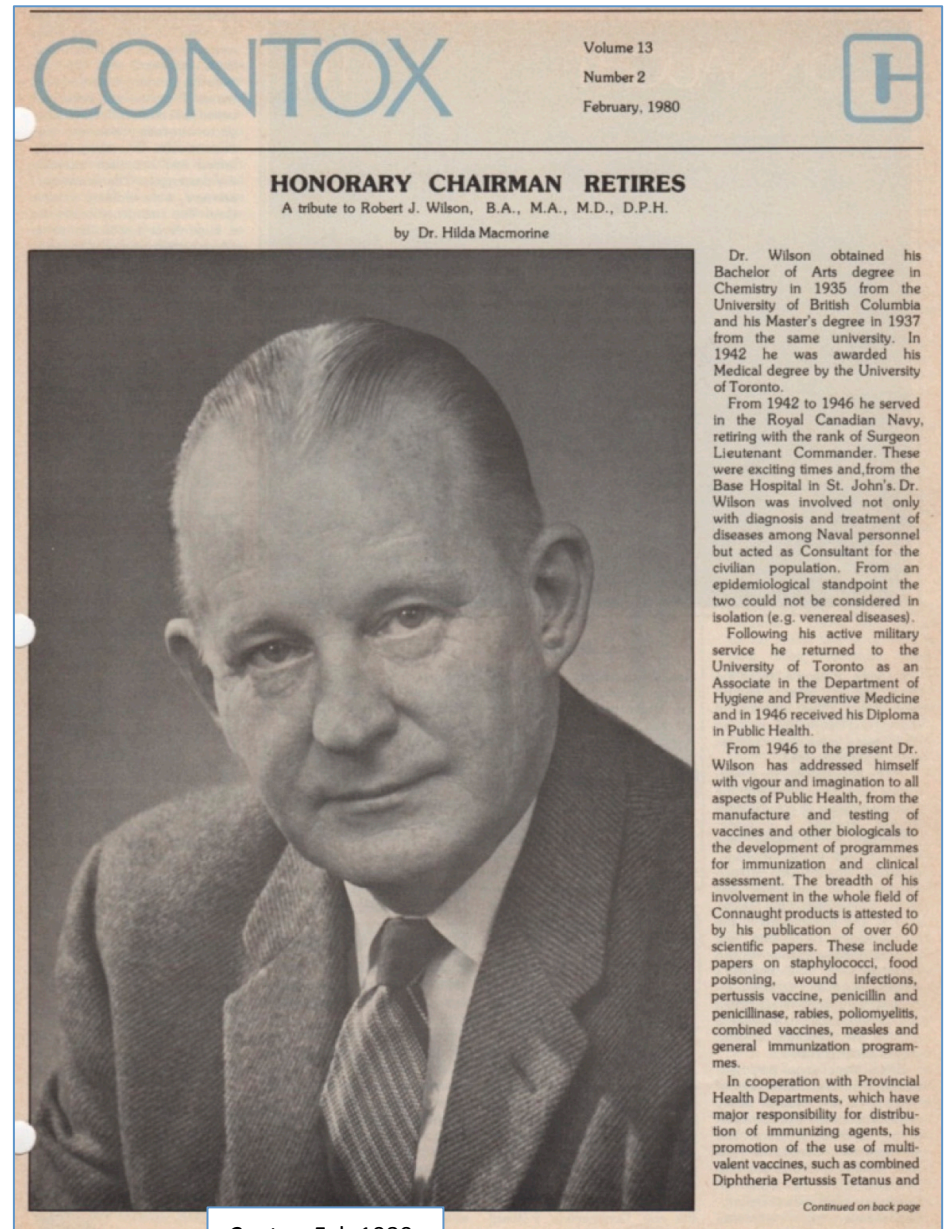
Dr. Fenje pictured accepting his retirement gift from Dr. Cochrane at the Retirement Party in June.

Since 1967 he has served as Consultant to the World Health Organization and to the Pan American Health Organization in their programme for the global

- Moreover, Henderson felt that, "Directly and indirectly, the ammunition for the campaign bore the indelible stamp — 'made in Canada'. To a once-Canadian, it was always a personal source of pride"

Post-Smallpox Eradication: Dr. Wilson Retires

- **Feb 29, 1980** – Shortly after Fenje, Dr. Robert J. Wilson formally retired from Connaught Labs after serving as its Director (1972), Scientific Director (1972-78), and Honorary Chairman and Special Consultant (1978-80)
- During his retirement, Dr. Wilson became Connaught's historian, and is largely responsible for organizing Connaught's archives, including his personal smallpox vaccine and eradication papers, upon which much of this presentation is based



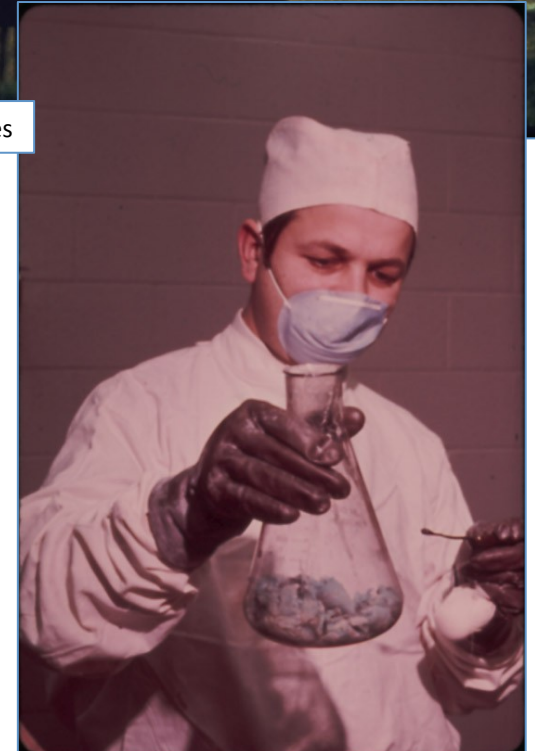
Contox, Feb 1980

Post-Smallpox Eradication: Vaccine Production Shutdown

- **March 1980** - Connaught began the process of shutting down its smallpox vaccine production facility, completing the last lots for a new Canadian stockpile; the stockpile the WHO had proposed was abandoned due to lack of Canadian government sponsorship
- **April 1980** - 15 Vaccinia pulps thus remained in deep freeze storage, along with other materials, such as seed virus and samples
- **July 1980** - The shut down included plans for the incineration of the remaining pulps and materials; it was assumed any future vaccine would be made by using cell culture adapted seed virus



Sanofi Pasteur Canada Archives



Whither Smallpox...?

- **Sept 1980** – However, Connaught’s Medical Director, Dr. E.W. Pearson, strongly recommended that the Vaccinia pulps be kept
- As he stressed, “It surely will not be a great problem to keep the seed virus and pulps for some time to come and at least in this way we might have something to fall back on so as to be able to prepare our licensed product”



- These Vaccinia pulps were indeed saved and kept in the deep freeze, undisturbed, for the next 21 years
- The terrorist attacks of '9/11' prompted their retrieval, testing and careful processing to expedite the preparation of a new Canadian smallpox vaccine stockpile
- But the telling of that story will have to wait for a future class...