The Ontario Vaccine Farm, 1885-1916

WILLIAM B. SPAULDING

Abstract. The first production in Ontario of a biological preparation to prevent an infectious disease began in Palmerston in 1885 with the establishment of the Ontario Vaccine Farm. The Ontario Board of Health, formed a few years before, wished to have an assured supply of smallpox vaccine to meet the needs of the province. The Board did not want to be dependent on production sources in the USA and Montreal, particularly in times of epidemics when the Board received many requests from Ontario doctors to supply vaccine. In 1884 an outbreak of smallpox occurred in the Township of Hungerford, north of Belleville, and in the following year there was fear that the devastating epidemic in Montreal would spread to Ontario. The Vaccine Farm was the one-man effort of an enterprising, energetic general practitioner in Palmerston, Dr. Alexander Stewart. He scarified calves, harvested the fluid from the vesicles, prepared the points, and distributed them to doctors and municipalities on request. This cottage industry, which was subsidized by the provincial government, sold vaccine to Ontario doctors for 31 years until it was closed in 1916. The Ontario Vaccine Farm fulfilled an important need in its day, but uncertainties about the potency and preservation of some batches led the government to put its support behind the fledgling Connaught Laboratories of Toronto, an organization better able to supply sterile vaccine of uniform, enduring potency.

Résumé. C'est à la «Ferme des Vaccins de l'Ontario» de Palmerston que vit le jour, en 1885, la première production d'une préparation biologique destinée à prévenir les Ontariens d'une éventuelle maladie infectieuse. Le Conseil ontarien de la Santé, créé quelques années plus tôt, désirait disposer d'une réserve suffisante de vaccins contre la variole pour satisfaire aux besoins de la province. On voulait ainsi éviter de devenir dépendant d'un approvisionnement en vaccins fabriqués aux États-Unis ou à Montréal, et ce particulièrement en période d'épidémie où le Conseil se voyait immégré de demandes de vaccins par les médecins ontariens. En 1884, une épidémie de variole éclata dans le canton d'Hungerford, situé au nord de Belleville; et l'année suivante, on craignait énormément que l'épidémie devastatrice se propage jusqu'en Ontario.

La «Ferme des Vaccins» était l'oeuvre d'un seul homme, le docteur Alexander Stewart, un omnipraticien énergique originaire de Palmerston. Celui-ci inoculait des veaux, puis recolait le précieux fluide à partir de leur vésicule.

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The long-term need for local sources of smallpox vaccine, rendered temporarily urgent by the outbreak of an epidemic in Montreal in 1885, led Dr. Alexander Stewart to establish a vaccine farm that year in Palmerston. Supported by grants from the provincial government and by payments from practitioners and health boards, this vaccine farm continued in operation until 1916, when it was taken over by the more sophisticated and comprehensive Antitoxin Laboratory of the University of Toronto, soon to become the Connaught Laboratories.

EARLY DIFFICULTIES WITH VACCINATION

Edward Jenner, a country doctor in Berkeley, Gloucestershire, England, first published his observations on smallpox vaccination in 1798.1 Within a few years the propagation, harvesting, and distribution of cowpox virus had grown into a flourishing biomedical industry. London, England became a major source of material for vaccination. The procedure quickly spread to the European continent. By 1801 more than 100,000 persons had been vaccinated in England.2 The year before, Dr. John Clinch, a classmate and friend of Jenner, carried out the first vaccination in North America, in Trinity, Newfoundland.3 The procedure was soon introduced in the United States and Latin America. Production of vaccine and the collection of statistics were put on a firmer foundation with the inauguration of the National Vaccine Establishment in London, England, in 1808, Jenner being appointed the first director. Material for the prevention of smallpox was despatched around the world.4 As Genevieve Miller has pointed out, interest in the older, more dangerous, and less reliable preventive method of inoculation with smallpox virus “naturally faded.” Inoculation was banned by law in several countries—Bavaria in 1807, Prussia, 1835, and England, 1840.5

From the beginning, problems arose with many aspects of vaccination. The demand for material was overwhelming; requests came in from countries in the Americas, Europe, Asia, and Africa. The potency and safety of any lot could only be determined by in vivo trials on humans. Sterility and antisepsis were unknown objectives. How could
one preserve cowpox virus and ensure potency, especially when batches were sent thousands of miles for use weeks or months later? People in the tropics were as much at risk from smallpox as those in temperate or colder regions, but reliable refrigeration of vaccine material could not be assured. Cowpox, a disease of cow's udders, was uncommon, appearing sporadically in only a few localities, so local production often was impossible. During the nineteenth century one authority claimed that naturally occurring vaccinia did not exist in North America.6

By the 1860s the controlled use of calves, which had been deliberately infected with vaccinia virus, was introduced in Italy and later employed elsewhere in Europe. This ensured an adequate supply of vaccine. Dr. Henry Martin of Boston was the first in North America to employ the new method, beginning in 1870. He established a farm which became an important source of supply for New England and beyond. Within a few years other vaccine farms were in production.

SMALLPOX IN ONTARIO

Ontario, with a population of about 2 million, faced a continuing threat from smallpox.7 The disease killed up to 200 annually.8

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Although diphtheria and tuberculosis took many more lives, the threat of smallpox excited stronger feelings of dread, especially when epidemics erupted.

Ontario had created a Board of Health in 1882, led by Dr. Peter Bryce as the full-time secretary. He soon began to receive requests from doctors and local boards to supply vaccine, which had to be imported from the USA or from the Montreal Cow-pox Institution, which had been established in 1878 with the endorsement of the Montreal Board of
At its first meeting, the Ontario Board of Health formed a committee to examine the possibility of establishing a farm for the production of smallpox vaccine. In 1883 the two-man committee visited the farm of the New England Vaccine Company near Boston. Persuaded by what they saw, the committee recommended that the need for vaccine in Ontario could best be met by a private institution that combined commercial advertising with the latest scientific advances.

During the next two years, no efforts were made by the province to establish a vaccine farm. Meanwhile, in 1884, an alarming outbreak of smallpox occurred in Hungerford township, 30 miles north of Belleville. In this sparsely populated area, 202 cases were reported with 45 deaths.

The next year brought a much bigger threat to Ontario from nearby Montreal, the scene of a catastrophic epidemic which disrupted the city. In February, 1885, a Pullman-car porter arrived in Montreal from Chicago. Feeling unwell, he was admitted to the Hotel Dieu Hospital with a diagnosis of chickenpox. He was not isolated. A month later a young female employee of the hospital died of smallpox. With what William Osler described as "a negligence absolutely criminal" the hospital authorities discharged all patients free of signs of infection. In this way the disease was seeded throughout the city.

During the summer, the epidemic killed hundreds. Nonetheless, because of anti-vaccinationists, merchants who feared their factories might be closed, and city fathers unwilling to approve payment of expenses, compulsory vaccination was not begun until September. Intense public opposition greeted the announcement of mandatory vaccination. Rioting broke out; mobs stormed the city health office, threatened to kill the medical health officer, and stoned his home. Only when the militia was called out could order be restored. Proper public health measures controlled the epidemic but not before 3,164 had died, over 80 percent of whom were children under ten years of age.

Montreal was a key transportation center, serving as a port for ocean-going ships bringing thousands of immigrants annually, and as a railway terminus for trains from eastern and western Canada and the United States. Most passengers leaving Montreal headed for Ontario. During the last four months of 1885 over 110,000 people travelled from Montreal into Ontario by rail alone.

The Montreal epidemic stimulated the Ontario Board of Health to find a reliable source of supplies of vaccine within the province instead of being dependent on suppliers such as Parke Davis in Detroit and the New England Vaccine Company. The first proposal was received in
1885, when the Health Boards of Waterloo and Puslinch townships urged that a vaccine farm be established by the Provincial Experimental Farm at Guelph. Nothing came of the proposal. Later that year, Dr. Alexander Stewart of Palmerston initiated his own establishment and, in January 1885, approached the government requesting the Health Board’s patronage, supervision, and inspection of his vaccine farm. Only a month later the Board recommended that the government begin the inspection of such farms “with the object of securing a supply of pure and reliable lymph” within Ontario. Stewart lost no time. By February he was actively promoting the “Ontario Vaccine Farm” and had provided numerous doctors with samples of the vaccine which he had produced in the converted barn of a local brewer.\(^{15}\)
Palmerston was benefitting from its location on the Wellington, Grey and Bruce Railway, built in 1870. Four years later, the town was incorporated on reaching a population of 1,400. Situated in good farm country, it provided a satisfactory living for tradespeople, merchants, manufacturers, and a few lawyers and physicians. Because medical practice in rural Ontario in the nineteenth century often provided only a low income, doctors might take on extra activities. Dr. Stewart, a man of initiative, became a producer and distributor of vaccine.

Alexander Stewart (see Plate 1) was born in 1845, near Stratford. He studied medicine at McGill, graduated with his classmate William Osler in 1872, and the same year established practice in Palmerston, where he remained for nearly 40 years. There he opened a drug store and was the railway doctor. Elected to the first Council of the town, he later served as its mayor (1894-95). For a holiday, he would travel to the mainland north of Manitoulin Island, where he loved to fish.

By 1886, when his farm was producing vaccine, he could respond quickly to requests for supplies. In that year Palmerston received its first telephones, twelve in all. The subscribers included the local brewery, the telegraph office, two lawyers, one banker, and one physician—the energetic Dr. Stewart.

Stewart bought the property on the main street adjacent to the land on which stood the barn where he produced vaccine. In 1886 he had a Toronto architect draw up plans for a spacious home for his wife (and the four children who came later). Calves and heifers were brought to a small building next door to be inoculated with virus propagated on other animals. The virus was introduced into incisions and allowed to produce vesicles, from which vaccine lymph was used to coat slivers of ivory resembling toothpicks—the so-called “points.” Local boys received 25 cents, a princely sum in those days, for accompanying calves to and from the farm.

It would be interesting to know how and why Stewart took up this quaint form of farming. Was he motivated by an urge to help stamp out smallpox, did he see this as a way of augmenting his income, or did both aspects enter into his decision? We can only speculate. He had grown up on a farm, so that the care of the animals would be familiar to him. He had a hired man to help. No account books or personal papers of the doctor have been preserved, so one cannot say how profitable the venture was except to note that he persisted with it until he retired from practice. We do not know how he learned to prepare vaccine material, nor do we know whether he kept abreast of improvements in antiseptic techniques and advances in making vaccine material. A decade later, he would be criticized for failing to employ improved methods of production.
IN FULL PRODUCTION

In May, 1886, Board of Health inspectors visited the farm, where they found one vaccinated heifer in clean, well-ventilated quarters. They judged Stewart's small-scale operation to be on a par with vaccine farms outside Ontario. Following the inspection, the Board abandoned its earlier intention of establishing a government vaccine farm. Instead, the Board concentrated on the Palmerston institution. They recommended improvements for the more efficient storage, shipment, and handling of vaccine points. Provided he implemented their recommendations, they were willing to support Stewart financially to develop "an establishment supplying ... vaccine, not cheaper in price, but superior in results to that already in our market." His efforts to improve production met with the Board's approval and he received a $1,000 grant for his work in 1885 and a similar amount for 1886. Throughout the year the Palmerston doctor strove "to have a regular supply of lymph ... on hand and in the highest state of purified activity" despite "various difficulties connected with the practical work." By December, 1886, Stewart had vaccinated about 100 heifers. Since one animal vaccination was estimated to yield about 500 points, the annual production would approximate 50,000 points, considered sufficient to meet Ontario's needs.

Opposition to vaccination was widespread amongst individual citizens and municipalities charged with mandatory immunization of school-age children and contacts of patients with smallpox. When the threat of the Montreal epidemic passed, Ontario lapsed into its former ambivalent attitude toward vaccination. Only when outbreaks flared up would vigorous efforts be made to immunize the people.

Between 1887 and 1894 Dr. Stewart continued both his management of the vaccine farm and his successful medical practice. He received payments from private practitioners and local health boards, supplemented by legislative grants up to $500. He advertised his product to practitioners, observing that, "The quality is always better when the demand is steady." (See Plate 2.)

SCIENCE ADVANCES

In 1895, Dr. Bryce reported to the Board of Health that "While the Ontario Vaccine Farm has ... maintained its reputation for supplying an active lymph during the past year, yet there have been too many complaints of activity on the lymph [indicating] ... that both in the standardizing of vaccine lymph and in its subsequent preservation and inoculation, improvements are both possible and practicable." Bryce began to advocate a government center for the production of vaccine of standard quality, but this was not to come for more than 20 years.
OUR FARM, now established for three years and placed under the inspection of the Provincial Board of Health, has large, airy stables filled up with all appliances for supplying

First-class Ivory Points
to any extent that the emergency may demand.
Large orders are being daily shipped to Medical Health Officers and Local Boards of Health.
Discounts allowed on large orders.

P.S.—The quality is always better when the demand is steady.

Plate 2
Advertising the Farm and its products

By the 1890s, European producers of vaccine had introduced the use of a glycerine solution, an effective chemical preservative that destroyed contaminating microorganisms and increased the volume of vaccine. In 1897, legal responsibility for vaccine supply shifted from the provincial Board to hospitals and public dispensaries. The legislative grants to the Ontario Vaccine Farm stopped a year later, but Stewart continued to be a supplier.

Although Bryce advocated that a government center produce smallpox vaccine, his attitude was unenthusiastic toward establishing a comprehensive institution for research, manufacture, and distribution of the increasing number of preventive biological products for infectious diseases. He said, "The Provincial Board has naturally been slow both to accept the reports of the great value attributed to the new discoveries and still slower [sic] to accept any responsibility with regard to their manufacture and distribution." The primary question, in his view, was whether the Board needed to add such an institution to its work. He said, "Clearly the work is beyond the scope and power of
ordinary medical practice and skill, and the financial means at the disposal of these or of the medical faculties in Ontario."  

Scientific advances and talk of a government institution did not reduce the need for vaccine. By 1906, most of the vaccine used in Ontario came from the United States. Despite this, the *Palmerston Spectator* reported in 1907 that owing to "the increased demand for vaccine in Canada" Dr. Stewart had been compelled to make extensive additions and improvements to the vaccine farm. These included a "two-storey brick operating room and laboratory as well as extensive calf stables" (see Plate 3). Stewart was described as using "the latest improved instruments and methods" but, for unknown reasons, this did not include the use of glycerine to produce a more stable product of uniform potency.  

![Plate 3](image)

The buildings of the Farm

When Stewart died in 1911, his funeral had the largest attendance in the history of the town.  The Vaccine Farm was continued by Dr. Herbert Coleman, who had entered practice in Palmerston in 1906 after graduating from the University of Toronto. Coleman bought and occupied Dr. Stewart's residence and, like his predecessor, operated the
nearby farm as an adjunct to his practice. The production methods were much as before. The calf was borrowed from a farmer or the local butcher. The hips of the animal were shaved and scarified with large-size vaccine "points" which had been prepared from a calf vaccinated earlier. In five days vesicles formed. When they were considered "ripe," the surface was lightly washed and a blunt instrument used to break the vesicles. Celluloid points, which had replaced the ivory ones, were arranged in wooden blocks each holding about a dozen points. The tip of each point was inoculated with lymph. After the lymph had dried, a protective coating of egg white was applied. Glycerine was not employed. Coleman used small glass capillary tubes to hold the celluloid points.26

CONNAUGHT LABORATORIES TAKE OVER

During Coleman's years of management, the laboratories of the province and the University of Toronto became involved in the production of serums and vaccines. The Board of Health laboratory began producing typhoid vaccine in 1912, and four years later the government announced that it would supply diphtheria antitoxin, tetanus antitoxin, anti-meningitis serum, and smallpox vaccine free of charge. These biologicals were produced in the Antitoxin Laboratory of the University of Toronto, known from 1917 as the Connaught Laboratories. The Ontario Vaccine Farm closed in 1916 when Coleman and the Antitoxin Laboratory agreed that he would stop production in Palmerston. Details of these negotiations have not been found. The farm buildings fell into disuse and were removed.27

PROVINCIAL RECOGNITION

The century-old, large, five-bedroom house, formerly owned by Doctors Stewart and Coleman, still stands on the main street of Palmerston. In front of the house is a plaque which commemorates the first production in Ontario of a biological product for preventing disease. The words on the plaque, which was erected by the Ontario Heritage Foundation, Ministry of Culture and Recreation, and unveiled on 1 August 1976, make a fitting summary statement.

The Ontario Vaccine Farm

Established in 1885 by Dr. Alexander Stewart, a local physician, the Ontario Vaccine Farm was the first institution to produce smallpox vaccine in Ontario. The Farm originally consisted of a converted barn where Stewart employed government-approved methods for obtaining and processing vaccine from inoculated calves. During an era of recurrent outbreaks in Ontario, large quantities were sold to local health boards for preventive vaccination. By 1907,
although American farms were supplying most of the vaccine in Ontario, Stewart had constructed new buildings, including a combined operating-room and laboratory. After Stewart’s death in 1911 the operation was continued until 1916, when it was taken over and transferred to the Antitoxin Laboratory of the University of Toronto.28

ACKNOWLEDGEMENTS

A shorter version of this paper was presented at the Annual Meeting of the Canadian Society for the History of Medicine, at McMaster University, 6 June 1987.

The project was initiated when my godmother, Miss Marguerite Stewart, daughter of Dr. Alexander Stewart, gave me a copy of the issue of the Palmerston Observer of 1975, commemorating “a century of history” of Palmerston. Marguerite remembered the vaccine farm well from her childhood days.

Dr. Barbara Craig of the Archives of Ontario helped me locate information. David Roberts of the Heritage Administration Branch of the Ministry of Culture and Recreation provided a copy of his paper for a press release about the unveiling of the plaque. Dr. Edward Bensley, Honorary Osler Librarian, confirmed that Dr. Stewart had been a classmate of Osler at McGill. Dr. Murray Fallis supplied the picture of the farm buildings. Dr. Gervais Tougas and Professor Othmar Keel translated the abstract into French.

NOTES

8 Provincial Board of Health of Ontario, Annual Report, 1898, p. x.
9 Canada Lancet, 11 (1 November 1878).
10 David Roberts, “Historical Plaque to Commemorate the Ontario Vaccine Farm, Palmerston,” paper prepared for the Ontario Heritage Foundation, Ministry of Culture and Recreation, printed in the Palmerston Observer, 45, 29 July 1976. The next number (5 August 1976) contains verbatim accounts of the speeches made when the plaque was unveiled.
13 Osler, Principles, p. 56.
Mrs. Ben Wilson of Hamilton, Ontario, supplied this information. She was born in Palmerston and knew the Stewart family well.

100 Years of Palmerston," Palmerston Observer, 19, 20, 21 July 1975, p. 96.
