THE BIRTH OF A MEDICAL RESEARCH PROGRAMME.

THE RHESUS (RH) FACTOR STUDIES, DR. BRUCE CHOWN,

AND THE FACULTY OF MEDICINE, UNIVERSITY OF MANITOBA, 1883-1946.

By

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A Thesis submitted to the Faculty of Graduate Studies of

the University of Manitoba

in partial fulfilment of the requirements of the degree of

MASTER OF ARTS

Joint Master's Program
Departments of History
University of Manitoba / University of Winnipeg

Winnipeg

NOTE TO READERS

Dr. C. Peter Warren passed away suddenly on 3 May 2011. He had finished this thesis, and we were in the process of scheduling his defence. Dr. Warren did not defend the thesis, but Dr. Greg Smith, Chair of the Joint Master's Program, and Dr. J Doering, Dean of the Faculty of Graduate Studies, agreed with Dr. Warren's family that the thesis should be made available for future scholars. Dr. Warren's thesis examining committee (Drs. Esyllt Jones, Emőke J. E. Szathmáry and Gerald Friesen) read the thesis and suggested a small number of typographical and editorial changes, and I am very grateful to them for their commitment to finishing this project. In two cases, I have inserted comments [ed.:] in order to clarify particular points. Apart from a small number of obvious omissions and errors which I have silently corrected, the work and words are as Dr. Warren wrote them.

James Hanley
Associate Professor of History
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15 August 2011

Abstract

The thesis is an analysis of the birth of the Rhesus (Rh) Factor Research Programme in the Faculty of Medicine, University of Manitoba. Rh Factor is one of the blood groups which can lead a pregnant mother to react to her baby's blood and destroy it. Research on this disorder yielded one of Manitoba's most profound medical discoveries. The account reveals that three elements contributed to this research, namely the researcher, the circumstances and chance. The narrative identifies the researcher, Dr. Bruce Chown, as a major influence in the development of the Faculty of Medicine, University of Manitoba. The conditions nationally and locally that enabled him to succeed in his research are examined. The role of chance in his picking a research subject is considered. The story of Bruce Chown and the start of the Rh research illustrates the beginnings of medical research in Manitoba.

The primary sources for the study were the Archives of the University of Manitoba, Archives Manitoba and the National Archives Ottawa.

Acknowledgements.

To my wife Faye who has always encouraged me in my interest in the History of Medicine. For all our marriage she has been the foremost and constructive critic of my papers in this discipline.

To Professor James Hanley who first suggested that the Manitoba Rhesus (Rh) story might be worth examining. Little did we know what a wealth of material was available and how much it would reveal on the origins of medical research in the Faculty of Medicine, University of Manitoba. But even more I appreciate very much his patience, advice and careful editing of the manuscript.

To Professors Ravi Vatheespara and Esyllt Jones whose excellently taught seminar based courses taught me how to think, analyze and appreciate the historical approach to their subject.

To the archivists Professor Audrey Kerr and Susan Bethune at the Faculty of Medicine Archives, Bannatyne Campus, to Shelley Sweeney at the Archives and Special Collections, Fort Garry Campus, University of Manitoba, to Chris Kotecki at Archives Manitoba and to the anonymous archivists at the National Archives Canada and National Research Council in Ottawa.

To the many librarians who sought books and articles in the N. J. MacLean Library and Caroline Sifton Library, University of Manitoba.

Table of Contents.

Figures and Tables.

INTRODUCTION.

On 31 May 1944 Dr. S. E. Smith, the President of the University of Manitoba, gave his farewell address to the Council of the Faculty of Medicine; Dr. Smith had been appointed President of the University of Toronto. In his address, summarized in the minutes of the Council, he encouraged the "prosecution and development of research" that he viewed as lacking at the medical college. Dr. Bruce Chown,[1] in response, recommended that the Faculty take a definite stand on research work, that the Faculty Research Committee draw up a report on what was needed and send it to the Association of Canadian Medical Colleges and the National Research Council (NRC).[2] Chown also commented on the Federal plan for research work that was limited to only problems connected with public health, as part of the Health Insurance scheme.[3] Chown proposed and Dr. Rice seconded a motion "that a report be prepared by the Medical Research Committee outlining a general plan of research work for the future and including recommendations as to the

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[1] Dr. Bruce Chown, pathologist and paediatrician at the Winnipeg Children's Hospital (1893-1991), on hospital staff 1925-1968, Demonstrator, Lecturer and Professor in the Faculty of Medicine, University of Manitoba, 1925-1968.

[2] Association of Canadian Medical Colleges formed by the Deans of the ten Medical Schools in April 1943. National Research Council. The federal agency for funding scientific research in Canada- founded in 1916.

[3] The Health Insurance Scheme to which Chown referred was presumably the initiative of the Federal Government that had its beginnings in 1939 and led to the appointment of 'An Advisory Committee on Health Insurance' chaired by J. J. Heagerty in February 1942. Wartime priorities affected the process. A full account of this may be found in: C. David Naylor, "War Years: Pressure Group Politics in Ottawa," in *Private Practice, Public Payment: Canadian Medicine and the Politics of Health Insurance 1911-1966.* (Kingston & Montreal: McGill-Queen's University Press, 1986): 109-111; Heather McDougall, "Into Thin Air: Making National Health Policy, 1939-45," *Canadian Bulletin of Medical History*, 26, 2 (2009): 281-313.

facilities required, personnel, salary, schedules etc." The Faculty Council approved the motion.[4]

Thus Bruce Chown was a leader in the emergence of research in the Faculty of Medicine. He both promoted research in the faculty and actively engaged in it, for some two months earlier, he had embarked on a study of Rh Factor, the cause of Rhesus (Rh) Haemolytic Disease of the Newborn.[5] The disease affected 1 out of 200 pregnancies. His investigation into the Rh factor began a research programme that may be judged the most successful, sustained research of the medical faculty at the University of Manitoba. The programme was to produce original knowledge that was quickly translated into clinical practice in the province. In 2006 the Manitoba Health Research Council listed it first in its Manitoba success stories and identified it as "one of Manitoba's most profound

[4] University of Medicine Faculty of Medicine Archives, N. J. MacLean Health Sciences Library, Faculty Council, Minutes, May 31, 1944. "At a meeting of the Faculty Council in May 1944, President Smith, in his farewell remarks, indicated that in his opinion this Faculty had failed to carry on an adequate amount of research work in recent years. As a result of his statement a motion was made by Dr. Bruce Chown and H. V. Rice directing the Research Committee to prepare a report on research."

[5] Rhesus (Rh) Haemolytic Disease of the Newborn is caused by the Rh factor, a blood group. The disease was earlier called erythroblastosis fetalis and is manifest by anemia in the newborn, jaundice in the newborn or hydrops (severe oedematous swelling) of a stillborn baby. Once the cause of the disease was elucidated the name changed to reflect the cause and it was called Rhesus (Rh) Haemolytic Disease of the Newborn. The disease is produced when a mother is blood group Rh negative, the father is Rh positive and the baby inherits the father's Rh positive blood. At some time, frequently at delivery, the baby bleeds into the mother. The baby's blood is incompatible with the mother and she forms an immune reaction against it in the form of antibodies. In subsequent pregnancies the antibodies cross the placenta and destroy the baby's Rh positive blood resulting frequently in stillbirth or death in the first week after birth.

medical discoveries."[6] The Rh programme is a prime example of the value of a university and the application of its research to its community. This work brought academic fame to Chown and several colleagues, and in due course, fortune to the University of Manitoba. The Rh research eventually yielded a vaccine to prevent the disease and the royalties realized from this were put to good use by the university.

In the beginning I expected that this thesis would describe the research work on Rh factor, the treatment of the babies who developed Haemolytic Disease and eventually the prevention of the disorder. Since Bruce Chown kept the case notes and correspondence pertaining to these a chronological account of what he achieved would be easy. However, this raised the question what factors determine a successful research programme? What made him begin a completely new field of research at the age of 51 years? The historian Mark Harrison, quoting Fernand Braudel, affirmed that a book on the history of disease required an overall model.[7] The same proviso applied to this thesis. The model I will use argues that three elements are necessary, namely the researcher, the situation that affects that person and a little bit of luck. All played a part in the Rh research programme. First there needs to be someone who has the ability to perform the research. Second is the circumstances in which they find themselves and I will argue that the researcher can

[6] Judy Birdsell and Maaike Asselbergs, *Health Research Funding in Manitoba: A Description and Comparison Across Canada* (Winnipeg: Manitoba Health Research Council, 2006), 7.

[7] Mark Harrison, *Disease and the Modern World: 1500 to the Present Day* (Cambridge: Polity Press, 2004): 2. He quoted Fernand Braudel "An overall model, good or bad, against which events can be interpreted."

select these and influence them. These two are well accepted.[8] The importance of the third, serendipity is often overlooked.[9] And yet serendipity is part of the legends of science and medicine with Newton's apple, James Watt's kettle, Edward Jenner's dairymaid with cowpox and Alexander Fleming's contaminated Petri dish coming to mind. It has played a recognized part in Rhesus studies.[10] The thesis will show that Chown had the curiosity, training and diligence necessary for research. The circumstances when he began his Rh research were propitious, for funding was available and his work environment was conducive to research. Unexpectedly, study of Chown's career prior to his Rh work demonstrated that he had played an active part in both the development of research funding and in its acceptance in the Faculty of Medicine. How the past determined these conditions is presented. Finally evidence is put forward that a chance meeting between Chown and an expert on Rh Factor prompted him to begin the Rh research programme.

What is Medical Research?

Since this thesis looks at a medical research programme it is necessary to review what is medical research? Research is the activity and product of the researcher exploring new

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[8]This is best known in the dictum of Karl Marx, "Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past." Karl Marx, "The Eighteenth Brumaire of Louis Bonaparte," in Karl Marx, *The Portable Karl Marx*, edited by Eugene Kameska (Middlesex: Viking Penguins, 1983): 297-323.

[9] Mark Pepys, "Science and Serendipity," *Clinical Medicine, Journal of the Royal College of Physicians* 7, 6 (2007): 562-578.

[10] L.A. Derrick Tovey, "Towards the Conquest of Rh Haemolytic disease: Britain's Contribution and the Role of Serendipity," *Transfusion Medicine* 2, 2 (1992): 99-109.

knowledge. Scientific researchers have been generally divided into observers and experimenters. The former does not alter the conditions of the natural phenomena studied. The latter poses a question, coupled with a pre-conceived idea, and tests it to find an answer. Claude Bernard, the renowned physiologist who wrote extensively on medical research compared the observational, in which the researcher contemplates, and the experimental, in which he acts.[11] In a controlled way the experimenter changed the conditions he observed and found what resulted. Depending on the branch of scientific research one type may predominate. For instance the geologist and astronomer, who have no control over the natural universe they study, are primarily observers as are clinicians on the wards. The physicist and chemist who manipulate the natural world in the laboratory are usually experimenters as are physiologists and biochemists. Medical historian Richard Shryock judged for the medical practitioner that isolated observations or developments in practice are not research, although both are often given the kudos of being published. He stressed that all research necessitated planning towards an end, so planned observation was research. At the same time Shryock stressed that medical research is not just experimental, although this has the prestige.[12] In the hierarchy of medical research the experimental was paramount.[13] Thus the methods used in medical

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[11] Claude Bernard, "La médecine d'observation *contemple,* la médicine expérimentale *agit,"* in Claude Bernard, Chapitre premier, *Principes de Médecine Expérimentale 1878,* translated by Dr. L. Delhoume. (Paris: Presses Universitaires de France, 1947), 18.

[12] Richard H. Shryock, "Introduction," *American Medical Research Past and Present* (New York: The Commonwealth Fund, 1947), 6-8.

[13] John R. Williams. "The Social Implications of Scientific Research," *Canadian Medical Association Journal* 51, 2 (1944): 99-106. Starts with the epigram by Poincaré, "Experiment is the sole source of truth. It alone can teach us anything new; it alone can give us certainty." Jules Henri Poincaré, Science *and Hypothesis*. Trans. J. Larmor (USA: Dover Publications Inc., 1952). Poincaré was writing on the physical sciences and

research to elucidate new knowledge are both premeditated objective observation of the natural state of health and disease and the experimental exploration of the influences on health and disease, usually performed in the laboratory. But just because a laboratory is involved in medicine does not mean the work therein was experimental since laboratory tests are often simply used to complement clinical observations.

National Support for Medical Research.

Shryock dated modern research in science, including Western medicine, to the late Renaissance and the appearance of such institutions as the Royal Society in England (1660).[14] In the last third of the Eighteenth Century medical research correlated observations of a patient's illness with the pathology observed at post mortem and this pointed the way to today's medicine.[15] In the early Nineteenth Century France adopted this approach and students flocked to its medical schools which provided the opportunity

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mathematics, but his aphorism may be applied to the natural sciences too. A Manitoban example of an isolated observation is the eponymous disease that bears the name, Hunter Syndrome. It was simply a case report of two patients that Charles Hunter, later Head of the Department of Medicine, encountered and whom he did not investigate in any way. Peter Warren and Robert Beamish, "Hunter Syndrome: Evolution of an Eponym," *Annals of the Royal College of Physicians and Surgeons of Canada* 35, 8 (2002): 513-516. In contrast Bruce Chown wrote the first case report of a kidney disease in a child that combined clinical observation and laboratory investigation. Bruce Chown, "Renal Rickets and Dwarfism: A Pituitary Disease," *British Journal of Surgery* 23, 91 (1936): 552-566.

[14] Richard H. Shryock, "Formative Influences," *American Medical Research Past and Present* (New York: The Commonwealth Fund, 1947), 11-13. The same period saw the founding of the Germany Academy of Science (1652) and the French Academy of Science (1666).

[15] Giambattista Morgagni, *The Seats and Causes of Diseases investigated by anatomy: in five books, containing a great variety of dissection, with remarks*, trans. Benjamin Alexander (1769). Facsimile (New York: Classics of Medicine Library, 1983). Morgagni's book was the germinal work linking both the clinical histories and their pathology found *post mortem* and heralded the end of the humoral theory of disease.

to study patients in their hospital's wards and perform autopsies on the many who died.[16] The morgue was the laboratory and as science developed others for chemistry and microbiology were added. France founded its Academy of Medicine in 1820.[17] As the century progressed Germany emerged as the major site of medical research, with again the laboratory as the foundation for its pre-eminence. This is attributable to a huge state investment in Research Institutes and their laboratories where experimental work flourished.[18] By the end of that century this German dedication to research and laboratories was considered the model for medical schools by Abraham Flexner, who had been hired by the Carnegie Foundation in 1908 to critique the American and Canadian medical schools.[19] Flexner extolled Johns Hopkins medical school that designed its curriculum on the German model.[20] In the United States the Rockefeller Institute led by Flexner's brother Simon established institute based laboratory experimental research in that country.[21] As the twentieth century evolved so America became the leading nation

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[16] Erwin Heinz Ackerknecht, *Medicine at the Paris Hospitals, 1794-1848* (Baltimore: Johns Hopkins Press, 1967). Ackerknecht attributed the pre-eminence of French medicine of this time to the growth of the hospitals facilitating the link of bedside observation with the autopsy.

[17] George Weisz, *The Medical Mandarins: The French Academy of Medicine in the Nineteenth and Early Twentieth Centuries* (New York and Oxford: Oxford University Press, 1995).

[18] Arleen Tuchman, *Science, Medicine and the State in Germany: The Case of Baden, 1815-1871* (New York: Oxford University Press, 1993).

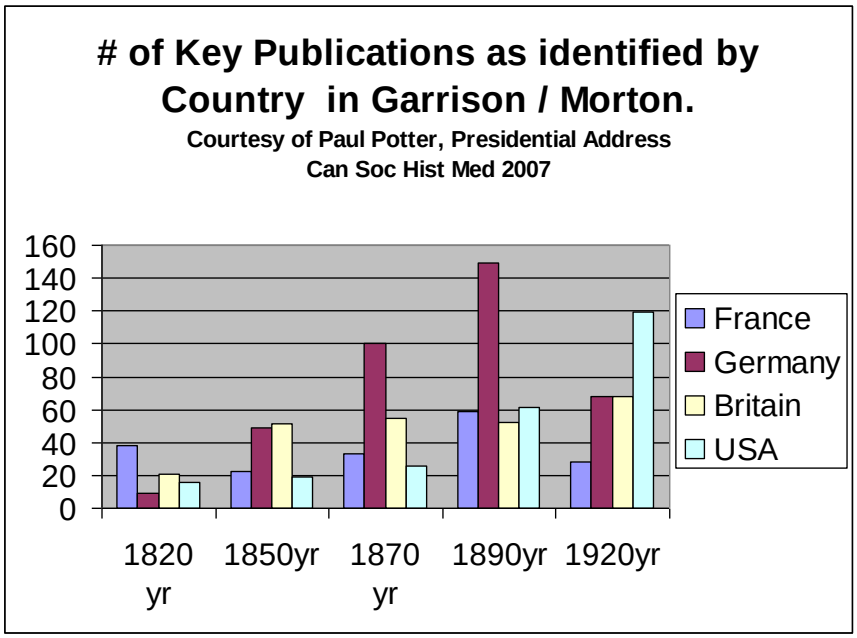
[19] Abraham Flexner, *Medical Education in the United States and Canada*, Bulletin Number 4 (The Flexner Report), (New York: The Carnegie Foundation for the Advancement of Teaching, 1910).

[20] Abner McGehee Harvey et al., *A Model of its Kind: A Centennial History of Medicine at Johns Hopkins, Volume 1* (Baltimore: Johns Hopkins University Press, 1989).

[21] Abraham Flexner, *Abraham Flexner: An Autobiography* (New York: Simon & Schuster, 1960), 96.

for medical research. Britain, renowned for a few famous discoveries, was generally in second place. The changes over time in research publications in France, Germany, Great Britain and the United States are illustrated in Figure 1.

Figure 1: The number of key publications from medical research in France, Germany, Britain and the United States 1820-1920.[22]



Canada added very little new knowledge to medicine until 1921 when insulin was discovered in Toronto.[23] Physiologist G. Ettinger described how this breakthrough surprised the country which "had little resources in equipment, supplies and technical

[22] Figure 1 derived from data provided by Paul Potter, Hannah Professor of the History of Medicine, University of Western Ontario in his presidential address to the Canadian Society for the History of Medicine, May 2007. He obtained his data from F. H. Garrison and Les T. Morton. *A Medical Bibliography: A Checklist of Texts Illustrating the History of the Medical Sciences.* (London: Grafton & Company. 1943), which catalogued the most influential medical publications.

[23] Michael Bliss, *The Discovery of Insulin* (Toronto: McClelland and Stewart, 1982).

assistance."[24] Public and private funding for medical research in Canada lagged behind most developed countries. With the exceptions of McGill University and the University of Toronto teaching dominated the activities of the country's medical faculties. This began to change in 1937, but then the Second World War meant postponement of general medical research in Canadian medical schools. Medical research now focussed on war issues, one of which turned out to be Chown's interest in Rh Factor. However, even before victory, thoughts in Canada turned to the organization of post-war research and Chown's work fitted with this.

The Historiography of the Organization and Funding of Medical Research in Germany, Great Britain and the United States of America.

Britain and the United States shaped Canadian medicine and science research in the twentieth century. Indirectly Germany affected it, but one consequence of the First World War was that its science and medicine fell out of favour,[25] although its medical education and research was the model for many medical schools in North America. France inevitably influenced developments in Quebec.

For Western Medicine, including Canada, the history of medical research and experiment is most often revealed in biographies, and a few autobiographies, of the researchers; the

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[24] G. H. Ettinger, "The Origins of Support for Medical Research in Canada," *Canadian Medical Association Journal* 78, 7 (1958): 471-474.

[25] Marianne Fedunkiw, "'German Methods,' 'Unconditional Gifts,' and the Full-time System: The Case Study of the University of Toronto, 1919-23," *Canadian Bulletin of Medical History* 21, 1 (2004): 5-39.

'great men' approach. [26] Similar histories of institutions and medical discoveries supplement the biographies. Historian George Rosen called this popular approach *iatrocentric* history.[27] Historian Charles Webster introduced his chapter on the historiography of medicine with the notion that the experimental sciences exemplified the notion of progressive development and their yield earned the esteem of science in the Western world. [28] He assessed that progress may have been less impressive in medicine than in the pure sciences, but their histories reveal a parallel interpretation. Karl Figlio supported this conclusion, "The history of medicine is written today with the attitude of a positivist historian of the nineteenth century." He went on in his essay "We should be 'whiggish' in setting out our historical exploration."[29] The belief that history revealed that the world has progressively changed for the better became unfashionable in historical

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[26] Charles R. King, "The Historiography of Medical History: from Great Men to Archaeology," *Bulletin of the New York Academy of Medicine* 67, 5 (1991): 407-428. Obstetrician and historian Charles King has divided the historiography of medical history into four periods. First 'the great men of medicine' as exemplified by librarian and historian Fielding Garrison, the second as historicism with physician and historian Owsei Temkin, the third social history with physician and historian Henry Sigerist, and finally intellectual history as established by philosopher and historian Michel Foucault. These categories apply to some extent to the subject of this section with the examples grouped under the first period most common.

For instance the series of biographies that concentrated on famous Canadians in health care and research commissioned by Associated Medical Services Inc., Toronto, Ontario with T. P. Morley, Series Editor.

[27] George Rosen, "People, Disease and Emotion: Some Newer Problems for Research in Medical History," *Bulletin of the History of Medicine*, 41, 1 (1967): 5-23.

[28] Charles Webster, "The historiography of medicine," in *Information Sources in the History of Science and Medicine*, eds. Pietro Corsi and Paul Weindling. (London: Butterworth Scientific, 1983), 29-44.

[29] Karl Figlio, "The Historiography of Scientific Medicine: An Invitation to the Human Sciences," *Comparative Studies in Society and History* 19, 3 (1977): 262- 286.

scholarship.[30] This may be true for social and the political world, but is harder to refute in scientific and medical research. On the other hand, Professor of Social Medicine Thomas McKeown's research, using historical trends, demonstrated that the improved health of society was due to social rather than medical advances.[31]

Germany

Germany during the early Nineteenth Century could have been a model for Anglophone Canada for, at that time, it was a collection of independent states, bound by a common language and culture. Its public funding for medical research might have been an example for Canada and its provinces. The dominant state was Prussia whose Minister of Education, Wilhelm von Humboldt, created the University of Berlin in 1810 with regulations that "obliged the professor to be first and foremost a researcher."[32] This set the tone for all German universities. Science, including medicine, was supported by most German states in the second half of the century and research was the foundation of the

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[30] The belief that over time the world becomes a better place has been called "Whiggism'; a concept criticized by Herbert Butterfield, *The Whig Interpretation of History* (New York: W. W. Norton, 1931).

[31] Thomas McKeown, *The Modern Rise of Population* (London: Edward Arnold, 1976) and *The Role of Medicine. Dream, Mirage or Nemesis?* (London: Nuffield Provincial Hospitals Trust, 1976). However others oppose this believing that McKeown underestimated the influence of medicine on improved hygiene- Simon Szreter, "Mortality in England in the Eighteenth and Nineteenth Centuries: A reply to Sumit Guha," *Social History of Medicine* 7, 2(1994): 269-282.

[32] Yves Gingras, *Physics and the Rise of Scientific Research in Canada* (Montreal & Kingston: McGill-Queen's University Press, 1991), 3.

teaching programmes.[33] The states invested in new faculty and research institutes, and the decentralized university system, with its resulting competition for professors, catalyzed the system. That research in chemistry and physics would directly aid industry was evident and indeed the German economy flourished, for industry and institutional research had a symbiotic relationship. Less apparent initially, was that research in the natural sciences, such as physiology, would contribute so much to medicine.[34] The many advances in microbiology by such workers as Koch in microbiology and Ehrlich in immunology produced vaccines and therapy that was quickly applied to improve health, and Germany became pre-eminent in medical research. However the financial chaos after the First World War, followed by the persecutions of the Third Reich, forced many German scientists to move to Britain and the United States and bolstered those countries' medical research.[35]

Great Britain

In the early twentieth century medical research became organized in Britain with the formation of the Medical Research Council (MRC). Landsborough Thomson, who joined the council in 1919, wrote its first general history and gave an insider's account of

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[33] Theodor Billroth, *The Medical Sciences in the German Universities: A Study in the History of Civilization* translated by William H. Welch (1876; New York: MacMillan, 1924).

[34] Arleen Tuchman, *Science, Medicine and the State in Germany: The Case of Baden, 1815-1871* (New York: Oxford University Press, 1993).

[35] One was Karl Landsteiner, Vienna, who discovered the Blood Groups ABO in 1910, for which he was to receive the Nobel prize in 1930. He moved to New York following the decimation of Austria after the First World War. He was Jewish but had converted to Catholicism. In 1940, with Weiner, he published his discovery of the Rhesus blood group.

its evolution and its range of activities.[36] The more recent account by various historians, edited by Joan Austoker and Linda Bryder, addressed certain aspects of the MRC. Bryder argued in her chapter that government funding of medical research in Britain originated with the 1911 National Insurance Act introduced by Lloyd George. Since tuberculosis affected the workforce age group and was a major expense for the sickness benefit programme it was given special attention. Research into tuberculosis was to be part of the programme and Bryder concluded this was the first medical state sponsored research in Britain.[37] The 1911 act was open to interpretation as to whether research into medical disorders other than tuberculosis might use these funds. To this end the editor of the British Medical Journal pointed out that the French Pasteur and American Rockefeller Institutes devoted only a small part of their activities to tuberculosis.[38] A Medical Research Committee, based in London, was formed at the behest of the Insurance Commissioners of England, Scotland, Ireland and Wales in 1913 and in 1919 this evolved into the independent Medical Research Council (MRC).[39] In her chapter Austoker proposed that the MRC moved to general medical research as its focus when

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[36] A. Landsborough Thomson, *Half a Century of Medical Research* (London: HMSO, 1973-1975).

[37] Linda Bryder, "Tuberculosis and the MRC," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989), 1-22.

[38] Editorial, "The Insurance Act and Research," British *Medical Journal*. 1 (1913): 571.

[39] Linda Bryder, "Tuberculosis and the MRC," *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989), 1-22.

Walter Morley Fletcher was appointed secretary in June 1914.[40] Austoker and Bryder in a subsequent chapter described that the same year the National Institute for Medical Research near London was founded by the Medical Research Committee, and other small institutes were established in the universities and medical schools. The Committee issued grants to individual researchers at the universities and these were often supplemented by the Rockefeller Foundation.[41] Subsequent chapters tell how the Council added research into public health by Bryder, nutrition by nutritionist Celia Petty, industrial health by sociologist Helen Jones and tropical diseases by historian Jennifer Beinart.[42] These

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[40] Joan Austoker, "Walter Morley Fletcher and the origins of a basic biomedical research policy," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989), 23-34. Fletcher was a Cambridge physiologist and inevitably directed the research towards his own bio-medical interests.

[41] Joan Austoker and Linda Bryder, "The National Institute for Medical Research and related activities of the MRC," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989), 35-58.

[42] Linda Bryder, "Public health research and the MRC," in *Historical Perspectives on the Role of the MRC:* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989), 59-82; Celia Petty, "Primary research and public health: the priorization of nutrition research in inter-war Britain," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989),83-108; Jennifer Reinart, "The inner world of imperial sickness: the MRC and research in tropical medicine," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989),109-136; Helen Jones, "Industrial health research under the MRC," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989),137-162.

authors provided a strong case that the demands of capitalism and imperialism stimulated the funding of these areas of research. Economist Jonathan Liebenau provided an interesting account of the relationship of the MRC to the pharmaceutical industry. He contended first that pharmaceuticals were omitted from the aegis of the MRC until the First World War removed the German source of effective drugs so local manufacture was now necessary. He next used the example of insulin for which the University of Toronto, offered the patent of insulin to the MRC so as to share the manufacture in Britain. The MRC was hesitant to accept this but, in due course, it licensed manufacturers for insulin and developed trials to determine its best use. There were strong objections to this commercialization of research.[43]

The United States of America.

The Federal funding of medical research took a different course in the United States and Shryock divided it into three eras, the early (1860-1895), the private (1895-1940) and finally the Federal Government.[44] Historian Victoria Harden who studied the early history of Federal research policy in depth maintained that the Federal Government took considerable responsibility for medical research because, in 1798, it formed the Marine Hospital Service for merchant seamen. This Service expanded into the Federal Public

[43] Jonathan Liebenau, "The MRC and the pharmaceutical industry: the model of insulin," in *Historical Perspectives on the Role of the MRC:* E*ssays in the History of the Medical Research Council of the United Kingdom and its Predecessor, the Medical Research Committee, 1913-1953* eds. Linda Bryder and Joan Austoker (Oxford: Oxford University Press, 1989), 163-180.

[44] There was a short lived Federal National Board of Health founded by Congress in 1879 that provided grants to university based researchers. Shryock hinted that jealousy of the Marine Hospital Service led to its demise. of the National Board of Health. Richard H. Shryock , *American Medical Research Past and Present* (New York: The Commonwealth Fund, 1947), 9-39.

Health Service which, inspired by the scientific example of Germany and its public health laboratories, added a bacteriology laboratory in 1887. Infectious diseases such as cholera, typhoid and pellagra[45] were researched by the Federal public Health Service. The German model of institutes, researching pure science, led to a proposed National Institute in 1919 to study chemistry, pharmacology and experimental biology. The private Rockefeller (1902) Institute for Medical Research was also a model. In 1926, the National Institutes of Health (NIH) formed and opened a dedicated building in 1930.[46] There were conflicts of responsibility for health at various levels between municipalities, the states and the federal government and research was affected by this. After the Bankhead-Jones act of 1935, joint state experimental stations and federal regional laboratories developed for which the Federal Government provided grants, advice and supervision.[47]

Canada

Historians, Mel Thistle[48] and Yves Gingras,[49] examined the rise of scientific research in Canada. Federal funding in Canada for scientific research began with the formation of the NRC in 1916, as part of the war effort. Physics, chemistry and biology were harnessed to

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[45] Pellagra was not immediately recognized as vitamin B3 deficiency until 1915.

[46] Victoria A. Harden, *Inventing the NIH: Federal Biomedical Research Policy, 1887-1937* (Baltimore: Johns Hopkins University Press, 1986).

[47] Richard H. Shryock , *American Medical Research Past and Present* (New York: The Commonwealth Fund, 1947), 267.

[48] Mel W. Thistle, *The Inner Ring: The Early History of the National Research Council of Canada* (Toronto: University of Toronto Press, 1966).

[49] Yves Gingras, *Physics and the Rise of Scientific Research in Canada* (Montreal & Kingston: McGill-Queen's University Press, 1991).

industrial development and the wartime economy.[50] Eggleston recounted the developments of the NRC and the initial mundane concerns with which it was occupied.[51] Its administrative structure was much influenced by the British model. The NRC formed Associate Committees that brought together experts in a field of research who directed the research and apportioned grants to individuals at universities. Thistle's book recounted the political and administrative activity behind the NRC and included much of the relevant correspondence verbatim. He made little comment on the material and did not provide much insight into the process. Gingras provided a deeper analysis of the history of scientific research and focused on physics as his example. He determined that science research developed in three steps. The first was that research activity materialized with individuals pursuing their curiosity in their discipline. The second was that institutions, the universities, began to provide the resources for researchers and to train future researchers. The third phase was that scientific research became established with conferences and publications to announce and disseminate research findings.[52]

To a large extent medical research followed this pattern but lagged behind the physical sciences by some twenty years. When the Federal government founded the National

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[50] Mark Harrison, *Disease and the Modern World: 1500 to the Present Day* (Cambridge: Polity Press, 2004), 146. Harrison quotes the sociologist Richard Titmuss that social policy is determined by the need for the masses to cooperate with the prosecution of the war. The same comment applied to the Government's science research policy of World War One and of medical research in World War Two.

[51] Wilfrid Eggleston, *National Research in Canada: The NRC, 1916-1966* (Toronto: Clarke Irwin & Co. Ltd., 1978), 1-34. A mundane example for instance was the deterioration of concrete pipes in Winnipeg's soil.

[52] Yves Gingras, *Physics and the Rise of Scientific Research in Canada* (Montreal & Kingston: McGill-Queen's University Press, 1991), 3-8. At the third stage the State provides a mechanism for the funding of research.

Research Council it had no responsibility for medical research for, after all, health was a Provincial affair under the British North America Act. In the early years the only medical subject supported through an Associate Committee was tuberculosis. Historian Georgina Feldberg made a strong case that this was because it most affected industrial workers, and generous funds were provided to support research on it and hopefully keep the workforce productive.[53] She placed this in the context that the NRC was also formed to harness the physical sciences to industry and the wartime economy. She concluded that the experience of the Associate Committee for Tuberculosis Research was a guide to the later developments in NRC organized medical research.[54]

The major biographies of the discoverers of insulin at the University of Toronto by historians dominate the historiography of medical research in Canada. The legends and controversies that arose around that work and the names of Frederick Banting and Charles Best are most recognized by the public. Historian Michael Bliss described what these researchers did and what they claimed to have done in detail, using their laboratory case notes as the primary source.[55] Bliss also wrote an objective biography of Banting,[56] while historian Henry Best, being his son, wrote a more subjective biography of Charles

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[53] A similar sentiment to the choice of tuberculosis for the first government funded medical research in Britain.

[54] Georgina Feldberg, "The Origins of Organized Canadian Medical Research: The National Research Council's Associate Committee on Tuberculosis Research, 1924-1938," *Scientia Canadensis* 15, 2 (1991): 53-69.

[55] Michael Bliss, *The Discovery of Insulin* (Toronto: McClelland and Stewart, 1982).

[56] Michael Bliss, *Banting: A Biography* (Toronto: McClelland and Stewart, 1984).

Best.[57] Banting and Best went on to lead the national initiatives in medical research. Historian Alison Li's biography of J. B. Collip, subtitled the Development of Medical Research in Canada, told the life of the third person in the discovery of insulin. She provided the most information on the emergence of private and public funding for medical research in Canada.[58] Both Bliss and Li showed that the experience of research funding received by Banting, Best and Collip cannot be generalized, for they were well endowed by the royalties from the sale of insulin. Moreover they worked in the two universities that supported medical research, McGill[59] and Toronto and their careers placed them in a leadership and privileged position in the administration of research. The research development and support at other medical schools has not been told, with the exception of the University of Alberta and Corbet then devoted only one chapter to research and mostly to Collip's time there.[60] Biographies of a few Canadian researchers of this period concentrated on their accomplishments and revealed little of the overall organization and funding of medical research. Histories of medical schools and hospitals contained some information on their research activities but this was not their focus.[61]

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[57] Henry B. M. Best, *Margaret and Charley: The Personal Story of Dr. Charles Best, the Co-Discoverer of Insulin.* (Toronto: Dundurn Press, 2003).

[58] Alison Li. *J. B. Collip and the Development of Medical Research in Canada: Extracts and Enterprise* (Montreal & Kingston: McGill-Queen's University Press, 2003). Collip was the biochemist who purified insulin and ensured that it would work.

[59] Collip moved to McGill in 1928 from the University of Alberta. He had been on sabbatical at Toronto when insulin was discovered.

[60] Elsie Corbet, *Frontiers of Medicine: A History of Medical Education and Research at the University of Alberta*. (Edmonton: University of Alberta Press, 1990).

[61] N. Tait McPhedran, *Canadian Medical Schools: Two Centuries of Medical History, 1822 to 1992* (Montreal: Harvest House, 1993). He confirmed Corbet's assessment of Alberta thus "there was little research, "156.

The insulin story and the Nobel Prize that followed might have inspired the Federal government to invest in medical research but this did not occur directly. Li, in a separate article, contended that the National Research Council led the Federal Government to the funding of medical research. In 1936 the NRC President, General A. G. L. McNaughton, invited Frederick Banting to join the council of the NRC and Banting made it a condition of service that medical research be included in its mandate. In 1938 the NRC formed an Associate Committee on Medical Research, first chaired by Banting and after his death by Collip. Li stressed that funding for research was generally low in Canadian medical schools, except for Toronto supported by the provincial government and McGill from private sources. Harold Ettinger, a colleague of Frederick Banting in physiological research and honorary secretary of the NRC wrote a history of the Associate Committee on Medical Research 1938-1946.[62] However this gave minimal information on the origin of the Committee and concentrated on its organization and work during the Second World War. Similarly Eggleston told virtually nothing on the origin of medical research at the NRC and only introduced the subject with the War.[63]

Not everyone in Canada wished to copy the German laboratory based approach to medical research and education. For instance even before the First World War the Canadian Medical Association Journal recommended against "made in Germany" as the hallmark in education and practice, since laboratories were not available to most

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[62] G. H. Ettinger, *History of the Associate Committee on Medical Research: National Research Council, Ottawa, 1938-1946* (Ottawa: National Research Council of Canada, 1946).

[63] Wilfrid Eggleston, *National Research in Canada: The NRC, 1916-1966* (Toronto: Clarke Irwin & Co. Ltd., 1978).

practitioners. Canadian medicine was built simply on clinical observation.[64] This advice was ignored across the country for the hospital and its laboratory were the symbol of science in medicine and epitomized the "research ideal", even if no new knowledge was actually created in it.[65] Therefore in 1925 the Board of the Winnipeg Children's Hospital invested in a fully equipped laboratory and expected that Bruce Chown would add research to his service duties, thus enhancing the status of the institution. The director of such a laboratory needed wide knowledge and skills to provide leadership and supervision in all laboratory disciplines.[66]

Childbirth in Canada.

Rh Disease is a disorder of childbirth that often kills the child. The historiography of childbirth in Canada is pertinent to several aspects of the Rh story. For instance writer Julie Vandervoort wrote a biography of Elinor Black, the Winnipeg obstetrician who helped Bruce Chown move his Rh laboratory to the Women's Hospital.[67] Historian Wendy Mitchinson described the move of birthing from the home, where the mother had help from family or a local midwife, to the hospital and the medical profession. She

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[64] Editorial, "Canadian Medicine," *Canadian Medical Association Journal* 1 (1911): 149-151.

[65] David Gagan and Rosemary R. Gagan, *For Patients of Moderate Means: A Social History of the Voluntary Public General Hospital in Canada, 1890-1950* (Montreal & Kingston: McGill-Queen's University Press, 2002), 103.

[66] Peter Twohig, "Diffuse Roles and Multi-tasking," *Labour in the Laboratory: Medical Laboratory Workers in the Maritimes, 1900-50* (Montreal & Kingston: McGill-Queen's University Press, 2005), 82-115.

[67] Julie Vandervoort. *Tell the Driver: A Biography of Elinor F.E. Black, M.D.* (Winnipeg: University of Manitoba Press, 1992). This life of Manitoban Elinor Black, who was Canada's first female head of an obstetric department, described Black's struggle as a woman physician rather than the childbirth that she delivered.

demonstrated the complexity of the circumstances that determined the 'medicalization' of a natural process and that this transformation was a subject of much debate within the health professions. Mitchinson concentrated on childbirth from the mother's perspective.[68] Georgina Feldberg in an essay, aptly entitled "On the Cutting Edge," on science in obstetrics at Women's Hospital, Toronto, refuted the belief that women physicians, mostly single and childless, were effective advocates for the mothers they delivered. Female obstetricians embraced technology and the use of the Caesarean section to achieve the respect of their male colleagues. Feldberg noted that even in this female oriented hospital there was a high C-section rate and a low maternal and neonatal mortality; an association but not necessarily causal.[69] In the history of childbirth the baby in childbirth and infancy has often been ignored, although there are exceptions.[70] That the medicalization of child birth and the application of science have been of great value and substantially reduced infant mortality is the belief of the majority of the medical profession. Historians have reminded them that other factors played a greater role. Historian Cynthia Comacchio examined the influence of educational programmes, rather than the medicalization of childbirth, in achieving successful childbirth in Ontario 1900-1940. She argued that economic forces, with improved citizen rights, had the

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[68] Wendy Mitchinson, *Giving Birth in Canada, 1900-1950* (Toronto: University of Toronto Press, 2002), 91. Her focus on the mother is summed up in this sentence, "For both midwives and physicians, particularly if they were not Catholic, the survival of the mother was more important than that of the child."

[69] Georgina Feldberg, "On the Cutting Edge: Science and Obstetrical Practice in a Women's Hospital, 1945-1960," in *Women, Health and Nation: Canada and the United States since 1945,* eds. Georgina Feldberg, Molly Ladd-Taylor and Kathryn McPherson. (Montreal & Kingston: McGill- Queen's University Press, 2003), 123-143.

[70] Denyse Baillargeon, *Babies for the Nation: The Medicalization of Motherhood in Quebec, 1910-1970,* trans. W. Donald Wilson, (Montreal: Wilfrid Laurier Press, 2009).

greatest effect on improving maternity health statistics.[71] The historiography of infant mortality in Britain supported her findings. Rosen concluded that in the twentieth century infant mortality dropped, mainly due to control of infections through public health measures, and only then did children become valued with every effort made to produce live babies.[72] Family physician and historian, Irvine Loudon, found that maternal mortality changed little in the early 20th century, and that the observed fall could be equally attributed to improved nutrition and social circumstances and general, not obstetric, medical gains. He found neonatal deaths were related to the parity of the mother, the rise beginning with the third pregnancy, a factor to which Rh disease would contribute.[73] Historian Salim Al-Gailani studied the drive for normal babies and contended that the eugenics movement of the early Twentieth Century, with its goal of a healthy population, stimulated the introduction of antenatal care.[74] Rh disease fits this conclusion.

In Canada the Dominion Bureau of Statistics showed that neonatal mortality hardly fell from 1926 to 1940 and that most deaths occurred in the first week of life. The category,

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[71] Cynthia Comacchio. *Nations are built of Babies: Saving Ontario's Mothers and Children, 1900-1940* (Montreal & Kingston: McGill- Queen's University Press, 1998).

[72] George Rosen, "Historical Trends and Future Prospects in Public Health," in *Medical History and Medical Care: A Symposium of Perspectives*, eds. Gordon McLachlan and Thomas McKeown (Oxford: Oxford University Press 1971), 57-83.

[73] Irvine Loudon, "On Maternal and Infant Mortality, 1900-1960," *Social History of Medicine* 4, 1 (1991): 29-73; Cynthia Comacchio, *Nations are built of Babies. Saving Ontario's Mothers and Children 1900-1940* (Montreal & Kingston: McGill- Queen's University Press, 1998).

[74] Salim Al-Gailani, "Teratology and the Clinic: John William Ballantyne and the Making of Antenatal Life," *Wellcome History* 42 (Winter 2009): 2-4. Rh Disease is a genetic disease and often left the babies that survived with significant mental disability. Prevention of mental deficiency was a major goal of the eugenics movement.

"disease peculiar to early infancy," which included icterus of the newborn, a lethal feature of Rh disease, contributed to 8.6 per cent of the total infant mortality.[75] Certainly overall the evidence is that social programmes such as nutrition and hygienic housing are the most important measures to reduce infant mortality. But medical science is also of value. Historian Anne- Marie Birn using the example of Uruguay stated for infant mortality, "The importance of integrating universalist welfare states with medical measures remains, even as medicine's technical armamentarium has grown."[76] This conclusion is supported by McKeown, the advocate of social medicine, who admitted that medical science had had benefits in some areas of medicine, and he specified preventive and therapeutic measures in the newborn.[77]

Rh Haemolytic Disease of the Newborn.

The culmination of this thesis is the beginning in 1944 of Bruce Chown's study of Rh Haemolytic Disease of the Newborn in Manitoba. Over the next three decades this research programme identified babies suffering from it, treated them, and eventually prevented it. About twelve per cent of marriages by Caucasians matched a Rh positive man with a Rh negative woman and their offspring was potentially affected. In 1944 in

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[75] *A Study in Maternal, Infant and Neo-Natal Mortality* (Ottawa: Published by Authority of the Hon. James A. MacKinnon, M.P., Minister of Trade and Commerce, 1942).

[76] Anne-Emanuelle Birn, "Mortal Questions: Uruguay's Infant Mortality Conundrum," *Wellcome History* 40 (Spring 2009): 2-4. For a fuller account, highlighting social programmes and infant mortality in Uruguay. Anne-Emanuelle Birn, "Doctors on Record: Uruguay's Infant Mortality Stagnation and Its Remedies, 1895- 1945" *Bulletin of the History of Medicine* 82, 2 (2008): 311-313.

[77] Thomas McKeown, "A historical appraisal of the medical task," in *Medical History and Medical Care: A Symposium of Perspectives*, eds. Gordon McLachlan and Thomas McKeown (Oxford: Oxford University Press 1971), 47. By 1971 the benefit of medical technology and science for Rh babies was proven.

Manitoba Rh disease condemned about 120 pregnancies a year to fail, either from stillbirth, or the death of the baby shortly after birth. The burden of Rh disease prior to effective treatment was further revealed by data from England and Wales. Doctor McCurdy, medical practitioner, pointed out that in 1947, 664 infants died of Rh disease as compared with 688 from poliomyelitis, 523 from meningitis and 644 from measles.[78]

By the time the Rh research culminated in the 1970's virtually no babies died from the disorder and if one looked back the research seemed of great value. But historian John Pickstone cautioned against the apparent benefit of such medical innovations in retrospective assessments.[79] This caveat did not apply to Rh research for the researchers were collecting prospective data. A further proviso for not accepting the immediate value of the Rh programme at face value was suggested in an essay by historian Anja Hiddinga who noted that, at one time, obstetricians were not highly respected by their colleagues. She insinuated that obstetricians welcomed the introduction of any new technology because it improved the specialty's image.[80] She might equally have commented on paediatricians' attraction to such treatment advances in their clinical practice for it also gave them respectability. Even if the paediatricians were seeking recognition by their colleagues, it seems highly unlikely that was their motive.

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[78] Robert Nigel Charles McMurdy, *The Rhesus Danger: Its Medical, Moral and Legal Aspects* (London: William Heineman, 1950). Dr McMurdy was a father who had lost an infant to the disease. His book included contraception, surrogate motherhood and abortion as means of preventing Rh Disease all of which were eugenic measures.

[79] John V. Pickstone, "Introduction" *Medical Innovations in Historical Perspective* ed. John V. Pickstone (New York: St. Martin's Press, 1992), 1-16.

[80] Anja Hiddinga, "X-Ray Technology in Obstetrics: Measuring Pelves at the Yale School of Medicine," *Medical Innovations in Historical Perspective* ed. John V. Pickstone (New York: St. Martin's Press, 1992),: 124-145.

Journalist David Zimmerman extolled the research around the world that conquered Rh Haemolytic Disease of the Newborn. He elucidated the discovery of the Rh blood group, the recognition that it caused disease in babies, the development of the treatment of the babies and the culmination of the preventive immunization programme introduced in New York and Liverpool.[81] Behind the science he reported the personalities and too common rivalry of the many researchers involved. More recently the reminiscences of the British workers in the field were published by the Wellcome Institute, as part of its 'Witnesses to Twentieth Century Medicine' initiative, based on a one day symposium, organized by the historian Tilli Tansey.[82] This book followed an iatrocentric and nationalistic form of medical history that bordered on self-indulgence, for the mostly male physicians and scientists involved recounted the history of Rh from a British stand point. The same held true for the many articles on the developments in Rhesus research. Leaders in the field of Rh research published their accounts of their own work with reference to that of others in various medical journals.[83] Dr. Bruce Chown, and his

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[81] David R. Zimmerman, *Rh: The Intimate History of a Disease and Its Conquest* (New York: MacMillan Publishing Co. Inc., 1973).

[82] D.T. Zallen, D.A. Christie and E.M. Tansey, editors, *The Rhesus Factor and Disease Prevention.* Wellcome Witnesses to Twentieth Century Medicine. 22 (London: Wellcome Trust Centre, 2004).

[83] David Wetherall, "Sir Cyril Clarke C.B.E. 22 August 1907- 21 November 2000," *Biographies Members Fellows Royal Society* 48 (2002): 1-85; A. Wegman, R. Glück , "The History of Rhesus Prophylaxis with Anti-D.," *European Journal of Pediatrics* 155, 1 (1996): 835-838; John H. Pearn. "Erythroblastosis fetalis- The Discovery and Partial Elimination of Rhesus Incompatibility- The Origins of Exchange Transfusion in Australia," *Pathology* 26, 2 (1994): 176-182; J.F. O'Sullivan, "The Rhesus Story in Northern Ireland," *Ulster Medical Journal* 52, 2 (1983): 94-100; Cyril Clarke, "Rhesus Haemolytic Disease of the Newborn and its Prevention," *British Journal of Haematology* 52, 4 (1982): 525-535; Douglas Gairdner, "The Rhesus Story," *British Medical Journal* 2 (1979): 709-711; or as chapters in books: Fred H. Allen, " Historical Perspective," in *Rh Haemolytic Disease* eds. Frederic David Frigoletto, et al. (Boston: G.K. Hall

successor, Jack Bowman, as director of the Rh Institute, gave accounts of the Winnipeg work in medical journals, but these have been simply brief reminiscences of what happened.[84] The histories of Rh Disease fit Brieger's description of medical history: "the history of medicine was frequently written by doctors for the service of the profession" and the message given is triumphalist.[85] Another criticism that applied to these histories is that of Sigerist who commented, "We know much about the great medical discoveries but very little on whether they were applied or to whom they were applied."[86] Rosen pointed out the general neglect of the patient's perspective in medical history.[87] The books and articles on Rh disease ignore the experience and viewpoint of mothers who lost their babies, their personal experience as research subjects and their hopes of a cure for their babies and future prevention in subsequent pregnancies. [88] It is trite to simply

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Publishers, 1982), 1-9; E. A. Friedman, " History," *Rh Isoimmunization and Erythroblastosis fetalis,* eds. Allen G. Charles and Emanuel A. Friedman. (New York: Appleton Century Crofts, 1969), 12-28; Fred H. Allen and Louis K. Diamond, " Historical Review," *Erythroblastosis fetalis* (Boston: Little Brown and Company, 1957), 6-8; L.A. Derrick Tovey, "Towards the Conquest of Rh Haemolytic disease: Britain's Contribution and the Role of Serendipity," *Transfusion Medicine* 2, 2 (1992): 99-109.

[84] Bruce Chown, "The Story of the Winnipeg Rh Laboratory," *Bulletin University of Manitoba* 3 (1968): 3-4; John M. Bowman, "Dr. Bruce Chown and the Winnipeg Rh Laboratory: From tragedy to triumph," *Journal of the Society of Obstetricians and Gynaecologists of Canada* 19 (1997): 59-68; J. Bowman, "Historical Overview of Rh Immunization and Haemolytic Disease of the Newborn," *Manitoba Medicine* 62 (1992): 134-136.

[85] Gert Brieger, "The Historiography of Medicine," *Companion Encyclopaedia of the History of Medicine, Volume 1* eds. W. F. Bynum and Roy Porter. (London: Routledge, 1993), 24-44.

[86] Henry Sigerist, "The Social History of Medicine," in *Henry E. Sigerist on the History of Medicine* ed. Felix Marti-Ibanez. (New York: MD Publications, 1960), 25.

[87] George Rosen, "People, Disease and Emotion: Some Newer Problems for Research in Medical History," *Bulletin of the History of Medicine,* 41, 1 (1967): 5-23.

state that Rh research was applied to Rhesus negative women; this still leaves them anonymous. Their story needs to be told another time.

Organization of the Thesis.

The thesis presents the three elements that I argue were necessary for the birth of the Rh research programme. Chapter 1 addresses the first element, that the right person is necessary. Bruce Chown's professional biography revealed that he fitted this when he began the Rh study. He was trained for research, he fulfilled his potential for it, and he became a nationally recognized researcher. The second element, namely the circumstances that influenced the start of the Rh research are covered in Chapters 2 and 3. Chapter 2 describes the origins of medical research funding in Canada from 1916 to 1946 and attributes its start to economic pressures and the demands of a healthy workforce, particularly during war time. The value of medical research for the Canadian armed services was ignored in the First World War but was recognized in the Second. The effect of the discovery of insulin on Canadian medical research is examined. Chapter

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[88] One exception to this generalization is the story of Dr. Ruth Darrow, a family physician, who had lost a baby to erythroblastosis fetalis. She was the first to suggest that the mother had had an immune reaction to the baby and her antibodies had destroyed it. Ruth Darrow, "Icterus gravis (Erythroblastosis) Neonatorum," *Archives of Pathology* 25 (1938): 378-417. Her paper was ignored, and it is tempting to conclude that the male scientific elite dismissed the untested hypothesis of a female family physician. Others felt that Darrow's 40 pages of arduous reading, published in a journal not read by the average paediatrician, was a better explanation for the neglect of it. Heyworth N. Sanford, "Ruth Renter Darrow and the Etiology of Hemolytic Disease of the Newborn Infant," *Journal of the American Medical Women's Association,* 12, 8 (1957): 254. In a later article Ruth Darrow developed her own theory on how the immune reaction damaged the baby and included in scientific language a description of the death and autopsy of her baby 'D'. Ruth Renter Darrow and Josephine Chapin, "Pathogenesis of passive Rh isosensitization in the newborn (Erythroblastosis fetalis)," *Archives of Diseases of Childhood* 73 (1947): 257-278.

3 covers the origins of the medical research enterprise in the Faculty of Medicine, University of Manitoba. The record showed that medical research was virtually non-existent until 1944 when Bruce Chown was instrumental in changing the Faculty's culture from teaching to research. Inevitably the events and people depicted in Chapters 2 and 3 overlap for Manitobans were involved in national developments which in turn affected activity in the Faculty. Chapter 4 introduces the third element, serendipity, for luck can play an important in a person's choice of research and in its success. The reason Chown began the work is established. The chapter ends with a summary of what Chown actually did in the first two years of the Rh Factor research programme and as a postscript what it later achieved. The new knowledge Chown created was the propitious result of the three elements coming together in time and place.

Chapter 1

BRUCE CHOWN: The years 1893-1944.

The subject of this thesis is the Rh Factor research programme begun in 1944. This chapter is devoted to the researcher, Bruce Chown (1893-1986), who initiated it. Bruce Chown's advocacy in the Faculty of Medicine Council, as described in the introduction, demonstrated his significance in the development of medical research in Manitoba. This chapter recounts the life and work of Dr. Bruce Chown from when he entered medical school in 1914 until the start of his research on Haemolytic Disease of the Newborn in 1944. For these thirty years, apart from a few years of war service and post graduate education. He was a leading member of the medical community in Manitoba. During these three decades, support for medical research only slowly emerged in Canada and the Faculty of Medicine of the University of Manitoba. Bruce Chown was the first successful clinician medical researcher in Manitoba. His life in medicine can be divided into three periods that to some extent parallel the three stages of the formation of scientific communities which Gingras identified.[89] In the first, from 1914 to 1939, Bruce Chown pursued his own curiosity and the research for which he had trained. The second was from 1939-1944, when he became a leader in developing research in his own institution, the Faculty of Medicine, and helped provide local resources for it. The third began in 1944 when he embarked on the research on the Rh factor that continued for the rest of his

[89] Yves Gingras, *Physics and the Rise of Scientific Research in Canada* (Montreal & Kingston: McGill-Queen's University Press, 1991), 3-8.

professional life and, for which by 1946, he was a participant in international conferences and publications.

Recently biography is out of fashion as a form of history but has remained of value in medical history. Historian Thomas Hankins proposed that biography provided valuable insight into developments in science.[90] Alison Li used her biography of J. B. Collip to explore the development of medical research in Canada, and Bruce Chown's life's work adds to this picture. To this may be added the observation by the historian Mark Jackson that biography is of value in medical education for, "the lives of good doctors can, and should, be inspirational and instructive."[91] This thesis will show that the professional life of Bruce Chown illustrated the development of medical research in Manitoba and is inspirational and instructive. True biographies are not just confined to the accomplishments and events of the subject's life but should also depict the person's character and personality. Both depend on the records available. For instance 'Chuck' Roland's biography of Archibald Malloch is based on the many personal, but scant professional, records of Malloch.[92] Sometimes the author is fortunate to have access to both professional and personal records. Michael Bliss, historian, had Frederick Banting's laboratory notebooks and papers recording his work on insulin coupled with his personal diaries and the reminiscences of his contemporaries. Henry Best for his filial biography

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[90] T. L. Hankins, "In Defence of Biography: The Use of Biography in the History of Science," *History of Science* 17, 1 (1979): 1-16.

[91] Mark Jackson, "Back to the Future: history and humanism in medical education," *Medical Education* 36, 6 (2002): 506-507.

[92] Charles G. Roland, '*Noted Surgeon, Fine Citizen': The Life of Archibald E. Malloch, MD, 1844-1919* (Montreal: McGill University and American Osler Society, 2008).

of Charles Best had his mother's personal diaries and, since she was inseparable from her husband, a picture of Charles Best's personality, hopes and private life emerges.[93]

Unfortunately the written records of Bruce Chown and his career that he bequeathed to the University of Manitoba Archives consisted mainly of letters and records from his laboratory, predominantly related to Rh factor. These are only supplemented by obituaries and introductions to the honours he received and naturally these are laudatory. However, even when a biographer has sources of information from people with a close relationship to the subject it can be difficult to be sure of their real nature. This was well expressed by Bruce Chown about his own father. When interviewed by Pat Saunderson, the biographer of Henry Havelock Chown, he answered this question about his father, "I try to build an answer to the question 'why did he become the man he did and what was that man'?" Bruce Chown felt that although he had shared home, hearth and meals with his father, he was unsure of the answer.[94] The brief biography of Bruce Chown that follows leaves the same question unanswered.

A glimpse of Bruce Chown's character and personality can be surmised from the appreciation of him on his 75th birthday. It referred to his current research in which he

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[93] Michael Bliss, *Banting: A Biography* (Toronto: McClelland and Stewart, 1984); Henry B. M. Best, *Margaret and Charley: The Personal Story of Dr. Charles Best, the Co-Discoverer of Insulin.* (Toronto: Dundurn Press, 2003). A biography of Charles Best that is more objective would be a valuable addition both to the insulin story and the developments of medical research in Canada. It would complement the Banting and Collip biographies.

[94] Patricia J. Saunderson, *Dr. Henry H. Chown: Biography* (Winnipeg: University of Manitoba Press, 1985);University of Manitoba, N.J. MacLean Health Sciences Library, Henry Havelock. Chown, File 21.4.4. Manitoba.

had broadened his interest in Rh factor to the value of blood grouping in anthropology and genetics in Northern Canada's people. The piece concluded:

> This interest provided him also with chances to exchange views on gardening with Mennonites, to hunt seals with the Eskimos, to see the water-birds on their nesting grounds in the far North, and to embellish his garden with wild flowers from all across America.
>
> His work has always been characterized by scrupulous honesty and penetrating scepticism. To his many friends his outstanding characteristics are his loyalty, his generosity, his warmth and a pervading sense of humour.[95]

One intriguing facet of Bruce Chown's interests, as a young man, was his involvement in the Winnipeg group of spiritualists. He with his cousin and fellow paediatrician, Gordon Chown, took photographs of ectoplasm emanating from the medium during séances.[96] Did this activity fit with his honesty and scepticism or was it an example of his sense of humour? No records of his views on the experience have been found.

Bruce Chown: His family.

Henry Bruce Chown, known as Bruce, was born, 1893, into the medical establishment. His father Henry Havelock Chown was Professor of Surgery at the Manitoba Medical College. Henry Havelock Chown had been born in 1859 and graduated MD from Queen's University, Ontario, in 1880. He came to Manitoba that year, and after some years in practice and further training in Britain, began his academic career in 1885 at the

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[95] Anonymous, "Dr. Bruce Chown- An Appreciation," *Vox Sanguina* 15 (1968): 241-248. A notebook of Bruce Chown in his archives records his interest in such matters during a northern trip. University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Henry Bruce Chown Fond, File 4.

[96] Shelley Sweeney, Archivist, University of Manitoba Archives and Special Collections. She has recently placed these photographs on a web site. //.umanitoba.ca/libraries/archives/Hamilton.shmtl. This dichotomy between Chown as a scientist and spiritualist is unexpected.

medical college as Professor of Anatomy. Bruce was the second son and his brother Charlie, who died from tuberculosis in 1928, after many years of sanatorium treatment, was one and half years older. Bruce Chown's parents were Methodists and his mother took the two brothers to services weekly. Methodism has a reputation for instilling the virtues of hard work and service; a characteristic that Bliss had identified as influencing Frederick Banting.[97] Bruce Chown's father may have had a different spiritual effect; for Bruce Chown concluded that his father was an agnostic, skeptic and cynic.[98] His father was recognized for his devotion to the poor, although he also enjoyed a good drink and cigar at the exclusive Manitoba Club. His mother died in 1916 from pernicious anaemia; a consultation with William Osler, although appreciated, did nothing to halt this untreatable condition.

In 1900, Henry Chown was appointed Dean of the Medical College. Consequently Bruce Chown grew up in a home dedicated to academic medicine. Henry Chown's greatest achievement was improvement of medical education, with the goal of seeing the medical college incorporated as a full faculty of the University of Manitoba, rather than just an independent college and the recipient of its degrees.[99] In 1904 Dean Chown engaged Swale Vincent a physiologist from Edinburgh, followed in 1910 by A. T. Cameron, a

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[97] Michael Bliss, *Banting : A Biography* (Toronto: McClelland and Stewart, 1984), 23-24.

[98] Bruce Chown, in Saunderson, *Dr. Henry H. Chown. Biography*. However, H. H. Chown in his diary, 1882, recorded a considerable depth to his beliefs in Christianity and attendance at church. University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty of Medicine Archives, Henry Havelock Chown Fond, File, 21.4.4.

[99] Ross Mitchell, "Manitoba Surgical Pioneers: James Kerr (1849-1911) and H.H. Chown (1859-1944)" *Canadian Journal of Surgery* 3 (1960): 281-285.

biochemist from the same place. Henry Chown's vision for pedagogy was further supported by his recruitment of a cadre of outstanding teachers also from Edinburgh; Alexander Gibson in 1911 followed soon by J. C. B. Grant in anatomy and William Boyd in pathology.[100] Cameron, who unlike the others remained in Manitoba, was much involved in the administration of medical research within the Faculty and influenced its conduct for many years.

Bruce Chown's Education**.** 1893-1925.

Bruce Chown went to Alexandra School in Winnipeg but nothing is recorded of his schooldays. Subsequently he received his Bachelor of Arts degree at McGill University in 1914.[101] He returned to Winnipeg and entered the MD programme at the medical school in the fall of 1914. Commencement that year coincided with events that were to annihilate many of his generation of young men, or at least change the next years of their lives in an unimaginable way. The First World War affected Canada considerably; if nothing else over 600,000 people volunteered to serve King and Country. On Christmas Eve 1915 Bruce Chown enlisted and, unlike many fellow medical students who served in the medical corps, he joined the artillery and was commissioned as a lieutenant.[102] Nearly

[100] Ian Carr and Robert E. Beamish, *Manitoba Medicine: A Brief History* (Winnipeg: University of Manitoba Press, 1999).

[101] Personal e-mail, Andra Syvanen, Reference Assistant, McGill University Archives, Montreal.

[102] Library and Archives Canada, http://data2.archives.ca/cef/ren2/021556a.gif , Attestation Paper, 24 December 1915, 66 medical students, 219 graduates and 24 teaching staff enlisted; J. Ross Mitchell, "Manitoba Medical graduates and Undergraduates in War. 1914-1918," *Manitoba Medicine* 63 (1993): 130-134.

44,000 Canadians served in the Artillery of whom over 2,500 were killed and 8,000 wounded.[103] Chown described the experience as,

> Four years on a government sponsored tour of Belgium and France, an introduction to a lot of horses leaving him with indifference, even antipathy, to them.[104]

The war diary of his unit, the 10th Brigade, Canadian Field Artillery, revealed what he concealed.[105] The unit landed in Britain in April 1916, transferred to France four months later and entered the fray within two weeks. The field artillery was indeed horse drawn and supplied the forward batteries of the artillery. The brigade served at Vimy and Passchendaele. In September 1917 Bruce Chown was awarded the Military Cross for action as a Forward Observation Officer.[106] Bruce Chown was discharged from the army early in 1919 and returned to his medical studies. He was also active in student politics.[107] In 1922 Bruce Chown graduated MD; he had won no student awards. He chose paediatrics for his career, perhaps influenced by his cousin Gordon Chown, who

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[103] Canadian Artillery Museum, Shilo, Manitoba, Information Leaflet.

[104] Quote cited by John M. Bowman, "Dr. Bruce Chown and the Winnipeg Rh Laboratory: From tragedy to triumph," *Journal of the Society of Obstetricians and Gynaecologists of Canada* 19 (1997): 59-68. One expects that the experience of serving in the First World War would have had some effect on Bruce Chown. The risk of premature death, the responsibilities and the team work would mould character. As seems to be so common he never expressed his views, other than the ironic comment quoted.

[105] Library and Archives Canada, War Diaries of the First World War, 10th Brigade Canadian Field Artillery, Militia and Defence, Series III-D3, Volume 4970. http:www.collectionscanada.gc.ca/archiavanet/020 152_e,htm.

[106] Supplement to the London Gazette, 17 September 1917, http:www.london-gazettte.co.uk/issues/30287/supplements 9590.

[107] In 1921 Bruce Chown was elected president of the University of Manitoba Student Union (UMSU) which had formed in 1919. One can postulate that as president of UMSU Bruce Chown would have come into contact with the university president Dr. James MacLean but no record of their interacting at this time is apparent.

was already a paediatrician.[108] In 1921 the news that Canadian researchers had discovered insulin and that laboratory research could save the lives of desperately sick children must have inspired many medical students. Bruce Chown chose to train where he could obtain experience in research and laboratory disciplines. He followed Gordon's path to Babies' Hospital at Columbia[109] and was intern to the eminent Emmett Holt Sr., who was renowned for his research.[110] Bruce Chown began his research career under him and was co-author of two studies on Calcium and Phosphate metabolism.[111] The metabolism of these elements and their relation to kidney function were to be Chown's main area of study and publications for the next fifteen years. To further his academic training, Chown transferred next year to the Harriet Lane Home of Johns Hopkins

[108] Gordon Chown was born 1888 graduated MD from Queen's in 1911 and interned at Babies' Hospital, Columbia University, New York. He came to Winnipeg and was appointed to the Children's Hospital in 1913 and acted as pathologist as well as clinician. With the First World War he volunteered and served overseas as a medical officer and was awarded the Order of the British Empire for his work. After his return to the Children's Hospital of Winnipeg he became a highly respected practicing clinician. University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Gordon Chown Fond.

[109] Personal communication with Stephen E. Novak, Head, Archives and Special Collections, Augustus C. Long Health Sciences Library, Columbia University Center. 2008. During that time Bruce Chown showed that he could be observant, for the story is told of a case of a child with chronically swollen fingers and toes, which Emmett Holt diagnosed as a rare syndrome. Preparing the child for a photograph Bruce Chown cleaned the extremities and found that the cause of the swelling was hair tightly wound round each; a few snips and all was cured. Val Werier, "Bruce Chown," *Winnipeg Tribune,* 29 December 1967.

[110] Saul Krugman, "The American Pediatric Society Presidential Address to the American Pediatric Society, May 18, 1973," *Pediatric Research* 7, 10 (1973): 846-852.

[111] L. Emmett Holt, Jr., Victor K. La Mer and H. Bruce Chown, "Studies in Calcification: I. The Solubility Product of Secondary and Tertiary Calcium Phosphate Under Various Conditions," *Journal of Biological Chemistry* 64 (1925): 509- 565; L. Emmett Holt, Jr., Victor K. La Mer, H. Bruce Chown and with the assistance of I. Gittleman, "Studies in Calcification: II. Delayed Equilibrium Between the Calcium Phosphates and its Biological Significance," .*Journal of Biological Chemistry* 64 (1925): 567- 578.

University, Baltimore, where he served under its head, the researcher John Howland. [112] He completed his postgraduate education in 1924 at Cornell University, New York, where he specialized in pathology, under Howland's protégé Oscar Schloss.[113] Thus Bruce Chown was the first fully trained paediatrician in Western Canada, an accomplished laboratory pathologist and the first trained research clinician. He had studied under leading academic paediatricians and had prepared himself to emulate their careers. Bruce Chown, now well qualified was attractive to any institution ambitious to enhance its reputation with research. The Children's Hospital of Winnipeg's board of directors determined to recruit him so took steps to meet his request to establish a biochemical, pathologic and metabolic laboratory at the cost of two thousand dollars for equipment. He asked for a salary of twelve hundred dollars in addition to what they had

[112] Personal communication with Marjorie W. Kehoe, Accessioning Archivist, Alan Mason Chesney Medical Archives, Johns Hopkins Medical Institutions, 2008. It is not recorded if he spent his time there on the wards, or in service laboratories or in research. At this time Johns Hopkins was considered the model for all North American medical schools for its curriculum was founded on the laboratory based German medical education. Its first Dean, William Welch, was a renowned bacteriologist who had studied in Germany. The Harriet Lane Home was the first pediatric clinic attached to a teaching hospital in the United States –John Howland was its head physician.

[113] Personal communication with Jim Gehrlich, Head of Archives, Medical Center Archives, New York-Presbyterian/Weill Cornell; Jane May, "Profiles: Bruce Chown," *Canadian Medical Association Journal* 124, 8 (1981): 1079.

paid Dr. William Boyd,[114] their current pathologist who had replaced Gordon Chown after he had left for military service in 1914. The board supported his terms. [115]

Professional Life- Research and Clinical, 1925-1939.

Bruce Chown began his career at the Winnipeg Children's Hospital in 1925. The Children's Hospital was then in the North End of Winnipeg, approximately three miles from the Medical College and Winnipeg General Hospital that were adjacent to each other. He was appointed to the Faculty of Medicine with the rank of Demonstrator in the Department of Medicine, later raised to Lecturer in 1934.[116]

As the pathologist he provided a wide range of laboratory tests including chemistry, microbiology, and haematology and he performed the autopsies. He also retained his clinical practice. In 1927 the Winnipeg Medical Society awarded him the prize for the best medical essay by recent graduates; his subject was, "Pyelitis in Infancy; a Pathological Study."[117] He took an active part in local medical politics as secretary of the Manitoba Medical Association from 1927 to 1929. During this time he proposed a

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[114] Ian Carr, *William Boyd: Silver Tongue and Golden Pen* (Markham: Associated Medical Services/Hannah Institute & Fitzhenry & Whiteside, 1993). No mention of the Children's Hospital nor of Bruce Chown is made in this biography. Boyd was paid $4,000 on appointment to the Chair of Pathology in 1915; whether the Children's Hospital contributed to or supplemented this is unrecorded.

[115] Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33 Box 6, Minutes of Board of Directors, 8 Sept 1925.

[116] He received no further promotion until raised to full professor in 1946 when the Department of Paediatrics was created.

[117] "Medical Notes," *Manitoba Medical Bulletin* 74 (October 1927):18.

Medical Historical Provincial Committee be formed as a branch of the CMA Historical Section.[118] In 1930 he opened an office for his clinical practice in the Medical Arts Building but his heart was not in it, for he was bored by seeing minor illnesses that, in his opinion, could easily be managed at home by the mother.[119] He continued his research on Calcium and Phosphate metabolism and in 1936 described the first case of hypophosphaturia.[120] In 1937 Bruce Chown gave up private clinical practice and became full time pathologist to the Children's Hospital, although he was still consulted and taught on the patients in the wards. Now supported by a salary and no longer dependent on clinical fees, he devoted his time to the laboratory and this enhanced his ability to undertake research. He published thirteen papers and their excellence was recognized in 1939 when the National Research Council reviewed medical research across Canada.

Professional Life- Research Development and Administration, 1940-1944.

His ambition to increase his research work was curtailed when the Superintendent of the Children's Hospital, Dr. Williams, was called up for military service in 1940. The Hospital Board invited Bruce Chown to take his place, although it expressed concern about his many other duties.[121] Next month he was appointed acting Superintendent

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[118] "Executive Meeting," *Manitoba Medical Bulletin* 88 (December 1928): 5. Bruce Chown's interest in the History of Medicine led him to obtain a large number of historical medical books from the New York Academy of Medicine and this is the nucleus of the rare books collection of the N. J. MacLean Health Sciences Library.

[119] Frank Rasky, "The Doctors," in *Canadian Magazine Supplement, Winnipeg Tribune*, 25 March 1967.

[120] Bruce Chown, "Renal Rickets and Dwarfism: A Pituitary Disease," *British Journal of Surgery* 23, 91 (1936): 552-566.

[121] Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 19 April 1940.

having agreed to reduce his own clinical and research work.[122] Nonetheless he still found time to serve in the military.[123] He actively supported others in clinical and research work; for instance he organized a visit by Sister Elizabeth Kenny and her treatment of poliomyelitis, [124] and supervised research on sleeping sickness (encephalitis).[125] Chown acquired even more responsibilities in the Faculty, internationally and provincially.[126] In 1942 he became a member of the board of the newly formed Manitoba Institute of

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[122] Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 14 May 1940. Also Bruce Chown , "I will discontinue most of my research work and also give up my teaching appointment at the University. I will require the continuance as a technician of Miss Marjorie Norris, who heretofore has been employed as Research technician: salary $175 a month.
His first step as Superintendent was to employ married women to work in the hospital for the duration of the war. Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 11 June 1940.
Although he had reduced his research work he still took on duties away from the hospital for in early 1940 Chown was asked to join the army as an instructor in the artillery and in June he was appointed Second in Command of an Artillery Unit. He requested a leave of absence to serve. It is not recorded if this was granted. Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 16 June 1940.

[123] Anon., "2/13th Battery Fully Organized," *The Winnipeg Evening Tribune* 24 August 1940: 4. Now promoted to Major, Bruce Chown organized a battery of the Fifth Field Brigade.

[124] Archives of Manitoba, Winnipeg Children's Hospital Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 9 September 1940. Sister Kenny, an Australian nurse introduced the heresy of active movement of limbs paralyzed by poliomyelitis. Bruce Chown, "Kenny treatment of poliomyelitis," *Canadian Public Health Journal*. 33 (1942): 276-277.

[125] Archives of Manitoba, Winnipeg Children's Hospital Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 18 November 1941. Chown obtained Rockefeller Foundation funding to send a technician to learn the tests for the disease.

[126] In 1941 he was added to the postgraduate committee and in 1943 he joined the Committee on Admissions to the Faculty of Medicine. In 1941 he chaired the Children's Hospital section of the American Hospital Association meeting in St. Louis, Missouri, and in May he was appointed to the Social Agencies Board of Winnipeg. Archives of Manitoba, Winnipeg Children's Hospital Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 13 January and 12 May 1942.

Medical Education and Research that was to become a valuable source of funding in the province.[127] His most important task was in early 1943 when the Board initiated plans to move the Children's Hospital, which was now an aged and infirm building, to the proximity of the Winnipeg General Hospital and the Medical College. Bruce Chown was appointed chairman of the Children's Hospital committee planning the move.[128] In May 1943 he joined the Winnipeg Medical Centre Coordinating Committee, which proposed that several Winnipeg hospitals be placed on one site in proximity to the Winnipeg General Hospital and Medical College.[129] In September 1943 Dr. Williams was 'demobbed' and returned as Superintendent of the Children's Hospital. The board re-appointed Bruce Chown to his former post as pathologist but also expected him to conduct ward rounds, work in outpatients, teach and research.[130] In December 1943 the Board of the Children's agreed to send Bruce Chown to Eastern Canada and the United States to study Children's Hospitals, as part of the planning process for the new Children's Hospital in Winnipeg.[131] In March 1944 he went on his travels and it was, whilst doing this, that he visited the Children's Department in Boston and by chance met

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[127] University of Manitoba Archives and Special Collections, Paul H. T. Thorlakson Fond, MSS 68 Box 9, File 2, "Memorandum, Manitoba Institute for the Advancement of Medical Education and Research."

[128] Archives of Manitoba, Winnipeg Children's Hospital Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 13 April 1943.

[129] This committee was chaired by Dr. P. H. T. Thorlakson, a surgeon who was the instigator of the plan to amalgamate the Winnipeg hospitals and Bruce Chown was elected vice-president.

[130] Archives of Manitoba, Winnipeg Children's Hospital Fond, MG10 B33, Box 7, Minutes, Board of Directors, 13 September 1943. His salary was $5,500 per annum and in 1941 he had a bonus of $200.

[131] Archives of Manitoba, Winnipeg Children's Hospital Fond, MG10 B33, Box 7, Minutes, Board of Directors 1938-1942, 21 March 1944.

Dr. Lou Diamond, a leading expert on Rh Disease. They agreed to cooperate in studies on the Rh factor.

CHAPTER 2

THE FUNDING OF MEDICAL RESEARCH IN CANADA. 1900-1946.

This chapter addresses the Canadian circumstances which affected medical research in the Faculty of Medicine. It recounts how the provision of funds for medical research developed in Canada. Scientific research was largely neglected in the country, apart from the well-funded McGill University and the University of Toronto, until the Federal Government invested in it by founding the National Research Council (NRC) in 1916. Significant support for medical research lagged behind by over twenty years. Within Canada no major private funding was available to offset this deficiency although such American Foundations as the Rockefeller often supported Canadians.[132] The NRC favoured industrially applicable research in physics, chemistry and agriculture which could be applied to the prosecution of the war. Medical research that might have benefited the injuries and illnesses of war was ignored. The reason for the neglect of medicine is unclear although the British North America Act, that made health a provincial responsibility, was cited as an explanation. The 1921 discovery of Insulin by Frederick Banting and Charles Best placed Canadian medical research on the world stage but no initiative for state funding of medical research emerged. Some private funding was raised to honour the discoverer, Banting. The first medical research assisted by the NRC was for tuberculosis, which was perceived as a major threat to the health of the workforce. Only when Banting was invited to join the NRC board in 1936 did the NRC

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[132] Marianne Fedunkiw, *Rockefeller Foundation Funding and Medical Education in Toronto, Montreal and Halifax* (Montreal & Kingston: McGill- Queen's University Press, 2005).

begin to acknowledge the need to develop medical research. By 1938 the NRC accepted a responsibility for it and organized an administration for medical research. The next year the outbreak of the Second World War stimulated the Federal government to increase funding for medical research which focussed on the hazards of war.

Private Funding for Medical Research in Canada.

Shryock deemed 1895-1940 in the United States as the era of private funding of medical research and John D. Rockefeller (1902) and Andrew Carnegie (1906) are prime examples of the patrons involved in this era.[133] No equivalent Canadian philanthropist stepped forward to support medical education or research nationally. Wealthy Canadians did fund some local research projects; as for example the Eaton family at the University of Toronto,[134] and Lord Strathcona for the establishment of the Faculty of Science, University of Manitoba.[135] Luckily, the Rockefeller and Carnegie Foundations provided funds to Canada. John D. Rockefeller himself instigated a grant to Canadian Medical Schools as a personal gift in 1919,

> My attention has been recently called to the needs of some of the medical schools in Canada, but as the activities of the General Education Board are by its charter limited to the United States I understand no part of that gift may be used for Canadian schools. The Canadian people are our near neighbours. They are closely bound to us by ties of race, language and international friendship: and they have without stint sacrificed themselves- their youth and their resources –to the end that

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[133] Richard H. Shryock , *American Medical Research Past and Present* (New York: The Commonwealth Fund, 1947), 9-39.

[134] Marianne Fedunkiw, "'German Methods,' 'Unconditional Gifts,' and the Full-time System: The Case Study of the University of Toronto, 1919-23," *Canadian Bulletin of Medical History* 21, 1 (2004): 5-39.

[135] University of Manitoba Archives and Special Collections, Minutes of the University Council III, (1904), 544-546.

> democracy might be saved and extended. For these reasons if your Board should see fit to use any part of this new gift in promoting medical education in Canada such action would meet with my very cordial approval.[136]

At a subsequent meeting of the Foundation the sum of $5,000,000 was set aside for use in Canada and disbursed in 1920. That year, the Foundation noted the emigration of Canadian doctors to the United States and that Canada needed 300 new doctors per annum and this donation was expected to increase the number of graduates.[137]

In 1921/1922 the team of Frederick Banting, Charles Best, helped by J. B. Collip and J. R. McLeod, at the University of Toronto, discovered, produced and showed that insulin could control diabetes. As Bliss put it "two inexperienced researchers in a city and country which had no particular stature in the world of medical research"[138] had made a major medical discovery that astounded the world and inspired Canadian medical research.[139] To honour Frederick Banting's work a group of eminent citizens led by Sir William Mulock, Chancellor of the University of Toronto set up the Banting Foundation in 1925 and received donations from the public of nearly half a million dollars from all over the country.[140] The purpose of the fund was to support both Frederick Banting in his

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[136] George E. Vincent, "President's Review," *Rockefeller Foundation Annual Report 1919.* (New York: Rockefeller Foundation, 1919), 43.

[137] George E. Vincent, "President's Review," Rockefeller Foundation Annual Report 1920. (New York: Rockefeller Foundation, 1920), 15.

[138] Michael Bliss, *The Discovery of Insulin (Toronto: McClelland and Stewart*, 1982), 13.

[139] Alison Li. "Expansion and Consolidation: The Associate Committee and the Division of Medical Research of the NRC, 1938-1959," *Scientia Canadensis* 15, 2 (1991): 89-104.

[140] The Banting Research Foundation, http:// www. Utoronto.ca/bantresf/; The Banting Foundation received support from across Canada for when the Faculty of Medicine research committee, University of Manitoba solicited support from a local successful

own work, as well as young Canadian researchers who lacked other sources.[141] Banting, Best and Collip also received considerable royalties from the sales of insulin and used these for their research endeavours.[142] Otherwise, in Canada researchers were dependent on their university, medical college or hospital for support of medical research.

Public Funding of Medical Research: The Federal Government of Canada.

The National Research Council (NRC) 1916-1924.

The Federal Government established the NRC in 1916 with the purpose of applying the physical sciences to problems faced by industry mostly engaged in war work. The NRC organized scientific research in Canada by forming Associate Committees in various disciplines. These brought together experts in that field who then developed priorities and helped provide grants to university based researchers to tackle the problems. The next step was to build the NRC laboratory in Ottawa (1932) where physical sciences research was carried out on site.[143]

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business, Great West Life, they were declined, as it had already given money to the Banting Foundation, University of Manitoba Faculty of Medicine Archive, N.J. MacLean Health Sciences Library, Faculty of Medicine Research Committee, File 10.2.2 (1), Letter, 9 July 1925.

[141] Michael Bliss, *Banting: A Biography* (Toronto: McClelland and Stewart, 1984), 153.

[142] Michael Bliss, *The Discovery of Insulin (Toronto: McClelland and Stewart*, 1982), 240.

[143] Wilfrid Eggleston, *National Research in Canada: The NRC, 1916-1966* (Toronto: Clarke Irwin & Co. Ltd., 1978), 55-61; Mary VanBuskirk, *1924 to 2009: The NRC Canada Institute for Scientific and Technical Information* (Ottawa: National Research Council Canada, 2009).

In Canada, focusing on physics, Gingras concluded we know little of how scientific research began in Canadian universities but concluded that the impetus of post-graduate education induced such universities as McGill and Toronto to pursue research programmes and to apply for grants from the NRC.[144] Physics dominated NRC research funding.[145] The NRC funded agricultural research for such threats as rust disease of wheat which was a major export to Britain.[146] Economic forces, not pure science, were the motivation for the public funding of scientific research in Canada. Inexplicably no medical research programs were developed to keep the military healthy, although the importance of research for disease such as typhoid fever and wounds must have been learnt by Canada in the Boer War. In the First World War at least some Canadian physicians were seconded to British medical research teams.[147]

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[144] Yves Gingras, "Financial Support for Post-graduate Students and the Development of Scientific Research in Canada," in *Youth, University and Canadian Society: Essays on the Social History of Higher Education.* eds. Paul Axelrod and John G. Reid. (Montreal & Kingston: McGill- Queen's University Press, 1989): 301-319.

[145] Yves Gingras, "Table 3.2," *Physics and the Rise of Scientific Research in Canada* (Montreal & Kingston: McGill-Queen's University Press, 1991), 69. Gingras found that for 1917-1937 most funding was awarded to physics research ($155,548) while medicine ranked 13th ($1400). The related medical disciplines of biochemistry, bacteriology and microbiology did better. Veterinary medicine received $5000. Over the same period Table 3.1 revealed research grants were most to Toronto followed by McGill, Alberta, Saskatchewan and Manitoba 5th. The ranking in the West may reflect the fact that the presidents of Alberta and Saskatchewan universities were physicists with the former a chair of the NRC.

[146] Mel W. Thistle, *The Inner Ring: The Early History of the National Research Council of Canada* (Toronto: University of Toronto Press, 1966), 142; Wilfrid Eggleston, *National Research in Canada: The NRC, 1916-1966* (Toronto: Clarke Irwin & Co. Ltd., 1978), 29-81.

[147] C. Peter W. Warren, "The Introduction of Oxygen for Pneumonia as seen through the Writings of Two McGill University Professors, William Osler and Jonathan Meakins," *Canadian Respiratory Journal* 12, 2 (2005): 81-85. In 1915 Meakins was seconded from the

NRC. Medical Research 1924-1935.

The first identifiable foray into medical research at the Federal level was when the NRC formed the Associate Committee on Tuberculosis in 1924.[148] The annual report of that year noted,

> For several past years there has been a steadily growing conviction that sufficient attention has not been paid, in Canada, to the solution of tuberculosis problems through research.[149]

Tuberculosis warranted a committee as much for economic as for beneficent reasons, for tuberculosis was the commonest cause of illness in industrial workers. As recounted by Feldberg, research in all medically related fields was to meet the needs of industry. The NRC had appointed an Associate Committee on Industrial Fatigue in 1919 to increase productivity in the workplace. Microbiology concentrated on food production problems in agriculture and the medicinal properties of plants for the pharmaceutical industry. The Committee on Industrial Fatigue was reconstituted as the Associate Committee on Industrial Hygiene that focussed on the living conditions and the nutrition of workers and this was eventually transferred to the Dominion Department of Health.[150]

McGill medical contingent to a British research team studying the effects of poison gas on the lungs and the value of oxygen treatment.

[148] Georgina Feldberg, "The Origins of Organized Canadian Medical Research: The National Research Council's Associate Committee on Tuberculosis Research, 1924-1938," *Scientia Canadensis* 15, 2 (1991): 53-69.

[149] National Research Council of Canada, Report of the President (1924-25), 17.

[150] Georgina Feldberg, "The Origins of Organized Canadian Medical Research: The National Research Council's Associate Committee on Tuberculosis Research, 1924-1938," *Scientia Canadensis* 15, 2 (1991), 55.

The Associate Committee on Tuberculosis was formed after a questionnaire had been sent to 53 laboratories and institutions associated with work on tuberculosis. Following that a 'small committee of gentlemen' was created. The committee addressed human disease as well as the bovine form that bedevilled cattle farming. The committee consisting of experts of high repute who worked well together and were rewarded with one of the largest budgets ($12,000) of the NRC.[151] The tuberculosis committee solicited research proposals from across the country and funded those, which fitted with their objectives, often awarding their own proposals. The committee was most supportive of research into Bacille Calmette-Guérin (BCG) vaccine as a measure of prevention.[152]

The NRC had provided a few grants for other medical research. In 1922 there were grants to Prof. R. H. Clark (UBC) for cultivation of medical plants, Prof. J. J. R. MacLeod (Toronto) for studies of blood and fatigue. From 1922 to 1924 Prof. Frank Allen (Physics, Manitoba) received funding for his studies of colour vision but this was classified as biophysics. In 1925 Prof. A. T. Cameron (Biochemistry, Manitoba) was supported for studies on the glucosides of plants.[153]

NRC. Medical Research 1936-1946.

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[151] Georgina Feldberg, "The Origins of Organized Canadian Medical Research: The National Research Council's Associate Committee on Tuberculosis Research, 1924-1938," *Scientia Canadensis* 15, 2 (1991), 53-54

[152] Mel W. Thistle, *The Inner Ring: The Early History of the National Research Council of Canada* (Toronto: University of Toronto Press, 1966), 285-288.

[153] Library and Archives Canada, NRC Fond, KG 77, File 4A 2-12 vol. 2, Miscellaneous memoranda. Collip also undertook studies on plant material for alternatives to insulin to control diabetes.

In 1936 the president of the NRC, General A. G. L. McNaughton, invited Frederick Banting to join the board of the NRC.[154] McNaughton, well grounded in physics, had greater farsightedness than his predecessors for what might be done for medicine at the NRC. The implication of his invitation is that he envisioned increased support for medical research and Banting agreed to join the NRC on condition that medical research became a recognized responsibility of it. In 1936 he drafted tentative proposals for medical research as a basis for preliminary discussion. These were sent to the presidents of the Canadian Medical Association (CMA) and Royal College of Physicians and Surgeons of Canada (RCPSC). In January 1937 the CMA appointed a special committee of its members to consider the subject and prepare a memorandum. The next month a meeting of representatives of the CMA, RCPSC, the Department of Pensions and National Health and the NRC met in Ottawa to consider the CMA proposal.[155] The CMA committee held further meetings and supported the idea and in June 1937 the CMA resolved its support for the proposals.[156] Meetings were held by various representatives of those involved with the Minister of Pensions and National Health. Sir Frederick Banting and Major-General McNaughton conferred with these players and the NRC set aside $7,500 for medical research. In October and again in December 1937 the various parties

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[154] G. H. Ettinger, "The Origins of Support for Medical Research in Canada," *Canadian Medical Association Journal* 78, 7 (1958): 471-474. Whether McNaughton had in mind that the NRC would enter the field of medical research or that Banting was simply a renowned researcher is not recorded.

[155] National Research Council of Canada, "Preliminary Steps in Organization," *Conference on the Organization of Medical Research in Canada. Document No. 1. Aims and Objects of the Proposed Associate Committee on Medical Research by the Preparatory Committee* (Ottawa: NRC, February 1937).

[156] Canadian Medical Association Archives, Canadian Medical Association Executive, Ottawa, Minutes, 18 & 19 June 1937.

met again in Ottawa and decided that the next step was to invite 60 to 70 delegates from across the country to Ottawa to examine the organization of medical research in Canada and make recommendations.[157] This meeting was arranged for February 1938. Professors A. T. Cameron, (Biochemistry), and F. Cadham, (Microbiology), represented the Faculty of Medicine, University of Manitoba, and there was a representative from the Manitoba Department of Health and Public Welfare. All delegates endorsed the plan to form an Associate Committee for Medical Research and Sir Frederick Banting was proposed as chairman. Immediate rapid progress was not anticipated; but steady growth and acquisition of funds was the aim. McNaughton and Banting asked for modest funding while the Deputy Minister of the Department of Pensions and National Health favoured a large sum of up to $100,000.[158] McNaughton pledged support. Some months later the first conference of what was to become the Associate Committee on Medical Research was held.[159] The proceedings of the conference pointed out that France had had its Académie de Médecin since 1820, the British a Medical Research Council since 1913 and the United States a medical division of its National Research Council since 1916, while South Africa had had a national organization for medical research since 1912 and

[157] Records Office, NRC, "Organization of Medical Research in Canada: Proceedings of a Preliminary Conference," 28 October 1937; Records Office, National Research Council of Canada (NRC), "Proceedings of the Second Meeting of the Preparatory Committee," 18 December 1937.

[158] Alison Li. "Expansion and Consolidation: The Associate Committee and the Division of Medical Research of the NRC, 1938-1959," *Scientia Canadensis* 15, 2 (1991): 89-104.

[159] Records Office, NRC, "Proceedings of the Conference on the Organization of Medical Research in Canada," 18 February 1938.

India since 1935.[160] There was considerable debate as to the need for a national medical research organization, with fears expressed that it might simply produce more bureaucracy than actual research. The main point of contention was whether medical research should be a free standing body rather than a branch of the NRC.[161] The long term hope of McNaughton was that an autonomous Medical Research Council might arise, but not yet. Certainly all delegates agreed that the lack of funds was a major handicap. Banting remarked that a further concern was that trainees who went to the United States for research training did not return because they became accustomed to well-endowed facilities. Better that they went to Britain which left them content to work in Canada's small and ill equipped laboratories. Recruiting to the Maritimes and the West was particularly hard.[162]

Following this conference the NRC formed the Associate Committee on Medical Research in 1938. It was chaired by Sir Frederick Banting and had four ex officio members and eleven selected members, few of whom were researchers, including Dr. P. H. T. Thorlakson from Manitoba. J. B. Collip was added and in September 1939 was appointed vice-chairman. Dr. C. B. Stewart was made full-time Assistant Secretary. The Associate Committee moved quickly and held its first meeting on 6 May 1938. The budget was $55,000 of which $25,000 was still devoted to tuberculosis. Researchers

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[160] Records Office, NRC, "Proceedings of the Conference on the Organization of Medical Research in Canada," 18 February 1938, Appendices 9 and 10.

[161] Alison Li. "Expansion and Consolidation: The Associate Committee and the Division of Medical Research of the NRC, 1938-1959," *Scientia Canadensis* 15, 2 (1991), 89.

[162] Records Office, NRC, "Proceedings of the Conference on the Organization of Medical Research in Canada," 18 February 1938, 38.

applied for support and small grants were disbursed.[163] The Associate Committee on Tuberculosis was disbanded and its work folded into the Associate Committee on Medical Research. Although considerable attention was paid to the organization of the British Medical Research Council (MRC), the Canadians rejected a central national medical research institute like the MRC or the American National Institutes of Health (NIH). There was a consensus that the policy of funding "a small amount of money expended in individual grants would give large returns in valuable research."[164] The representatives of each medical school thus looked after their own interests, for they believed in the importance of medical research even if their own school did little. Bruce Chown applied for a grant for his calcium research to the Associate Committee's first competition, but was not successful that year.[165]

The next task of the Associate Committee, in late 1938, was to determine what medical research was actually occurring in Canada. To that end a cross country survey by questionnaire was undertaken to catalogue the activities in the universities and other institutions. Subsequently site visits were arranged with both Banting and Stewart spending time at each place. The findings of the survey were published in early 1939. Both the facilities in Winnipeg and Brandon were included fitting with Banting's endorsement of the policy that medical research not be centralized and due consideration

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[163] Records Office, NRC, "Proceedings of the First Meeting of the Associate Committee on Medical Research," 6 May, 11.

[164] Records Office, NRC, "Proceedings of the Third Meeting of the Associate Committee on Medical Research," 27 - 28 February 1939, 8.

[165] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, Box 17, File 4, Office of the Dean, Faculty of Medicine, Submitted research projects, 18 February 1938.

given to smaller centres.[166] Contemporaneously McNaughton emphasized that the grants supplemented the usual funding of an institution and these were not to replace nor reduce this.[167] In 1939 Bruce Chown received a small NRC grant for his study "Interrelationship of Thymus and Parathyroid Glands." [168] He also co-applied to the NRC for a study of "The relationship of vitamin D and calcium in the pregnant woman's diet to calcification of the foetal skeleton." But for this he asked not to be named director, because of his other NRC grant. This study was performed at the Grace Hospital, Winnipeg's largest obstetrical unit and the hospital in which, five years later, Chown was to start much of his Rh Factor research on the babies born there.

As early as 1937 Banting began to consider the future role of the NRC in wartime, reflecting the perceived threats from Germany.[169] The outbreak of the Second World War in September 1939 justified such foresight and put all current plans of the Associate Committee on Medical Research on hold. From now medical research, in coordination with the British Medical Research Council, became directed to the needs of the war. Four sub-committees were set up dealing with infections, shock and blood substitutes, surgery, and industrial hygiene and medicine. Large numbers of university staff devoted their

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[166] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, Box 17, File 4, Letter from Frederick Banting to Paul H.T. Thorlakson, 26 April 1939.

[167] Library and Archives Canada, NRC Fond, KG 77, File 4A 2-12, vol. 2, Letter from A. G. L. McNaughton to Dr. L. W. Douglas, Principal McGill University, 24 November 1939, Miscellaneous memoranda.

[168] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty of Medicine Research Committee 10.2.2 (5), Minutes.

[169] Michael Bliss, *Banting: A Biography* (Toronto: McClelland and Stewart, 1984), 232-233.

efforts to research in these fields, while other areas of activity addressed the needs of aviation medicine, naval medicine and nutrition. Certain peace time research support continued, for instance, in tuberculosis.[170] The Canadian and British medical researchers shared information and made exchanges, including by trans-Atlantic travel. On such a flight Sir Frederick Banting was killed in a crash. Collip succeeded him as chair of the Associate Committee. Thorlakson was active on the Surgery Committee which issued a report on Prevention of Wound Contamination.[171] Thorlakson recommended that Bruce Chown be included in the work of the burns section but there is no evidence that Chown took an active part. [172]

In 1943 Dr. A. E. Archer, President of the Canadian Medical Association, suggested to the Associate Committee that the Federal Government include provision for public health research in its proposed National Health Insurance Bill. The Department of Pensions and National Health envisioned hosting its own research program. In rebuttal the Associate Committee recommended that a large sum of money would be needed to investigate the needs of the civilian population and this should be entrusted to the NRC.[173] This discord

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[170] G. H. Ettinger, *History of the Associate Committee on Medical Research: National Research Council, Ottawa, 1938-1946* (Ottawa: National Research Council of Canada, 1946), 9.

[171] G. H. Ettinger, *History of the Associate Committee on Medical Research: National Research Council, Ottawa, 1938-1946* (Ottawa: National Research Council of Canada, 1946), 34.

[172] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, Letter P. H. T. Thorlakson to Wilder Penfield, 1 May 1942.

[173] G. H. Ettinger, *History of the Associate Committee on Medical Research: National Research Council, Ottawa, 1938-1946* (Ottawa: National Research Council of Canada, 1946), 43.

between the Ministry and the NRC was resolved with the Federal Government placing all research with the latter.

By 1944 the NRC was turning its attention to post war research.

> Canada has hitherto been a research importer, and the pre-war per capita expenditure on research was far below that of other industrial nations. Under the pressure of war Canada has been spending five times as much on research as in pre-war years. Working conditions and remuneration must be made sufficiently attractive to retain the best brains in this country and to offset the tendency to migration.[174]

In March 1944 the Associate Committee met to deal with post-war planning. It concluded that Medical Fellowships and grants to facilitate travel and conferences between researchers should be instituted. At the very least the money assigned to the war time committees would be needed in future. More importantly medical research would stay with the NRC rather than be transferred to the Department of National Health and Welfare.[175] The NRC would continue to use facilities in the university medical schools and hospitals through research grants, together with fellowships to aid the training of research personnel.[176]

Thorlakson expressed concern that Western Canada was remote from the main research activities of the Associate Committee with only himself and Dr. J. C. Paterson, (Pathology, Regina General Hospital) as representatives for the region. If nothing else,

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[174] Records Office, NRC, C. J. Mackenzie, "Report of the President," *Twenty-eighth Annual Report of the National Research Council of Canada 1944-1945*, 12.

[175] C. B. Stewart, "Reminiscences on the Founding and Early History of the Medical Research Council of Canada: Part 2," *Annals of the Royal College of Physicians and Surgeons of Canada* 9 (1986), 385-389; 471-473.

[176] Records Office, NRC, C. J. Mackenzie, "Report of the President," *Twenty-ninth Annual Report of the National Research Council of Canada 1945-1946*, 14.

travel to Ottawa took days for them. On his appointment to the Associate Committee Thorlakson had stated that "the western universities were well equipped for fundamental research, and many of the men had good research work to their credit."[177] In 1944 the Western Regional Committee was formed with representatives from the three Prairie Provinces and British Columbia appointed by the NRC Associate Committee.[178] The Western Committee fostered interest in research in the West and facilitated the transfer of information. On Feb 17 1945 Collip and Dr. G. H. Ettinger had visited Winnipeg and,

> were taken by Bruce Chown to the Children's Hospital, where they were introduced to the personnel in the laboratory active in Rh research. Dr. Chown is enthusiastic and energetic in his investigations, and should be given encouragement.

They also referred to his interest in equine encephalitis.[179]

A week later the Western Committee met for the first time and noted Chown's grant from the NRC for "A Study of the Rh Factor." After his two terms Thorlakson stood down from the Associate Committee in May 1945, but remained influential as a member of the sub-committee on Surgery. In October 1945 the four special war time sub-committees were closed. In December 1945, Thorlakson submitted a brief to the Associate Committee on Medical Research proposing his support for medical research becoming a Division of the NRC. For some points, he referred to a memorandum prepared by the

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[177] Records Office, NRC. "Proceedings of the Third Meeting of the Associate Committee on Medical Research," 27-28 February 1938.

[178] Records Office, NRC. "Proceedings of a Special Meeting of the Associate Committee on Medical Research" 18 March 1944.

[179] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, Box 17 File 6, NRC Western Regional Committee, Report of Visit of Western Regional Group to Western Medical Schools, 1945.

Research Committee of the Faculty of Medicine, University of Manitoba in 1944 as the basis for his recommendations.[180] Thorlakson's recommendation was accepted by the Board of the NRC and in 1946 a Division of Medical Research was formed. Collip continued as director with a budget of $200,000.[181] By now the NRC had established the value of medical research in Canadian universities and the Federal government, which provided the funds for it, was supportive.

[180] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, Box 17, File 4, NRC Western Regional Committee, P. H. T. Thorlakson, Memorandum concerning the establishment of a division of medical science, 5 November 1945.

[181] Alison Li. "Expansion and Consolidation: The Associate Committee and the Division of Medical Research of the NRC, 1938-1959," *Scientia Canadensis* 15, 2 (1991): 89-104.

CHAPTER 3

THE LOCAL SUPPORT OF MEDICAL RESEARCH ACTIVITY IN THE FACULTY OF MEDICINE, UNIVERSITY OF MANITOBA. 1883 to 1945.

This chapter focuses on the local circumstances that shaped the development of research within the Faculty of Medicine, University of Manitoba. The period covered is from its origins as a Medical College attached to the University (1883) to when research became entrenched in its mission (1945). The founding purpose of the College was to educate medical students and Bruce Chown's father, Henry Chown, had a major influence on the quality of the teaching. The College transformed into the Faculty of Medicine in 1920. For the next twenty years teaching remained the dominant activity of the staff. After the discovery of insulin in 1922 the Faculty did form a research committee but very little research was done. From time to time, to combat outbreaks of infectious disease, the provincial government funded research activity to deal with these. With the creation (1938) of the NRC Associate Committee on Medical Research, of which the Manitoba surgeon P. H. T. Thorlakson was a member, the faculty began to consider research more seriously. However the war meant little could be done as many members of the faculty joined the services and the remainder had to shoulder the teaching and clinical work. Finally in 1944, under pressure from the University, the Faculty of Medicine realized that research must be given a strong presence in its mission. A major report on research was produced by Faculty Council and accepted by the university in 1945. The Faculty of Medicine embraced the idea that research was as much part of its duty as teaching, and over the next few years ensured that this was put into place. The funding now available from the NRC, and locally thanks to the initiative of Thorlakson, made this possible.

The Manitoba Medical College, later the Faculty of Medicine of the University of Manitoba, is the oldest in Western Canada and felt responsible for training practitioners for this half of the country. For its first sixty years little research was undertaken in it unlike the Universities at McGill and Toronto. These had doctoral programmes in their Faculties of Medicine and provided institutional support that trained researchers in medicine. [182] McGill relied on money raised from private sources, especially from the Rockefeller Foundation. Toronto as, a provincial university, received public funding from the provincial government, supplemented by income from the Connaught laboratory that manufactured sera and antitoxins for sale and put money into a research fund.[183] In its first 40 years Manitoba had no post-graduate training programme in research and no university funding for research. The Manitoba provincial government only funded specific projects to meet its responsibility, outbreaks of contagious diseases.

Even in the basic science departments of the Manitoba Medical College, where the professors had access to laboratories, the heads of the department were better known for their authorship of student text books than the discovery of new knowledge. The principal function of the laboratories was for medical students to learn by simple experiments. The members of the clinical departments did write papers describing their clinical experience and the cases they observed, but their main activity was patient care and teaching. Three excuses were made for the lack of research. The first was lack of

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[182] Gingras, "Financial Support for Post-graduate Students and the Development of Scientific Research in Canada," in Youth, University and Canadian Society: Essays on the Social History of Higher Education. eds. Paul Axelrod and John G. Reid. (Montreal & Kingston: McGill- Queen's University Press, 1989): 301-319.

[183] Alison Li. "Expansion and Consolidation: The Associate Committee and the Division of Medical Research of the NRC, 1938-1959," *Scientia Canadensis* 15, 2 (1991), 91.

money, the second was the heavy teaching load of the professors and the third was a shortage of trained researchers. The Banting Foundation helped but did not provide salaries nor did the NRC. Only towards the end of the Second World War did the Associate Committee of Medical Research provide much money to medical research and the trainees with the university responsible for salaries of researchers. Most importantly for Manitoba was that P. H. T. Thorlakson formed the Manitoba Institute for the Advancement of Medical Education and Research, whose grants would supplement NRC funding and support trainees in research. Bruce Chown played a major role in establishing this Institute.

Academic Activity in the Manitoba Medical College. 1883-1922.

The medical college in Manitoba originated in 1883 to satisfy the potential students in the province who lobbied to receive a medical education locally. Bruce Chown, who wrote the first account of the founding of the Manitoba Medical College, recorded that a young practitioner had come from Toronto to start a private medical school. Local physicians were in opposition, and led by Dr. James Kerr, thirteen established Winnipeg practitioners petitioned the provincial government to form the college.[184] The Torontonian was not a complete outsider, for Morton identified him as the son of the

[184] Bruce Chown, "The Founding of the Manitoba Medical College," *Manitoba Medical Bulletin*. 67 (1921): 1-5; Ross Mitchell, "The Manitoba Medical College 1883-1933," *Canadian Medical Association Journal* 29, 5 (1933): 549-552; Ian Carr and Robert Beamish, *Manitoba Medicine: A Brief History* (Winnipeg: University of Manitoba Press, 1999). Bruce Chown wrote his article when he was still a medical student, perhaps influenced by his father the Dean who had planned that the College become the Faculty of Medicine. Bruce Chown's father had an interest in history and in 1915 had presented a paper on "Medical Men and Medicine in Western Canada" to the Winnipeg Medical Society. Ross Mitchell, "Manitoba Surgical Pioneers: James Kerr (1849-1911) and H.H. Chown (1859-1944)" *Canadian Journal of Surgery* 3 (1960): 281-285.

Lieutenant Governor, Honourable J. C. Aikins.[185] The local established practitioners prevailed and their college became one of those affiliated to the University of Manitoba. The university granted the degree to the college's graduates, while the College of Physicians and Surgeons of Manitoba approved its curriculum to ensure the graduates would be licensed. In many ways the medical college was a not-for-profit proprietary school but these arrangements ensured that it provided a generally acceptable standard of education. The thirteen practitioners divided the various educational tasks amongst themselves, and modelled the courses on those used in eastern Canadian schools and Britain.[186] The first Dean, James Kerr, raised money to construct the medical college adjacent to the Winnipeg General Hospital. For the first decades of the school its finances were solely generated by the students' fees and the activity of the medical college was simply educational.

Bruce Chown's father, Henry Havelock Chown, who had graduated from Queen's University, became the fourth Dean in 1900. The Provincial University Act that year enabled the university to form a Faculty of Science. The province did not finance the new faculty and appointments to it were only possible with the receipt of a grant from Lord Strathcona in 1904.[187] Of the professors appointed to Science, several full time positions

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[185] W. L. Morton. *One University: A History of the University of Manitoba 1877-1952* (Toronto: McClelland and Stewart, 1957), 28.

[186] Thomas Neville Bonner. *Becoming a Physician: Medical Education in Great Britain, France, Germany and the United States, 1750-1945.* (Oxford: Oxford University Press 1996),179-180; described Canadian schools; N. Tait McPhedran, *Canadian Medical Schools: Two Centuries of Medical History, 1822 to 1992* (Montreal: Harvest House, 1993), 139-151.

[187] University of Manitoba, Archives and Special Collections, Minutes of the University Council III, pp. 544-546.

were attached to the Manitoba Medical College and as laboratory based scientists they introduced research to the faculty. They included Gordon Bell, Provincial Bacteriologist, Swale Vincent from Edinburgh in physiology, and in lesser roles at the Medical College the botanist Reginald Buller and physicist Frank Allen.[188] Although the latter became head of physics he maintained an interest in medicine with much of his research being related to the nervous system and sight. Swale Vincent began active research in endocrine physiology which he published.[189] In 1905 Vincent and Buller were among the scientists who founded the Scientific Club of Winnipeg that met to communicate scientific papers and research to its members.[190] In 1906 the new Medical College building was opened, and space for research was now available.[191] But being dependent only on student fees and doctor donations for income the College questioned whether research could be afforded. In 1907 a submission to the government raised the question of integrating the College with the University to become a Faculty of Medicine with access to university funding. At the same time the University saw the need for becoming a state supported institution with access to more revenue. In 1907, Dr. F. F. Wesbrook, a graduate of the Medical College and now Dean of Medicine at the University of Minnesota, was invited to deliver the opening address of the University's academic year. The title of his lecture was "State responsibility in University Education" and he advocated a strong state funded

[188] W. L. Morton. *One University: A History of the University of Manitoba 1877-1952* (Toronto: McClelland and Stewart, 1957), 67.

[189] Unfortunately for the Medical College, London University recruited him in 1921.

[190] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, F. D. White Fond, File 17.4.10, *Scientific Club of Winnipeg: The First Forty Years 1905-1945.*

[191] W. L. Morton. *One University: A History of the University of Manitoba 1877-1952* (Toronto: McClelland and Stewart, 1957),70.

university that supported both research and teaching.[192] A government bill to reorganize the university was opposed by the university council in a resolution proposed by Henry Chown, who felt it failed to meet the "urgent educational needs of the province."[193]

Henry Chown's goal, as Dean of Medicine, was to raise the academic standards of the school. He planned to correct the paucity of trained basic medical scientists, and to cement the College's relationship with the university. In 1910, Professor A. T. Cameron, a biochemist from Edinburgh, joined Swale Vincent. Cameron became an important figure in the organization of research activity in the Faculty, although he created relatively little new knowledge himself. A major spur to improve education at the college was the Flexner report (1910) in which the Manitoba Medical College fared relatively well, being deemed adequate, but in the second rank because of its lack of full time teachers and laboratories for the education of students.[194] Laboratory based education of medical students became an important measure of excellence in the assessment of medical schools. The lessons learnt in laboratories were carried over to what the staff expected of the hospitals in which they worked. Henry Chown resolved to solve the first deficiency and recruited three faculty members from Edinburgh: J. G. Gibson in 1911 and shortly after J. C. B. Grant[195] in anatomy followed by William Boyd[196] in pathology.

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[192] W. L. Morton. *One University: A History of the University of Manitoba 1877-1952* (Toronto: McClelland and Stewart, 1957), 73.

[193] University of Manitoba, Archives and Special Collections, Minutes University Council, vol. 50.

[194] Abraham Flexner, *Medical Education in the United States and Canada*, Bulletin Number 4 (The Flexner Report), (New York: The Carnegie Foundation for the Advancement of Teaching, 1910), 320-325.

[195] Clayton L. N. Robinson. *J. C. Boileau Grant: Anatomist Extraordinary*. (Markham: Associated Medical Services, Fitzhenry and Whiteside, 1993).

These new young professors became renowned teachers and the textbooks they wrote were used worldwide.

In 1917 Henry Chown resigned from practice and the Deanship, but remained influential, serving on the University Board of Governors for the next fifteen years. That year the University Council began the process of assimilating the Medical College as the Faculty of Medicine. Henry Chown's successor, Dean A. Prowse saw this accomplished, and in 1920 the Medical College became the Faculty of Medicine of the University of Manitoba.[197] In return for the College's surrender of its autonomy, the university enlarged the Medical Building where more laboratories could be accommodated. Thus the Faculty of Medicine was further positioned to add research to its armamentarium for it had full time faculty and the laboratories. This potential was greatly enhanced by the grant from the Rockefeller Foundation of $500,000, the interest of which would provide salaries for full time staff. In 1921 the Manitoba legislature made appropriations to meet the conditions of the Foundation pledge and new Medical College buildings were under construction. On 8 May 1922 the University of Manitoba received full payment of the $500,000 plus interest accrued.[198] Thus the Manitoba Medical College benefited from this Rockefeller Foundation grant, with the money being devoted to its education endeavours rather than research.

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[196] Ian Carr, *William Boyd: Silver Tongue and Golden Pen*. (Markham: Associated Medical Services, Fitzhenry and Whiteside, 1993).

[197] University of Manitoba, Archives and Special Collections, Minutes of the Board of Governors, 4 May 1920, 119.

[198] Rockefeller Foundation, *Annual Reports* (New York: Rockefeller Foundation, 1919, 1920, 1921, 1922).

Research Activity in the Manitoba Medical College. 1922-1938.

In an effort to raise academic standards the College introduced a B. Sc. Medicine degree in 1919. The purpose of the degree was to encourage students to spend an extra year studying biochemistry or physiology while receiving some research training that might be used later in their careers.[199] In 1920 the Faculty Council reiterated that the foremost need was full time faculty who provided "satisfactory teaching but also enabled the teacher to carry on a reasonable amount of effective research which will enable them to keep up-to-date in their various subjects."[200] The income from the Rockefeller endowment meant that staff could be salaried and freed to research. In 1922 the Faculty of Medicine was inspected by the accreditation survey of the American Medical Association. In its report three concerns were identified: the sending of students to rural hospitals, the serious lack of full time teachers and "that productive research work was hampered by a lack of teaching staff." The staff of the Faculty certainly believed research was important but did very little of it. Nonetheless the school was rated Class A, despite that the Faculty of Medicine had not realised its potential afforded by more full time staff, its laboratories or the Rockefeller grant.[201] Morton, in his history of the University

[199] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty Council Minutes, 1919-1922.

[200] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty Council Minutes, 1919-1922, 15 September 1920.

[201] Faculty Council Minutes 1919-1922. Faculty of Medicine Archives. N. J. MacLean Health Sciences Library, University of Manitoba. The American Medical Association followed Flexner's lead and regularly evaluated and accredited medical schools in the United States and Canada. As a result Canadian medical degrees are recognized in their country.

of Manitoba, concluded that by the 1920's the faculty turned out well-trained general practitioners, and had added "a policy of supporting research, a policy which had nourished, for example, the outstanding work in pathology of Professor William Boyd."[202]

The discovery of insulin at the University of Toronto was hailed around the world, and inspired Canadian medical schools on the value of research. The Manitoba Faculty of Medicine was not immune and formed a Committee on Diabetic Research that first met 26 December 1922 under the chair of Dean Prowse. It seems, though, that the purpose of the committee was to produce insulin locally and teach local practitioners how to use it for the treatment of diabetes, rather than to add new knowledge. One concern the committee had was that obtaining a supply of insulin from Toronto by train took so much time that the insulin lost its efficacy. J. R. McLeod, by telegram, gave the committee access to the patent, and a letter from J. B. Collip explained how to prepare insulin. With funds raised, mainly from the Red Cross, preparation of insulin began. By the end of March 1923 there were ten children and twenty three adults receiving insulin. Over the next twelve months the price of insulin fell, the supply from Toronto became reliable and

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[202] W. L. Morton. *One University: A History of the University of Manitoba 1877*-1952 (Toronto: McClelland and Stewart, 1957), 119. William Boyd was certainly outstanding as a writer of textbooks but his research simply followed the observational school of medical research. Morton's assessment of Boyd does not hold water. Guillermo Quinonez concluded Boyd contributed little to new knowledge and so was not a researcher. Guillermo Quinonez, "A Study of Medical Specialization: The History of the Department of Pathology of the Winnipeg General Hospital (1883-1957)" Thesis, University of Manitoba, Universities of Manitoba and Winnipeg, 2007; Ian Carr, *William Boyd: Silver Tongue and Golden Pen*. (Markham: Associated Medical Services, Fitzhenry and Whiteside, 1993), 144. Even after Boyd moved as chief of Pathology to the wealthier and larger University of Toronto and Banting Institute Carr commented, "He was no research worker and did not train juniors in experimentation."

local production was no longer necessary. In 1924 the Diabetes Research Committee disbanded and its residual funds were assigned to general medical research.[203]

In 1923, the secretary of the Faculty of Medicine Council surveyed all departments on their research activities. Only Cameron and V. H. K. Moorhouse, (Physiology) reported much research, the departments of surgery and medicine little, and anatomy, pathology and bacteriology some. The results were shared with the registrar of the university.[204] Further evidence that research was not improving is suggested by a letter to the President of the University, Dr. James MacLean.

> In reply to your friendly criticism of the amount of research work which is being undertaken in the Medical School at present, as suggested by Dr. Bruce Chown's communication of a recent date. I may say that my conception of the chief function of a medical school at the present time is that it should teach the science and art of Medicine to registered students. ..... Further than that, research work, particularly in the clinical branches of it in which I am interested, implies both exhaustive and intensive knowledge of the fundamental sciences and clinical subjects as well, and such clinical research work cannot be undertaken until the student has acquired an advanced knowledge of the subjects of the medical course.

The writer went on that research was a postgraduate subject, and that the institution needed adequate laboratories and equipment. The letter concluded "The problems suitable for clinical research are so numerous and call so insistently for attention that no comment is necessary for this particular point." The letter, as a copy, was unsigned, but

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[203] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Committee on Diabetic Research, 1922-1924 File, 10.2.2 (1), 8 April 1924.

[204] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Medical Research Committee File, 10.2.2 (2), 6 February 1924

was presumably from Dean Prowse; no record of Bruce Chown's communication nor of President MacLean's reply has survived.[205]

The Dean asked the Faculty Council to form a research committee, chaired by himself, and this met on 12 November 1924 with Cameron as secretary. The goal of the committee was to help research throughout the faculty and a sub-committee was formed in the department of medicine. A survey of the various departments asked what they wanted from the committee and they returned the unanimous answer 'money' and, since there was none, nothing much happened. The Rockefeller support was clearly devoted to teaching laboratories and Dean Prowse was ineffective in fostering research. For some years the committee provided nominal supervision over some research in the Department of Medicine. Gordon Bell, (Bacteriology), died tragically in 1923 and in his memory a fund was raised, mainly by the College of Physicians and Surgeons. The fund was for stipends for fellows to train in research and to build the Gordon Bell laboratory available to the research committee. The university also provided a stipend for a fellow, the first of

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[205] Unsigned letter to Dr. James MacLean, President University of Manitoba. Medical Archives, Faculty of Medicine. File # 10. 2 .2. (1). Bruce Chown would have been away pursuing his postgraduate training in the U.S.A. Chown was probably referring to the M.D. /B. Sc. Degree that had been introduced by the Faculty in 1919 and that was replaced by the B. Sc. Medicine degree, initiated by Faculty Council in 1924, approved by the University Council in 1925 and initiated in 1926. The purpose of the B. Sc. Med. was to "encourage students in scholarship and research." B. Sc. Medicine File. Medical Archives. Faculty of Medicine, File # 6. 3.1. (2). N. J. MacLean Health Sciences Library, University of Manitoba. Whether Bruce Chown, who was training in the United States, knew of the survey of research activity when he wrote his letter to President MacLean is unknown.

whom, Margaret Rioch, had been the first graduate of the B. Sc. medicine programme.[206] She studied pernicious anaemia and her work was continued by Max Wintrobe, a Gordon Bell fellow.[207] Papers on their work were published but as pernicious anaemia became treatable[208] this avenue of research ceased. The next research endeavours were on gastric ulcers by two Gordon Bell fellows; however it led nowhere.

In 1928 the committee was given a new responsibility for a provincial poliomyelitis epidemic. Dr. E. W. Montgomery, Provincial Minister of Health asked it "to obtain and handle poliomyelitis serum and make regulations for their proper use and the interpretation of results,"[209] The service of the most recent Gordon Bell fellow, Dr. Mary Mackenzie, was retained and Bruce Chown was part of the polio sub-committee.[210] Thus the province supported, and delegated to the university, medical research for a specific practical acute problem that threatened the population. In September it was noted that Bruce Chown would try to obtain the serum of convalescent polio victims from Trail,

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[206] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library A. T. Cameron, Secretary, Report of the Work of the Medical Research Committee of the University of Manitoba, 1924-1925, File 10.2.2 (3).

[207] Max Wintrobe became a distinguished alumnus of the medical school; a renowned researcher, teacher and author in the field of haematology.

[208] Too late for Bruce Chown's mother. Minot and Murphy found in 1925 that the disease could be controlled by the eating of raw liver in 1925. They later received the Nobel Prize for this work.

[209] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Medical Research Committee, Letter, 10.2.2 (2).

[210] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Medical Research Committee, 10.2.2 (2), Handwritten note. It was hoped that serum taken from patients recovering from poliomyelitis that would contain antibodies against the disease was hoped would ameliorate the disease in new victims.

B.C. By November the epidemic settled and responsibility for the whole endeavour reverted to the Ministry of Health.[211]

Over the years the research committee had made space available in the Gordon Bell laboratory to various research projects and the Fellows. In 1930, the College of Physicians and Surgeons of Manitoba which had largely financed the Gordon Bell Fellowship, took control of it perhaps unsatisfied with the productivity of the research committee. However it did no better so the Gordon Bell laboratory was then taken over by the Faculty Council. The research committee and the laboratory languished for there were too few qualified researchers to use it. The faculty in the basic science departments, such as physiology and biochemistry, with access to laboratories, continued with some experimental work on animals or in the test tube. Faculty in clinical departments pursued observational work describing the patients they saw. The University Department of Pathology that bridged the clinical and basic science fields, for its subjects were patients and it had its own laboratories, took little advantage of either for research. Bruce Chown, although practicing pathology, was never a member of the university department.

In 1931 Dean Prowse died and was succeeded by Dean A. T. Mathers.[212] In 1933 Bruce Chown wrote a second article on the history of the medical college. After describing the success of its education programmes he wrote ironically on research, "Perhaps we shall see a more vigorous growth of the one tree in Doctor Prowse's garden which fruited only

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[211] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Medical Research Committee, 10.2.2 (3).

[212] He was elected by the faculty, rather than formally appointed by the university, although the latter accepted the result.

sparingly in spite of his nurture of it, the tree of research."[213] Bruce Chown acknowledged that the educational goals of his father and Prowse had been accomplished but once again showed his expectation that research should flourish in the Faculty of Medicine was not being met.

The Faculty Research Committee now took on some specific projects. In 1933 the Provincial Government asked it to make the Friedman Test for Pregnancy available to practitioners throughout the province. This it did, striking a sub-committee for this and the College of Physicians and Surgeons funded the project with a grant but this was service not research. In 1934, the College of Physicians and Surgeons gave the committee funding for two Gordon Bell fellows working in the department of medicine, but the projects were not recorded. That year James Richardson and Sons Ltd, a Manitoba grain firm, offered a grant to test the accuracy of Dr. J. R. Davidson's work on tar-cancer in mice.[214] Davidson's work received widespread publicity and backing from Federal and Provincial politicians. The College of Physicians and Surgeons and the Richardson Company supported it.

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[213] Bruce Chown, "The Story of the Medical College," *University of Manitoba Medical Journal* 5 (1933): 28-34.

[214] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Medical Research Committee, 10.2.2 (3).

The claims by Dr. Davidson generated considerable interest and support locally and nationally by politicians and the public. Already the fear of cancer and the hope that a treatment could be found was receiving great public support. Davidson's work was discussed at both the Provincial Legislature and Houses of Parliament. However Davidson's work was slipshod, and his claims bogus. In due course the National Research Council, in particular P. H. T. Thorlakson, assessed and dismissed it as valueless. University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond; Gurney Bishop. *Davidson of Manitoba: Cancer Pioneer* (London: Bishop, 1974).

In 1935, Cameron reported to the Faculty Council on the first decade of the Research Committee's work. He wrote that the committee had been ineffective in stimulating research. Its most important work was aiding with specific projects such as for polio and the work on the Friedman test. He concluded that the committee should not increase its activities. Cameron hoped that in future, when need arose and funds became available new tasks could be accepted by the committee. The committee had had past success training medical graduates in research but this had now ceased due to lack of funds. He pointed out that although one of the most important functions of a faculty's research mandate was to train graduates for research work, this did not draw funds from private sources and to do this there must be an object that appeals to the public, "such funds were only obtained when striking results are being obtained and striking results cannot be guaranteed. A repeat of Toronto's insulin discovery is a rare event in medical research." [215] The tone of this report was pessimistic, even if realistic, and presumably reflected the priorities set by the Committee's Chair, the Dean. The frequent reference to scarcity of funds for research was the result of both the great Depression on Canada's economy and, more devastatingly the defalcation in 1932 by John Machray, chairman of the University Board of Governors and bursar. Machray embezzled nearly a million dollars of university money and most disastrously for medicine, all of the $530,674.61 of its Rockefeller Foundation endowment.[216] To these losses were added fewer student fees, as one of Dean

[215] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, A. T. Cameron, Secretary, Report of the Work of the Medical Research Committee of the University of Manitoba, 1924-1925, File 10.2.2 (3).

[216] W. L. Morton. *One University: A History of the University of Manitoba 1877-1952* (Toronto: McClelland and Stewart, 1957), 148-150; Machray had graduated from the University of Manitoba and then obtained a law degree at Sidney Sussex College, Cambridge, before returning to Winnipeg.

Mathers's first acts limited enrolment to raise the academic standard of the students.[217] The Dean of Medicine was strapped to pay full time teachers, let alone researchers.[218] Salaries were reduced, planned improvements placed on hold and medical students employed to trap rabbits for the laboratories.

Cameron's report described that research only occurred "when the researcher had pursued his own interest and not needed an artificial stimulus to initiate research."[219] This described Bruce Chown who continued the research for which he had been trained. The Children's Hospital Board valued his service and appreciated the prestige that research brought. In 1926 the St. Agnes Guild, the first charitable supporter of the Children's Hospital founded in1909, noted in its annual report "another definite advance is the appointment of Dr. Bruce Chown as Pathologist and Biochemist to the Hospital and the equipment of the laboratory. The Hospital is now in a position to carry out research work."[220] In 1927, Bruce Chown applied for research funds from the National Research Council to study tuberculosis. The work he proposed included the effects of food deprivation and vitamins on tuberculosis in the guinea-pig, and the incidence of bovine tuberculosis in children. The sum sought was one thousand dollars to supplement $1500

[217] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty Council Executive minutes, 13 June 1933.

[218] University of Manitoba, Archives and Special Collections, Minutes of the Board of Governors, University of Manitoba, 1935, 298.

[219] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, A. T. Cameron, Secretary, Report of the Work of the Medical Research Committee of the University of Manitoba, 1924-1935, File 10.2.2 (3).

[220] Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 12, Annual Report, Winnipeg Children's Hospital, 1926.

invested in new laboratory equipment by the Children's Hospital.[221] There is no record that he was successful and this probably reflected that the Associate Committee for Tuberculosis mostly supported its own members.

Chown's chief interest remained the relationship between the kidneys, calcium, phosphate and the bones. In 1929 Bruce Chown received a Banting award for his studies of pyelonephritis in children.[222] From 1934 the St. Agnes Guild donated to his research. Beginning with a grant of $100 they increased this to as much as $900 in 1937.[223] In 1936 the contribution to his research by the Children's Hospital itself was $2,080.35.[224] In 1937, the Children's Hospital appointed him as the full time pathologist and now he had plenty of time to investigate his interests; salaried, he had no need to earn income from treating patients. But he did not relinquish clinical medicine for his colleagues gave him free rein to see their patients. Chown published regularly on his research and was actively involved in local educational activities to promulgate his findings. He produced animal models of nephritis by an analogue of vitamin D and then studied both the histology and functional effects in the kidneys. He hoped to find ways to prevent the disorder. One particular facet of his work was the role of parathyroid hormone, a controller of calcium

[221] Library and Archives Canada, NRC. KG 77, File 4A 2-3, vol. 1, Miscellaneous reports on medical research ,198. Chown had been assigned responsibility for the care of tuberculosis at the Children's Hospital although he had no record of work on the disease and would not have fitted into the small committee of gentlemen. He later presented a paper on "Pulmonary T. B. in children" at the joint British Medical Association - Canadian Medical Association meeting held in Winnipeg, 28 August 1930.

[222] *Manitoba Medical Association Bulletin*, August 1929, 9.

[223] Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 12, Annual Reports. St. Agnes Guild, Winnipeg Children's Hospital. 1934, 1937.

[224] Archives of Manitoba, Children's Hospital of Winnipeg Fond, MG10 B33, Box 10, Finance Committee Reports 1936.

that had been discovered by Collip in 1925 while at the University of Alberta.[225] He wrote to Dean Mathers, in response to a survey of research in the Faculty of Medicine, that he had ample laboratory facilities, adequate equipment and two technicians, one for histology and one for chemistry (with a B Sc. degree) as well as a 'wash-up'girl.[226] Chown hoped, in 1939, that he could hire a biochemist who was taking her Ph. D. in London. His other need was access to animals that he had no space to breed at Children's. He relied on the generosity of Cadham for mice, and Cameron for rats, since he had no animal holding facilities at the Children's Hospital.

Research Activity in the Manitoba Medical College. 1922-1944.

In 1937, at the behest of Sir Frederick Banting, the National Research Council of Canada (NRC) planned the Associate Committee on Medical Research. For the Conference of the Organization of Medical Research in Canada held in Ottawa 18 February 1938, the Faculty of Medicine was represented by Cameron and Cadham. Cameron reported briefly to Dean Mathers on the conference's deliberations a few days later. He recounted that Dr. Cadham had been applauded for the briefest speech in which he sized up the psychology of the meeting better than most. He conveyed the support of the Provincial Board of Health and medical school to the recommendations expressed at the conference that an Associate Committee on Medical Research be formed.[227] The Manitoba surgeon

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[225] Alison Li, "J. B. Collip, A. M. Hanson, and the Isolation of the Parathyroid Hormone, or Endocrines and Enterprise," *Journal of the History of Medicine and Allied Sciences* 47, 2 (1992): 405-438.

[226] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Bruce Chown letter to Dean A. T. Mathers, 5 November 1938.

[227] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Letter A. T. Cameron to Dean Mathers, 22 February 1938.

P. H. T. Thorlakson was made a member of the Associate Committee on Medical Research. The Faculty research community questioned Thorlakson's credentials for appointment. This was expressed in a confidential letter from Dean Mathers to Dr. T. C. Routley of the Canadian Medical Association. Mathers sought information on how the selection was made. Mathers described Thorlakson as an estimable fellow, good surgeon and a personal friend but he had shown no very great interest in research and this had rankled with the faculty researchers. The appointment seemed 'incongruous". There was suspicion that this was a further example that many things were engineered out of Toronto with little regard to the rest of Canada.[228]

As one of its first actions the Associate Committee surveyed Canadian medical research with a questionnaire and to answer it Dean Mathers evaluated the research of the faculty. This revealed that there was little done and only the departments of anatomy, biochemistry, bacteriology, pathology and physiology had some activity. The clinical departments warranted no comment. Dean Mathers replied to the Associate Committee's secretary, Dr. C. B. Stewart, that after careful consideration, most of the items in the questionnaire had to be answered in the negative, and summarized the position of the school as follows. It had suffered a severely reduced budget and so no Faculty funds had been available for research. Some research supported from departmental funds had

[228] Letter Dean Mathers to Dr. T. C. Routley, Canadian Medical Association, 26 March 1938, asking for information on Thorlakson's appointment. I have not been able to trace who, or what institution, proposed Thorlakson. From the tone of Mathers's letter to Routley it is probable the Canadian Medical Association that had been consulted by the National Research Council nominated Thorlakson. However no record is found in the archives of the CMA. Routley's reply to Mathers has not been found, University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, File 10.2.2 (4).

occurred. Some clinical faculty had received funds from the Banting Foundation. Clinical research in the three teaching hospitals had been done, but it was sharply limited.[229] The only endowment fund was the Gordon Bell Research fellowship of the College of Physicians and Surgeons and it was now mainly devoted to Dr. J. R. Davidson's cancer work on Cancer in Mice. Dean Mathers welcomed Sir Frederick Banting's pending visit. [230]

Whatever his research credentials Thorlakson proved to be an efficient administrator and organized the visit of Banting and Stewart to Manitoba that occurred in late November 1938. In his report of the visit Stewart wrote, [231]

> Impression. Winnipeg.
>
> 1). Very considerable financial difficulties over a period of years, heavy burden of routine work, the staff are carrying out a considerable number of valuable research projects.
>
> 2). Fine spirit of cooperation among the groups.
>
> 3). The facilities are fairly good.
>
> 4). Outstanding research workers and directors include:
>
> Dr. Pat MacDonald, Cancer; Dr. Bruce Chown, Children's[232]; Dr. I. M. Thompson, Anatomy; Dr. J. D. Adamson, Medicine; Dr. A. T. Cameron, Biochemistry; Prof. Frank Allen, Physics."

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[229] The Winnipeg General Hospital, the Winnipeg Children's Hospital, St. Boniface General Hospital.

[230] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Letter Dean Mathers to D. B. Stewart, Assistant Secretary, Associate Committee for Medical Research, NRC, 13 October 1938.

[231] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, MSS68, Box 17, File 17, C. B. Stewart, Report of Survey of Medical Research Facilities.

[232] The verbatim description of Bruce Chown was: Nov. 29. 9.30. am. visited Children's Hospital and met Dr. Bruce Chown, lecturer in paediatrics involved in research (both

Simultaneously the Federal Department of Pensions and National Health also evaluated medical research in the medical schools and colleges.[233] Following the NRC visit Dean Mathers wrote to all faculty asking for information on research projects in mind.[234] There were some but these were postponed in 1939 for the school had to cope with the departure of numerous faculty members for war time service and the need by the few left to teach students.

Public Funding of Medical Research: The Provincial Government of Manitoba.

The Manitoba Provincial Government had enacted a Public Health Act in 1893 that defined its responsibility for public health and sanitation and the belief that diseases imported by immigrants were a major threat to the citizens. The health portfolio was a branch of the Ministry of Agriculture and Immigration. By now medicine had accepted that bacteria were the vectors of disease and were the main threats to public health. Their detection necessitated laboratories and the provincial one was established in 1898. Dr.

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experimental and clinical) on the metabolism of calcium and phosphorus. Description of work. Impression. Dr. Chown is carrying out some very valuable research work. The facilities available are fairly good, but he is hampered by the large amount of routine work and teaching, and lack of a graduate research assistant for whom adequate facilities, cooperation, and direction would be available. Dr. Chown is at present receiving a research grant from the Manitoba College of Physicians and Surgeons for his research work on calcium and phosphate metabolism.

[233] Coincidentally with the site visit Dean Mathers was in correspondence with S. J. Cook, Officer in Charge of the Research Plan and Publications Section of the Department of Pensions and National Health, Ottawa, who inquired about the drift of graduates to the U.S.A. Mathers replied that by 1937-38, of the 1548 graduates of the medical school, 161 had been identified as residing in the U.S. A. It was a concern of the research community that a dearth of research training for medical graduates in Canada contributed to this.

[234] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Letter Bruce Chown to Dean Mathers. 5 November 1938.

Gordon Bell became provincial bacteriologist, holding this post together with his position in the university. The province delegated much of the day to day public health work to the municipalities. The care of the sick was a responsibility of the municipalities and the independent medical practitioners.[235] Only when a disease became epidemic and was declared to be a 'contagious or infectious disease' did the Province take command of its management. Such had been the case with the 1918 Influenza epidemic.[236] In Manitoba poliomyelitis and encephalitis epidemics recurred during the mid-half of the Twentieth Century and engendered intervention by the Provincial government. To combat these, the province provided generous funds for research that was mainly used to develop vaccines for prevention or treatment. Chown was involved in such work. In 1938 the Provincial government, under the leadership of Premier John Bracken undertook a major review of the industries in Manitoba as part of the planning for development, for it was perceived that the province was declining economically. The recurrent theme that Western Canada was unfairly disadvantaged by the East was noted.[237] Animal diseases, since they had a major impact on agricultural income, were devoted a special report.[238] There was no evidence that medical research might one day be a valuable asset for the province.

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[235] J. G. Fox and J. C. Wilt, "The History of the Provincial Health Laboratory Services in Manitoba," *University of Manitoba Medical Journal* 49 (1979): 118-124.

[236] Esyllt W. Jones. *Influenza 1918: Disease, Death and Struggle in Winnipeg* (Toronto: University of Toronto Press, 2007). Research into possible vaccine treatment for the influenza by Drs. Gordon Bell and F. T. Cadham had been pursued at the provincial laboratory; F. T**. Cadham**, "The Use of a Vaccine in the recent Epidemic of **Influenza,"** *Canadian Medical Association Journal* 9, 6 (1919): 519–527.

[237] Thomas C. Knight, *Interim Report and Findings in Two Volumes* (Winnipeg: Economic Survey Board, 1938).

[238] Alfred A. Savage, *Animal Diseases in Manitoba: A Report to the Economic Survey Board*. (Winnipeg: Economic Survey Board, 1938).

In January 1942, Dr. J. W. Jackson, Deputy Minister, Department of Health and Public Welfare, Government of Manitoba, wrote to Dean Mathers informing him that Cabinet in Council would establish a small research item in the estimates particularly applied to the research in the field of western equine encephalitis.[239] A large epidemic of the disease had occurred in 1941. Bruce Chown took on this research and it continued for three years. His assistant in microbiology went to the Rockefeller Institute in New York to study methods for testing for the disease.[240]

Private Funding of Medical Research:

The Manitoba Institute for the Advancement of Medical Education and Research.

In May 1941, Dr. Thorlakson was appointed chair of the faculty research committee.[241] At that time there was some confusion as to whether this was a sub-committee of the University Research Committee or one of the Faculty; it was decided that it was the latter.[242] Most tellingly Thorlakson was inspired by a conversation he had had with Sir

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[239] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Letter from J. W. Jackson to Dean Mathers. 5 January 1942. In reply, 2 February 1942 Mathers proposed A.T. Cameron as chair and Bruce Chown, Adamson, Nicholson and Cadham as a research committee for the ministry.

[240] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty Medical Research Committee, Statement by Bruce Chown to H. V. Rice, Secretary.

[241] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Minutes Faculty Medical Research Committee, 15 December 1942. His position on the NRC Associate Committee would be his qualification to be chair.

[242] Further evidence of the quasi-independence of the Faculty of Medicine, that had certainly been allowed to persist through the presidency of Dr. J. A. MacLean, and was still in existence, as judged by a series of complaints by A. T. Cameron about the "petty red tape" of the comptroller in the administration of research funds. University of

Frederick Banting when travelling on the 1939 tour of the Western Canadian medical schools. As Thorlakson recalled,

> It was stressed that financial assistance from the NRC and from other organizations interested in supporting research will come to us, in the West, only in proportion to the success that attends one's own efforts in laying the foundation for research activities.[243]

Thorlakson later recalled that one motivation for Sir Frederick Banting's effort to increase research funding was that Canada was losing 1200 potential scientists annually to the United States.[244]

In 1942, always a man of decision, 'the stereotypical surgeon', Thorlakson decided to take the initiative and generously committed his own resources to this. He proposed to form a Manitoba Institute for the Advancement of Medical Education and Research and its chief asset would be the Winnipeg Clinic that Thorlakson had founded, and its revenue created from the rent of the doctors practicing within it. The medical education grants would be to deserving students, partly to encourage their training in research. Dr. Thorlakson divested himself from the financial control and ownership of the properties of the Winnipeg Clinic. Bruce Chown was designated as a member of the Institute. An act of the legislature set up the Institute the draft of which stated,

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Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Letter, 31 March 1942.

[243] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, MSS 68 Box 9 File 2, First Annual Meeting, Manitoba Research Institute for the Advancement of Medical Education and Research.

[244] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, MSS 68 Box 9 File 2, P. H. T. Thorlakson Address. Winnipeg Clinic Research Institute Report, 23 August 1973.

> The purpose and objects of the Institute shall be to advance scientific, medical and surgical knowledge through research, and to assist advancing the scientific, medical and surgical knowledge, provided no part of the income of the Institute shall move to the personal profit of or be paid or payable to any member of the Institute by reason only of his membership there in.[245]

This altruistic gesture and leadership was questioned by a few members of the faculty for Thorlakson had taken his proposal to the legislature without informing, let alone consulting, the Faculty of Medicine. The criticism at the Faculty Council was that an organization to rival the medical school was being created and this was debated in the Legislature.[246] Bruce Chown spoke in defence of Thorlakson's move at the Faculty Council and pointed out that such an institute would be of benefit to the faculty and provide support for it.[247] Thorlakson in a draft speech to the Faculty Council referred to "some misunderstanding of the relationship of the institute to the faculty on the part of two or three of its members" and commented "I must confess that the malice exhibited under a veneer of friendship has tempted me to become discouraged and bitter." However he delivered a positive speech to the Faculty Council and the majority gave him loyal encouragement.[248] In June 1943 Thorlakson asked Bruce Chown to produce a memorandum on the relationship of the institute to the university. Bruce Chown in the

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[245] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, MSS 68 Box 9 File 2, Memorandum, Manitoba Institute for the Advancement of Medical Education and Research.; Ross Mitchell, "The Progress of an Idea: The Story of the Winnipeg Clinic Research Institute," *Canadian Medical Association Journal* 94, 3 (1966): 132-137.

[246] Anonymous, "Medical Institute Bill Held Up," *The Winnipeg Evening Tribune*, 10 March 1943, 17.

[247] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty Council Minutes, 15 March 1943.

[248] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, MSS 68 Box 9 File 2, Personal notes.

first address to the Institute pointed out that the Charter of the Institute was "to aid scientific medical and surgical education and research." This would be accomplished by the provision of money while the University would be asked to provide its plans for the development of graduate research and education in the Faculty of Medicine and how best it could be helped.[249] In October 1943 Dr. Charles F. Code, a Manitoba graduate and now researcher at the Mayo Clinic, spoke on "The Role of Medical Research in a Medical Centre" at the opening of the Manitoba Institute for the Advancement of Medical Education and Research. Code believed research was not simply the compilation of facts, but was a more active process using experimental methods to ask why and how health or disease is determined. As to the researcher the key attribute was curiosity coupled with industry, and a willingness to collaborate with whomever he pleased, particularly when entering a new field.[250]

In February 1944 Faculty Council nominated Cameron to replace Thorlakson as chair of the research committee; Cameron had served for 20 years as its secretary. Certainly he had pursued some research and this justified the appointment but, even allowing that it had been a period of frugality, Cameron had not done much or inspired researchers to do what they could. Dean Mathers wrote to Dr. Thorlakson thanking him for his great interest and service to research in the school but that the expected increase in research

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[249] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, MSS 68 Box 9 File 3, Address by Bruce Chown, 22 June 1943.

[250] Charles F. Code, "The Role of Medical Research in a Medical Centre," *Canadian Association Medical Journal* 50 (1944): 308-313.

after the war called for more time from the chair, and finally that he desired to broaden the relationship between the college and the Institute.[251]

It was soon after that the President of the University, Dr. S. E. Smith, gave his farewell remarks to the Faculty Council in which he had deprecated the dearth of research. Bruce Chown's proposal at that Council that the Faculty must plan for research and recommend it to the University led to an invitation for him to join the Faculty Research Committee and he accepted. Bruce Chown now directly took part in the development of research in the Faculty and soon emerged as an influential force. At the behest of Faculty Council the committee produced a memorandum on medical research for transmission to the Board of Governors of the University. After a meeting of the Research Committee, 26 September 1944, Cameron wrote a draft memorandum to be conveyed to all members of Faculty Council for review. Cameron, who by now was approaching retirement age, produced a sound but unimaginative document that covered a range of rather general statements and a focus on laboratory based research. He correctly identified that the general public, including physicians, favoured research but few knew what it entailed. The public provided some money and expected results but successful research needed sustained funding, and corporations and government favoured planned research. In universities, faculty must follow their own interests and must train future researchers as part of their teaching. In the long run the training of students in research was more important than doing research in the Faculty. Research directors were necessary with a good salary ($7,000-10,000 a year) and supply of resources. Assistants who devoted

[251] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty research Committee, Letter, Dean Mathers to P. H. T. Thorlakson, 23 February 1944.

more time to research than other duties were needed and fellows, attracted by the benefit of the training offered and an adequate stipend would facilitate research. The B. Sc. Med. Programme must be enhanced. Technicians, secretaries, space for research, animal facilities were required and the library though adequate improved. He then addressed sources of funding. The NRC and Banting Foundation provided grants but not stipends for the researcher, while the Gordon Bell Fellowship had not always gone to researchers. The most promising source of endowment for training fellowships was the Manitoba Institute for the Advancement of Medical Education and Research. He noted that the University had contributed few resources to medical research in the Faculty. After this unenthusiastic assessment of the current situation, Cameron proposed some steps that might be taken. The Faculty must identify researchers and relieve them of other duties. Future researchers would be trained with support from the Institute and the University and work as fellows in the basic science departments. The university must provide a secretary and support a machine shop mechanic. Due to war time regulations men might not be permitted to fill the fellowships but women might. Professor I. M. Thompson, (Anatomy), added (Appendix A) that research was best produced by those engaged in teaching and that a moderate investment by the University would produce much. He advised that senior academic rank must be reserved only for people with demonstrated research ability and that the University should improve the salaries of the current faculty before recruiting new research staff. When this was first presented to the Research Committee Bruce Chown felt a wider medical perspective was necessary and submitted his own commentary. This was included as Appendix B by Cameron who added "This, while in no way antagonistic to the main memorandum, is too lengthy to be easily

incorporated in it." Chown's opening sentence encapsulated his vision of medical research,

> The purpose of medical research is the extension of our knowledge of the human body and mind in health and disease, and of all factors that affect them, to the end that disease may be controlled, life prolonged and health made the lot of more of the people for a greater proportion of their lengthened lives.[252]

He went on to categorise what constituted medical research. These were, and he pointed out the boundaries overlap: laboratory (pure and clinical), clinical and socio-medical. He did not rank them, for all were needed and it was a function of a medical school to advance all, although one school might emphasize one more than another. The importance of the first two was well recognized but the third, the sociological side of medicine, was not then generally acknowledged.

Chown first focussed on the funding of research by the Federal Government, for as pointed out by Cameron federal support for medical research was 'niggardly.'[253] Chown referred to the proposals for medical research in the proposed health insurance bill of the Federal government where only $50,000, of a $250 million budget, would be assigned to research even though the Prime Minister, Minister and Deputy Minister of Health had concluded that "the expenditure of public money for medical and public health research is economically sound. This could be supplemented by emergency funds in the case of an

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[252] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, University of Manitoba, Faculty of Medicine, Bruce Chown Fond, Memorandum, Appendix B, November 1944.

[253] Quoted by Cameron, John R. Williams, "The Social Implications of Scientific Research," *Canadian Medical Association Journal* 51, 2 (1944): 99-106. Cameron quoted from this article that pre-war Britain invested 0.1% of national income to research, the USA 0.6 % and the USSR 0.8% and it was presumed Canada emulated the former.

epidemic." Chown suggested that those in authority were misinformed for they were willing to support projects that they deemed emergency or for public health, such as an influenza epidemic, but not necessarily less pressing research. At the provincial level Chown had experience of this approach, both for the polio and encephalitis outbreaks. Chown argued that although epidemics, such as the influenza, fired the lay mind they will only be conquered by years of painstaking research that can then be applied when the epidemic strikes. He further pointed out that the $50,000 proposed for medical research was no increase on the pre-war budget of the Associate Committee, that itself had recommended an increase to half a million dollars per year. The Faculty Research Committee had made certain recommendations which Chown felt were sound but still inadequate. First there needed to be a detailed assessment of each department's and sub-department's (paediatrics was still a sub department of medicine) adequate plan for research. These plans must be presented to the Federal and Provincial governments as well as the NRC and the University. He addressed the recurring hindrance of the British North America Act that "Health and education are Provincial responsibilities," and he suggested that this might be overcome by a look at the Medical Research Council in Great Britain. One of the MRC's tasks was to supply grants to various research units scattered around the country in universities and hospitals which were simply responsible for supplying the infrastructure necessary for the unit to function. Another task was the provision of grants to individual researchers and the NRC already did this through its Associate Committee. Chown stressed that the recommendations for research put forward must be representative of the whole faculty as part of the university, and not just views of the Dean nor the Research Committee.

He also noted that the latest draft of the Federal health insurance bill contained the clause that one of the proper activities of the Provinces was research. Indeed the Provincial Department of Health and Public Welfare had included an item for research in its own budget but no money for research in the medical school. The University was a corporate body funded by the Province and student fees, and was not controlled by the government. Clearly the faculty had failed to contact those in authority in the Government and Ministry of Health to fund research at the school; individuals may have been consulted but not as members of the Faculty. Bruce Chown, although citing the current failure of the Faculty to obtain research support, was encouraging and optimistic that this could be done by Faculty for, "

> It seems to me that the responsibility for the development of research rests with ourselves. We as a Faculty must be convinced of the need, must have a plan and must set forward <u>as a single compact unit</u> to put that plan into operation.[254]

He stressed that the mindset of the Faculty must change if research was ever to be established within it, and it was the faculty, not just the Dean and Research Committee, that was responsible for the task of informing the authorities.[255] On 10 November 1944, the Faculty Council endorsed the memorandum on future research in the Faculty of Medicine of the University of Manitoba and it was forwarded to the Board of Governors.[256] Some of Chown's suggestions had been included in the body of the

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[254] Underlining by Chown.

[255] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Bruce Chown Fond, Draft memorandum to Faculty Council from the Medical Research Committee, Appendix B.

[256] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, A Memorandum on Future Research in the Faculty of Medicine of the University of Manitoba, 10 November 1944. It was to this that Thorlakson referred when he advocated for a Division of Medical Research in the NRC.

document. Although the generalities persisted in part I, part II made specific proposals. The recommendations were that in future only professors who could be trusted to do research be appointed and that research departments such as, for example, Experimental Medicine, be created and the teaching load of the researchers reduced with adequate salaries paid. The memorandum singled out the early training of medical students in an enhanced B. Sc. Medicine programme so that first rate graduates could be recruited to fellowships in research.[257] The memorandum proposed assistants, technical and secretarial staff be hired, space for researchers and animal facilities enlarged, and an expanded library be provided. The key to any success in achieving these hopes was money and the memorandum identified five possible sources. a) the National Research Council, b) the Banting Foundation, c) the College of Physicians and Surgeons of Manitoba, d) the Manitoba Institute for the Advancement of Medical Education and Research, and e) the University. "Of these only the Manitoba Institute is at present the potential source of any fairly large amount of money." Thus Thorlakson's philanthropy was appreciated. The University was lambasted having only contributed incidentally to medical research and the University Act "involves cumbrous red tape which tends to inhibit research, especially where National Research Council grants are concerned." In part III the memorandum spelled out the actual costs of what was needed. In part IV the memorandum was pessimistic that, in a less wealthy province, either the government or benefactors of great wealth would fund research. The Federal government must be the

[257] Two years later much of this was achieved on the appointment of Dr. Joe Doupe as Director of Experimental Medicine and his subsequent leadership in training researchers through the B. Sc. Medicine summer programme.

prime source of funding for medical research. The plan adopted by the British Medical Research Council should be the model for Canada.[258]

Thus Bruce Chown established himself as a leader in research development in the Faculty of Medicine and research funding, through his help to Thorlakson and the Institute for the Advancement of Medical Education and Research. Chown led by example, for he had begun his studies of the Rh Factor six months before and three months later Dr. H. P. Armes, President of the University, approved an application by him to the National Research Council for a grant for research. The title of the proposal was "Work on the Rh factor," and the amount requested $6,580.00.[259]

[258] The memorandum was submitted to the University President and Board of Governors 11 December 1944, accepted by the Board 11 January 1945 and replies sent to the Dean of Medicine by the Secretary and President 13 April 1945. They encouraged the Dean to share the memorandum with the NRC and other medical colleges in Canada. The President of the NRC C. J. Mackenzie responded 2 June 1945 and once more reminded the Dean that Canada was complicated with ten governments while Britain was only one in its tidy little island. University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty Research Committee File 10.2.2(5).

[259] University of Manitoba, Archives and Special Collections, President's Fond, Box 66 File. 8, Letter of Support, President H. P. Armes, 13 February 1945. No actual copy of the first grant application has been found.

Chapter 4

THE BIRTH OF MANITOBA RESEARCH ON RHESUS HAEMOLYTIC DISEASE OF THE NEWBORN IN MANITOBA. 1944-1946.

This chapter appraises the third element of the thesis and asks whether the Rh Factor research of Bruce Chown was created by chance. It further describes what the research accomplished in its first phase. The circumstances confirmed in the previous chapters were conducive for this research since funding sources were available and the Faculty of Medicine was eager to develop medical research. Part II of the Memorandum on Research by the Faculty of Medicine concluded prophetically,

> If, in future, any one person here has the capacity plus good luck which is equally needed, to make a medical discovery of great value and of newspaper interest, institutions and wealthy people will rush to provide funds.[260]

This chapter shows that Bruce Chown was such a person and reports his initial findings. His biography confirmed that he had been trained for research and his career that he successfully performed medical research. This chapter shows that he chose to study Rh Factor, a completely new subject, thanks to his good luck in meeting an acknowledged expert in Rh Disease, Lou Diamond, who was willing to cooperate with Chown. Rh Factor is one of the determinants of a person's blood type, and since the blood types have profound effects on the safety of blood transfusion, the chapter opens with a brief review of blood transfusion in Canada. This is because Chown obtained support for his work on Rh Factor from the NRC more for its benefit to the wartime blood transfusion service

[260] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, A Memorandum on Future Research in the Faculty of Medicine of the University of Manitoba, 10 November 1944.

than to investigate Rh Factor on the newborn. Since this thesis has addressed the nature of medical research, the chapter ends with an account of what Chown attained in the first two years of his research into Rh Factor. His careful planned observations placed him amongst the world experts of such research and were acknowledged by his peers. Over the next years, he and his colleagues developed the research on the Rh Factor and these medical discoveries led to the elimination of Rhesus Haemolytic Disease of the Newborn. These achievements are summarized in a postscript. The newspapers, institutions and the public were indeed interested in such discoveries of great value. The results of his early Rh research summarized in this chapter confirmed Chown's comment (in Appendix B) to the Faculty Memorandum on Research that only years of painstaking work conquers disease and fires the lay mind.

The Blood Groups- Blood transfusion in Canada

The red blood cells that transport oxygen throughout the body have different natural structures (proteins) on their surface. These structures vary from person to person and do not affect the function of the cell just as the colour of one's skin does not affect the ability of the person. In 1910 [ed.: probably meant 1901] Landsteiner identified that these surface structures could be classified as the major blood groups and labelled them the ABO blood groups. Depending on one's ABO type, one's blood serum might possesses antibodies against the surface proteins of other individuals so if blood is transfused between two people of different groups there is a potentially fatal adverse reaction. In 1940 Landsteiner also discovered the Rhesus Factor blood group, the second most important group, when he tested human blood against that of Rhesus monkeys. 85% of Canadian Caucasians are Rh Factor positive, independent of their ABO type.

Blood transfusions by physicians from person to person, and even from animals, have a long history and until the discovery of the blood groups were usually fatal but occasionally life-saving.[261] Inevitably the greatest demand for blood transfusion occurred during wars. In 1916 blood was first given directly from donors to the Canadian wounded. Adverse reactions were a problem and blood grouping to ensure compatible transfusions was only introduced in 1918.[262] During the Spanish Civil War, the surgeon Norman Bethune further developed the transfusion services to the needs of the wounded.[263] In 1939 the NRC formed a Sub-Committee on Blood Storage and Serum headed by Charles Best to study shock and its treatment due to blood loss in the coming war.[264] In 1940, Best, in conjunction with the Canadian Red Cross Society, organized a

[261] Douglas Starr, *Blood: An Epic History of Medicine and Commerce* (New York: Harper Collins, 1998).

[262] Bill Rawling, *Death their Enemy: Canadian Medical Practitioners and War* (Quebec: AGMV Marquis, 2001), 97-99.

[263] P. Weil, "Norman Bethune and the Development of Blood Transfusion Services," in *Norman Bethune: His Times and His Legacy* eds. David Shephard and A. Levesque (Ottawa: Canadian Public Health Association, 1982), 177-80.

[264] G. H. Ettinger, *History of the Associate Committee on Medical Research: National Research Council, Ottawa, 1938-1946* (Ottawa: National Research Council of Canada, 1946), 21-22.

national blood transfusion programme.[265] Best's organizational ability shone in the Red Cross transfusion service.[266]

One task of the Sub-Committee was the provision of safe blood transfusions and the avoidance of adverse reactions to blood groups ABO. When evidence of transfusion reactions to the Rh Factor emerged the need for research on it became pressing. Once the Canadian troops invaded Europe, the mounting casualties demanded even more safe blood transfusions, and the service became crucial for the war effort. The NRC sub-committee was interested in the blood groups, and coincidentally Chown chose to study the Rh Factor.

Serendipity: The Origin of Bruce Chown's Interest in Rh Disease.

According to some of the evidence, Bruce Chown's interest in Rh disease grew out of his work as a pathologist. His closest associate, Marion Lewis, recalled 50 years later that as a pathologist he had seen dead new born babies with jaundice and wished to elucidate the

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[265] Richard W. Kapp, "Charles H. Best, the Canadian Red Cross Society, and Canada's National Blood Donation Program," *Canadian Bulletin of Medical History* 12 (1995): 27-46. Kapp has suggested that Best's experiences as a driver in a Canadian artillery regiment in the First World War had interested him in blood transfusion. This seems very farfetched for, although transferred to a tank regiment, the nearest Charles Best got to the front was North Wales.

[266] Richard W. Kapp, "Charles H. Best, the Canadian Red Cross Society, and Canada's National Blood Donation Program," *Canadian Bulletin of Medical History* 12 (1995), 36. Best calculated that the Red Cross voluntary system and the Connaught laboratory could provide blood at $8.00 a bottle, where private enterprise in the United States cost $50.00. The sociologist Richard Morris Titmuss in his book, *The Gift Relationship: From Human Blood to Social Policy* (New York: Pantheon Books, 1971) showed similar price differences between the voluntary British and American systems. Years later the Winnipeg Rh factor voluntary programme, which developed the anti-Rh globulin that prevented the disease would market their product at a fraction of the cost of the United States commercial product.

cause.[267] He published no papers on the subject until after 1944 and there are few records existing of his earlier work as a pathologist. One exception is a series of 50 file cards in his archives describing autopsy observations dated 1936 to 1939.[268] These would be part of his 1939 NRC funded research on the relationship of the thymus and parathyroid glands since the emphasis is upon the findings in these organs.[269] Included in the cards are seven cases of babies who died jaundiced. Three of these are suspicious of Rh disease for the jaundice occurred in the first week of life, with one case being the second in the family so Lewis's suggestion is plausible. The other evidence of an interest in jaundice consists of undated lecture notes on neonatal jaundice which he speculated was due to an excessive breakdown of red cells in the baby, one cause of which could be Rh Haemolytic Disease.[270] Bruce Chown later stated that he had seen few cases of erythroblastosis since the Children's Hospital and the obstetrical unit of the Winnipeg General Hospital were three miles apart. Moreover paediatricians were not welcome in the care of the newborn and although his cousin, Gordon Chown, had "cracked the wall" of the obstetrics unit, it was not breached.[271] As he described in his Gairdner lecture, "I

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[267] Marion Lewis, "Early Pioneers: Bruce Chown," in *Medical Genetics in Canada: evolution of a hybrid discipline: essays on the early history*, ed. H. C. Soltan (London: University of Western Ontario, Regional Medical Genetics Centre, 1992). [Ed.: see above, p. 2 for relationship between Rh and jaundice.]

[268] University of Manitoba, Archives and Special Collections, Chown Fond, Box 10 File 2, File card records of autopsies.

[269] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Faculty of Medicine Research Committee, Minutes, File 10.2.2 (5).

[270] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 1, Miscellaneous lecture notes. If these notes were after 1940 he would have included erythroblastosis fetalis.

[271] Bruce Chown, "The Story of the Winnipeg Rh Laboratory," *Bulletin University of Manitoba*. 3 (1968): 3-4.

did not see cases in the 1920's. New-born babies were the property of obstetricians. The rare pathologist had any interest in the pathology of the fetus or new born baby."[272] In the ten years after its description, he claimed, erythroblastosis was diagnosed only once at the Children's Hospital. By1941 the medical literature had revealed that Rh incompatibility between the mother and her expected baby was the cause of erythroblastosis.[273] Obstetricians and paediatricians began to pay attention to this.

Serendipity played a part in Bruce Chown's choice of Rh Factor as a new subject for research. As chair of the planning committee for the new Children's Hospital, he visited Boston to learn about its Children's Hospital. Twenty-three years later he stated "when I chanced to visit Boston that year to see Dr. James Gamble I met (Lou) Diamond."[274] Luck was again recalled in his *Bulletin* article "By chance I visited Boston and there met

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[272] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 3, Text of Gairdner Lecture, 23 November 1968.

[273] The major title works on the disease associated with Rh factor were James M. Baty, Kenneth D. Blackfan and
Louis K. Diamond, "Blood Studies in Infants and in Children I. Erythroblastic Anaemia; A Clinical and Pathologic Study," *Journal of Pediatrics* 1 (1932): 269-309; K. Landsteiner, A.S. Weiner, "An Agglutinable Factor in Human Blood Recognized by Immune Sera for Rhesus Blood," *Proceedings of the Society of Experimental Biological Medicine* 43 (1940): 223; P. Levine, E. M. Katzin, L. Burnham, "Isoimmunization in pregnancy: Its possible bearing on the etiology of erythroblastosis fetalis," *Journal of the American Medical Association* 116 (1941): 825-827; Philip Levine, R Stetson, "An Unusual Case of Intra-group Agglutination," *Journal of the American Medical Association* 113 (1941): 126-127. These were journals that Bruce Chown might be expected to read.

[274] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 6, Notes for Alan Brown lecture, Sick Children's Hospital, Toronto, 1968. James Gamble was the Head of Paediatrics, Boston Children's Hospital.

Dr. Louis K. Diamond."[275] Chown much admired Diamond's paper on erythroblastosis and the work he did on Rh Factor and its tests.[276] Was that meeting with Diamond really by chance or planned? Even if he went to meet James Gamble did he also request to see Lou Diamond to learn the serological tests for Rh? Twenty three years later he stated, "it was incumbent on me to learn about serological diagnostic methods" that would identify it.[277] He may therefore have planned to meet Diamond but no letter making an appointment is in the Chown archives. Chown had realized that it was "my duty to study the disease as a pathologist with some immunology and bacteriology training."[278] Chown could have simply provided Rh Factor identification as a routine service test, but curiosity motivated him to research it. There is no better way to get one's head around a subject than to investigate it.

Diamond "made me an offer, that if I would send him serum from mothers, he would provide the test serum."[279] Perhaps the greatest luck was that these two determined on a brief meeting to cooperate, and a close relationship and friendship was formed. Chown

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[275] The year of this meeting is somewhat uncertain. In Bruce Chown, "The Story of the Winnipeg Rh Laboratory," *Bulletin University of Manitoba* 3 (1968): 3-4, he put it as 1942 and in his manuscript for his Gairdner lecture hand corrected from 1944 to 1942. However, the correspondence between Chown and Diamond are all dated 1944 and this was the year of his hospital tour and so 1944 seems to be the real date. However 1942 is the often cited date in later articles on Chown's work.

[276] Bruce Chown, "The Story of the Winnipeg Rh Laboratory," *Bulletin University of Manitoba* 3 (1968): 3-4.

[277] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 6, Notes for Alan Brown lecture, Sick Children's Hospital, Toronto, 1968.

[278] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 3, Chown Text of Gairdner Lecture, 23 November 1968.

[279] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 6, Notes for Alan Brown lecture, Sick Children's Hospital, Toronto, 1968.

later called Diamond a "generous and big hearted man."[280] The collaboration between the two researchers was to be mutually beneficial. Chown received anti Rh sera that he could use to test blood in Winnipeg; while, in return, Diamond received blood from Rh sensitized mothers that contained the high levels of anti-Rh antibodies that he needed for his work. Diamond, being the wartime director of the transfusion services of the American Armed Services, needed a large supply of serum for blood typing to prevent Rh induced transfusion reactions.[281] Thus Bruce Chown, aged 51, began the work that eventually was to bring a successful pregnancy to many mothers and a healthy life to many babies.

Chown wrote to thank Diamond for their meeting and five days later Diamond sent 5cc. of serum which was delayed six days by customs at the border. [282] The Children's Hospital provided him with a 100 square foot space in the basement for the work. The Children's Hospital and St. Agnes Guild gave some financial support for Chown to get started.[283] Years later Chown told an interviewer "The Rh laboratory was born of ignorance and brought up in poverty."[284] A month after receiving the serum Chown

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[280] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 6, Notes for Alan Brown lecture, Sick Children's Hospital, Toronto, 1968.

[281] After his return to Winnipeg, Chown thanked Diamond for their meeting in a letter dated 2 March 1944. This confirms that the meeting was 1944.

[282] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 1, Letter from Chown to Diamond, 2 March 1944 and reply from Diamond, 7 March 1944. These too confirm that the meeting was in 1944 not 1942.

[283] Harry Medovy, *A Vision Fulfilled: The Story of the Winnipeg Children's Hospital, 1909-1973* (Winnipeg: Peguis Publishers, 1979), 65-73.

[284] Frank Rasky, "The Doctors," in *Canadian Magazine Supplement, Winnipeg Tribune*, 25 March 1967.

wrote to Diamond that the tests for Rh factor seemed to work. He had no centrifuge, and devised a capillary method of testing serum for antibodies which meant he could stretch the precious anti-serum as far as possible and reduce the costs of the work.[285] Within a week Diamond wrote that he was much interested in Chown's new method of testing for the Rh agglutinogen.[286] Over the next months, Diamond and Chown exchanged letters every few weeks. In the summer Diamond wrote "if you have any qualms of conscience about taking the serum without charge, do let me know what funds you have for purchase of serum and we'll bargain about it."[287] In September more serum was sent, though whether free is unrecorded.[288]

In early October 1944, Colonel W. Hurst Brown and Lieutenant-Colonel. D.S. McMeacham came to Winnipeg. They toured the country to review research that benefited the military. The two officers reported to the Director General Medical Services (Army) on Bruce Chown,

> Dr. Chown was particularly impressive and seemed worthy of the support of the Associate Committee on Army Medical Research. The former is engaged on a

[285] Bruce Chown, "A rapid, simple and economical method of agglutination," *American Journal of Pathology* 14 (1944): 116-17. Two years later, 1946, Diamond falsely attributed this frugality to Chown's Scottish ancestry; Discussion Dr. Diamond, "Current Problems regarding Rh Factor: The Rh Factor in the Clinic and the Laboratory," *Blood, The Journal of Haematology* Special Issue 2 (1948), 180. In fact, the family was from Devon in England. Gordon S. Farhni, "Dr. H. Bruce Chown Honoured," *Annals of the Royal College of Physicians and Surgeons of Canada.* 14, 3 (1981): 160-61.

[286] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 10, Letter from Diamond, 11 April 1944.

[287] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 10, Letter from Diamond, 13 June 1944.

[288] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 10, Letter from Diamond, 26 Sept [1944].

> study of the Rh factor which might well play a part in the transfusion reactions being met with overseas.[289]

Thus the need of wounded soldiers, not babies, seemed to have been one circumstance that fostered the Rh research programme.

Although Diamond gave the anti-serum as a gift, Chown needed funds to cover the cost of the laboratory reagents and glassware and, above all, a salary for a technical assistant. He applied to the NRC for a one year grant of $4,220 for his Rh factor research. A grant of $2,110 for six months support was swiftly approved and on 21 October 1944 received.[290] Having begun the work using the resources and incidental expenses provided by the Children's Hospital, Chown was able to develop the work further when he received the NRC grant. With it he hired a 19-year-old woman, Marion Lewis, who was in the fourteenth of an 18-month laboratory technician course at the Winnipeg General Hospital, organized by Drs. Dan Nicholson (Pathology) and A. T. Cameron (Biochemistry).[291] It seemed research, rather than a diploma interested her more.[292] Chown and Lewis set rapidly to work and quickly formed a partnership that was a model

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[289] University of Manitoba, Archives and Special Collections, Paul H.T. Thorlakson Fond, Box 17 File 5, Copy of Report by Col. Brown and Lt.-Col. McMeacham.

[290] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Minutes of the Faculty of Medicine Research Committee, 24 October 1944. If only grant applications were approved so fast! Bruce Chown reported that he had grants for his encephalitis and Rh Factor research of $5,000 from the Children's Hospital, $21,800 from the Provincial Government and $8,690 from the NRC (presumably for his Calcium studies).

[291] Bruce Chown, "The Story of the Winnipeg Rh Laboratory," *Bulletin University of Manitoba* 3 (1968): 3-4.

[292] Some years later she passed the course's exams with honours.

for success. Chown's second paper on the Rh research was with Lewis as co-author.[293] Bruce Chown re-applied for an increase[294] in the NRC grant six months later, and this application revealed what he planned to do. He had already tested 757 pregnant women and found 113 who were Rh negative. His priority the first year was to survey as many Rh negative pregnant women in Manitoba as possible so as to discover how many foetuses or infants developed Rh Haemolytic Disease. To draw attention to this he visited all obstetrical units in Winnipeg, spoke to the Manitoba Association of Registered Nurses and gave notice to all medical practitioners with an announcement in the Manitoba Medical Review. He offered to test the mothers for nothing if in return he could see the babies.[295] He intended to identify mild forms of the disease, to improve the diagnostic criteria for it and to see what happened to the babies. He followed the Hippocratic principle of diagnosis and prognosis.[296] But besides this descriptive observational work he wished to elucidate the patho-physiology so as to learn why and how the damage was done. He hoped that autopsies would yield clues.

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[293] B. Chown and M. Lewis, "Further experience with the slanted capillary method for the typing of red blood cells," *Canadian Medical Association Journal* 55 (1946): 66-69. This was the first of the many papers they wrote together. In due course, Marion Lewis became an independent researcher and author and was eventually awarded an honorary Doctorate by the University of Manitoba.

[294] He had found that the expenses of the study higher than he had expected especially the travel costs between the laboratory and the hospitals in which the babies were born.

[295] This was still a time in which the researcher asked the patient's doctor, not the patient, to do a study. The assumption was that the study was of benefit and the autonomy of the patient had not been appreciated. There was an unwritten understanding that no harm would be done!

[296] Hippocrates, *Epidemics* I, XI Trans W. H. S. Jones. Loeb Classical Library (Cambridge: Harvard University Press, 1923), "Declare the past, diagnose the present and foretell the future; practice these acts."

At year's end Chown wrote a long letter to Diamond with a cry for help since there were problems with the tests that produced unexpected results. His technician, presumably Marion Lewis, had performed 491 tests on unselected blood donors but found that fewer agglutinated than expected.[297] Diamond promptly responded with an apology that he had mis-labelled the serum provided and Chown would miss some cases. Diamond raised the question as to whether there were racial differences in the Winnipeg population and that the odd results might reflect this since Rh positivity was more common in Negroes (sic) and Mediterreneans (sic) than in Nordics.[298] Diamond would have been ignorant of Winnipeg's marked ethnic diversity. Three days later, Chown prophetically replied that he would try to look at races in the summer.[299] Indeed with an ethnic Japanese medical student he studied the blood groups of Japanese-Canadian in the summer of 1945.[300]

With the funding of the NRC grant Chown hoped to test 4000 mothers a year and this he exceeded for in the next two years they had Rh grouped some 15,000 women and had

[297] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 10, Letter to Diamond, 27 December 1944. Chown was painstaking and even worked at a traditional holiday time.

[298] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 10, Letter from Diamond, 3 January 1945.

[299] University of Manitoba, Archives and Special Collections, Chown Fond, Box 4 File 10, Letter to Diamond, 6 January 1945.

[300] B. Chown, Y. Okamura and J. Peterson, "The Rh Types in Canadians of Japanese Race," *Canadian Research Journal* 24, 5 (1946): 135-143.

seen over 300 babies.[301] Since all expectant mothers had by law blood drawn for the Wasserman syphilis test, it was easy to obtain an aliquot of this serum for Rh tests.[302]

Chown and Lewis embarked on their full clinical and pathological studies of the effects of Rh Factor on babies in the spring of 1945. First he performed autopsies on all babies and stillbirths supposed to have died of Rh Haemolytic Disease. Second they typed the blood of all mothers-to-be, identified those who were Rh negative mothers and after their delivery observed the first weeks of their baby's life for evidence of erythroblastosis. They checked all Rh negative mothers for anti Rh antibodies that might destroy the baby's blood. They grouped all husbands to confirm they were Rh Positive.[303]

At once, Chown began the autopsies and over the next 8 years he examined the pathology in 88 dead babies.[304] The gestationary records of the mothers of these dead babies revealed the full tragedy of Rh disease, both for the many babies' lives lost and for the fruitless and heart-breaking pregnancies through which the mothers went, often many times. One mother had four stillbirths and also lost five babies after birth.[305] Less than

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[301] Bruce Chown, "On certain variants in erythroblastosis fetalis," in *Blood, The Journal of Haematology* Special Issue 2 (1948), 155-163

[302] At this time, and today, no formal consent was obtained when blood tests are ordered for routine clinical purposes.

[303] They assumed that the husbands were the fathers. It is noteworthy that unmarried mothers did not feature in the records.

[304] That the post mortem studies included here extend beyond the period (1944-1946) addressed in this thesis is because the research began during those years.

[305] Euripides, "Oh what sorrows accompany child-rearing! How they torment the hearts of mortals. For whoever considers them rightly will pass his days without offspring and not produce children only to bury them!" "Rhesus," Lines 979-982, in *The Bacchae and Other Plays* trans. John Davie (London: Penguin Classics, 2005).

half of the pregnancies of these mothers had resulted in a live child and of the latter a few were left brain damaged. The data is detailed, but provided simply the biomedical bones of the cases- it is left to the imagination to flesh out the psycho-social effects of these pregnancies on the families, their hopes and anguish. That first year Chown tried to see all the babies that suffered from Rhesus Haemolytic Disease, and as he recalled later,

> It was a good way to learn, but one that often tried your heart. For having made your diagnosis, what could you do? Essentially nothing! Here is a newborn baby pink and vigorous. By night-fall it is yellow; by morning yellower still. It drowses; it will not suck. Its back begins to arch, its eyes turn down, there trickles a little blood from the corner of its mouth, and it is dead.[306]

Such sentiment belied Foucault's comment that the observing gaze is silent and gestureless. However, the pathologist in Bruce Chown was active, for if he was to learn what went wrong, he had to follow the adage, "If the old beliefs had for so long such prohibitive power, it was because doctors had to feel in the depths of their scientific appetite, the repressed need to open up corpses."[307] He hoped that autopsies would reveal why some babies lived, while others died although the mother in each case had antibodies against the baby's blood. In addition, why did sensitization occur in that particular pregnancy? One unfortunate picture emerged- several women had blood transfusions from their husband, or in one case by a son, and so became sensitized and subsequently produced Rh diseased babies. Injections of a husband's blood had even been tried to ameliorate uncontrollable vomiting of pregnancy!

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[306] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 3, Chown Text of Gairdner Lecture, 23 November 1968.

[307] Michel Foucault. *The Birth of the Clinic*: *Archaeology of medical perception* (New York: Random House Inc., 1973), 125-126.

The observations of the living babies of all Rh negative mothers are recorded in clinical case notes. [308] The detailed data revealed the conscientious work involved in observing so many babies with a potential risk of Rh disease. Although subsequently Chown claimed that Marion Lewis and he "turned up at all hours of the day and night in those innermost obstetric shrines, the delivery room"[309] the case notes showed that this was an embellishment, but he did arrive the next morning. In just over a year they visited nearly 300 babies, even on holidays, and made observations about three to six times on each.

In the winter of 1945- 46, Bruce Chown presented a paper on the Rh factor to the Scientific Society of Winnipeg. He said "There is at present no accepted method of treating the mothers so that the babies may escape the disease, or be sufficiently vigorous at birth that by treatment after birth they may be saved." He went on prophetically "We are now hoping to develop a technique that will permit us to draw off nearly all the baby's blood at birth and replace it with Rh negative blood."[310]

In November 1946 Bruce Chown presented the results of his research to a conference of international experts on the disease. His paper outlined the findings from 60 families and babies whose Rh negative mother had anti-Rh antibodies and on whom they had complete data. A major finding was that even when the mother had had a baby with erythroblastosis the next baby might be unaffected. In these cases Bruce Chown declared

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[308] University of Manitoba, Archives and Special Collections, Chown Fond, Box 9 Files 1-15, Clinical notes.

[309] University of Manitoba, Archives and Special Collections, Chown Fond , Box 2 File 3, Chown Text of Gairdner Lecture, 23 November 1968.

[310] University of Manitoba, Archives and Special Collections, Chown Fond, Box 2 File 1, Draft of lecture to the Scientific Society of Winnipeg,1945-46 Session.

"Nature has ... carried out a successful experiment, and challenges us to discover how she did it, and to devise means to imitate her." He concluded there had to be other factors that modified the mother- baby reaction and it would require a well-organized team that would include more than the pathologist such as the endocrinologist, psychiatrist, bio-chemist and obstetrician "to *prevent* the disease."[311] Chown pursued his vision of treating the babies and preventing the disease. Chown's philosophy for disease and medicine was "Recognize it. Cure it. Prevent it! Prevent it!"[312] Bruce Chown's first foray into unravelling Rhesus Haemolytic Disease of the Newborn enabled the disease to be recognized in Manitoba. In the subsequent years he contributed to the treatment and in due course the prevention of the disease.

[311] Bruce Chown, "On Certain Variations in Erythroblastosis Fetalis," *Blood, The Journal of Haematology* Special Issue 2 (1948): 155-63, 159. Chown's comment on Nature's experiment echoes**, "**As clinical observers, we study the experiments which Nature makes upon our fellow creatures." William Osler, "The Army Surgeon," in *Aequanamitas* 3rd Edition (Philadelphia: The Blakiston Company, 1932): 106.

[312] University of Manitoba Faculty of Medicine Archives, N.J. MacLean Health Sciences Library, Henry Bruce Chown Fond, File 3, Bruce Chown, Address: Unveiling of the Annie A. Bond Memorial Plaque, Winnipeg Children's Hospital, 19 June 1947.

POSTSCRIPT

In 1945 Dr. Wallerstein in New York introduced exchange blood transfusions in which the bad blood was replaced with fresh invulnerable to the Rh antibodies bequeathed by the mother. Dr. Chown quickly adopted the procedure and provided it as a service to Winnipeggers and Manitobans as far as 159 miles away. In November 1963, Liley in New Zealand performed blood transfusions on the baby before birth *in utero* through the mother's abdominal wall. Two months later this technique was used for the first time in North America in Winnipeg by Bruce Chown's colleagues. Further refinements in these procedures saw a drop in mortality in the babies from 50% to 3% by 1982.

All researchers in the field hypothesized that sensitization of the mother occurred when babies bled into the mother and Chown was the first to show this. Then Dr. Zipursky, Chown's colleague, showed that the baby's blood cells were actually frequently detectable in the mother throughout pregnancy. To prevent the fetal red blood cells sensitizing the mother to form anti- Rh antibodies immunization of the mother with anti-Rh serum was introduced at the time of delivery in Liverpool and New York. However, Chown's research successor Jack Bowman showed it was also safe and more effective to give the anti-serum before delivery and in due course this became standard practice around most of the world. As a result sensitization of mothers dropped by 87%. In the Twenty First century only 65 sensitized mothers, usually immigrants, have been seen in Manitoba and only 1-2 babies needed treatment. The steps in the conquest of the disease are summarized in Table 1. [313]

[313] Annual Reports Rh Laboratory, 2001-2005.

Table 1. The improvement in wastage of pregnancies from Rh Immunization in Manitoba. [314]

Date and innovation. of in Manitoba		Death rate in babies Rh–ve sensitized mothers
1940.	Before Rh factor recognized	50%
1942-52	Exchange transfusion	25%
1954-1961	Selective induction with exchange transfusion	15.7%
1963-1964	Foetal intra-uterine transfusion	8%
1969-1975	Immunization at delivery.	3%
1975-1983	Antenatal Immunization	

[314] Peter Warren and James Jamieson, "Jack Bowman: Winnipeg's Contribution to the Treatment and Prevention of Rhesus Haemolytic Disease of the Newborn," *Transfusion Medicine Reviews*, 24, 1 (2010): 68-76.

CONCLUSION.

The thesis proposed that three elements were necessary for the medical research on the Rh Factor to begin and to succeed in the Faculty of Medicine, University of Manitoba. First someone had to want to do research. Second the circumstances needed to be propitious for success. Third luck played its part. This thesis confirmed that all three played a part in the research programme studied.

The Rhesus (Rh) Factor research programme, begun in 1944, was chosen because it was "one of Manitoba's most profound medical discoveries." More importantly the career of the researcher, Dr. Bruce Chown, who started it, bridged the transformation of the Faculty of Medicine from a teaching dominated facility to one in which research became equally important. Moreover it emerged that Bruce Chown led this transition.

Dr. Bruce Chown was a clinician and pathologist at the Winnipeg Children's Hospital which he joined in 1925. His biography provided an informative picture of academic life in the Faculty of Medicine in the inter-war and Second World War years. His life confirmed that to become a researcher, training in research was necessary as was perseverance in pursuit of funding. His work confirmed that biography reveals the development and organization of medical research. Chown's approach and achievements are instructional for those who choose research as a career.[315]

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[315] Thomas L. Hankins, "In defence of Biography: The use of biography in the History of Science," *History of Science* 17 (1979): 1-16; Mark Jackson, "Back to the future: history and humanism in medical education," *Medical Education* 36, 6 (2002): 506-507.

Chown's biography confirmed that he had specifically trained for research and had arranged to train under leading scholars in his discipline, paediatrics. He then applied his training to research on his return to Winnipeg and within fifteen years was recognized nationally for his first class work. He showed that he had a broad range of interests and talent for working in several fields without becoming a jack of all trades and master of none. He combined his research with several other duties in clinical and service work and administration exhibiting that he had a capacity for hard work. His biography bore out that he was fully capable and prepared to begin research in a completely new field, the Rh Factor.

The second element was the circumstances under which the researcher worked. However much Chown was prepared to study Rh Factor these needed to be supportive. Scientific research needed funding. Laboratory supplies had to be purchased and a salary for an assistant usually necessary. As well the work environment had to be conducive to enabling the researcher to have the time to devote to research and this activity must be valued by colleagues. In 1944 the state of affairs in Canada was favourable for Bruce Chown to study Rh Factor. First the funding of medical research in Canada and Manitoba was available. The Federal Government through the National Research Council now included medical research in its mandate. Admittedly this was devoted to research relevant to the war effort but fortunately Bruce Chown's research on the Rh Factor fitted with the interests of the Blood Transfusion Service of the Army. Secondly funding for medical research in Manitoba now existed through the Manitoba Institute of Medical Education and Research of which Chown had played a part in its inception. Finally he

received some subsidies from the Winnipeg Children's Hospital that saw his research as adding to its prestige.

The third circumstance was that the Faculty of Medicine now accepted that research must be performed by its members and that they must be responsible themselves for this. Again the record showed that Chown was very instrumental in the adoption of this new ethos in 1944 for he made it clear that the time was past for using the excuse of no funds to avoid doing research. His career had shown that much could be accomplished in research with what had been available to him. The time was ripe for medical research in Manitoba 1944.

Moreover the thesis demonstrated that Chown could self-select and indeed influence the circumstances that existed. He had chosen to return to Winnipeg after training for research in the United States where many Canadians chose to stay to avail themselves of the better opportunities there. The Winnipeg Children's Hospital had realized that if it was to encompass research and recruit a researcher then its conditions of employment must be attractive. But Chown was well aware that little medical research was being done in Winnipeg and that he would need to pursue his own interest and not require an artificial stimulus to initiate research. His advocacy of the Manitoba Institute of Medical Education and Research in Faculty Council and his strong views on medical research that were incorporated in the policy of the Faculty of Medicine and University produced the circumstances in Winnipeg that supported his commitment to research. And indirectly these were transmitted to the Associate Committee on Medical Research and were part of the rationale for its becoming a Division of the National Research Council.

The third element of this thesis is that serendipity, luck, can play a major role in medical research. The evidence confirmed that this was the case for Chown's study for if he had not gone to Boston to learn about Children's Hospitals he would not have met a leading expert on Rh Factor, Lou Diamond. Moreover it was luck that Chown and Diamond immediately saw the benefit of cooperating on this research and were collegial in their relationship. Although Chown might have simply provided tests for Rh Factor as a service to Manitoba his curiosity led him to investigate it and its effects on babies. This chance encounter in the well trained and proven researcher Bruce Chown was a prime example of the oft-quoted aphorism of Louis Pasteur, *"*Dans les champs de l'observation le hazard ne favorise que les ésprits préparés."[316]

A question left unanswered was whether the history recounted here can be generalized to the other Canadian medical schools. As had been made clear Toronto and McGill were in an unique situation and such researchers as Banting, Best and Collip, with their royalties from insulin, not representative of Canadian researchers as a whole. Certainly the Associate Committee on Medical Research policy of making grants available to all medical schools meant that Bruce Chown was not alone in making use of it. The wartime committees that applied research to specific problems introduced and trained many Canadians in medical research who then expected to continue research when war ceased. Bruce Chown was the recipient of this effort for his Rh Factor research fitted with the need of the armed services blood transfusion service. The recommendation of the Faculty

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[316] Louis Pasteur, *"*Dans les champs de l'observation le hasard ne favorise que les ésprits prepares," Speech, 7 December 1854 *in Mélanges scientifiques et littéraires, Vol. 7, Oeuvres de* Pasteur, réunies par Louis Pasteur Vallery-Radot (Paris: Masson 1922-1939), 131.

research memorandum that there should be a Department of Experimental Medicine was headed by Joe Doupe who had trained for research while in the army. Apart from the need for funding the most common complaint of the Canadian medical research community and medical schools was the lack of trained researchers and every effort was made to make the preparing of young people for research a high priority. Training was often obtained in the United States and added to the recurrent concern that these trainees did not return to Canada.

Further the thesis has shown that although the birth of the Rh Factor research programme in the Faculty of Medicine was determined by three elements the situation was more complex than just these.[317]

The Rh Factor research described in this thesis was simply the first step of a Manitoba research programme that continued for many years. Even if no concrete improvement was made for the babies in the first two years of the programme the families were given hope that this would come. Chown's compassion, curiosity, industry, and willingness to collaborate with whomever he pleased, particularly as he was entering a new field, served him and his patients well. Because he collaborated with Diamond he quickly learnt of the advances in treating the babies by exchange transfusion and was applying it to save lives by the second year of the research. This intervention, followed by the technically more

[317] "The deeper we delve in search of these causes the more of them we find." Leo Tolstoy, *War and Peace* trans. Louise and Aylmer Maude (1868; London: MacMillan & Co, 1942).

challenging antenatal transfusion in utero, was heralded by the press and public as one of the direct feats of bio-medical science. The more important determinants of health are social problems and poverty but society does not appreciate the benefit of indirect intervention in these. And bio-medicine has its influential doomsayers, for the Nobel Laureate immunologist Macfarlane Burnet gloomily concluded that "We have reached the stage in 1971 when little further advance can be expected from laboratory science in the handling of the "intrinsic" types of disability and disease." And yet he cites the control of Rh Haemolytic disease of the Newborn as the first genetic disorder which science had helped.[318] For those individuals whose babies had been affected the benefit of the Rh Factor studies was very evident and such advances have contributed to the current power of medical research in Manitoba. And yet when finally the disease was prevented effectively by immunization the bio-medical science disappeared into the background for, like good nutrition, its value was indirect. There is a constant imbalance between the value of such bio-medical science for the health of the individual and the greater need for improved social conditions for the health of the population. Acknowledging this the renowned social historian Roy Porter still chose to 'mistakenly' title his book on the history of medicine *The Greatest Benefit of Mankind: A Medical History of Humanity*; he admitted that the book verged on the old-fashioned Whiggish 'great docs' history.[319] Bruce Chown and the Rh Factor programme reinforces this.[320]

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[318] Macfarlane Burnet, *Genes, Dreams and Realities* (Middlesex: Penguin Books, 1973), 20-24.

[319] Roy Porter, *The Greatest Benefit of Mankind: A Medical History of Mankind* (New York: W.W. Norton & Co., 1997). This is actually a misquote from Samuel Johnson who placed God first and Medicine second, Samuel Johnson, "Herman Boerhaave" *The Works of Samuel Johnson, Volume 14* (Troy, NY: Pafraets Company, 1903), 154-184.

For as Porter wrote the discovery of the Rh Factor had "immense implications for the health of unborn babies."[321]

[320] Roy Porter, *The Greatest Benefit of Mankind: A Medical History of Mankind* (New York: W.W. Norton & Co., 1997), 6.

[321] Roy Porter, *The Greatest Benefit of Mankind: A Medical History of Mankind* (New York: W.W. Norton & Co., 1997), 592.

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