10 Personality, Politics, and Canadian Public Health: The Origins of Connaught Medical Research Laboratories, University of Toronto, 1888–1917

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On the eve of the official opening of the Connaught Antitoxin Laboratories and University Farm, some twelve miles north of the University of Toronto campus, the October 1917 issue of the Canadian Journal of Medicine and Surgery began a news item as follows:

Down in an obscure corner of the basement of the Medical Building of Toronto University a great and important public work is carried on. It is great because there is no limit to its expansion. It is important because it is the most outstanding effort of Government organization on this continent to stop, with a scientific barrier, the encroachments of disease that claim a high mortality. And it is unique because its service is free as air and entirely untrammeled with red tape.\(^1\)

From its humble origins in a backyard laboratory and stable in downtown Toronto in 1913, Connaught Antitoxin Laboratories soon evolved into the cornerstone of Canada’s public-health infrastructure and a key player in the national and global control of many infectious and other diseases. Connaught is best known for its major contributions to the research, development, and large-scale production of an unusual range of biological products, including diphtheria toxoid, insulin, pertussis vaccine, heparin, penicillin, a variety of combined vaccines, and the Salk and Sabin polio vaccines, as well as its major contributions to the global eradication of smallpox.\(^2\)

Connaught’s central role in the insulin story is described in Michael Bliss’s *The Discovery of Insulin*, albeit at the time he researched that seminal work, Connaught’s archives had not yet been collected and catalogued. Bliss could thus only discuss Connaught’s contributions in
limited detail, and hint at the major part the Labs would play in the subsequent developments in insulin research, production, and distribution in Canada and globally. Little had been published on the history of Connaught Laboratories in 1982 when The Discovery of Insulin appeared beyond a few short articles and a 1968 book by Connaught’s second director, Robert D. Defries, The First Forty Years, 1914–1955: Connaught Medical Research Laboratories, University of Toronto. However, in 1991–2, by the time I began to research my PhD thesis on the Canadian polio story, under Michael Bliss’s supervision, Connaught’s archives had been organized to a significant degree and I was able to immerse myself in them to document Connaught’s key role in the polio vaccine story. In the process, I discovered the broader and largely untold history of the Labs and its significance to the evolution of Canada’s public health system. A postdoctoral fellowship that focused on the history of Connaught, coupled with almost ten years of providing historical research and creative and consulting services for Connaught itself, have provided a rich opportunity to further explore the dynamic history of this unique Canadian institution. I could not have done it, however, without Michael Bliss’s leadership, guidance, and support. This essay, originally prepared during my postdoctoral fellowship in 1999–2000, traces the origin of Connaught Laboratories and the original Canadian foundation upon which it has grown.

Known as Connaught Laboratories during most of the 1920s through to the 1940s, and as Connaught Medical Research Laboratories after 1946, the Labs remained a uniquely organized, non-commercial, and self-sustaining part of the University of Toronto from 1914 until 1972, when it was sold to the Canadian Development Corporation (CDC), a federal Crown corporation, and privatized. By 1989 the CDC had divested much of its interest in Connaught and Institut Mérieux of Lyon, France, acquired a controlling stake in the company. By this time, Institut Mérieux had formed an alliance with the Pasteur Institute. Over the next decade Connaught remained the Canadian component of what became known as Pasteur Mérieux Connaught, which, in turn, was owned by Rhône Poulenc, a French multinational chemical, agricultural, and biotech company. In December 1999 Rhône Poulenc and the German pharmaceutical and chemical company Hoechst joined forces to create a new pharmaceutical/biotech giant known as Aventis. In the process, Connaught’s identity changed in a significant way for the third time since 1972. Pasteur Mérieux Connaught became known as Aventis Pasteur, and its Canadian component became the ‘Connaught Campus’
of Aventis Pasteur. However, within five years, Aventis was transformed into the even larger Sanofi-Aventis Group following the acquisition of Aventis by Sanofi-Synthélabo of Paris. The original Connaught identity thus shifted yet again to become the Canadian component of Sanofi Pasteur, the global vaccine business of Sanofi-Aventis.

While the Connaught name has been reduced to a subtitle, its identity as part of Aventis Pasteur, and now Sanofi Pasteur, clearly underscores the primacy of Louis Pasteur and the Pasteur Institute in the history of vaccines. The new names also serve to mark the important inspirational and practical role the Pasteur Institute played, especially through Dr John Gerald FitzGerald’s (1882–1940) experience and network of contacts there, in the origin of Connaught and the unique place it held within the University of Toronto for fifty-eight years. Indeed, FitzGerald had originally considered calling his new antitoxin laboratory the Pasteur Institute in the University of Toronto. No other university in the world had or has undertaken such an integrated and self-supporting public-health research, manufacturing, teaching, and public service–based biologicals distribution enterprise. Thus, the central question for this paper is, How and why did the University of Toronto assume responsibility for this unusual work in 1914? Moreover, the Pasteur Institute was created in 1888, quickly followed by the establishment of some forty similar private and state serum institutes in other parts of the world, but not in Canada until the founding of Connaught. Why the delay?

**Connaught’s Global Roots**

The discovery of the Pasteur rabies treatment in 1885–6, and the subsequent founding of the Pasteur Institute in Paris in 1888, sparked a wave of institution building around the world focused, first, on preparing the new rabies treatment and, second, after the early 1890s, on producing the newly discovered diphtheria and tetanus antitoxins. These new public-health institutions were often based directly on the Pasteur Institute model; that is, a privately endowed, public dispensary of biological products, also focused on scientific research and teaching, and financially supported by the production and commercial distribution of biological health products.

While the Pasteur Institute soon spawned a network of Pasteur Institutes around the world, the Pasteur model also inspired a variety of other approaches to supplying the new biologicals. Initially, Pasteur
had plenty of moral support from the French government to build his institute, but little of the financial kind. Elsewhere in Europe, particularly in Germany, the government played a much larger role in establishing and operating what became known as state serum institutes, most of which were also dependent upon varying levels of private philanthropy and public subscriptions to supplement the income they derived from the commercial sale of their products, especially to support research. Some institutes, particularly those that competed with one another in Germany, built close relationships with pharmaceutical companies to manufacture antitoxins and vaccines, while the institutes focused on testing, standardization, product development, research, and teaching. This was the case with the Paul Ehrlich Institute in Frankfurt and the nearby Hoechst firm.¹⁰

Encouraged by popular interest in the new life-saving products and the political and scientific rivalry between France and Germany, the Pasteur Institute and the Koch, Behring, and Ehrlich Institutes were established with minimal resistance from the public, the state, or the medical profession. The situation in Great Britain was quite different, as strong resistance from anti-vivisectionists, and thus political hesitation from the British government, frustrated the establishment of what became the Lister Institute of Preventive Medicine. There was also the specific desire among its founders to not form a centre similar to the Pasteur Institute. The dual goals for the British institute were to undertake scientific research into the causes, prevention, and treatment of diseases in man and animals, and also to supply biological products. But with minimal government funding or involvement, the Lister Institute was always hungry for endowments to pursue its research goals, and, as a production laboratory, was also expected to augment its income for research by the profits on its sales. The Lister Institute was therefore forced to take a market approach to distributing its products and compete with European commercial pharmaceutical companies. However, while it struggled for funding and public and political support, the scientific work of the Lister Institute ranked internationally with that of the other medical research institutes of the pre–First World War period, including the well-endowed Rockefeller Institute of New York.¹¹

The impact of the Pasteur Institute and the other serum institutes it spawned was not felt in North America on a significant level until after 1895, when the New York City Department of Health, with much public and political fanfare, produced and administered the first supplies of diphtheria antitoxin on the continent.¹² Rabies was less of a problem
in North America, and so there was little pressure to establish an official Pasteur Institute, or European-scale serum institutes, in the United States or Canada until the mid-1890s, when the effectiveness of diphtheria antitoxin had been established.

There was, however, a small and almost forgotten commercial enterprise established in December 1889 known as the New York Bacteriological and Pasteur Institute. Founded by Dr Paul Gibier, a former collaborator of Pasteur's, and with his agreement, the New York institute had no further links with Paris, however, and seems to have disappeared by 1917. During its existence, this small North American Pasteur Institute published a journal, The Bulletin of the Pasteur Institute, served as a rabies treatment centre for the United States and Canada, and was one of the first companies to produce and market the new antitoxins in North America. Indeed, in 1894–5, Gibier's institute was the source of serum for the first Canadian tests of diphtheria antitoxin in Toronto and Montreal. There is also evidence of a Pasteur Institute in Chicago, which opened in July 1890, although little more is known about it.

In North America, it was the increasing threat of such epidemic diseases as cholera that catalysed the establishment of public health boards at the state, provincial, and city levels from the 1830s on, albeit not always on a permanent, professional, or scientific basis. In New York City, the 1892 cholera epidemic prompted the city government to establish an independent diagnostic and bacteriological research laboratory under the leadership of Dr H.M. Biggs and Dr W.H. Park, the latter man becoming the North American authority on diphtheria antitoxin production. This expertise was quickly transferred around the United States, initially to Philadelphia, the Massachusetts State Board of Health, and the Hygienic Laboratory of the Marine Hospital Service (the forerunner of the U.S. Public Health Service) in Washington, DC.

It was not long after Park's first diphtheria antitoxin was produced that several large pharmaceutical companies, such as Parke, Davis and Mulford Laboratories, began to produce the new biological wonder drugs on a large scale for the North American market, including Canada. Park's New York City Health Department Laboratory was able to produce and distribute antitoxin and other biologicals as a free public service until the 1930s, despite the often strong opposition of doctors, politicians, and the pharmaceutical industry. Their resistance stemmed from a new encroachment of the state into the private business and profits of physicians and drug companies. Such opposition
resulted in the Philadelphia Health Department abandoning biological production by 1904. In 1903, when faced with similar commercial pressures, the Massachusetts State Board of Health responded aggressively to charges from the pharmaceutical industry of poor quality and primitive biological manufacturing conditions by arguing that, while not perfect, the serums produced by the state government were 'standard in everything but price. The state produces this at a cost of less than twenty-five cents a bottle. The druggists charge something like two dollars a bottle for what they sell.' Moreover, 'the difference between a public and a private laboratory is that the first finds its chief incentive in the service of science, while the second is of necessity primarily concerned with making money.'

**Canadian Roots**

The economic and state versus industry issues debated in Massachusetts do not seem to have been a major concern in Europe. However, in a reflection of long-standing cross-border trade and political concerns, these economic and commercial issues resonated among Canadian doctors, as well as the public, during the early years of the new century.

In 1905 diphtheria antitoxin was the focus of a lively discussion at a meeting of the Ontario Medical Association. Some Ontario doctors were still unconvinced of the serum's value, despite the experience of ten years, particularly, it was stressed, in the city of Chicago. In Ontario the antitoxin had been imported by the Provincial Board of Health from American pharmaceutical companies since 1894-5. Nevertheless, the diphtheria death rate in the province remained as high as 12 per cent. In reporting on the OMA meeting, the Canada Lancet stressed, 'This we think should not be the case; and we fear is due to the expense of the antitoxin placing it beyond the reach of some of the poorer patients. In such cases we think the municipality should supply it. We know of many instances where the doctor supplied it rather than see the patient die.' A year later, in an editorial focused on 'Discovery and Commercialism,' the Canada Lancet found it remarkable that the discoverer of diphtheria antitoxin, Von Behring, received nothing for his discovery, yet commercial manufacturers had made millions out of it, while the public had been 'charged a very long price for the serum.' It was suggested that 'such a discovery as this should be placed under the highest authority in the government of the country. Why should manufacturers be allowed to grow rich from Behring's serum, and pay nothing for it?'
This was a position that the editors of the *Canada Lancet* had taken since 1895, when the concern was less about price and more about quality control. An editorial noted how the Canadian medical profession, in light of recent experience with ‘the fads of the German and French physicians,’ was ‘a little shy of the serum therapy.’ ‘Will the profession not be liable to the perpetration of fraud by those who may desire to speculate?’ To ensure that ‘we are procuring anti-toxine in the blood serum that we may demand,’ the journal suggested ‘that the Government take hold of this matter and employ salaried officials to carefully prepare and preserve the serum as it may be demanded. The test of the value of the serum now before us is by no means reliable.’

In 1895 the *Canada Lancet* hoped that the federal government would assume this responsibility. However, despite strong lobbying, in particular by such Canadian public-health pioneers as Dr Edward Playter from as early as 1874, a Dominion Department of Health would not be established until 1919. In 1866 the prime minister appointed Dr Frederick Montizambert as director general of public health. However, his mandate was primarily the quarantine of immigrants. While several other federal departments had an interest in health matters, albeit primarily animal and plant health, it remained practically and politically impossible for Ottawa to make any focused effort towards producing a Canadian supply of anti-toxins or controlling the quality of the many drugs that were imported.

The only government in Canada with any chance of supplying antitoxins at this time was that of Ontario, in particular its Provincial Board of Health. The board was established in 1882 and by the 1890s had assumed a progressive posture towards controlling infectious diseases. Smallpox was of particular importance, especially in the wake of the great 1885 epidemic in Quebec and Eastern Ontario, and the Provincial Board was able to secure a local supply of vaccine from a farm in Palmerston. The board then set up, in 1890, the first of a network of provincial laboratories, which focused on bacteriological and chemical work. The Ontario laboratory predated New York City’s and all but four other government laboratories in North America. However, the earlier U.S. city and state labs were largely focused on testing food and water, while investigating rabies outbreaks was among the first projects tackled by the Ontario laboratory.

The Ontario Provincial Laboratory was as much a product of what Sandra McRae has called the ‘scientific spirit’ of medicine at the University of Toronto, as it was of any particular scientific or medical policy of the Ontario government. Echoing the close scientific, personal, and
physical ties between the biology and medical faculties since the early 1880s, especially with respect to laboratory research, the origins of the Provincial Laboratory, and later Connaught, reflected the converging interests of key members of the Provincial Board of Health and professors of medicine and 'sanitary science' at the nearby provincial university. Practical laboratory demonstrations in sanitary science began in the medical faculty in 1889, while the first bacteriologist of the Provincial Laboratory was Dr J.J. McKenzie, a former assistant of Professor Ramsay Wright in the university's biology laboratory. Indeed, after first locating at Yonge and Queen Streets, the Provincial Laboratory shared space in the University of Toronto Biological Building, then in the new Medical Building after it opened in 1903, before settling into its own government facility at number 5 Queen's Park in 1911. Dr John A. Amyot succeeded McKenzie in 1900, and in 1910 was also appointed part-time professor in the newly created Department of Hygiene and Sanitary Science at the university. In 1904 the Medical Faculty had recommended that a Diploma in Public Health, or DPH, be established; however, with no facilities for courses, only didactic instruction in hygiene was given to undergraduate students between 1906 and 1910.27

The establishment of a department of hygiene at the University of Toronto coincided with several other important events in 1910 that were critical catalysts to Connaught's origin. Under circumstances not unlike those leading to the founding of the Pasteur Institute itself, in early 1910 the worst rabies epidemic in Ontario to date prompted strong lobbying from Canadian doctors, especially the Toronto Academy of Medicine, for the establishment of a Pasteur Institute in Toronto. While the medical men approached the Ontario cabinet for action, it is significant they asked that 'such an institute should be established in connection with the University.' As the Canada Lancet stressed, 'If such an institute was established it would be possible to obtain the serum, which cannot be exported from the United States.' Otherwise, victims of the 'mad dog scare' had to travel across the border to New York City for the Pasteur rabies treatment.28 'Needless to say, this incurred a much greater expense than most people can afford.' In 1910 the Provincial Board of Health found itself in a better position to respond. A sum of $1000 was quickly secured to provide for rabies treatments at two special clinics at Toronto General Hospital and the Hospital for Sick Children, the treatment being given by medical staff of the Provincial Board for a fee of $25 per case to cover the cost of vaccine specially imported from the New York City Health Department.29
In 1910 there were also increasingly vociferous calls, particularly from the Canadian Medical Association, for Ottawa to establish a national health department, an issue the CMA, and others, had pressed on and off in Ottawa over the previous decade. There was also a proposal from the chief inspector of immigration, Dr P.H. Bryce, who had been the first secretary of the Ontario board of health, for a National Institution for Scientific Research, modelled after the Pasteur Institute. Among other duties, the Canadian institute would prepare serums, vaccines, and other health products for plants, animal, and man. Neither proposal was successful, although the federal government did establish a Health Branch for the newly created Conservation Commission, to which Dr Charles Hodggett was appointed medical adviser. (Hodggett had succeeded Bryce as secretary of the Provincial Board of Health in Ontario in 1903.) This commission had no executive powers and served merely an advisory role for Canadian governments, with Sir Edmund Osler, brother of the famous Sir William Osler, presiding over its Public Health Committee.

Hodggett’s position as secretary of the Ontario board of health was given to Dr J.W.S. McCullough, a long-time member of the board, who was also appointed chief officer of health and deputy registrar-general for the province. From these positions, McCullough implemented many of the public-health reforms he had often spoken about, including establishing full-time district health officers and compulsory smallpox vaccination, when the Ontario Public Health Act was passed in 1912.

In 1910 McCullough, along with Hodggets and Amyot, had been among the founders of the Canadian Public Health Association. The new association published the Toronto-based Public Health Journal as its official organ. Canada’s governor general, the Duke of Connaught, who had a close interest in public health, served as official patron of the CPHA and presided over its inaugural congress in Montreal in December 1911. Among the conference’s recommendations was a call for federal supervision of biological products. This was a more politically acceptable resolution than had been proposed a few months earlier, when the federal government announced that it was about to establish a national laboratory in connection with a new federal department of health. The proposal, which originated with the Conservation Commission, suggested that a federal laboratory ‘would provide a cheaper and purer supply of bacterins, antitoxins etc in Canada.’ It would also enforce standards, provide means for experimentation with new medical discoveries, and also cover a wide field of educational work relating
to health conservation. While the idea was greeted with great interest, the *Canadian Journal of Medicine and Surgery*, nevertheless, concluded, 'It would be a mistake, however, for the Canadian Government to organize and run a factory for the manufacture and sale of human biological products, in opposition to well-organized private concerns.'

While the editors of the *Canadian Journal of Medicine and Surgery* felt confident in the stability, quantity, and quality of the antitoxins produced by American pharmaceutical companies—advertising revenues from which were supporting its publication—others were not so sure, especially about the long-term stability of the U.S. biologicals supply and, more important, about its price tag for those who needed their life-saving benefits the most. Dr John G. FitzGerald was one Canadian doctor increasingly uncomfortable with this situation in 1911, but he was not yet in a position to do anything about it.

**FitzGerald's Canadian Public Health Plan**

Born on 8 December 1882 in the rural village of Drayton, Ontario, the eldest son of Alice and William FitzGerald, a pharmacist with Irish roots, the tall, slim, red-headed John Gerald FitzGerald sought early to rise above his obscure origins and become a doctor. He wasted little time, and in 1903 became the youngest yet to graduate from the University of Toronto Medical School, although he soon found himself frustrated by the suffering he encountered in practice. Yielding to what would become his characteristic restlessness, enthusiasm, and ambition—characteristics also of a manic-depressive condition that would underlie both his creative genius and the self-destructive tendencies that would surface later in his life, tragically leading to his suicide in 1940—he signed up as ship surgeon on the S.S. *Philadelphia* in 1904. Whether or not he sensed his own psychiatric condition and hoped to be able to do something about it, FitzGerald turned his attention to psychiatry and the study of nervous and mental diseases and their prevention. He interned at the Buffalo State Hospital in 1904-5 and then worked at Sheppard Hospital in Baltimore and Johns Hopkins Hospital until late in 1906. He then returned to Toronto to become pathologist and clinical director at the Toronto Asylum for the Insane, also working as a demonstrator in the Department of Psychiatry at the University of Toronto during 1907-8. But, as one of his friends later wrote, 'the young man's restless mind could never be content with any activity savouring of routine.' Perhaps also growing frustrated with the limited individual results that he could achieve in
psychiatry, despite his energy and campaigns for significant institutional reform, FitzGerald shifted his interests in 1908 towards pathology and the revolutionary subject of bacteriology while spending a year as a research student at Harvard University. He returned to Toronto in 1909, this time ready to lecture on bacteriology at the University of Toronto.39

Much as 1910 was an important year for public health in Canada, it was also significant for FitzGerald, both personally and professionally. He was married in April 1910 to Edna Leonard of London, the heiress of a foundry fortune, and shortly after their wedding they sailed for Europe. FitzGerald would spend his summer as a research student at the Pasteur Institutes in Paris and Brussels, establishing close friendships with Émile Roux, director of the Paris institute, as well as other European leaders in the field.

When FitzGerald returned to Toronto he was eager to apply what he had learned. In early 1911 he single-handedly set up a Laboratory of Serum Diagnosis in the University’s Department of Pathology and Bacteriology, offering to the medical profession a variety of diagnostic testing services, as well as a supply of rabbit serum.40 However, not long after announcing his new laboratory service, FitzGerald was offered a position as associate professor of bacteriology at the University of California in Berkeley.41 By the summer of 1911, FitzGerald was back in Europe for more postgraduate study, this time based in the pathological anatomy department of the University of Freiburg in Germany. During both summers, FitzGerald also spent time at the Lister Institute, as well as at the New York City Department of Health and other city and state laboratories on the American east coast, likely before and/or after his trans-Atlantic voyages.42

FitzGerald was no doubt impressed and inspired by what was being done with biological products produced by these institutions. However, he was also aware of their limitations with respect to funding, research, and distribution, their relationship to universities and public health education, as well the prices of their products, whether within a commercial market or if bought and distributed as a free public service by government health departments. While in California, FitzGerald was able to assimilate his recent experience, but he was eager to apply it, preferably in Canada, and pick up where he had left off with his efforts to provide a diagnostic service and serum supply within the University of Toronto.

In the spring of 1913 FitzGerald got his chance when Amyot invited him to return to Toronto to assist with the production of the Pasteur
Dr John G. FitzGerald (in white lab coat) at the Pasteur Institute, Brussels, summer 1910. (James FitzGerald/SP-C Archives)
rabies treatment at the Ontario Provincial Laboratory and, if sufficient funds were raised to pay his $350 per month salary, to assume the position of part-time associate professor of hygiene at the University of Toronto. Despite receiving a new endowment of $25,000 per year in 1913 to support medical research from 'some of Toronto's wealthy men,' the University of Toronto was actually in poor financial shape when FitzGerald returned. He was eager to carry out the plans that he had formulated while away, the success of which depended upon the support of the university, which was running a deficit.

During the summer of 1913 FitzGerald focused his energies on working with Amyot and his assistant, William 'Billy' Fenton, to produce the first made-in-Canada supply of the Pasteur rabies treatment. FitzGerald taking advantage of his unique connections with the New York City Health Department for supplies, advice, and moral encouragement. By August, while he and Fenton were preparing the rabies vaccine, FitzGerald began to ask his many contacts about the actual costs of producing antitoxins on a large scale. He discovered that, for example, the New York State Health Department, which gave antitoxin free upon the demand of any physician, was able to produce a purified diphtheria antitoxin, ready for filling, for between 5¢ and 6¢ per 1000 units. FitzGerald saw no reason that he could not produce antitoxins for a similar price, with the facilities and support of the university, and make such biologicals available to the Provincial Board of Health at cost for free distribution to the public.

By the fall of 1913, enough money had been raised for FitzGerald to assume his part-time university appointment in the Department of Hygiene, which by this time had graduated its first student to complete the full DPH course, Dr Robert D. Defries. In 1911 the first DPH from the department had been granted to Dr H.V. Hill, who was given his diploma based only on his extensive public-health experience. Hill went on to help establish the Institute of Public Health at the University of Western Ontario in 1911, leaving the Toronto Faculty of Medicine wondering whether or not it was worth investing in the necessary facilities and staff if many potential graduate students went down the road to London. In the fall of 1912, with the university ready to abandon a DPH course, Defries applied, which, together with pressure on the faculty from Amyot and McCullough, ensured that the course was given. FitzGerald was later appointed. McCullough had just implemented the new Ontario Public Health Act, an important part of which was the hiring of full-time district health officers across the province.
He needed qualified candidates quickly, all of whom would require a DPH. The demand for DPH graduates would also soon grow across the country, and Amyot, FitzGerald, McCullough, and Defries all saw an important national role for Toronto’s fledgling Department of Hygiene, an educational role that was also important to the plan that FitzGerald was developing. In the fall of 1913 four candidates registered for the Toronto DPH course, which was taught by FitzGerald, with Defries assisting as demonstrator.50

During that fall, FitzGerald, without consulting with the board of governors, took advantage of an offer by Billy Fenton to help build a small stable and laboratory behind his house at 145 Barton Avenue, near Bathurst and Bloor Streets in what was then west Toronto. FitzGerald borrowed from his wife’s inheritance to pay for the construction and necessary equipment, in addition to five horses, purchased for $5.00 each, and that would serve as the real antitoxin factories.51 After spending just under $3000, by early December the modest wood-frame stable and laboratory covered with tin was ready and four of the horses, ‘Crestfallen,’ ‘Surprise,’ ‘Fireman,’ and ‘J.H.C.’ were given their first of many small but increasingly larger doses of diphtheria toxin.52 By the end of March 1914, after producing the first batches of Canadian-made diphtheria antitoxin since January, which the Provincial Board of Health had already bought, FitzGerald formally approached the university’s board of governors with what seemed to be a radical proposal.53

Building a Public-Health Factory

It has often been suggested that FitzGerald’s proposal for the University of Toronto to assume responsibility for his antitoxin production enterprise was a ‘revolutionary’ one for the university to accept. While it clearly was unusual to expect a university to operate a biologicals factory, it is, however, evident that the University of Toronto, as the provincial university, was open to just such an idea. As a 1928 Maclean’s magazine article on the Connaught story noted, ‘Fortunately, the University of Toronto is not entirely ruled by precedent or managed by convention.’54 Indeed, by virtue of its ‘scientific spirit’ and the close personal relationships between the Faculty of Medicine and the Provincial Board of Health, the university had already been suggested as a home for a Canadian Pasteur Institute in 1910. FitzGerald was thus confident that he would have the support of the board of governors,
especially of Sir Edmund Walker, chairman of the board, Sir Edmund Osler, and Sir Robert Borden, president of the university. The only limiting factor seemed to be whether or not the university could afford to fund FitzGerald’s ambitious plans.

On 31 March 1914 FitzGerald wrote to Edmund Osler, detailing how much had been spent to date building the Barton Avenue stable and preparing antitoxin, how much had been earned already from the Provincial Board of Health, and how much was anticipated from sales to health departments in the City of Toronto and elsewhere across Ontario and Canada. He noted that at least $6000 was necessary for the university to take over the work, while ‘an additional like amount should be available to meet the initial cost of a small place in the country at the earliest possible moment.’ Under these circumstances, FitzGerald was confident that ‘the work will be self-supporting within three to six months, probably less,’ especially as the Provincial Board
was prepared to undertake distribution at once. However, FitzGerald knew that he could not carry the work any further personally, but ‘it can be done in the University, under University auspices only if funds are available.’

Before taking the matter to the board, President Falconer let FitzGerald go ahead and make the necessary modifications in the Department of Hygiene, which then consisted of FitzGerald’s office on the ground floor of the Medical Building’s north wing, and a ‘Museum of Hygiene’ in the basement. However, since funds were tight at the university – it required $1,400,000 from the province but would still run an $85,000 deficit in 1914 and expected a $120,000 deficit in 1915 – Osler provided at least $500 of his own money to cover the immediate expenditures of converting the Museum of Hygiene into a laboratory. On 23 April 1914 a special committee of the board of governors met to discuss FitzGerald’s proposal. With Osler’s personal and financial backing, and an expectation that the university would eventually provide funding, the committee recommended establishment of an ‘Antitoxin Laboratory in the Department of Hygiene,’ effective 1 May 1914. There is some evidence, however, suggesting that FitzGerald had originally considered calling the laboratory the Pasteur Institute in the University of Toronto.

While the University of Toronto had agreed to assume official, and eventually, financial responsibility for the new Antitoxin Laboratory, it is clear that FitzGerald’s enterprise would actually receive very little, if any, direct funding from the university. FitzGerald had desired to create a self-supporting organization, and much to the delight of the university bursar struggling with a deficit, he was never a financial burden. Even after FitzGerald was officially appointed director of the Antitoxin Laboratory, it was expected that his salary would be paid out of its operating expenses, the university being responsible only for his position as associate professor of hygiene.

Over the first few months of the Antitoxin Laboratory’s official existence, FitzGerald focused on expanding the modest facilities Amyot had managed to find in the basement and sub-basement of the Medical Building, converting the old Museum of Hygiene into a general laboratory, a bacteriological lab, and a room for sterilizing glassware, and adding space in the sub-basement for, among other things, processing blood plasma and packaging and storing finished products. FitzGerald also worked on expanding the output and range of products, including typhoid vaccine, tetanus antitoxin, and anti-meningitis serum to meet demands from British Columbia and elsewhere, and developing a
capacity for research and enlarged facilities for teaching. As he concluded in his first annual report as director of the Antitoxin Laboratory for the period ending 30 June 1914:

The value of the laboratory is thus greatly enhanced, since the Public Service aspect is made to go hand in hand with teaching and research, a combination possible only when the work is being done in connection with the University. It is the hope of those responsible for the Laboratory that it may in this way be possible to gradually develop in Canada, laboratories analogous in scope to those of the Lister Institute in London and the Pasteur Institute in Paris, Brussels and elsewhere.61

After a productive summer, the sudden onset of the First World War at first threatened to end FitzGerald’s ambitious plans prematurely. However, the conflict quickly provided an opportunity for the fledgling laboratories to rapidly expand. In November 1914, surprised at the unexpected impact of wound infections, the British Expeditionary Force ordered that all wounded soldiers be given prophylactic doses of tetanus antitoxin as soon as possible, an order also given by the other armies on both sides of the front. A severe shortage of tetanus antitoxin ensued shortly, despite the efforts of serum labs in the United Kingdom, France, Germany, and the United States. As Defries described the situation to the university governors at the end of January 1915, ‘not a fraction of the necessary amount was available,’ since the entire output was spoken for in advance by the Allied Powers. Defries, who had quickly become FitzGerald’s right-hand man, especially directing tetanus antitoxin production, outlined a plan whereby over the next five to six months, the Antitoxin Laboratory could produce enough serum for every Canadian soldier for 65¢ a dose, compared to $1.25 a dose, which was the lowest price at which the Canadian Red Cross could purchase it from the New York City Health Department. The proviso was that expanded stables and laboratories were needed as quickly as possible.62

President Falconer and the board of governors quickly approved the plan, Falconer telling Prime Minister Borden that it was a ‘patriotic duty that we in Canada should manufacture tetanus antitoxin for our own expeditionary forces.’ The board, however, was unable to provide the $3000–$4000 that was immediately needed, suggesting that it was up to FitzGerald to raise the money. Falconer had already approached a number of wealthy Toronto men for support, who suggested that the Dominion government should meet this war-related
cost. McGill University had already received special grants for war work, so when Falconer asked Borden for a federal grant of $4500, he noted that no new precedent would be established. Shortly after Falconer had made his appeal to Ottawa, Colonel Albert E. Gooderham, a local distiller and member of the university board of governors, as well as chairman of the Ontario Red Cross Society, visited Falconer’s office after a board meeting. He immediately wrote a cheque for $3000, on the condition that the money be used to provide facilities for the preparation of tetanus antitoxin so that a supply might be made available to the Canadian Red Cross. After thanking Gooderham, Falconer recognized that he had a potential problem should the Canadian government grant additional funds and then find that the Red Cross was given the entire output of antitoxin. Although he considered withdrawing the university’s request for a grant from Ottawa, by late February he decided to ask for $5000 instead of $4500 after he found out that the federal government was well supplied with antitoxin for the short term.

The potential conflict was averted by early March after FitzGerald arranged to immediately supply the Red Cross with 5000 packages of antitoxin that he was able to purchase from the New York City Health Department at a special reduced price. In the meantime, Gooderham’s $3000 gift would be used to equip the Antitoxin Laboratory for producing a Canadian supply by August. The federal grant would also be used to expand the laboratory facilities, but if the government needed a supply before August, FitzGerald would also use his connections to buy it from New York City at a similarly reduced price. Once the federal grant was finally received in May, Falconer returned Gooderham’s cheque as FitzGerald expected that the Antitoxin Laboratory would be able to produce enough antitoxin to meet the needs of both the Canadian military and the Red Cross by August.

By this time, however, Gooderham had offered a much more valuable gift in support of FitzGerald’s enterprise. Shortly Gooderham wrote his $3000 cheque, Falconer suggested that he visit FitzGerald to learn more about his plans, as they had never actually met one another. Gooderham immediately arranged to see FitzGerald in his office in the Medical Building, and after a ninety-minute discussion about his plans, FitzGerald showed Gooderham around, including a boiler room in the basement where he planned to stable the extra tetanus antitoxin horses. Gooderham did not think much of that idea and said to FitzGerald, ‘I suppose for twelve or sixteen thousand dollars it would be possible to purchase a
few acres of land on Yonge Street and build a stable and some laboratories there.' A few days later Gooderham asked that Fitzgerald meet him at the offices of Stevens and Lee, architects, to review some preliminary sketches Gooderham had asked be done, on his own initiative, of the laboratory and stable buildings he was offering to build once a suitable site was found. To this end, in early April 1915, Gooderham once again gave Fitzgerald a phone call, asking him to take a car trip, along with Gooderham’s real estate agent, up north to York township. The agent had already heard about a possible site on the York-Vaughan town line at Dufferin Street in what was once the village of Fisherville. After making the twelve-mile drive along dirt roads, they found a long, derelict fifty-six-acre farm property that included a farm house, bank barn, and a disused chopping mill. Fitzgerald saw no need to visit any other properties. Gooderham then asked his agent to track down the owners and find out their price, but told him, ‘Don’t let them know that I am interested in it.’ Gooderham was anxious to complete the sale and proceed with erecting the new buildings, both to expedite the production of antitoxin and
because he was planning to leave for England shortly, and, concerned about the war, he asked his son to carry out his wishes should he not be able to return. 68

The war situation also prompted FitzGerald to enlist in May 1915. Fortunately, he did not have to go to the front, at least not yet, but was assigned to take charge of the Bacteriological Unit at the Camp Niagara training camp, a posting that enabled him to devote part of his time to directing the Antitoxin Laboratory. 69 While plans for the new farm building were finalized and construction proceeded, the stables of the old Ontario Veterinary College were offered, at no charge, by Dr King Smith, to accommodate the extra fourteen horses assigned to tetanus antitoxin production. In the meantime, diphtheria antitoxin production continued and the output distributed across the country, from St John’s to Victoria, FitzGerald stressing in his second annual report that ‘the support accorded the laboratory has greatly exceeded the most sanguine expectations, and its place in the scheme of public health activities is Canada made manifest.’ His staff had grown from six to sixteen, five of whom worked exclusively in the new Tetanus Branch. 70 By the end of 1915, however, FitzGerald’s unusual enterprise was being noticed by the American pharmaceutical companies that were no longer able to sell as many of their antitoxins and vaccines in Canada.

In early December 1915 it was evident that representatives of certain companies were spreading rumours, similarly to what had occurred earlier in American cities and states that distributed antitoxins as a public service, that the University of Toronto products were prepared by non-competent students, their stables and labs were not properly equipped, and their products were not as potent and caused more reactions than the commercial products. Dr E.J. Banzhoff, of the New York City Health Department, who had been in almost daily communication with FitzGerald since the beginning of the Antitoxin Laboratory, had frequently heard such rumours and rallied to FitzGerald’s defence. 71 Calgary’s medical officer of health, Dr C.S. Mahood, had been visited by one of these representatives and later wrote to Banzhoff, as well as a number of other health officers and hospitals in Canada that had been using the Antitoxin Laboratory products. 72 The Ottawa Board of Health had recently received its first supply and found that there were some reactions, but they were no worse than from any other source. 73 The experience of the Riverdale Isolation Hospital in Toronto was similar, its medical superintendent, Dr M.B. Whyte, stressing to his Calgary Hospital counterpart, Dr A. Fisher, ‘I believe it is everyone’s duty to
support the project undertaken by the University of Toronto, whose aim is not to profit by the manufacture of Antitoxin but ultimately to have the cost borne by the Provincial Governments and Antitoxin distributed free of charge to the people. I believe this will shortly be done by the Ontario Government and we have Dr. FitzGerald and the University of Toronto to thank for the efforts put forth by them to obtain this end.74

On 2 December 1915 Falconer received a letter from FitzGerald outlining the proposal from the Ontario board of health that McCullough had prepared, offering to distribute the products of the Antitoxin Laboratory for free across the province. As FitzGerald noted to Falconer, this would make the university laboratories the official source of public-health biological products in Ontario and practically eliminate commercial firms, at present, competing in Ontario. For FitzGerald personally, 'This marks the second step in the plan I had in mind when I first undertook this work and its culmination at this early date is a source of considerable gratification. I think we may look to the future with a reasonable certainty that the new stables and laboratories will have a definite place in the scheme of public health endeavors in Canada.'75 Ontario's free distribution plan began on 1 February 1916, a month after FitzGerald purchased the cattle stock and remaining vaccine supply from Dr H.B. Coleman's Smallpox Vaccine Farm in Palmerston.76 After its first year the cost of Ontario's free distribution program totalled $40,000, about a quarter of what an imported commercial supply would have cost.77

By the fall of 1916 the new farm property was largely occupied and its small staff focused on an expanded level of antitoxin production for the war effort and the home front. However, it was not yet ready to be officially handed over to the university until 25 October 1917, which happened to be Gooderham's wedding anniversary.78 During the months leading up to the official opening of what was to be called the 'Connaught Antitoxin Laboratories and University Farm' — named after Gooderham's friend, patron of the Canadian Public Health Association, and former governor general, the Duke of Connaught — FitzGerald was focused on securing more autonomy for the laboratory. Specifically, he wanted the authority to engage or disengage staff as necessary, without reference to the board of governors.79 He also wanted to secure the future of the 'Connaught Laboratories Research Fund,' to which all future surpluses from the sale of products were to be segregated from general university funds, and the income from
which would support research in preventive medicine. FitzGerald suggested to President Falconer that in order for Connaught to provide a truly national service — and since Ontario and Saskatchewan were now providing largely the financial support of labs through free distribution of products — he recommend an honorary advisory committee of the Connaught Laboratories be established. Representatives of each provincial government and the federal government would be appointed to this committee and would meet annually to consult with FitzGerald in regard to scientific problems in which Connaught could be of service. As FitzGerald stressed to Falconer, It is the belief of the Director, that, in this way, the Connaught Laboratories may come ultimately to occupy the position in Canada, that the Lister Institute does in Great Britain and the Pasteur Institute in France. 

October 25, 1917, was a rainy day for an official opening ceremony. However, the spirits of the dignitaries and others in attendance on the covered stage set up next to the new laboratory building were lifted with the announcement from Premier Hearst that the Ontario government would contribute a $75,000 endowment in support of research at Connaught. It was also announced that Gooderham had also contributed another $25,000 for Connaught’s research fund. In all the press coverage of the official opening, however, there was no indication of any financial contribution from the University of Toronto itself. When asked why the university was involved in such an unusual manufacturing enterprise, Sir Edmund Walker, chairman of the board of governors, explained: ‘Through the laboratories the university would extend the work it is carrying on as a great instrument of good for the entire community apart from the educational purpose, by way of direct service for the betterment of general conditions throughout the country.’

Conclusions

In creating Connaught, it is clear that FitzGerald had offered the University of Toronto a valuable opportunity to expand the ‘scientific spirit’ in medicine that it had nurtured since the 1880s to a new level of national and international public service, but without having to invest any of its own capital resources, limited as they were during this period. As a self-supporting and separate department of the university by 1919, for the most part, Connaught’s unique arrangement would continue until 1972, when the University of Toronto decided to sell it to the Canadian Development Corporation, a federal Crown corporation. By this time, in the
Ontario Department of Health Exhibit, Impact of Diphtheria Antitoxin on diphtheria death rates, 1895-1915. The exhibit highlights the free availability of diphtheria antitoxin from Antitoxin Laboratory, University of Toronto, and a model of the main building for expanded production then under construction at ‘New University Farm,’ 1916-17. (SP-C Archives)

wake of such prominent vaccine-related events as the ‘Cutter incident’ with the Salk vaccine in the United States in 1955, concerns about the risks of the live Sabin polio vaccine after 1962, coupled with the Thalidomide babies tragedy in Canada in the early 1960s, the university’s newly restructured governing council was worried about the potential legal liabilities Connaught’s work inherently flirted with. The council and others in the university were also worried about rapidly increasing government regulatory power over biological products, coupled with relentless pressure from commercial pharmaceutical companies who, among other complaints, resented Connaught’s tax-free status. There were passionate arguments in support of Connaught’s continued relationship with the university, particularly from Dr James K.W. Ferguson, Connaught’s director since 1955. However, the university’s new generation of leaders, less familiar with Connaught’s many contributions and unique mission,
and faced with a rapidly expanding student body and shrinking provincial funding, were increasingly desirous of the capital that Connaught’s research fund had accumulated, as well the financial windfall its sale would bring.84

Despite Connaught’s transformation into a profit-driven corporation after 1972 and, eventually, into the Canadian component of the global Sanofi Pasteur organization, Dr FitzGerald’s original mission has remained largely intact: that is, to develop, manufacture, improve, and distribute, through provincial health departments, essential public-health products at a price that is within the reach of everyone. Well before FitzGerald had crystallized his vision for what became Connaught Laboratories, several distinctive Canadian elements provided him with fertile ground, in particular: the problem of expensive U.S. imports of antitoxins and vaccines; persistent and growing public-health challenges (diphtheria, rabies), strong interest in public health and the power of bacteriology to meet and prevent such challenges among key medical, scientific, and political leaders at the University of Toronto and in the Ontario government; and the emergence of national interest in public health, reflected in such organizations as the Canadian Public Health Association. FitzGerald’s personal background, his international exposure to European and American approaches to public health and the provision of biological products, and his extraordinary drive focused and expedited the evolution and application of an emerging and quite distinctive Canadian approach to preventing disease and protecting national, as well as international, health. The essential role Connaught played in the development of insulin, as told by Michael Bliss, as well as of polio vaccines, as I have documented, for example, in addition to many other important biological products (i.e., heparin, diphtheria toxoid, pertussis and smallpox vaccines, various combined vaccines), clearly depended upon this distinctive Canadian approach to public health, an approach Connaught simultaneously reflected, reinforced, and furthered from its modest beginning in a backyard stable.

NOTES

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