

“The Science Ball”: Poetry as Historical Evidence¹

Christine LEI

Mother Berchmans (1876-1964), a member of the Institute of the Blessed Virgin Mary (IBVM) and a teacher at Loretto Academy in Hamilton, Ontario² in 1905, wrote this ode for her students:

Last night I dreamed a strange, wild dream
Of a festive study hall
Where girls and books and school supplies
Attended a Science Ball.
Camilla K. received the guests,
(She knew them all by name)
She smiled as she greeted them one by one,
And seemed so glad they came.
Then they were shown to the gay ballroom,
Where all was mirth and fun;
The hall was brilliantly lighted
By the Phosphorescent Sun.
Miss Hydrogen came with her pale blue flame
Of most becoming tint;
The guests all beamed in the radiant light
Of Oxygen's glowing splint,

¹ I wish to thank Dr. Elizabeth Smyth, OISE/University of Toronto, for piquing my curiosity in this poem during the writing of my dissertation, to the three anonymous reviewers for commenting on an earlier version of this paper, Sister Juliana Dusel, IBVM, for clarifying information about Mother Berchmans, and Peter Meehan and Janice Wilson for editorial comments and corrections.

² The Loretto School for Girls opened in 1865 and closed in 1970 for a number of reasons: the buildings were in poor condition; there was declining enrollment in the order, and consequently a lack of teachers; the few teachers who remained were elderly; the Hamilton Separate School Board wanted to construct a new co-educational high school on the property to retain the Catholic baby boomers who might otherwise be lost to the city's public high schools. Loretto Hamilton is still the longest continuously operating private school in the city's history.

Then music arose with its voluptuous swell
 From Miss Watson's tuning fork,
 Which gave more sound when it bobbed around
 On a frivolous bit of a cork.
 Nellie Coughlin played on the wave-machine,
 Hilda Murray on two U-tubes,
 While Bessie MacSloy passed round a box
 Of delicious wee jujubes.
 Frances Dopp had an organ pipe,
 Margaret Brownlee did sing.
 And Edna Tracey played harmonic scales
 On a silver sonometer string.
 A test tube played on a Hydrogen flame,
 A card on a tooth-edged wheel,
 While the riders who sat on the Nodes and Loops
 Danced a Highland Fling and a Reel.
 The hostess led with a Major Chord
 While the orchestra did march,
 Ozone came next in her airy way,
 Her test-paper stiff with starch;
 Then Major Wilkins came striding in,
 Escorting Miss Florence Flask,
 While the gayest of Spectrums danced behind
 With a Carbon Disulphide mask.
 Bunsen's Photometer followed them close
 Attended by Ruhmkorff's Coil,
 A wire conducted a Current in,
 The Compass Needle swayed;
 Old Umbra came in with Miss Penumbra
 Who threw them all in a shade.
 Frances Daniells came with a looking-glass
 And without a bit of shame
 Explained that she wished to measure
 A Mamometric Flame.
 Then Newton's Disk came whirling in
 With a Nightmare hat on her head,
 Trimmed with Violet, Indigo, Blue and Green
 And Yellow, and Orange and Red.
 Rita Tracey came with a Carbon Rod,
 They were quite an Astatic Pair,
 Clara Buckel came with Mr. Joule
 But went home with young Ampere.
 A Dynamo came across Wheatstone Bridge
 And said he had paid no toll,
 Which the Positive Plate appeared to doubt,
 For she shook her Negative Pole.
 Little Miss Ohm resisted all
 Till pressed by telephone
 Then she told Miss Gladys Wilkins

She preferred to be alone.
Sulphuric Acid began to flirt
And kissed Miss Pigott's hand,
But she sent him off with a sharp retort,
And a gesture of command.
Till a shadow of fear and horror
Across the ballroom fell,
An Incident Ray from Port Lumiere
Came in at a Critical Angle;
And struck a Plane Mirror right in the face
Which caused a terrible wrangle.
Manganese Dioxide, that black-eyed thief
Took advantage of the strife,
And accosted Potassium Chloride with –
“Your Oxygen or your life.”
Gravity cell was simply shocked,
Newton's Disk turned white,
Carbon Fibre became so hot
He gave incandescent light,
The exhausted Air-Pump lost his breath
The Alarm Clock could not ring;
The younger cells were polarized
By this audacious thing,
The Mirrors and Lenses gathered round
And stood in their Normal Line
But the Refracted Ray put an end to it all,
Going off at a certain incline.
Copper Sulphate still looked blue,
And at last dissolved in tears;
But two electrodes came to her
And strove to calm her fears.
Then Anode winked at Miss Cathode
Who returned a significant glance
As Copper led forth the Sulphion group
For the Intermolecular dance.
Then Birdie walked over to Marjorie G –
As she sat on an Optical Bench,
And said she thought it a sin and a shame,
That no one invited the French.
As the faithful Rompre came to Marjorie's mind
Her tears fell thick and fast,
While Birdie declared not one guest there
Could boast of an Anterior Past.
While German Bucher did not appear
Miss Robinson expressed a doubt –
Perhaps they had sent regrets, because
They hadn't a new umlaut.
Horace and Livy refused to come
Because of Kathleen O'Brien

Who said that if Caesar brought Bellum there,
She would, of course decline.
Now several thought that Miss Bell Jar
Was the fairest maid of all;
But the Sounding Bell in the Spherical Wave
Was pronounced “the belle of the ball.”
Though the Centre of all attraction
Was Miss Magnetite, of course,
Young Filings madly followed her round
Along the lines of force.
And so the night passed merrily on,
Till I heard an enormous call,
And a brazen voice disturbed my dream –
But twas not “the belle of the ball.”³

This poem offers a unique and engaging window on the educative and cultural life of Loretto Academy in Hamilton at the turn of the twentieth century. It departs from the traditional conception one has of a convent school where the accomplishments and deportment were emphasized. Instead, “The Science Ball” is a primary piece of historical evidence that raises questions about our traditional understanding of women not taking or enjoying science. What were the social attitudes towards women and science education in the late nineteenth and early twentieth-centuries? What was the place of science in ladies academies and schools, religious and otherwise, in Ontario? How does the poem speak to subjects other than science that were part of the school’s curriculum? The purpose of this paper is to widen the lens beyond the text to recreate the curricular landscape in a particular school, time and location and add to the growing body of literature on women and science education.

Kim Tolley’s *Science and the Education of American Girls* is the first historical study that compares the science education of girls and boys. The author explores the origin and development of the sciences and mathematics in the formal curricula for girls from the antebellum years to the mid-nineteenth century, the rise of natural history study, and the cultural forces that emerged in the early twentieth century that prevented girls from pursuing higher education. Tolley explains how science (chemistry, biology, astronomy) became equated with girls and classics with boys. The study of science was inextricably linked to class, and was taught only to girls from wealthy families and in academies run by various religious orders. Tolley also examines why science became part of the curriculum,

³ “The Science Ball” first appeared in the IBVM’s quarterly magazine *The Niagara Rainbow* in 1906. The poem was reproduced in the 1965 Loretto Centennial Yearbook. The former is housed in the Loretto Abbey Archives (LAA) in Toronto, Ontario, and the latter in the Hamilton Public Library Special Collections department (HPLSC).

and why it was abandoned by girls in the late nineteenth century.⁴ Prior to Tolley's study, American and Canadian researchers tried to explain why girls became disinterested, disengaged, and disenchanting with science and mathematics by the time they reached high school without looking at the historical context.⁵

The history of science education in the late nineteenth century receives very little attention in works that examine curriculum in a particular girls school or school system. Johanne Selles finds that science was taught at the Ontario Ladies' College, the Wesleyan Ladies College, and Alma College because private schools had to meet provincial standards of suitable scientific facilities, adequate apparatus, and qualified teachers.⁶ Elizabeth Smyth and Christine Lei discover that science was offered in Ontario convent academies as early as 1865, where lush botanical grounds provided natural classrooms for students.⁷ Susan Houston and Alison Prentice describe teachers afraid of teaching science because they knew very little about the subject.⁸

Earlier works provide a more detailed analysis of how and why science became a serious subject of study in the Ontario high school curriculum. Robert Gidney and Wyn Millar show why Egerton Ryerson failed to get his classical, sex-segregated high school system, and why middle-class parents obtained the practical system they wanted. The authors trace the origin and evolution of natural science as a compulsory subject in a curriculum that

⁴ Kim Tolley, *The Science Education of American Girls: a Historical Perspective* (New York: RoutledgeFalmer, 2003).

⁵ For discussion of this kind see Ann Gibbons, "Is there a female style in science?" *Science*, 260 (16 April 1993), 384-5; Beatriz Chu Clewell, Bernice Taylor Anderson and Margaret E. Thorpe, *Breaking the Barriers: Helping Female and Minority Students Succeed in Mathematics and Science* (San Francisco: Jossey-Bass, 1992); Magda Leis, "Math Class and Other Stories of Exclusion," in *Girls and Science: Discovering Their Choices*, 9,1 (Summer, 1991), 28-31; Gail Pose, "New Technology and the Education of Female Students," in *Feminism and Education: A Canadian Perspective* (Toronto: OISE, 1990), 311-45.

⁶ Johanna Selles, *Methodists and Women's Education in Ontario, 1836-1925* (Montreal: McGill-Queen's University Press, 1996), 123.

⁷ Elizabeth Smyth, "A Noble Proof of Excellence: The Culture and Curriculum of a Nineteenth Century Ontario Convent Academy," in Ruby Heap and Alison Prentice, eds., *Gender and Education in Ontario: An Historical Reader* (Toronto: Canadian Scholars' Press, 1991), 279; Christine Lei, "Academic Excellence, Devotion to the Church and the Virtues of Womanhood: Loretto Hamilton, 1865-1970," Ph.D. thesis, Ontario Institute for Studies in Education of the University of Toronto, 2003, 153.

⁸ Susan Houston and Alison Prentice, *Schooling and Scholars in Nineteenth-century Ontario* (Toronto: University of Toronto Press, 1988), 333.

had as its goal the acquisition of mental discipline.⁹ Robert Stamp writes that natural science grew in popularity after Ontario's success at the international exhibition in Philadelphia in 1876, where the province's science exhibits (geometrical forms and solids, mathematical instruments, globes and maps, geological and biological specimens, and apparatus for chemistry and physics) far surpassed those of any other country. After this date, educators began seeing science as a subject worthy of more than just mental discipline. In an increasingly industrialized and globally competitive economic market, science study would contribute to better trained and specialized miners, geologists, farmers and labourers.¹⁰ "The Science Ball" adds to the literature by taking the reader into an Ontario convent classroom to recreate the pedagogical, curricular, and socio-historical forces that shaped science education for girls in 1905.

There are two reasons why 1905 is a good year to look at the curriculum in a convent school. First, Hamilton was the most heavily industrialized of all Canadian cities, with a large proportion of its 52,634 inhabitants employed in the steel or steel-related industries as labourers or professionals.¹¹ Its proximity to northeastern American cities as well as Montreal, Toronto, and Windsor necessitated the construction of railway lines and made Hamilton a viable target for immigrants. This growth and prosperity extended to rapid expansion and differentiation of purpose in schooling. In 1905, educational activity included the Ontario Normal College for high school teacher training, the Hamilton Normal School for elementary teacher training, the Normal School of Domestic Science and Art, and the Hamilton Collegiate Institute, and Loretto Academy, the only Catholic high school. Second, sweeping changes were implemented in the Ontario high school curriculum by the Department of Education in 1904. The formal, classical model of a common course plus options was incrementally replaced by a more practical and varied course of study consisting of general, commercial, technical, household science, agriculture, university

⁹ Robert Gidney and Wyn Millar, *Inventing Secondary Education: The Rise of the High School in Nineteenth Century Ontario* (Toronto: University of Toronto Press, 1982), 231-391. By the 1880s the goal of science education changed from the inculcation of utilitarian and social skills to a serious subject of mental discipline. According to the minister of education, George Ross, "the main reason for the introduction of science into our schools is the mental discipline to be obtained therefrom."

¹⁰ Robert Stamp, "Education and the Social Milieu: The English Canadian Scene from 1870 to 1914," in J. Donald Wilson, Robert Stamp, and Louis-Philippe Audets, eds., *Canadian Education: A History* (Scarborough, Ontario: Prentice-Hall of Canada, Ltd., 1970), 290-336.

¹¹ John Weaver, *Hamilton: An Illustrated History* (Toronto: James Lorimer and Company and National Museum of Man, 1982), 196.

matriculation,¹² and normal school entrance streams, which in turn required a new kind of teacher who was well trained in the practical and theoretical aspects of the new curriculum.

Mother Berchmans was one of these young high school teachers who delivered the revised curriculum. Born Mary Doyle in Kansas City, Missouri, she is described in the Institute's necrology as having a remarkable gift for storytelling, often giving fascinating recitations of the great literary works.¹³ Her teaching specialty was languages, particularly French and Italian, not science, and this brings into question her qualifications and suitability to teach science. Many elementary and high school teachers, lay as well as religious, became qualified in their areas by taking specific summer courses and obtaining a certificate in the field. The general pattern was that a young person would attend a Normal School for one year, and then take a teaching position. She would teach during the school year, and then attend summer school at the university or other institute of higher learning. It was common for many Loretto Sisters to acquire their degrees summer by summer for almost twenty years.¹⁴

Mother Berchmans was educated at Loretto Academy in Hamilton, taught there from 1902 to 1907, and obtained her undergraduate degree from the University of Toronto in 1920.¹⁵ Therefore, the Loretto routines and methods would have been familiar to her. Many young women who were university graduates were drawn to the IBVM because it was a teaching congregation that undertook educational work of various kinds, including the administration of secondary and elementary schools, boarding schools, schools for domestic and commercial instruction, finishing schools, orphanages, and hostels for girls, students, and employees. The Institute also worked in cooperation with Catholic associations for girls and women. Day or boarding schools for boys could only be engaged in if there were cases of extreme necessity and if the local bishop approved.

¹² In 1905, entrance to the University of Toronto Arts program was gained through successful completion of either the junior (Latin, English, history, mathematics, and any two of Greek, French, German, or elementary experimental science) or senior (English, Latin; one of Greek, French, German, Hebrew, Spanish; ancient history, mathematics; and physics, or biology) matriculation examinations. University of Toronto Archives. *University of Toronto Calendar, 1905*.

¹³ LAA. Aloysius Kerr, IBVM, *Dictionary of Biography of the Institute of the Blessed Virgin Mary in North America, 1847-1983* (Toronto: Mission Press, 1984), 45-6.

¹⁴ LAA. *100 Years in Retrospect*, 9; letter from Sister Juliana Dusel, IBVM, to Christine Lei, 7 May 1999, 1-2. It was not until the Act of 1907 that all separate school teachers had to obtain the same professional qualifications as their public school counterparts. J.G. Althouse, *The Ontario Teacher, 1800-1910* (Toronto: The Ontario Teachers' Federation, 1967), f35.

¹⁵ Kerr, *Dictionary of Biography*, 45-6.

The care of creches, hospitals and asylums could not be accepted.¹⁶ One further advantage that Mother Berchmans had was that the Institute itself provided an educational atmosphere. In 1905, she was the youngest teaching Sister on staff at Loretto Hamilton. By living with a group of seven other educated women who were also teachers she was able to acquire a vast general knowledge through everyday association and conversation. So, should a question arise outside of one's field of study (such as science), there was always an older expert on hand to enlighten the younger teacher in pedagogy. Even after attending teacher training schools, the novice teachers attended a formal Saturday afternoon help session given by one or more of the professed and experienced teachers, or arranged to get individual help with a specific topic. In addition, the eight teachers at Loretto Academy in Hamilton were able to share assignment topics, or coordinate topics between literature and science classes, for example, and thereby help each other in many ways.¹⁷ By the time Mother Berchmans taught science, chemistry, physics, astronomy, and botany had been a part of the Loretto Academy curriculum for fifteen years. There must have been teachers knowledgeable about these subjects who had ample teaching materials and apparatus they could pass on to Mother Berchmans.

One of the pedagogical devices her mentors may have passed on to her and that she used in "The Science Ball" was taught and examined at the Ontario Normal College – mnemonics. The aim of chemistry in the 1905 Ontario high school was to "enable pupils to gain a knowledge of chemistry by doing chemistry," but first they would have to know the list of elements and chemical nomenclature. The *Calendar of 1897* mandated that teachers in training at the ONC have a familiar understanding of chemical language.¹⁸ Mother Berchmans uses mnemonics in the poem. Phosphorescent Sun, for example, *brilliantly* [italics mine] lit the hall; Hydrogen came with her *pale blue tint*; the Compass Needle *swayed*; Incident Ray came in at a *critical angle*; Old Umbra came and threw them all in the *shade*. In this way, Mother Berchmans' use of a modern pedagogical device contradicts the stereotypical depiction of the yardstick-wielding rigid woman religious educator. She was, instead, making the study of science more interesting, more lucid and more fun for the girls in her 1905 science class.

¹⁶ LAA. *Constitutions of the Institute of the Blessed Virgin Mary Commonly Called the English Virgins* (Toronto: IBVM, 1908), 101.

¹⁷ For a more detailed discussion of Loretto teacher training and certification see Marion Norman, IBVM, "Making a Path By Walking: Loretto Pioneers Facing the Challenges of Catholic Education on the North American Frontier," *Historical Studies* 65 (1999), 103-4.

¹⁸ Archives of Ontario (AO). *Calendar of the Ontario Normal College, 1897*, 19.

Mother Berchmans' teaching style was in step with the new education movement sweeping the province in the late nineteenth century. Instead of relying on textbook methods and blackboard instruction, teachers were expected to develop "that mental attitude called a scientific mind which investigates, weighs evidence, and forms judgments based on reason," because a textbook, educators thought, could not replace the teacher. It had no personality, it could inspire no enthusiasm, and it lacked all emphasis.¹⁹ Chemistry was especially conducive to this new style of pedagogy because it was experimental. Topics included the properties of hydrogen, chlorine, oxygen, sulphur, nitrogen, and carbon, all of which are mentioned in the poem. Additional topics included nomenclature, the laws and combinations of the elements, and atomic and molecular theories. Teachers and students had to construct their own science apparatus by using the directions and illustrations provided in the appendices of textbooks.²⁰ High school chemistry teachers were instructed by the Department of Education to give preference to those experiments most easily performed, most striking and least costly, and have pupils construct their own apparatus at home.²¹ There is striking evidence that Loretto Hamilton possessed a vast array of up-to-date science equipment in 1905. In "The Science Ball" there are references to tuning forks, wave machines, test tubes and paper, sonometers, photometers, compass needles, Newton's disk, mirrors and lenses, air pumps, and optical benches.

By the 1880s, the goal of science education changed from the inculcation of utilitarian and social skills to become a serious subject of mental discipline.²² Under the *1882 Regulations*, the natural sciences were elevated from their status as optional to prescribed subjects, and became part of the core syllabus along with English, classics, mathematics, and modern languages.²³ Even though physics, botany, and chemistry had found a place in the curriculum, they were still relatively new subjects that

¹⁹ *Ontario High School Chemistry* (Toronto: The Copp, Clark Co., 1909), 3-4.

²⁰ *High School Chemistry* (Toronto: The Copp, Clark Co., 1895).

²¹ AO. *Calendar of 1897*, 19. Egerton Ryerson, influenced by Johann Pestalozzi's child-centred philosophy, advocated object training in arts and science. Collections of specimens housed in school glass cases were to be instruments of self-education. For richer detail on this topic see John Carter, "Ryerson, Hodgins, and Boyle: Early Innovators in Ontario School Systems," *Ontario History* 86,2 (June 1994), 119-31.

²² "The main reason for the introduction of science into our schools is the mental discipline to be obtained therefrom," stated the Minister of Education, George Ross. Ontario Department of Education, *Annual Report of the Minister of Education, 1882*, 21, cited in Stamp, "The Centennial Exposition of 1876," in Neil McDonald and Alf Chaiton, eds, *Egerton Ryerson and His Times* (Toronto: Macmillan of Canada, 1978), 302-16.

²³ Gidney and Millar, *Inventing Secondary Education*, 253.

required qualified teachers, adequate facilities, and enlarged classroom space.

In the 1860s, social attitudes towards women and science education were influenced by what constituted a woman's education – that it be useful, beautiful, and intellectual. The result of such an education was to produce the perfect lady, and to limit it to the elite. At the private girls' Elm House School in Toronto in 1865, science was taught for two reasons: "that a girl may not look with an ignorant eye on the wonders of the world of which she forms a part, and when thrown among the learned and scientific she may follow the conversation with pleasure, even when forbidden to assist."²⁴ Kim Tolley finds that American girls were taught science for the same reasons: to teach it to their sons, and to discuss recent scientific discoveries with their husbands.²⁵ The role of science, then, functioned as something more than preparation for teaching; it was inextricably linked to the nineteenth-century cult of true womanhood, where women were socially constructed into passive, dependent, humble, meek, graceful, and nurturing beings. Through the cult of domesticity, a wealthy woman could provide a haven in an increasingly industrialized heartless world for her husband, upon whom she and her children were dependent for financial support. One American historian asserts that piety, purity, and submissiveness became the pillars of what became known as the cult of true womanhood.²⁶ Characteristically, at the first annual distribution of prizes at Loretto Hamilton in 1865, two prizes were awarded for piety and good conduct.²⁷

There were similar attitudes in the Catholic community. Teresa Dease (1820-1889), first Superior General of the IBVM in North America, "dreaded" any change in the curriculum of the Loretto convent schools in Ontario. Both the 1832 Rule and the 1861 Constitutions that the Sisters brought with them from Ireland placed limitations on the teaching Sisters in Ontario, one of which was the curriculum. A Loretto convent education in Ireland differed greatly from that of Loretto convent education in Ontario. The former taught a limited curriculum in harp, embroidery, and pottery to the daughters of the wealthy elite, while the latter offered these accomplishments and academic subjects. Mother Dease, educated and trained in an Irish convent school, worried that language, religion, and music study, the hallmarks and financial security of a Loretto education,

²⁴ Mrs. Holiwell, "Address to Parents, on the education of girls of Elm House School for the Education of Young Ladies, Toronto, 1865," in Alison Prentice, *Family, School and Society in Nineteenth-century Canada* (Toronto: Oxford University Press, 1975), 249.

²⁵ Tolley, *Science Education*, 61.

²⁶ Linda Kerber, "Separate Spheres, Female Worlds, Woman's Place: The Rhetoric of Women's History," *Journal of American History* 75 (June 1988), 11.

²⁷ HPLSC. "Convent Examination," *Hamilton Times* (11 July 1866), 3.

would be sacrificed for mathematics and science. After pressure from the local bishops in Ontario, however, she conceded and came to understand that girls who followed the course prescribed by the Department of Education and obtained their certificate of qualifications might enter the IBVM already qualified as teachers.²⁸ Mother Dease's decision may have led to the formation of an independent North American generalate in 1881. In the Loretto convent schools, studying science served a practical purpose: it was a stepping stone to a teaching career.

Bishop Peter Crinnon (1818-1882) also expressed concern with the new scientific education. In an address to graduating pupils at Loretto Hamilton in 1879 he said "the [Roman Catholic] Church was not content with a mere scientific education, but insisted on a religious education as well, otherwise it was no good. The jails and penitentiaries were full of people who were said to be educated but they were not truly so, for they had no knowledge of religion." The most important lesson Loretto Hamilton students could learn was "to be modest and ladylike," he concluded.²⁹ Bishop Crinnon's words are significant because they indicate that religion, not science, was the most important part of girls' education in the late nineteenth century.

In 1900, leading Ontario educators also expressed concern over the growing popularity of science education. J.A. McLellan, principal of the Ontario Normal College and former high school inspector, wrote "the utilitarian advantages of technical knowledge has raised science study to a place of paramount importance." He cautioned that a scientific education alone would fail to supply those humanizing influences, those moral stimuli, and that taste and culture that classical instruction provided. Students trained in science alone "lacked both the gentler arts and good conversation."³⁰ Therefore, the rise of science as a subject of mental discipline and utilitarianism was hedged by a concern in the religious and secular community over the loss of culture and morals. How then was science to be taught in the Ontario high school?

Late nineteenth-century and early twentieth-century textbooks prescribed by the Department of Education give insight into the aims, purpose, and methodology of the science courses. In general, the textbooks reveal that the laboratory method of instruction was becoming increasingly popular. Textbook authors believed direct investigation of celestial

²⁸ For a brief history of the transition of curricular changes in the Loretto convent schools in the late nineteenth century see Margaret Costello, IBVM, *Life and Letters of Reverend Mother Teresa Dease* (Toronto: McClelland, Goodchild and Stewart, 1916), 172-8.

²⁹ LAA. "AMDG. Loretto Convent. Closing Exercises. Crowning the Graduates. Distribution of Prizes by His Lordship Bishop Crinnon," (1879), 7, 9.

³⁰ HPLSC. J.A. McClelland, "Science Education," *Ontario Normal College Monthly* (November 1900), 10.

phenomena and botanical specimens, for example, gave a vividness and reality to science that would arouse interest and enthusiasm not attainable through the study of textbooks and pictures alone. The aim of science instruction was to move away from the formal technical completion of separate subjects and toward the development of a workable training in activities that were related to the pupil's own life experiences. In the natural sciences this meant that less importance was attached to botany, zoology, and physiology, and more to the processes and adaptation of life found in plants, animals, and men. "Education that is not applicable, that does not put the pupil in touch with the living knowledge and the affairs of his time, may be of less educative value than the learning of a trade in a shop," wrote the authors of the *First Course in Biology*.³¹ Adolescent girls at Loretto Academy in Hamilton would have been interested in boys and dances, and Mother Berchmans successfully intertwines a lesson in nomenclature and chemical properties with her students' interests.

The earliest and most popular of the sciences for girls was botany. Students studied those plants and foliage that were indigenous to their area.³² Kim Tolley writes that American schoolgirls studied botany because educators believed girls would benefit from open air, health, and cheerfulness.³³ Wealthy nineteenth-century women also studied botany because of the keen Victorian interest in flower language. Numerous glossaries of botanical terminology, lessons in flower structure and the Carl Linnaeus' classification system of flowers were given individual meanings, and developed a language of their own.³⁴ One science textbook author noted "the ideals and abilities should be developed out of the common surroundings and affairs of life rather than imposed on the pupil as a matter of abstract, unrelated theory."³⁵ Even the reporter invited to the first annual distribution of prizes at Loretto Hamilton in 1866 remarked on the "grounds that extend over several acres, and are so thickly studded with every variety of shrub and tree as to be perfectly charming."³⁶

Horticulture and nature societies flourished during the last half of the nineteenth century. In 1866, the Hamilton Horticultural Society held its second annual exhibition, with prizes awarded for the finest fruit trees in pots, baskets of flowers, hand bouquets, annuals, daisies, roses, and table bouquets. Botany and specimen collecting were very much associated with

³¹ *First Course in Biology* (Toronto: The MacMillan Co. of Canada Ltd.), 5.

³² H.B. Spotton, *High School Botany* (Toronto: W.J. Gage and Company, 1889), 5.

³³ Tolley, *Science Education*, 36, 101-2.

³⁴ Carl Linnaeus (1707-1778), a Swedish naturalist, founded the modern plant and animal classification. His survey of 7,700 species of plants and 4,400 species of animals helped to establish botanical and zoological nomenclature.

³⁵ Bailey-Coleman, *First Course in Biology*, v.

³⁶ HPLSC. "Convent Examination," 12.

gender and class, although by 1900 there was a concerted effort to teach nature study to public school children. The aim of the course was to instill curiosity and knowledge about the world around them in an ultra-utilitarian age. These children, the anonymous writer noted, “would never reach our higher schools.”³⁷ Science was taught to girls from wealthy families, and in academies run by various religious orders, writes Tolley.³⁸ In this way, botany became a subject of study for girls who used their knowledge of the subject by forming societies and clubs of their own.

Astronomy was the first science subject taught at Loretto Hamilton in 1865, and was part of an education heavily steeped in a classical and liberal education duly influenced by Jesuit pedagogy.³⁹ In the early sixteenth century Mary Ward (1585-1645), founder of the IBVM, advocated a Jesuit curriculum that would teach young girls Christian doctrine, morals, reading, and the common languages (English, Spanish, French) and Latin, writing, household management, the liberal arts, singing, painting, sewing, spinning, and curtain making. Astronomy was also part of this curriculum.⁴⁰ By 1905, the laboratory method of instruction had become popular with astronomical teachers in Ontario’s public high schools. Mary Byrd, in the preface to the *Laboratory Manual in Astronomy* in 1899, warned that studying the heavenly bodies and having no means for observing them “is somewhat like restricting the study of botany to textbooks and to pictures of plants.” For the student of general astronomy, however, simple “naked-eye observation,” an unobstructed place for watching the heavens, and a few home-made instruments, would promote a genuine interest in the subject. A general course in astronomy consisted of using almanacs, maps, and globes in identifying such topics as the position and surface markings of the sun and moon at differing times of the day, the motion of the stars and milky way, and observations for an inch-and-a-half telescope.⁴¹

The study of chemistry in the public high school was particularly problematic for early twentieth-century educators. Since few chemistry students pursued the subject beyond the high school, the teacher’s main

³⁷ HPLSC. *Ontario Normal College Monthly* (May 1900), 103-4.

³⁸ Tolley, *Science Education*, 40.

³⁹ A translation of the Jesuit curriculum is located in Regis College Library of the University of Toronto. A.P. Farrell, ed., *The Ratio Studiorum of 1599* (Washington, DC: Conference of Major Superiors of Jesuits, 1970).

⁴⁰ Mary Ward, “Schola Beatae Mariae,” in Emmanuella Orchard, IBVM, *Till God Will: Mary Ward Through Her Writings* (London: Darton, Longman and Todd, 1985), 37.

⁴¹ Homemade telescopes were made from bookbinder’s paste, pine tree branches, and lenses purchased at the local optician’s shop. Although this text is American, it was used in the Hamilton Normal School. Mary Byrd, *Laboratory Manual in Astronomy* (Boston: Ginn and Company Publishers, 1899), iii-ix.

objective was to “connect this particular school work (i.e. chemistry) with the activities of life.” This included emphasizing the relationship among chemistry, life, and “local conditions and industries.” The fundamental purpose of chemistry was to “develop that attitude of mind which causes the pupil to observe accurately, to take account of essential conditions, and to draw proper inferences from them.” In other words, chemistry and experiments could encourage students to think. Educators thought chemistry “an excellent subject” for the inculcation of observation skills, accuracy of reasoning, clearness of judgment, and exactness of expression. “Slovenly work,” in writing lab reports or performing experiments, was not tolerated. The chemistry teacher was expected to “be competent ... to drill on important points, to put stress where it is required, and to fill in details” that are necessary for the students to know.⁴² In “The Science Ball,” Mother Berchmans is successful in linking chemistry to her students’ life experiences at an upper-middle class private girls school. She gives instructions in not only prescribed chemistry topics such as matter, energy, chemical change, mixtures, oxidation, the study of sulphur and sodium, chemical names, and the list of elements, but also deportment. In writing the poem, she stresses and emphasizes those topics that her students needed to know for the examination through a form she is most familiar with – storytelling.

The core academic courses offered at Loretto Hamilton did not differ markedly from those offered at other private girls’ schools of the time. In 1865 Ontario, an English education for girls consisted of the same subjects many of the boys studied at the grammar schools, including Latin, natural philosophy, history, geography, and English grammar and composition. There existed gender variations in the purpose of a common course of an English education, though. For boys it meant a stepping stone to a career in law, medicine, or theology. For wealthy girls, it meant usefulness, good taste, civility, and sociability. Aside from the regular branches of an English and French education, astronomy, botany, and natural history were on the syllabus for Loretto Hamilton, although no prize was awarded for science that year. In fact, no student won a prize for science at Loretto Hamilton until 1879. At St. Joseph’s Academy in Toronto, girls were taught chemistry, botany, zoology, and astronomy in 1865 and were awarded prizes.⁴³

The introduction of science courses into the curriculum of Loretto convent schools throughout the province in the late nineteenth century was erratic and sporadic. Loretto Lindsay, established in 1876, was the first of the schools to prepare students for departmental examinations in the high

⁴² “Preface,” *Ontario High School Chemistry*, iv-v.

⁴³ Elizabeth Smyth, “The Lessons of Religion and Science: The Congregation of the Sisters of St. Joseph and St. Joseph’s Academy, Toronto, 1854-1911,” Ed.D. dissertation, University of Toronto, 127.

school or collegiate, in the highest class. In 1884, the short-lived Loretto Stratford offered botany, astronomy, and natural history. A greater array of science courses was offered at Loretto Bond Street in Toronto, including astronomy, botany, natural history, use of globes, natural philosophy, and chemistry.⁴⁴ Teacher qualification, number of students enrolled in collegiate classes, and availability of science apparatus and classroom space may account for the discrepancy in what science subjects were taught in the Loretto schools.

Non-Catholic private girls' academies in the province fared better in their offering of science courses. Natural science, comprised of natural history (botany, zoology, and physiology) and natural philosophy (astronomy, physics, chemistry, geology, and other physical sciences) was offered at the Ontario Ladies College in Whitby.⁴⁵ Geology was part of the fourth year of study at the Wesleyan Ladies College in Hamilton. A former WLC student notes that prominent sewing manufacturer, R.M. Wanzer (1818-1900), offered one of his machines valued at \$60 for the best examination paper in the natural sciences in 1881.⁴⁶ By 1890, the WLC housed cabinets containing valuable geological, botanical, and historical specimens.

At Hamilton Collegiate Institute, the only public high school in the city until 1925, science had great difficulty making inroads into the curriculum. The high school inspector for 1897 noted he could not grade the science department because the classes were not yet fully organized.⁴⁷ In 1906, a high school inspection report shows that lack of classroom space prevented science courses, especially biology, from being taught at HCI: "since last inspection some necessary additions have been made to the equipment of the science rooms. Provision is now made for individual work in physics in the lower school, and this provision will be extended as necessity as necessity arises." Glass cases were also installed for storing botanical and zoological specimens.⁴⁸ While science courses appeared in the syllabus of two convent schools as early as 1865, and at private girls' academies

⁴⁴ AO. RG 2, E2, E22. "Loretto Lindsay, Bond Street, Hamilton, Niagara Falls, and Stratford, 1884."

⁴⁵ Selles, *Methodists*, 89.

⁴⁶ HPLSC. Louise Wright, "The Wesleyan Ladies College, Hamilton, Ontario," 3-4. The Wanzer Sewing Machine Factory (1859-1892) at King and Catherine Streets employed 800 workers and produced 2,000 sewing machines per week. Margaret Houghton, ed., *The Hamiltonians* (Toronto: James Lorimer and Company Ltd., Publishers, 2003), 141-3.

⁴⁷ HPLSC. *Hamilton Board of Education Minutes 1895*, 108, and *HBE Minutes 1897*, 93. Microfilm #561.

⁴⁸ Educational Archives of the Hamilton Wentworth Board of Education (EA). *HBE Minutes, 1906*, 27.

throughout the late nineteenth century, they were absent from the public high school in Hamilton.

“The Science Ball” indicates that other subjects formed a significant part of the Loretto curriculum, including the study of German, Latin, and French. There is a line in the poem about Germans not appearing at the ball and Horace and Livy refusing to come. Until World War I, German was a popular subject of study in the Ontario high schools, even though it was an optional, not examinable subject. Fewer students studied German in 1915 because of anti-German sentiment during the Great War. By the late 1920s, the subject was dropped from the Ontario high school curriculum.⁴⁹ At the ONC, German (or French) was a required subject for modern-language specialist teachers.⁵⁰ The IBVM’s emphasis on the importance of studying Latin can be traced back to Mary Ward, The recitation of the office of choir (the ability to read and understand Latin) was a pre-requisite for her teachers, and differentiated the classes of Sisters between lay (who were not versed in Latin) and choir.⁵¹ In nineteenth-century Ontario, Latin had been one of the key requirements for admission to professional education, but by 1879, was dethroned, according to Gidney and Millar.⁵²

The Loretto academies in Ontario were renowned for offering instruction in the arts, music, art, and drama. At Loretto Hamilton, the ornamentals, or extras, included instrumental (violin, harp, piano, guitar, and melodeon) and vocal music, sewing (embroidery, ornamental, and plain needlework), drawing, and painting, in 1865. The constitutions mandated that “the proper training of the [Loretto] teachers in literature and arts are abundantly supplied,” but made no such provision for math or science teachers.⁵³ By 1885, the ornamentals were still offered at Loretto Hamilton but had disappeared from the public high school curriculum. The reason for studying fine arts in the Loretto academies was to “conduce good breeding and a more refined culture,” in the students.⁵⁴

While music played a significant role in establishing Loretto’s reputation as a cultural centre in the city, it also deepened the school’s pocketbook. At Loretto Hamilton, for example, piano study equalled 33 per cent of a boarder’s tuition fee in 1865, and 100 per cent of a day student’s fee. Music and art were studied by wealthier students who could afford to pay extra fees. Regular tuition fees for boarders from preparatory to 6th

⁴⁹ Robert Stamp, *The Schools of Ontario, 1876-1976* (Toronto: University of Toronto Press, 1982), 91.

⁵⁰ HPLSC. *Ontario Normal College Monthly* (May 1900), 113.

⁵¹ Orchard, “First Formulations,” in *Till God Will*, 36.

⁵² Gidney and Millar, *Inventing Secondary Education*, 238-242.

⁵³ LAA. *Constitutions of the Institute of the Blessed Virgin Mary (Commonly Called the English Virgins)* (Toronto: IBVM, 1942), 83. These 1942 constitutions are a compilation of previous constitutions (1861 and 1908) and the 1832 rule.

⁵⁴ LAA. *Constitutions of 1908*, 181.

class was \$100 per annum. By comparison, day students paid between \$1 (preparatory and 1st class) to \$32 (6th class). Guitar, melodeon, and piano lessons cost \$24 per annum (use of the piano was an additional \$8), harp \$38 (use of the harp was included), and singing \$16.⁵⁵ Accreditation with the Toronto Conservatory of Music not only lent prestige to Loretto Academy, but also provided senior students with certification that enabled them to gain employment as music teachers in the private or public spheres. Music at Loretto Hamilton in 1905 is evidenced in the poem when the orchestra's "music arose with its voluptuous swell," and Frances Dopp plays the "organ pipe."

"The Science Ball" is in the form of an ode, a lyric poem intended to be sung. Vocal music was an integral part of the Loretto Hamilton curriculum, and of all the Loretto convent schools. In her first formulation of a curriculum, Mary Ward advocated the teaching of singing.⁵⁶ The constitutions advocated that music be taught to daughters of the nobility in order to "avoid sloth...the root of all evil." Specifically, the aim of music instruction was to "conduce to innocent pleasure, and not to excite sensations which are too delicate and soft [nor] to encourage vanity."⁵⁷ In the poem, vocal music is evidenced by the line "Miss Brownlee began to sing."

The poem also reveals the hidden curriculum of a 1905 convent school, including themes of deportment, class, gender, and ethnicity. The Loretto Sisters modelled proper deportment, and had high expectations that their students would emulate them. In 1900, for example, more awards were given to students for the social arts than for academics, according to a newspaper reporter who attended the school's graduation ceremony.⁵⁸ In 1905, gold medals were awarded for deportment, music, and mathematics, but none for science.⁵⁹ By 1908, gold, silver, and bronze medals were given for excellence in academics; girls who won for ladylike deportment were crowned with flowers.⁶⁰ Mother Berchmans uses the poem as a lesson in deportment, warning the students in her science class to resist the boys' advances. The IBVM constitutions mandated teachers "to forearm the pupils against the perils to salvation and to strengthen their virtue, by nipping in the bud those vices to which the female mind is usually exposed." The greatest vice was "vanity and the desire to please men. Vain and false female decoration and new and wondrous costume" were not to

⁵⁵ HPLSC. "Loretto Convent, Terms," *The Spectator* (8 September 1865), 2.

⁵⁶ Ward, "Schola Beatae Mariae," in Orchard, *Till God Will*, 37.

⁵⁷ LAA. *Constitutions of 1908*, 181.

⁵⁸ HPLSC. "Young Ladies of Loretto Academy Played the Harp," in *Victorian Hamilton Scrapbook*, 19, 24.

⁵⁹ HPLSC. "Loretto Academy - Presentation of Prizes at the Closing Exercises Last Evening," *Hamilton Spectator* (24 June 1905), 10.

⁶⁰ PLSC. "Loretto Academy," *Hamilton Herald* (19 December 1908), 11.

be encouraged because they were opposed to Christian humility and modesty.⁶¹ Between 1900 and 1914, there was much argument against co-education in the high school, and the most vehement one was that the purity of the teenage girl would be jeopardized.⁶²

Mother Berchmans taught her nineteen students a lesson in deportment through the poem's structure. The female students are named in the poem, and are escorted to the ball by an assortment of fictitiously-named science partners. The subject of the poem is revealed through its four-part structure. In the first part, the reader is introduced to the setting, a "brilliantly lighted hall." The atmosphere is "festive," "glad," "gay," and "full of mirth and fun." No male escorts are introduced until the second part. Suddenly the images change and so too does the atmosphere. One student "appeared to doubt" her partner; little Miss Ohm resisted all because "she preferred to be alone"; another young woman send her escort off with a "sharp retort." The girls are resisting their partners. A brawl ensues in the third part of the poem, and here the words stand in stark contrast to those in the first two parts: "shadow of fear and horror," "struck right in the face," "which caused a terrible wrangle," "black-eyed thief," "your oxygen or your life," "simply shocked," "turned white, and lost his breath." The brawl is resolved in the last part of the poem, and the girls dance once again.

In order to appreciate that this poem is a lesson in deportment, the reader needs to examine the poet's attitude. The reader knows it is a dream because the poem begins with the words "last night I dreamed" and ends with "brazen voice disturbed my dream." It is a pleasant dream, yet Mother Berchmans uses language that is not characteristically associated with women religious. The *Constitutions of 1861* stipulated that the Loretto Sisters were to speak modestly, but the dream is "a strange and wild" one. There is a reference to an attempted kiss. It is a "brazen" not modest voice that awakens Mother Berchmans, and it is that of the Caller.⁶³ There is violence, a brawl, in the poem. All these words conjure images that contradict the perception one usually has of a woman religious – obedient, quiet, peaceful. "The Science Ball" is a daring piece of work for 1905, and the poet has successfully used strong, harsh words to teach her students how to behave while in the company of the other sex.

⁶¹ LAA. *Constitutions of 1908*, 184-5.

⁶² For a complete list of the arguments against co-educational schooling in Ontario in the first decades prior to World War I see Robert Stamp, "Evolving Patterns of Education," 314-36, and Gidney and Millar, *Inventing Secondary Education*, 244-5..

⁶³ The duties of the Caller are described as following: she was to go to bed one half hour before the rest of the Sisters, rise fifteen minutes earlier than they, open each door, and call out "Benedicamus Domino," and light the gas and candles. LAA. *Constitutions of 1908*, 35-6.

The poem also demonstrates class distinctions at Loretto Hamilton in 1905. The ball is an upper middle-class event, resplendent with a hostess who leads the first dance in a ballroom where an orchestra plays, and “filings” vie for the attention of the debutante, “the belle of the ball.” Loretto Hamilton was predominantly a school for wealthy girls until the 1940's when post World War II immigration changed the ethnic and class composition of the school from British to Italian, and upper middle to working class.

It is noteworthy that Mother Berchmans does not mention religion in the poem. Religion played an integral part in the public school day, but was not integrated into the curriculum as it was at Loretto Hamilton. The *1882 Regulations on Religious Instruction in Public and High Schools for the province of Ontario* stipulated that the school day be opened and closed with the Lord's Prayer and another prayer approved by local trustees. In addition, the scriptures were read daily and systematically, without comment or explanation. Student exemption from participation in religious exercises was allowed if parents or guardians objected to the practice. For example, public school teachers allowed Catholic children to leave the classroom during prayers. In 1884, education minister George Ross introduced even more rigorous instruction in daily prayers and readings, but refused to authorize separate textbooks, separate high schools, separate normal schools, or a deputy minister for Catholic schools, and thereby ensured that Catholic schools functioned as an integral part of a unified provincial educational system. These new regulations gave the clergy of any denomination the right to give religious instruction to the pupils of their own church, in each school house, at least once a week after school closed, provided it not be during the regular hours of school.⁶⁴

Thousands of pupils, Catholic and otherwise, subscribed to a daily routine of religious instruction at Loretto convent schools in Ontario. The constitutions states pupils were taught to perform exercises of piety at fixed hours and in a Christian manner, assist at mass every day, make a daily examination of conscience, and go to confession and receive communion at least once a month.⁶⁵ The aim of religious instruction in Loretto schools is found in each of the four constitutions and states that the principle goal of the Institute was to educate girls in a Christian life.⁶⁶ Attendance in

⁶⁴ EA. “Programme of Studies for Public Schools,” in *Public School Daily Register for Recording the Attendance of Pupils, 1882 and 1901* (Toronto: Warwick Brothers and Rutter, Printers and Bookbinders, 1882); Stamp, *Schools of Ontario*, 32.

⁶⁵ LAA. *Constitutions of 1908*, 182.

⁶⁶ LAA. *Rules of the Institute of the Blessed Virgin Mary* (Dublin: Coyne, 1832), 80; *Rules and Constitutions of the Congregation of Nuns of the Institute of the Blessed Virgin Mary Founded in Dublin* (Dublin: Coyne, 1861); 24; *Constitutions of 1908*, 182; *Constitutions of 1942*, 139.

religious class was optional for non-Catholics until 1942, when the word “Catholic” replaced the all-encompassing “Christian” in the constitutions. In 1866, religion was named “piety.” By 1915, students were instructed in “church doctrine” and “church history.” By 1942, “religion” was taught, and all students had to attend this class regardless of religious affiliation. Therefore, Mother Berchmans does not refer to religion because it was an optional subject at Loretto Hamilton in 1905.

After leaving Loretto Academy, a few of Mother Berchmans’ students entered religious life or pursued careers. Clara Doyle (1890-1975), for example, who came with “Bunsen’s Photometer, Burner and Cell” in the poem, entered the IBVM in 1922 and professed as Sister Kevin in 1930. She taught in many elementary schools in Ontario.⁶⁷ Gertrude Taylor, a Presbyterian of German and French descent, is not mentioned in the poem but is photographed with the 1905 class. She later worked as a stenographer at the law firm of Staunton, O’Heir and Morison at 111 Catherine Street in Hamilton.⁶⁸ Hilda Murray, who played on “two U-tubes” in the poem, won a gold medal for fidelity to school rules, and two silver medals for 5th class English and composition in 1905.⁶⁹

“The Science Ball” is merely a snapshot into the science education of a young girl in a Loretto convent school in 1905. Additional research might compare the science education of girls in Ontario to the American experience, or how a girls’ science education differed from that of the boys. Another venue for research, which is beyond the scope of this paper, is to examine the experience of girls who pursued post secondary education in a science field, such as nursing, domestic science, and teaching.

Elizabeth Smyth writes that the history of women religious in English Canada remains a largely neglected topic because researchers are often denied, or restricted in, their access to diocesan and congregational archives.⁷⁰ A supplement to traditional archival research is for writers to seek out former students and/or their families in search of yearbooks, photographs, letters, and other forms of historical evidence that will allow a different perspective on the lives of women religious, their students, and their schools. Future studies of poems, plays, essays, and other literary works that were written by women religious can be used as authentic and reflective pieces within a broader historical context to show how and what they felt and experienced.

⁶⁷ LAA. Kerr, *Dictionary of Biography*, 44.

⁶⁸ HPLSC. *1901 Census. Wentworth County, Hamilton, Ward 4-1*, 11.

⁶⁹ HPLSC. “Presentation of Prizes, 1905,” 10.

⁷⁰ Elizabeth Smyth, “Writing Teaches Us Our Mysteries: Women Religious Recording and Writing History,” in B. Boutilier and Alison Prentice, eds., *Creating Historical Memory: English Canadian Women and the Work of History* (Vancouver: University of British Columbia Press, 1997), 124.