

Jane's Walk: Banting & Best Insulin Discovery Tour; *The Road to the MaRS Exhibit*



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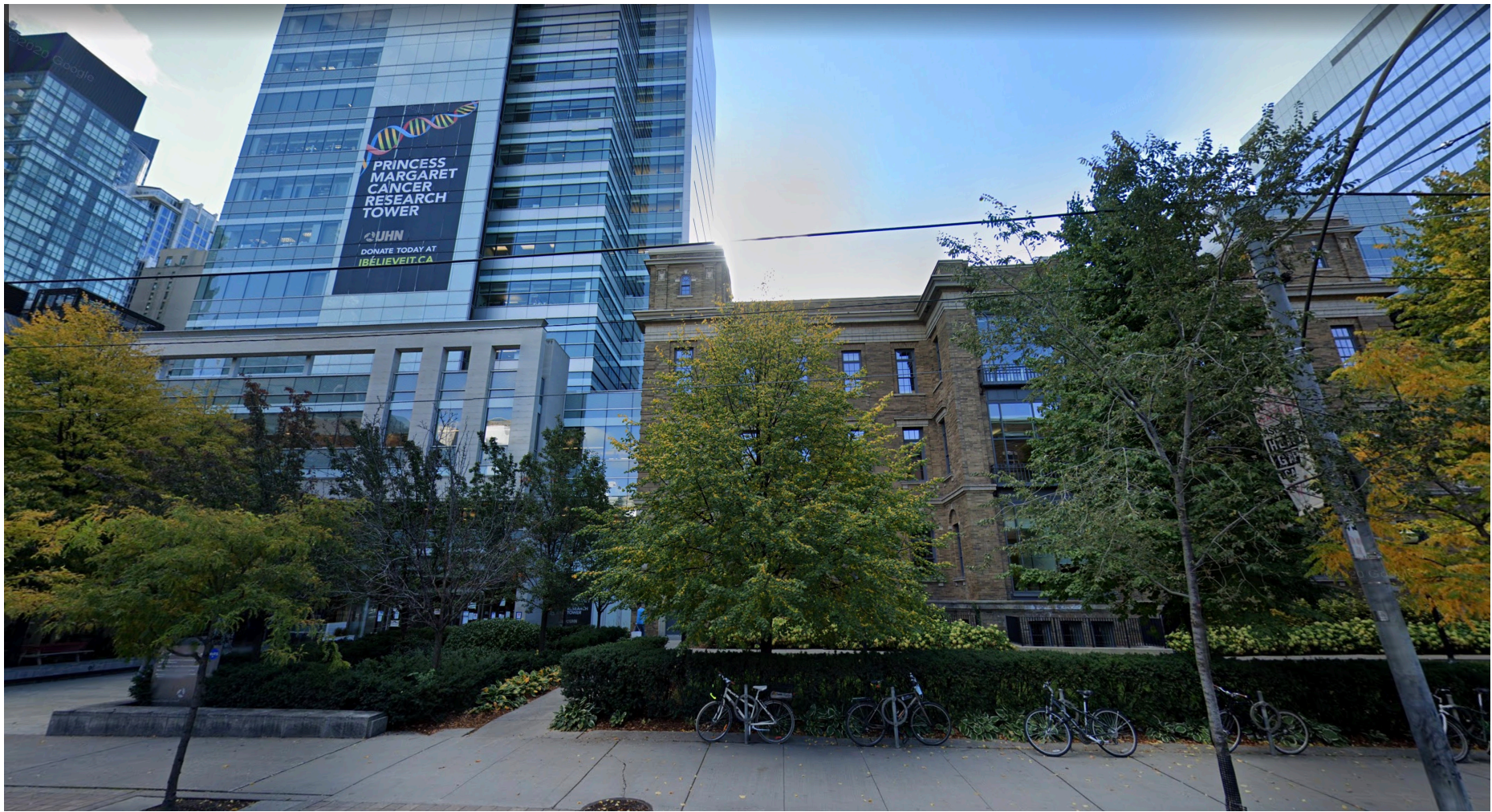
University of Toronto

Jane's Walk via Zoom, May 8 & 9, 2021



Introduction





October 2011 – “Insulin: Toronto’s Gift to the World” exhibit opened during 90th anniversary

- Lead by University of Toronto Faculty of Medicine & University Health Network

INSULIN: Toronto's Gift to the World

A feast of celebration in the wake of the night but to one of the greatest achievements of the 19th century. What is being said and how it is being said. Health has saved the lives of millions of people and paved the way for unprecedented progress in medical science.

Before insulin, the life of a patient with diabetes – especially type 1 – was usually short and often painful. Without insulin, patients have weakness, appetite and weight loss, and a host of other complications such as kidney disease, blindness, and limb amputation.

Insulin, as far back as the 1870s, had been known to scientists that the pancreas was the central gland for regulating sugar in the body. This history remained unknown to the general public for decades. There would not be a major medical breakthrough until October 1921, when a young Canadian surgeon, Dr. Frederick G. Banting, was asked to try something new for an experiment to isolate an internal secretion of the pancreas.

In the summer of 1921, Dr. Banting and Charles H. Best would conduct a series of experiments in an animal laboratory at Toronto University. The results would lead to the discovery of insulin, a natural hormone, and Best, a young medical student, would produce a crude pancreatic extract. When further purified, the extract, later called insulin, would prove to be the first effective treatment for diabetes.



HISTORICAL BUILDING, UNIVERSITY OF TORONTO, SITE OF INSULIN DISCOVERY, 1921 - ORIGINALLY LOCATED NEAR NORTHWEST CORNER OF UNIVERSITY AVENUE AND COLLIERIE STREET

INSPIRATION
 "The dog produced insulin... might allow the animal to live longer... might be obtained without the... of the pancreas..."

WORK BEGINS
 "The first trial was on a dog... who [sic] pancreas had been removed on July 18. This animal was running a blood sugar of 7.2 and a pH ratio of about 2.1. We were enclosing a chart showing her history. The extract ought to have a marked effect."

PROMISING RESULTS
 "It's very easy often in science to satisfy one's own self about some point, but it's very hard to build up a strong hold of proof which others cannot pull down."

SUCCESS
 "I discovered a way to get the active principle free from all the muck with which it appears to be inseparably bound."

MEETING THE DEMAND
 "Our small-scale method is now giving good results, and we hope to maintain a small but steady production by this means while installing a larger plant."

THE LEGACY
 "The immortality of the discoverers of insulin was particularly deserved, in the sense that for diabetes it was more than a matter of just getting a new hormone of the gland. All the later questions, at the current ones, are secondary to the one answered in 1921-22 at Toronto. With the discovery of insulin, the stone was rolled away, and diabetes became a matter of life, not death."

AWARDS & RECOGNITION
 "That trusting have conferred prizes on Macleod and me - you are with me in my share always."

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CONNUGHT LABORATORIES, WHERE INSULIN WAS PRODUCED FROM 1923-1927.

INSULIN WAS PRODUCED IN THE FITZGERALD BUILDING (ORIGINALLY THE SCHOOL OF HYGIENE), 1927-1970.

CONNUGHT LABORATORIES' FIRST LARGE-SCALE INSULIN PRODUCTION FACILITY, THIS IMAGE ILLUSTRATING THE FILTRATION PROCESS, 1923.

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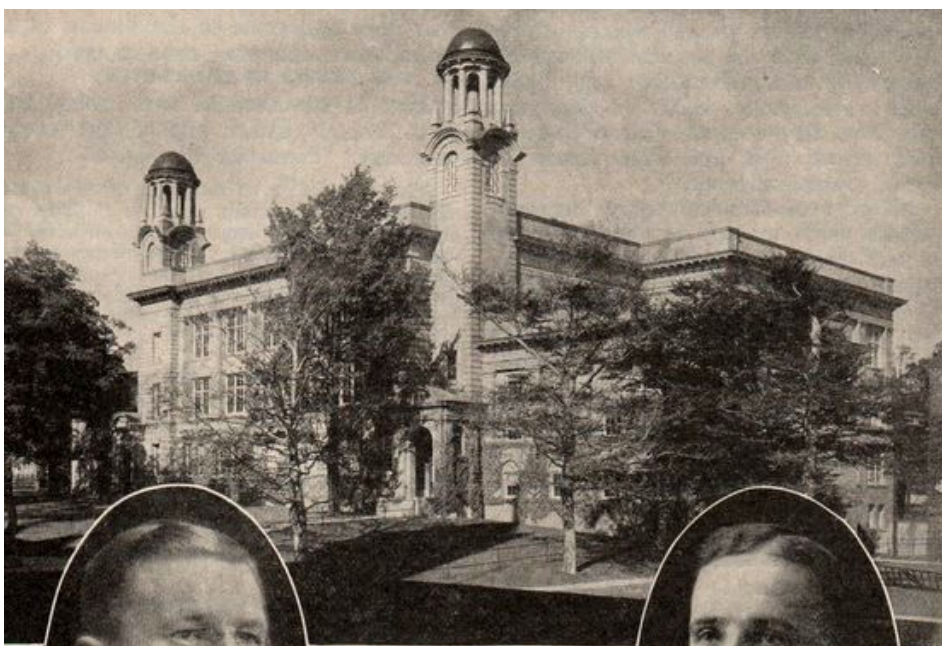
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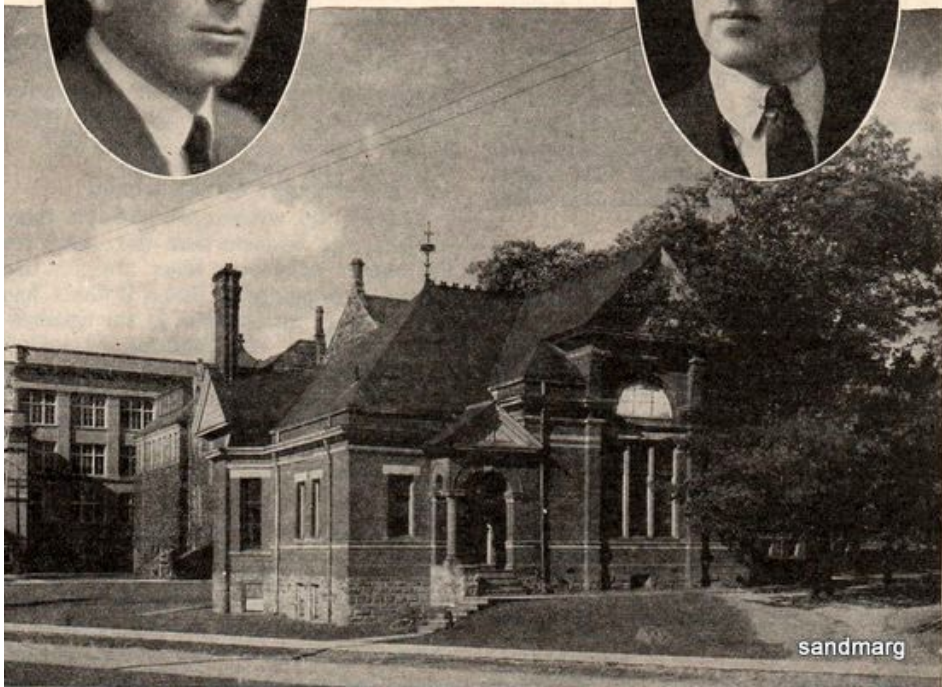
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The birthplace of Insulin.



sandmarg

New Laboratory

Accommodation in the Connaught Laboratories at the University of Toronto has been considerably taxed by the Insulin Division, and this important section is soon to be moved entirely into new quarters. Through the use of the \$25,000 grant made recently to the Banting-Best Fund by the Ontario Government, it has been possible to reconstruct the old Y.M.C.A. building at the University as an insulin "factory." The work on this building has already been partially completed, and Charles Best, who, as assistant to Dr. R. D. Defries, head of the Insulin Division, will have charge of the manufacture of insulin, has already moved into the new laboratories.

Insulin will be manufactured commercially nowhere else in Canada, and the insulin "factory" will, besides providing a supply for Canada, provide the curative fluid for all countries which do not manufacture their own supply. At present insulin is manufactured in the United States, Great Britain and Denmark. The main idea of the enlarged laboratory will be to keep the cost of insulin as low as possible. This object will be assisted by the fact that overhead expenses in the new laboratory will be very low. The building is situated conveniently to the Medical Building. It consists of two stories and a basement, and has until recently served as a draughting room for the Faculty of Applied Science.

Globe, Aug. 1, 1923

THURSDAY, NOVEMBER 29, 1923.

INSULIN PRODUCTION 250,000 UNITS WEEKLY

And Price Has Dropped From
Five Cents to Two
Cents Per Unit

Tucked away in an obscure corner of the University of Toronto grounds, overshadowed by the new Electrical Engineering Building and flanked by a row of venerable elms, stands a two-storey, red brick building formerly occupied by the University Y. M. C. A. A year or two ago it was planned to remove the building as it was not suitable for any University purpose. To-day, housing, as it does, the only "Insulin Laboratory" in Canada, the building, together with the recently installed equipment, is worth upwards of \$35,000.

The Insulin Laboratory is one of the latest chapters in the romance of insulin. It stands as a confirmation of the success of the research of Dr. F. G. Banting and his fellow-investigator, Charles H. Best, M.A. Its management and operation are in the hands of Mr. Best, who has from the beginning been in charge of the large-scale production of insulin. The laboratory is operated as a division of the Connaught Anti-Toxin Laboratories, of which Dr. J. G. Fitzgerald is director and Dr. R. D. Defries associate director. The business administration is in charge of Dr. Fitzgerald and Dr. Defries. Mr. Best is

assisted in the new laboratories by D. A. Scott, M.A., as assistant director, and a staff of 26 persons working day and night shifts.

Big Production Now

The erection of such a completely equipped plant was made possible through the Ontario government's grant of \$25,000, the remaining \$10,000 to \$15,000 being secured from funds of the laboratory and from private donations. The plant is now producing in the neighborhood of 250,000 units a week for distribution throughout Canada, Ireland, South Africa, Central America, New Zealand, Australia, and other countries where plants have not been established. The average dosage for the diabetic patients for whom such a large quantity of insulin is being prepared varies from 15 to 20 units a day.

The price for which insulin is distributed is, as with other products of the Connaught Laboratories, governed entirely by costs of material and of production. The Connaught Laboratories are not engaged in commercial business but constitute a department of the University of Toronto. Mr. Best has called attention to the gradual fall in the price of insulin. In May, 1923, the material was sold at 5 cents per unit, in June at 3 cents, and now at 2 cents per unit.

How It is Prepared

The distribution of insulin is effected through two channels. The first is hospitals which have organized departments for the administration of insulin. The second is through physicians trained in the use of insulin. For these latter a special short course of instruction was provided at the University of Toronto last July under the direction of Professor Duncanson Graham.

The preliminary stages in the preparation of the health-giving extract are conducted in a large laboratory in the north-east corner of the in-

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sulin building where beef and pork pancreas (sweet-breads) fresh from the abattoirs, are first minced in a large meat grinder, dissolved in vats of alcohol, and then placed in a large basket centrifuge. The liquid is drawn off from the centrifuge and further clarified by filtration through paper in glass funnels. This liquid, containing the soluble constituents of the pancreas, is reduced to a small volume by evaporation of the alcohol and water content in a large vacuum still. The residue contains the insulin. The solution is purified in two chemical laboratories, one on the main floor and one on the second floor, by chemical processes known as "fractional precipitations." The purified product is then sterilized, standardized, and filled into vials for distribution by the Connaught Laboratories.

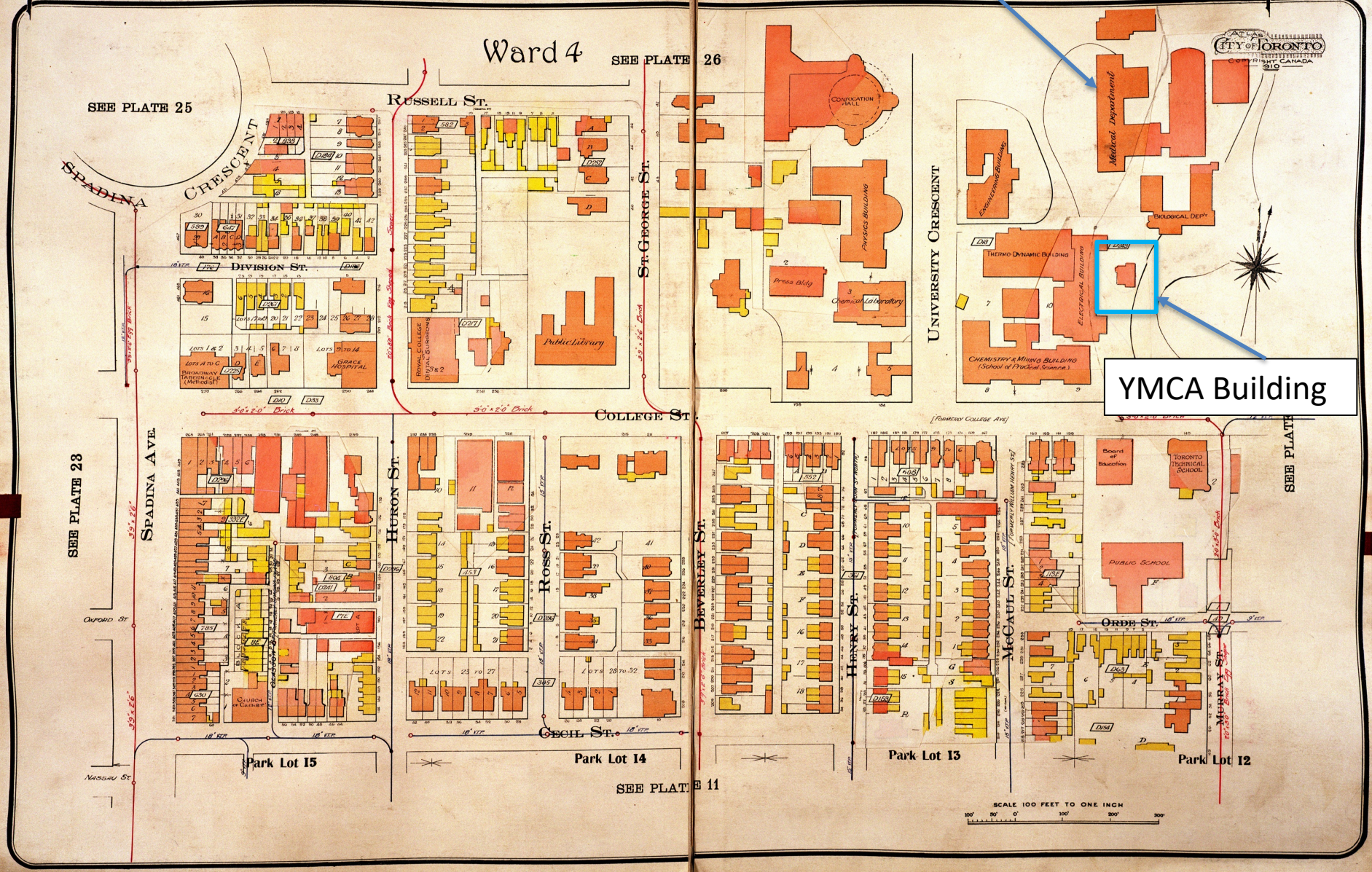
Toronto Star,
Nov. 29, 1923

Toronto Fire Map, 1924

Medical Building

DATE 14

DATE 14



YMCA Building

Toronto Fire Map, 1924

Medical Building

DATE 14

SEE PLATE 26

ATLAS
CITY OF TORONTO
COPYRIGHT CANADA
1910

ST. GEORGE ST.

UNIVERSITY CRESCENT

COLLEGE ST.

CONVOCAATION HALL

PHYSICS BUILDING

2
Press Bldg

3
Chemical Laboratory

ENGINEERING BUILDING

Medical Department

BIOLOGICAL DEP^t

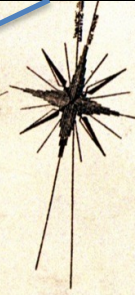
YMCA Building

D18
THERMO DYNAMIC BUILDING

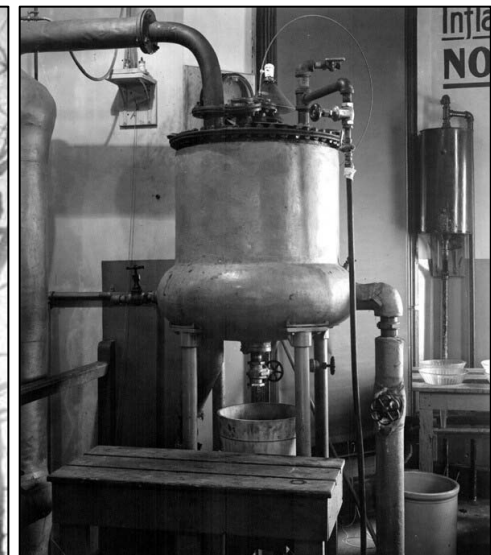
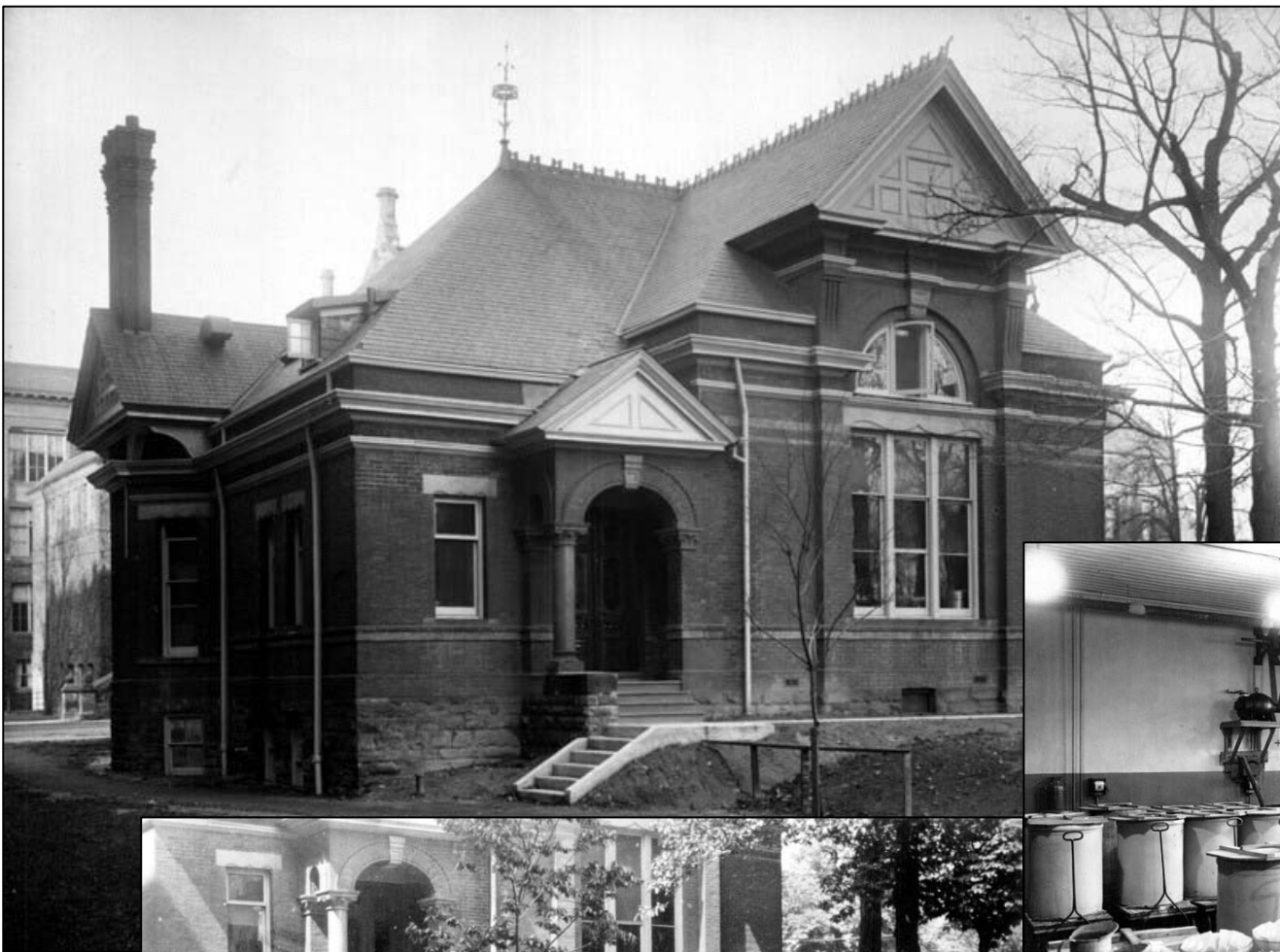
ELECTRICAL BUILDING

CHEMISTRY & MINING BUILDING
(School of Practical Science.)

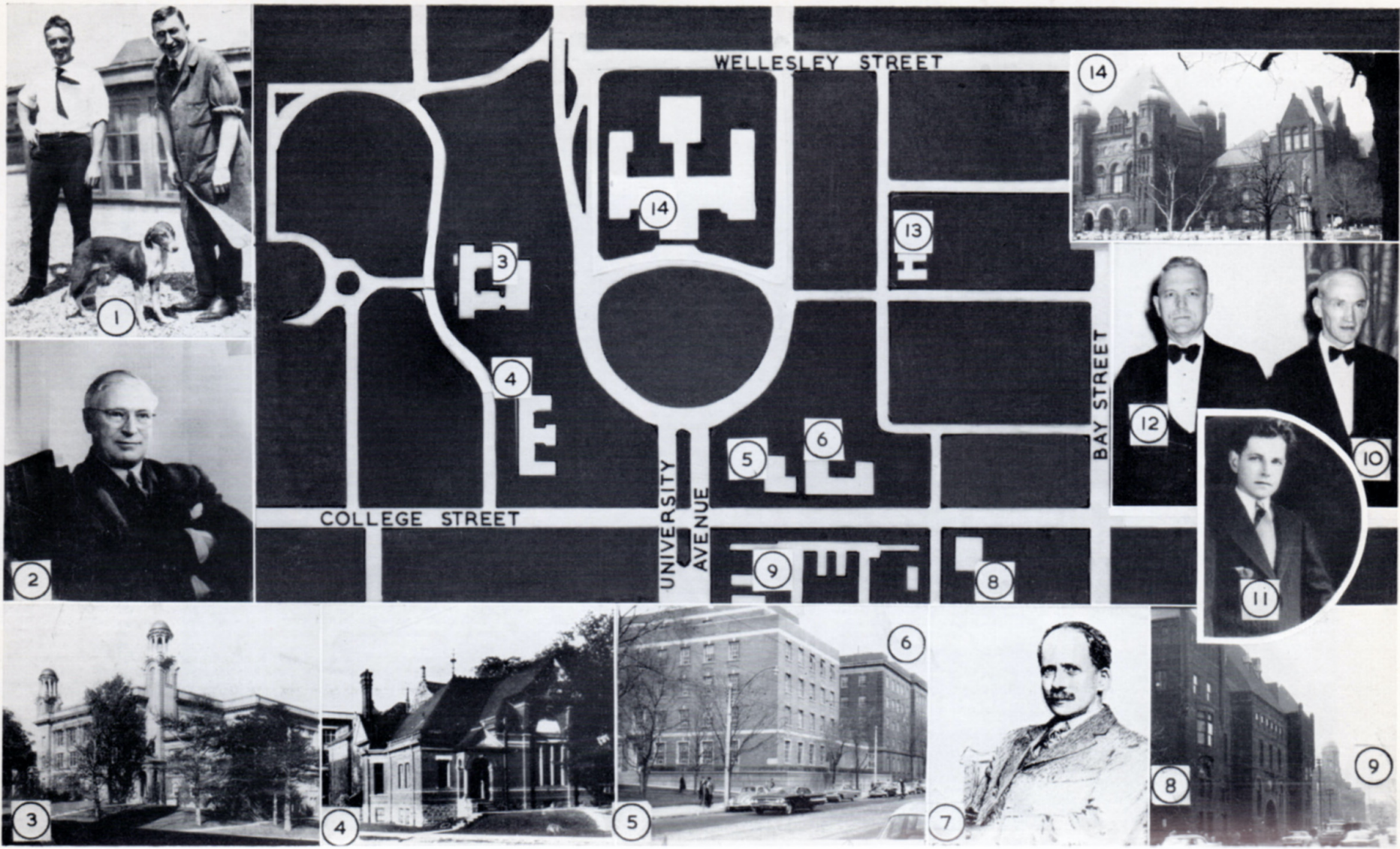
School of Hygiene Building site



15

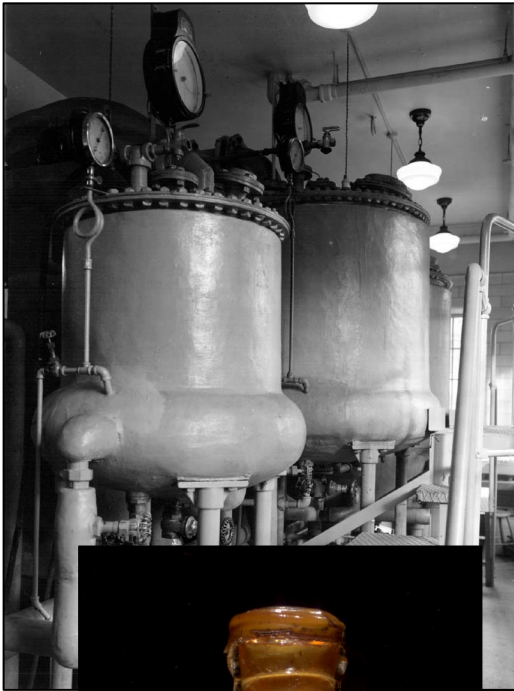


Fall 1923 – June 1927 – Insulin produced by Connaught Labs in former YMCA Building



From G.A. Wrenshall, W.R. Feasby, *The Story of Insulin: Forty Years of Success Against Diabetes* (London, 1962)

1927 - 1970 – Insulin produced by
Connaught Labs in School of
Hygiene (FitzGerald) Building







All Visitors
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the Construction
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Footprint

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Queen's Park

University Ave

QUEEN'S PARK

PREPARE FOR
THE SLOW
NEW CONSTRUCTION

NO LEFT TURN
ON RED

NO LEFT TURN
ON RED

NO LEFT TURN
ON RED



INSULIN: Toronto's Gift to the World

A burst of inspiration in the middle of the night led to one of the greatest discoveries of the 20th century. With a recipe that still remains hidden, insulin has saved the lives of millions of people and paved the way for unprecedented progress in medical science.

Before insulin, the life of a person with diabetes - especially type 1 - was hardly long and sweet. Without its preventative and disease-control effects and right weight loss, a person with diabetes could suffer emaciation, coma and, eventually, death.

Stories as far back as the 1800s led scientists to speculate that the pancreas was the central organ for regulating sugar in the body. This theory received confirmation in 1914 when a young Canadian surgeon, Dr. Frederick G. Banting, was struck by a compelling idea for an experiment to isolate an internal secretion of the pancreas.

In the summer of 1921, Dr. Banting and Charles H. Best used a series of experiments in a small laboratory at Queen's University to harvest collaboration between Banting, a former researcher, and Best, a young medical student, would produce a crude pancreatic extract. When further purified, this extract, later called insulin, would prove to be the first effective treatment for diabetes.



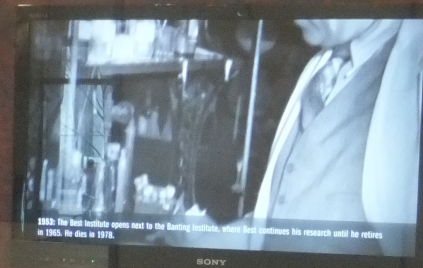
TO THE VICTOR

A burst of inspiration in the middle of the night led to one of the greatest discoveries of the 20th century. With a legacy that still resonates today, insulin has saved the lives of millions of people and paved the way for unprecedented progress in medical science.

Before insulin, the life of a person with diabetes - especially type 1 - was inevitably short. Racked by unquenchable thirst, excessive urination and rapid weight loss, a person with diabetes would suffer emaciation, coma and, eventually, death.

Starting as far back as the 1800s led scientists to speculate that the pancreas was the gland for regulating sugar in the body. This theory launched experiments and research for decades. None would yield promising results until October 1920, when a young Canadian surgeon, Dr. Frederick G. Banting, was struck by a compelling idea: an experiment to isolate an internal secretion of the pancreas.

In the summer of 1921, Dr. Banting and Charles H. Best would conduct a series of experiments in a small University of Toronto laboratory. The historic collaboration between Banting, a novice researcher, and Best, a young medical student, would produce a crude pancreatic extract. When further purified, this extract, later called insulin, would prove to be the first effective treatment for diabetes.



This display commemorates the 100th anniversary of one of the most celebrated and profoundly exciting breakthroughs in the history of medicine: the discovery of insulin. Made from the genius of its contributors, the discovery and rapid development of insulin for commercial use was the product of a broad and diverse network of uniquely linked scientists and medical institutions.

It is in this spirit of collaboration that the University of Toronto, University Health Network and MARS Discovery District carry on a tradition of partnership that underscores the shared legacy of Banting, Best, Macleod, and Collip's historical achievement.

This exhibit was made possible through a partnership between:

UNIVERSITY OF TORONTO
MARS
Toronto General & Western
Hospital Foundation

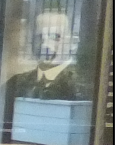
Financial support for this display was generously provided by Ascottford Medical Services, Inc.

MEDICAL SCHOOL AND COLLEGE STR

INSPIRATION

Dr. Frederick G. Banting (1891-1978) was a Canadian surgeon and physiologist who, along with Charles H. Best, discovered insulin in 1921. He was awarded the Nobel Prize in Physiology or Medicine in 1923.

On October 1, 1921, Banting and Best began their experiments in the University of Toronto laboratory. They isolated insulin from the pancreas of a dog, which they named "Leah".



1921: Banting and Best begin their experiments in the University of Toronto laboratory.

1923: Banting and Best receive the Nobel Prize in Physiology or Medicine.

1925: The Banting Institute opens next to the Banting Institute, which Best continues his research until he retires in 1965. He dies in 1978.



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1923: Banting and Best receive the Nobel Prize in Physiology or Medicine.

1925: The Banting Institute opens next to the Banting Institute, which Best continues his research until he retires in 1965. He dies in 1978.

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—◆◆◆—
This historic project was made possible through a partnership between



UNIVERSITY OF TORONTO
FACULTY OF MEDICINE



Toronto General & Western
Hospital Foundation

Financial support for this display was generously provided by
Associated Medical Services, Inc.

Some of the original original
instruments used by Banting and Best.

THE 90th
The original Banting
discovered in Toronto &
collaborated in the region
inspired to create the program
associated a foundation to
also mark the centenary of
the insulin story.



1921 - 1922

THIS TRANSOM IS FROM THE DOORWAY TO THE LABORATORY
WHERE INSULIN WAS DISCOVERED BY THE TEAM OF
F.G. BANTING, C.H. BEST, J.B. COLLIP AND J.J.R. MACLEOD.





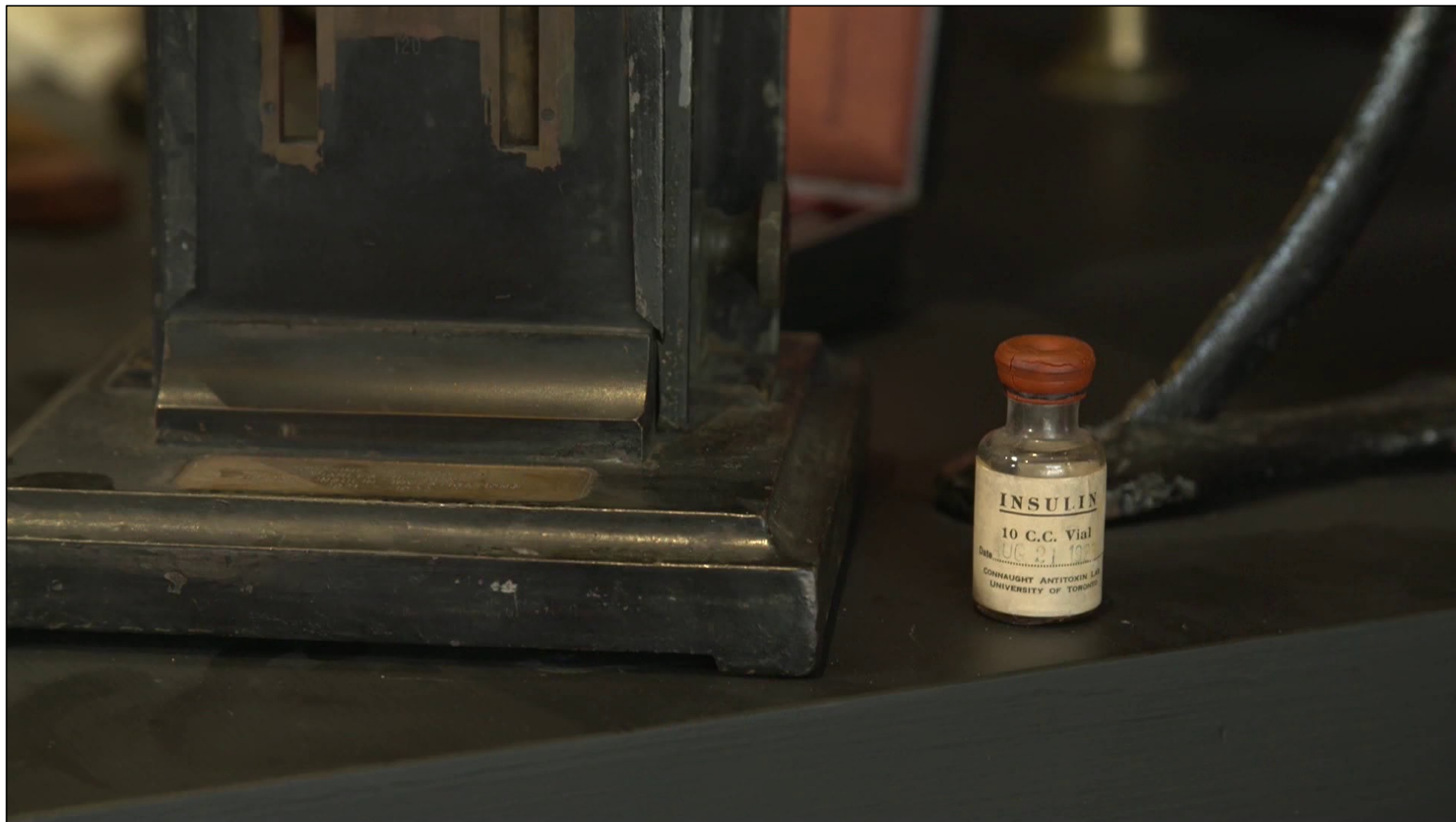



INSULIN SQUIBB & PROTAMINE
This package contains
9 cc. Insulin Squibb and
1 cc. Buffered Protamine Solution
After admixture according to directions,
each cc. will contain 40 units of Insulin
in combination with protamine.
Keep in a cool place, preferably
E. R. SQUIBB & SONS, INC.
MANUFACTURING DIVISION OF THE MEDICAL PRODUCTS
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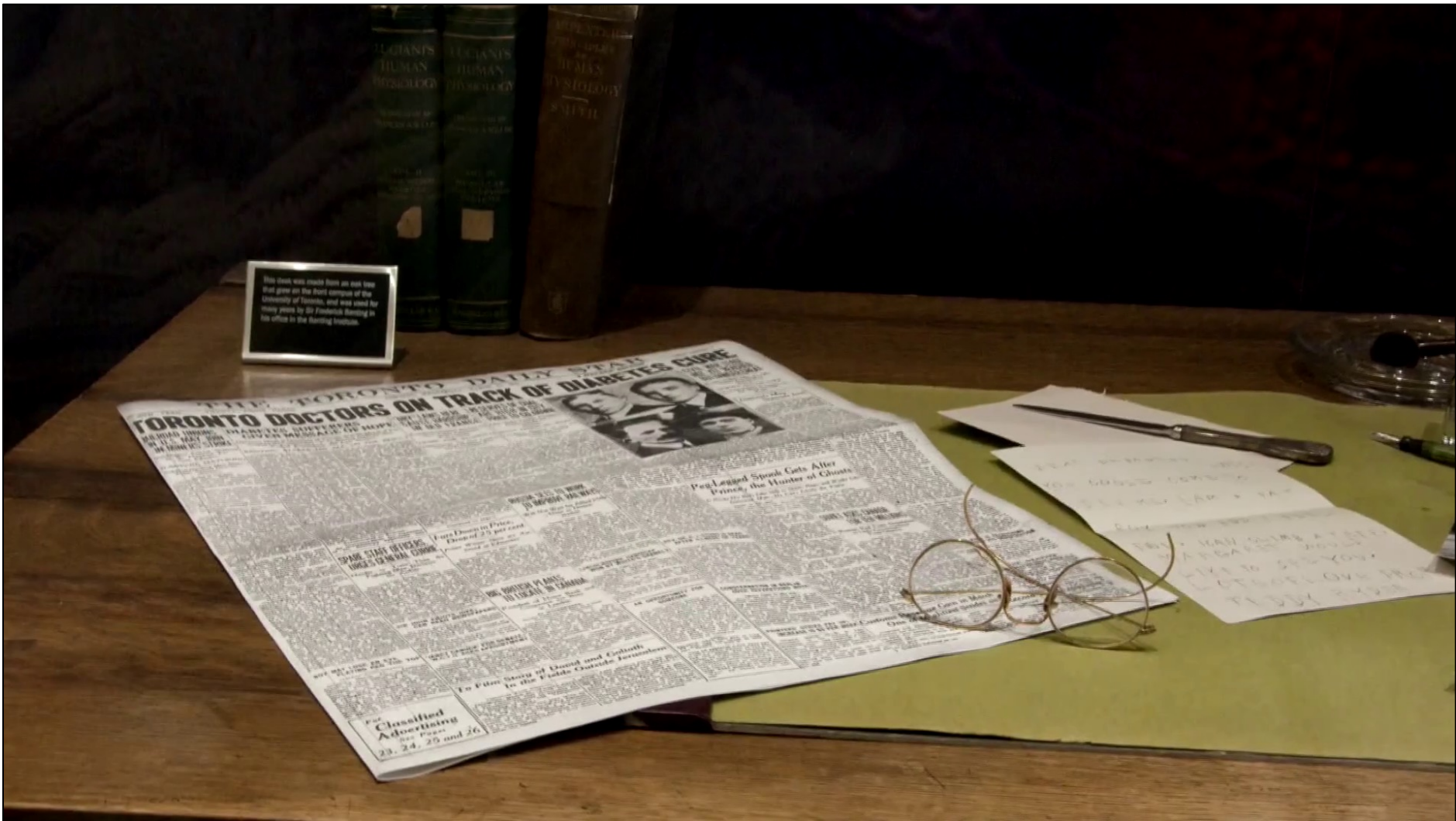
INSULIN
SQUIBB & PROTAMINE







COLORIMETER USED BY
CHARLES H. BEST
DURING INSULIN INVESTIGATIONS
1921 - 1922



This chair was created from an oak tree that grew on the front campus of the University of Toronto, and was used for many years by Dr. Frederick Banting in his office in the Banting Institute.

THE TORONTO DAILY STAR
TORONTO DOCTORS ON TRACK OF DIABETES CURE
PHOTOGRAPH BY [unreadable]
BY [unreadable]

PRO-LEGGED STROOK GETS ALICE PRINCE, THE HUNTER OF GHOSTS

SPARE TIME BRIDGE WAGES 12-NETION CHINESE

DR. BROWN PLANS TO LOCATE IN

IN FILM STORY OF DREAMS AND CATHARSIS IN THE FUTURE CHINESE JOURNALS

Classified Advertising
23, 24, 25 and 26.



**INSULIN: TORONTO'S GIFT TO THE WORLD
90TH ANNIVERSARY EXHIBIT**

PRODUCED BY: University of Toronto Faculty of Medicine

RESEARCHER, WRITER & HISTORICAL CONSULTANT:
Christopher J. Ruddy, Ph.D., Health Heritage Research Services

EXHIBIT DESIGN & GRAPHIC PRODUCTION: iQ inc, Toronto

BACKGROUND IMAGE – ISLETS OF LANGERHANS:
Courtesy of Jasleen Chahal & Professor Patricia Brubaker,
Department of Physiology, University of Toronto

“BANTING, BEST AND DIABETES” REPRODUCTION:
Artist, Robert Thom (Grand Rapids, MI, 1915-1979).
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Banting House Museum, London, ON

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