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Robert Edwards Holloway: Science and Science Education in St. John's, Newfoundland, 1874-1904

RUBY L. GOUGH

EXEMPLARY TEACHING of secondary school science, combined with popularization of science through effective outreach into the wider community, reached a high point in the last quarter of the nineteenth and the beginning of the twentieth century in St. John's, Newfoundland. The school was the Wesleyan Academy, later renamed the Methodist Academy and, still later, the Methodist College. The teacher was Robert Edwards Holloway, principal of the institution, scientist, humanist and science teacher *par excellence*. Holloway's story is all the more remarkable when viewed against the backdrop of the history of education in Newfoundland, where progress in elementary education in the 1870s and onwards was still plagued by the same restrictive forces that had hampered settlement and where efforts to provide a satisfactory level of secondary education had stormy beginnings and little real success.

Born in England, trained as a teacher in a Wesleyan Training College and with a degree from London University and two years' teaching experience in private schools in England, Holloway was selected in 1874 by the Board of the Wesleyan Academy for the position of principal.[1] He came to St. John's, Newfoundland, on a four-year contract which extended to a thirty-year tenure during which he made an outstanding contribution to education in Newfoundland, as well as to the cultural life of Britain's oldest colony.

The Newfoundland that Holloway came to think of as his homeland in the years that followed already sustained a variety of cultural forms. A reading room and library had been established and a Mechanics Institute formed in 1849, featuring regular courses of lectures. In 1861 the Young Men's Literary and

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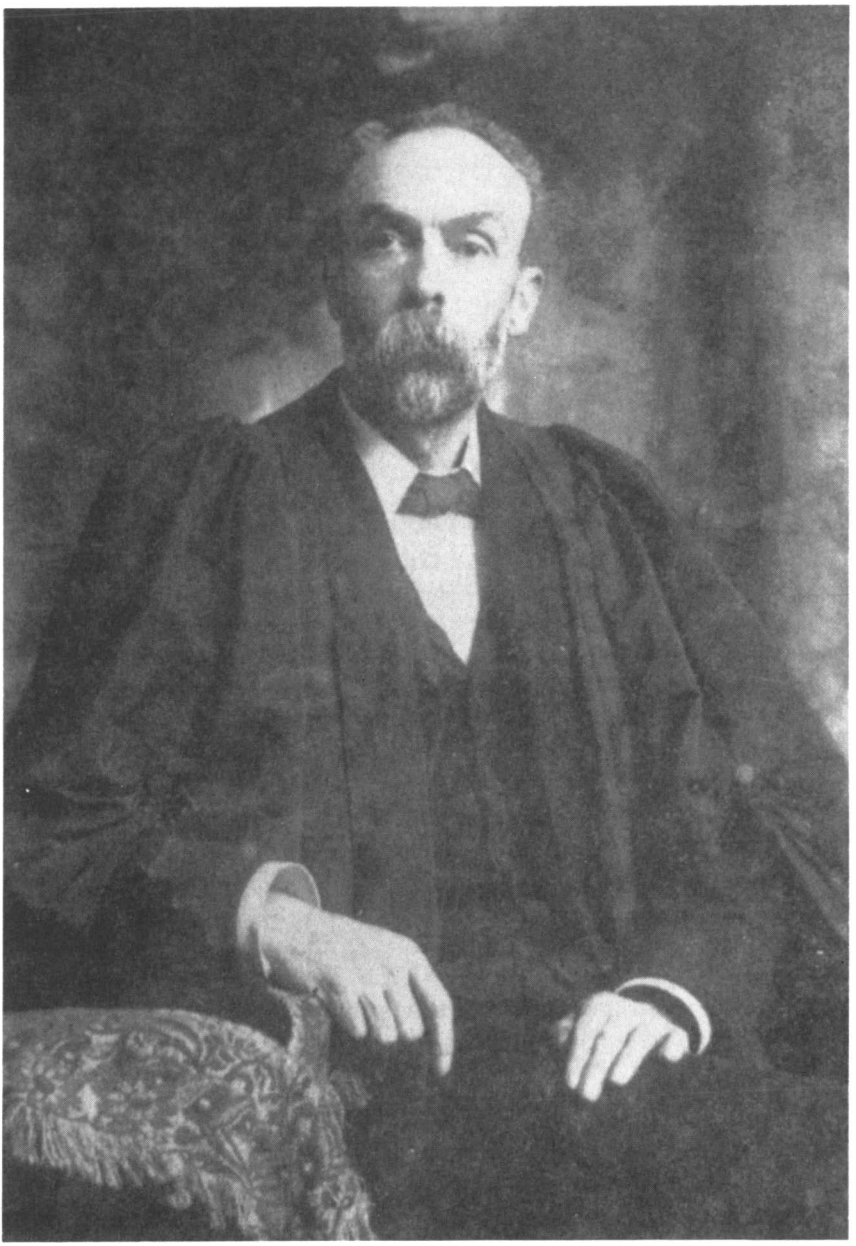


R.E. Holloway

Scientific Institute, the St. John's Library and the Reading Room had amalgamated to form the Athenaeum,[2] with its lectures and reading room well patronized from the start. An impressive building, the Athenaeum Hall, would be completed in 1879 to house these activities. In 1882, there would be 350 members of the Athenaeum and the library would have grown to 5000 volumes, with more than 80 papers, reviews and periodicals subscribed to regularly.[3] The historian Louise Whiteway cites the societies — benevolent, patriotic, fraternal, cultural, and recreational — that were part of the cultural and social life as "evidence of a settled way of life."[4]

Change had been occurring at an accelerated pace in the second half of the nineteenth century. Modern methods of communication were at last being extended to the island. The *Halifax Mail Steamer* called at St. John's fortnightly. The newspapers of the 1860s were distinctly more sophisticated than those of the 1840s. There was more local news, and the foreign news was reported more promptly after the laying of the Atlantic Cable in 1858.[5] In 1864 a geological survey of the country was begun by Alexander Murray. Attempts were made to lessen dependence on the precarious fishing industry by encouraging agriculture and mining to diversify the economy. Plans were made to build a railway which would open up the interior of the island and make it possible for people to settle in the fertile valleys and near the forest lands that were discovered there. Steamship communication with Europe and America and between St. John's and the principal settlements lessened the isolation that had been for so long the lot of Newfoundlanders.[6]

Societal and cultural change had been accompanied by efforts to extend education to the secondary level. On September 29, 1845, after a number of years of political debate, the non-denominational St. John's Academy had been established at Castle Rennie "for the instruction of youth in the several branches of scientific and classical learning."[7] Low enrolment at the Academy and resistance to the idea of a non-denominational institution led to attempts to pass legislation to build two colleges, one for the Roman Catholic population and one for all Protestants. These efforts were abandoned in favour of a proposal to divide the grant into equal proportions to build three separate denominational colleges in St. John's for Roman Catholics, Anglicans and other Protestants. A deciding factor had been the growing strength of the Wesleyan Methodists, who numbered 20,000 or about one-sixth of the total population, and who feared that in any general Protestant institution they would be subject to the power of the established church. On this basis an initial grant of £600 had been awarded in 1858 for the operation of the Wesleyan Academy.[8]

The school had not progressed well in its early years. Only 60 pupils were in attendance in 1874, and the most recent headmaster had resigned suddenly because of serious health problems. The decision of the Board of Directors to hire Holloway as principal of the Academy, at the age of twenty-four, from a number of applicants recommended by Wesleyan lay agent, Joseph Lawrence of East Keswick, Yorkshire, England, has been referred to as a courageous one.[9] The wisdom of that

decision, however, became apparent in the course of his career. H.N. Burt, the historian of the Wesleyan Academy and Methodist College, refers to Holloway's tenure as principal as the "Holloway Era," and as a "notable period in the history of the Academy and College; also of Education in Newfoundland."[10]

In England, Holloway had been a pupil of a Wesleyan Day School. He was the son of Mary Edwards Holloway and William Holloway of Wesley Place, Barton-on-Humber, Lincolnshire. His father was the schoolmaster of the Wesleyan school in Barton, which had been opened in 1845 in an improvised room over the vestry of the chapel, with other buildings added as the years went by for juvenile, infant and industrial classrooms, playgrounds and teachers' dwellings. Funds to build and operate the school were raised largely by the Wesleyans, who comprised about one-tenth of the total population. An interesting account of a public examination of the students, followed by a bazaar in the chapel, describes a demonstration of a Bible-training lesson by Holloway's father, who had been awarded a "Certificate of Merit" as a teacher. The historical sketch praised the schoolmaster's mastery of his topics and his graceful and easy delivery during a course of four lectures to raise money for the school. The title of one of his lectures was "The natural history of animals, illustrated by numerous particulars of their habits and peculiarities."[11]

During his schooldays Robert Holloway experienced more than once the annual visits to his school of Matthew Arnold, the eminent Inspector of Schools, poet and son of Thomas Arnold, Headmaster of Rugby School. Long afterwards he remembered the dictation given to the higher class by the Inspector, as well as his own reply to the history question, "Who fought at Flodden Field?" Holloway replied "Marmion," having just finished the poem of that name by Walter Scott, and recalled that Matthew Arnold had seemed more pleased than if he had "known more history and less fiction." Holloway also recalled a subsequent visit to his school by the Inspector, when Arnold recalled the details of an algebra problem that had been worked out on the blackboard during his visit to the school a year earlier.[12]

Holloway was a product of the new attitudes that were developing towards science teaching in England in the last half of the nineteenth century, and his rationale for the importance of science in the curriculum was an echo of the arguments that were being used to promote science in the schools and universities there.[13] Every large town had its literary and philosophical society, and from these had sprung the provincial university colleges, in which science education was strong. The Royal School of Mines had begun in the early nineteenth century as an outcome of a geological survey and in response to the need for science education in connection with the mines, and had later become affiliated with the Royal College of Chemistry. Under the leadership of T.H. Huxley and his distinguished staff, the Departments of Chemistry, Physics and Biology were transferred to a new building in South Kensington, and later the Departments of Applied Mechanics, Metallurgy and Geology became part of the new centre. Here many science

teachers were influenced by the work of Huxley in natural history, R. Hunt, G.G. Stokes and J. Tyndall in physics, and W.H. Perkin and H.E. Armstrong in chemistry. Here, for the first time, Huxley was able to emphasize the experimental teaching of biology which he so strongly advocated.[14]

Many of the courses arranged for teachers involved experimental methods and laboratory courses as well as lectures on content, and must have been extremely valuable to the participating teachers. Holloway matriculated from the Wesleyan Training College in Westminster in June, 1867.[15] His B.A. degree (1873) was awarded from the University of London, which had a strong chemistry and physics orientation.[16] He is listed in the 1901 University of London Register as Intermediate Arts, Clevedon College, Northampton, and Intermediate Science, New College, Eastbourne.[17] He had also studied science in Huxley's laboratory in South Kensington.

An early interest in zoology had been manifested when, as a boy, Holloway had gone to school with Thomas J. Parker. Encouraged by Parker's father, William K. Parker, a physician and comparative anatomist, the ten-year-olds had collected diatomaceae for microscopic examination from pockets of Atlantic ooze.[18] Later, Holloway studied at the College of Science at South Kensington with Thomas Parker's younger brother, William Newton Parker.[19] Important components of Huxley's legacy to student teachers attending the College of Science were a sense of the importance of practical work by the pupil and an awareness of the need for a teacher to have a genuine knowledge of the subjects taught.

* * *

The Wesleyan Academy in St. John's had opened in the building formerly occupied by the Wesleyan Day School. The teaching method recommended by the Board was that all possible means be employed "to awaken the interest of the students in their studies, to exercise at once the memory, understanding and judgement, to see that they are well grounded in what they learn."[20] On Holloway's arrival the philosophy expressed ceased to be merely a collection of high-sounding phrases in a minute book, and became part of the daily practice of the school. The "awakening of students' interest" began in the classroom, in the science laboratory, often in their out-of-school experience. The "exercise of memory, understanding and judgement" was part of the theory of mental discipline to which Holloway subscribed. He believed that scientific subjects were the best vehicles for strengthening "the mental qualities which are so valuable in after life — Observation, Experiment, Deduction, Generalization,— Exactness in Record,— Importance of Detail, etc."[21]

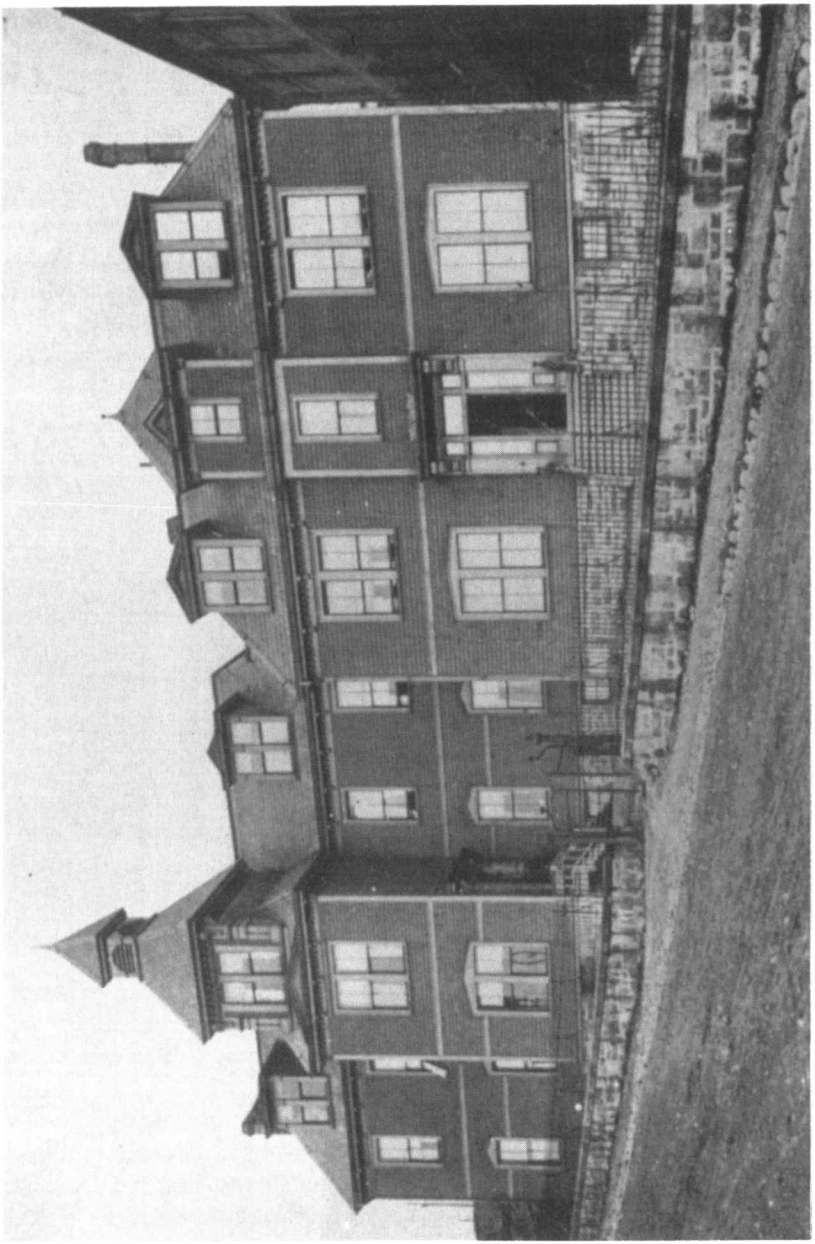
Science had rarely been emphasized in the curriculum of the private schools, grammar schools, convents and academies of Newfoundland in the mid-nineteenth century. This is not surprising in view of the fact that in England the fight for science in the curriculum of the great schools was still being waged.[22] In each of the three

St. John's colleges—the Church of England Academy (later Bishop Feild College), the Roman Catholic Academy (later St. Bonaventure's College), and the Wesleyan Academy (later the Methodist College), some science was taught and laboratory equipment was gradually accumulated before the end of the nineteenth century. The position of science education in the total life of the school and the degree of involvement varied in the three schools.[23] At the Methodist institution it was emphasized strongly from 1874, the year that Holloway arrived, and continued to be defended and promoted during the thirty years of his administration.

Phillip McCann, in *Schooling in a Fishing Society*, suggests that if the breadth of the curriculum can be taken as an indicator of the quality of education in the St. John's denominational colleges, then the colleges provided, in general, a high-quality academic education. The scope of the curriculum varied in each of the colleges, as did as the emphasis on scientific subjects. For example, the 17 subjects offered by the Church of England college in 1876 included only one science, Natural History, whereas the 20 subjects offered by the Methodist College in the same year included Natural History, Chemistry, Mechanics and Hydrostatics. In 1901, the Church of England college offered 23 courses, of which the only science was Chemistry. In the Roman Catholic college in 1901, 12 courses were offered, with Natural Philosophy the only science. In that year, with the Methodist College still under the principalship of Holloway, 22 subjects were taught, with the strong scientific bias evident in the provision to students of a variety of courses in science, including advanced courses for pupils preparing for science-related careers and/or further education in science.[24]

One of Holloway's first requests at the Methodist Academy was for science equipment, and in this he received the full support of the Board of Directors, who advanced £50 for this purpose and promised further appropriations from time to time from the fees collected for science.[25] Dr. George S. Milligan, Superintendent of Education for Methodist Schools, reported in 1876 a year of prosperity for the College, and commented favourably on the principal's efficiency of management and the thoroughness of his teaching. There were now separate boys' and girls' sides and enrolment had grown to 130 pupils. The sciences were well underway, and in that year the Board approved an expenditure of $500 for "apparatus to illustrate natural science."[26] Mineralogy was begun, and a start made on Chemistry and Physics. Milligan saw the growth of the sciences as a hopeful sign for the academy and one that augured well for the future of Newfoundland:

> I had special pleasure in observing the good beginning towards the formation of a museum for natural objects, also the very respectable number of articles making up the principal laboratory, in which I was further gratified by a lecture of the learned principal to his class on mineralogy, and by his examination thereof in chemical analysis, as a knowledge of this subject has become of great practical consequence in this colony.[27]



The Methodist College

In 1877 Milligan enthusiastically reported further additions to the laboratory, intended to familiarize students with many chemical analyses and to assist them in learning the principles of the telephone, microphone, electric light and many other things engaging public attention.[28] Over the years the collections of rocks and minerals grew, partly through purchases from the Board's allotment for science, as well as gifts from Holloway's brother, George, in England, and other benefactors interested in the work of the College, such as Justice Donald Morison, who donated 120 minerals from his private collection.[29] The rocks and minerals were later housed in a cedar cabinet with a front of polished oak donated by John H. Birkett, a former pupil of the College.[30] More than 200 specimens of rocks were classified and catalogued, together with a large collection of metallic ores, and both pupils and old pupils were encouraged by Holloway to spend time studying the specimens. "One hour of such study," he advised, "is worth months of only book-work."[31]

As early as 1877 the annual report of the Academy listed 42 students learning mapping and 42 mineralogy, while there were 8 in botany, 1 in hydrostatics, 10 in chemistry, 2 in navigation and 29 in natural history.[32] This was not done at the expense of other parts of the curriculum, which gave corresponding weight to English, mathematics, the social sciences and languages. Students were given a great deal of choice, especially in the advanced classes. According to Whiteway, Holloway belonged to the now vanished race of scholars whose learning was encyclopedic in scope. He was both humanist and scientist, teaching, over a period of time, mathematics, history, geography, Latin, Greek, German, Italian, Spanish and French, and an assortment of sciences ranging over the spectrum of the natural sciences and including applied sciences such as photography, navigation and land surveying.[33]

From the beginning the subjects taken were relevant to the interests of the students, and current topics were often explored. In 1878, when the excitement of Alexander Graham Bell's invention of the telephone had hardly died down, the pupils at the Wesleyan Academy were learning about it first-hand as Holloway, following a description of the telephone in the *Scientific American*, constructed and demonstrated one.[34] The memory of that experience was still with one of the students more than 50 years later, as he spoke to a student assembly and told them how they had "used the instrument and learned how it was constructed before anyone else in Newfoundland had seen it, and in fact before most people in Canada or in the United States."[35] They also constructed a microphone box, put a fly on the box, under a glass tumbler, then listened through the telephone to the amplified sounds of "the little creature walking around and stumbling."[36]

At that time the laboratory was in one of the rooms of the principal's house, which was attached to the Academy, and the "hour for chemistry or physics" was looked forward to with great anticipation.[37] Although the experimental approach was stressed, and Holloway came to believe in it more and more as the years went by,[38] his classes frequently took the form of a series of lectures, in which he

performed demonstrations or used other means of illustration. Questions were encouraged, for he was anxious that the slowest student should understand, and he recognized the need for the pupil to have a basic framework of knowledge before proceeding to more complex concepts.[39] He stressed comprehension of "first principles" rather than rote memorization of facts or using a formula without really understanding its meaning. His examinations stressed this, and required understanding of laboratory procedures.[40] He believed in introducing a science by means of a series of lectures much like the "popular science lectures" in England. His classes were widely attended, and not all students who came were actually enrolled in the class or were required to write the examinations. When interest was aroused by this introduction to "the vast domain of chemistry," then students were led to good textbooks to explore further, or additional laboratory work was encouraged.[41]

In the college laboratory, students retraced the history of science as the carbon arc was demonstrated,[42] and limelight produced.[43] Holloway's students also became involved that year with preparations for a series of public lectures given by Holloway in the Athenaeum Hall. Here the telephone was once more demonstrated, and other lectures featured the production of electric light and limelight. The classical experiment of Humphry Davy at the Royal Institution was repeated, this time with the help of the chemistry class, who filled and connected in series 150 quart Bunsen cells.[44] Holloway later recalled,

> We made, too, all our lamps. It is a fine discipline for the young scientist to have to work with insufficient and inefficient material. And it was a fine light which our Bunsens gave with their 300 volts pressure, and with little besides their internal resistance to lessen the current.[45]

The limelight experiment was also an improvisation from beginning to end:

> The lens was a borrowed portrait combination, quite detached from the lantern (which was little more than a box), supported some distance in front of the lantern by a Bunsen universal holder. We made our own limes, and of course our own gas. Yet the result was a complete success, and certainly we and our helpers...obtained a real knowledge of the subject which no mere users of first class apparatus could have obtained.[46]

The academy prospered. Whiteway notes that it was "little wonder that the Academy, later College, under Holloway, took on definite shape and form, from relatively small beginnings to quasi-university."[47] The impetus towards change was enhanced by Holloway's positive relationship with the College Board. The Board rarely set aside his recommendations, and generously assisted him in his regular work and special projects.

In 1877 provision was made for the training of pupil teachers, and a model school was erected at a cost of £800, with facilities for kindergarten and primary work. This served both as an elementary division and as a practice school for pupil teachers.[48] By 1885, the College was filled to overflowing, with an attendance of 324, and plans were made for a new building, and additional staff to ease the load of the principal and free him for administrative duties and the management of the

advanced classes.[49] In spite of this, he became seriously ill; his illness delayed his return to work in the fall.[50] Dr. Milligan filled in during the emergency. This was to be a recurring pattern during Holloway's lifetime, and one of the striking aspects of his personality was that he managed to rise above such impediments and accomplish so much.

In January, 1886, the new Methodist College was opened in St. John's, and the name "academy" was left behind as staff and students began life in the new surroundings. There were two suites of classrooms with folding walls, an assembly hall, gymnasium, a large room to be used for a Young Men's Institute for Mutual Improvement, and a laboratory and museum.[51] Although there were separate "sides" for boys and girls, students combined as before for special classes, and a preceptress was appointed.[52] Milligan's reports in the years that followed commented on the success of the institution and the Board's thankfulness that the "efficient principal...whose delicate health has been for some time a cause of anxiety, has been spared to preside, with his recognized ability, assisted and supported in the work of instruction in the college proper, by John West, B.A. (Durham) and James Walker, C.N. (Westminster) in the male department, and by Miss Wilson, Preceptress, and Misses Dove and March, in the ladies' department."[53]

The new college lasted only six years, when it was destroyed in the Great Fire of July 8, 1892. Within hours after the closing exercises, all was lost: the College, the Model School and the Home (the residence for boarding students); the principal's house, library and personal effects; all the furniture, science equipment, appliances and many valuable records.[54] With part of the building debt of 1886 still outstanding, the Methodists began the task of rebuilding, this time with elementary and secondary divisions in the same building, and with the hope that "by the end of the year the new Methodist College will be in full operation in all its departments—thoroughly equipped," and with "a complete corps of professors and teachers worthy of its noble antecedents."[55]

That these hopes were fulfilled is evident from the pages of the *Collegian*, the school magazine begun in 1895 and edited by Holloway until his death in 1904 at the early age of 54. In many ways these were his greatest years, when his fine qualities as scientist and as science teacher were most clearly evident. As a practising science teacher who was evolving and refining his philosophy of education as he continued his teaching, he became more and more sensitive to the needs and interests of his students and also learned to give them more and more responsibility.[56]

Science experiences for Holloway's students were not limited to the classroom. Clear winter evenings might find him with the boarding students from the Home, locating planets and constellations with the college telescope, encouraging students to become familiar with them so that they would recognize them as old friends for a lifetime.[57] From time to time, in the pages of the *Collegian*, students

were reminded of what to look for in the night-time sky. The telescope, a three-inch refractor by Dollard, had been a gift from an appreciative member of the College Board.

Hobbies were encouraged, and Holloway learned along with his pupils. Confessing his ignorance of entomology, he sent a boy's initial collection of beetles and butterflies to the best authority he knew, James Fletcher in Ottawa.[58] There followed from the same student a collection of birds' eggs and, later, relics for the museum.[59]

As soon as some of the students acquired cameras, classes were begun in photography, which Holloway described as "an art founded on two, at least, of the sciences which form part of our regular study."[60] Lessons were given in printing and developing. Students were taught how to make lantern slides by reduction, and they soon added to the College stock of slides.[61]

The opening of the street railway became an object lesson in transformation of energy for Holloway's classes in mechanics and electricity.[62] The noonday gun was an opportunity for comparing the speed of light and sound.[63] The white encrustation on the brick buildings throughout the town became the topic for a scientific inquiry, with a possible explanation for the phenomenon appearing later in the pages of the *Collegian*.[64]

And always Holloway defended science education—against parents who felt it was a waste of their children's time, against those who believed that Latin was of more use than physics, and against those who argued that time spent in English was more profitable than that spent looking through a microscope, analyzing mineral ores or searching for the first wild flowers in the spring. To these he pointed out that no subject requires such clarity of thought and expression as does science, that every lesson in science, every oral or written answer that is corrected and made more concise and exact, is also a lesson in English.[65] "Education," Holloway maintained, "is not merely putting facts into a boy's head. It is the general preparation of his mental machine for his work in life." Paraphrasing the words of Herbert Spencer, he felt that "Latin and its associations...must give way, in the case of the majority of boys, to the increasing claim of science."[66]

A vivid memory of one of Holloway's pupils, the poet E.J. Pratt, was the visit of the physics class to the House of Assembly to see G.M. Marconi, the celebrated Italian physicist and inventor then visiting St. John's, and to be present at a demonstration of a "message being transmitted from one closed room to another, from key to key, without a wire."[67] He remembered that the thrill was multiplied the next morning when the word spread that Marconi had received the first wireless signals across the Atlantic.[68] Holloway had explained the principles of wireless telegraphy to his class, and did not agree with Marconi's "modest assertions" that he had stumbled on the discovery by accident. Holloway impressed upon his class the importance in science of building carefully on work already done.

Individual projects were encouraged and never failed to get recognition in the College magazine, which became a medium for further teaching and reached countless old pupils and kept them in touch with the College. Early issues of the *Collegian* became a medium for reporting the results of the school examinations, as well as recording the successes of Methodist College pupils in the London Matriculation examinations and later in the examinations of the Council of Higher Education, established in 1893. Examination papers were published in the *Collegian* to guide private students in the outports; problems were worked out, and sample questions were answered with "model answers."

Holloway had emphasized examinations at a time when there was no standardization of curriculum and each of the schools prescribed its own course of study and method of examination. From the beginning of his administration regular examinations were conducted at all levels, and as early as 1876 there were four examinations a year, with results published by grade.[69] The policy in the years that followed was to base grades on year-round achievement rather than one final examination.[70] In 1879 one of the pupils went "directly from the classes of the principal to London, England" and passed the London Matriculation examinations.[71] The following year arrangements were made to establish St. John's as a colonial centre for preparation of pupils for these examinations, and pupils began preparatory courses. In the years that followed varying numbers of candidates from the Methodist College were successful in passing, often with honours, the London Matriculation examinations, with a total of 29 matriculants by 1901.[72]

Holloway's belief in the importance of examinations was underlined when he became a founding member, in June 1893, of the Council of Higher Education, a body which provided for the appointment of examiners and the setting of examinations.[73] It was given power to "prescribe subjects, manner, time and place of examinations and to make rules."[74] It was made up of 23 members, including the Superintendents of Education and the principals of the St. John's Colleges, *ex officio*. Holloway attended meetings regularly and served on a committee to draw up regulations for examiners,[75] as well as on a committee to prepare the syllabus for the examinations for the Junior, Senior and Associate grades.[76] His influence on this Committee is reflected in the detailed specifications for the science sections of the syllabus in the report adopted by government and published as a supplement to the *Royal Gazette* in November, 1895. Natural science options (Chemistry and Physics) were included in the syllabus for the Junior grade, and Mechanics, Magnetism and Electricity, and Chemistry options were included in the syllabus for the Senior and Associate grades. Comprehensive lists of scientific topics or appropriate sections of textbooks were prescribed for each course.[77]

Holloway spoke of the usefulness and fairness of the Council of Higher Education examinations, the new standards of efficiency, and the potential of the examinations for "minimizing the evils natural to a system of Denominational Education."[78] He also praised the new system for accomplishing for the younger

and less advanced students what the London Matriculation examinations had done for the more advanced students. Students in the Associate grade were advised to choose subjects in line with the requirements for London Matriculation rather than to take the easier path to success by avoiding, for example, a second language, which was an option possible in the Associate of Arts (A.A.) examinations.[79] Comparisons of pupil achievement in the St. John's colleges in the years immediately following the introduction of these examinations revealed that each year the Methodist College passed the largest number of candidates.[80] Details of the results of the various levels of examinations—associate, senior and junior—were published in the college magazine, along with lists of scholarship and prize winners and notes on the positions of Methodist College pupils on the general honours lists.

Holloway frequently alluded to the successful achievement of his female students in the Council of Higher Education and London Matriculation examinations in mathematics and the sciences. He was ahead of his time in his encouragement of girls in science, or for that matter, girls in any subject for which they showed aptitude. This is typical of his comments in the *Collegian*:

> Someone remarked the other day, "A is a clever girl; she has no difficulty with her Euclid deductions." "Yes," we said, "her mother twenty years ago was good at Euclid." ...We know of many of these mothers who were clever girls years ago at *boys'* studies (so-called). We believe they are better mothers, better fitted to help and sympathize with their *boys* as well as their girls than if they had learnt nothing but music, painting and tatting.[81]

And he could not resist this aside: "For 25 years we have regularly taught girls, and we think it is time we knew something about it."[82]

In successive issues of the *Collegian* Holloway recorded the successes as well of old pupils, who were encouraged to keep in touch with him when they left the College to pursue further education or to begin the careers for which their college days had prepared them.[83] Old pupils corresponded with him and he followed their progress after they had left the College and hoped that he had prepared them well. Girls wrote to him from schools on the continent and told him of their "Heimweh" and "nostalgie."[84] An "Old Pupils" page became a regular feature of the school magazine. Honours earned by former students were recorded, and letters from former students published, so that those receiving the college magazine were kept in touch with one another and with the College. The pages of the *Collegian* bear testimony to the successes of those who learned science with Holloway and went on to further academic training, or sometimes went straight from his mineralogy classes to become analysts in various mining companies, or from the College to become teachers.

Holloway's contribution to education was recognized by a grateful Board of Governors and also by the Superintendents of Education for Methodist Schools. In 1900, at a meeting of the Executive of the Board of Governors, it was reported that the College had maintained the proud position it had won in the front rank of the

educational institutions of St. John's. In that year there were 440 students in attendance at the College, and the examination results in all grades were outstanding. All outport scholarships had been won by Methodist schools whose teachers were old College pupils.[85] The *Methodist Monthly Greeting* gave the credit for the success of the institution to the principal. Principal Holloway was classed as an indefatigable worker who brought to his profession the full strength of intellectual power and long and honoured experience, and whose pupils were to be found in all the learned professions—many as the "best and ablest" of Methodist ministers and many more as contributing members of the legal, medical, and mercantile professions.[86]

Holloway's legacy, as with all good teachers, would be the lives he influenced, the students who caught his enthusiasm for life and for learning. In Holloway's own words,

> ...[the] profession of teacher is not a money-making one. It is not markedly so anywhere. But there is no country in the world where the faithful services of a teacher receive more gratitude than here. I have not had to wait 25 years to learn this. My old pupils are to be found in every part of the island. In my holidays in the outports I rarely find a settlement, however small, which does not contain one or more of them.[87]

Some evidence exists for the careers Holloway inspired, and it would be interesting to add to what is known by following the post-secondary academic records and subsequent careers of his students, many of whom, under different circumstances, may not have realized their potential.[88] The career of one of Holloway's pupils, William Boyle, is a case in point. The son of a Carbonear doctor, he transferred to the Methodist College in 1897 at the age of fourteen and gradually improved under Holloway's influence. By 1900 he had crept to the top in most of Holloway's term examinations, and in 1900 wrote the Associate Grade examinations of the Council of Higher Education and the London Matriculation examinations. He placed highest and won the Jubilee scholarship of $600. His marks came too late, however, for entrance to McGill, and as he was still quite young he stayed on at the College, where Holloway tutored him in advanced courses to prepare him for the engineering course he planned. In addition, he became demonstrator in the laboratory that year and prepared the experimental work for the younger students.[89] It was at this time that the principal was experimenting with Crookes' tubes,[90] and perfecting his apparatus for X-ray work.

Boyle's academic record at McGill was brilliant. He became interested in physics, reportedly because of the research activity of Ernest Rutherford at the Macdonald Physics Laboratory, but possibly because of earlier experiences in the laboratory of the Methodist College with a teacher-mentor with whom he continued to share his successes.[91] After graduation with high honours Boyle demonstrated in physics, taught mathematics, and became involved with Rutherford's research group. In 1909 he was awarded the first Ph.D. ever granted by McGill for his work on the emanations of radium and thorium. Boyle was chosen 1851 Exhibition

Scholar. This scholarship was tenable in Manchester, England, where he continued to work with Rutherford and his research team. While there Boyle also encountered other scientists such as Charles Darwin, Niels Bohr and Hans Geiger. He established the Department of Physics at the University of Alberta, developed methods of submarine detection during World War I, and was Director of the Division of Physics and Engineering in the new Research Laboratories in Ottawa until his retirement in 1949. Boyle was recognized as the senior physicist in Canada and received many honours.[92] Holloway had followed his career as a student and commented on his success, but died before Boyle had completed the first phase of his research. In 1907, however, Boyle's achievements and the influence of his Methodist College experience were once more noted. Dr. Arthur Barnes suggested that "St. John's is to be congratulated, too, for it was here that he obtained his love for science, and the rudiments of that physical knowledge which he has turned to such good account."[93]

When meeting old pupils in his travels, Holloway mentioned appreciatively how physical difficulties vanished when they were near: "they were breath and limbs to me."[94] Such references to his health were infrequent and belied the seriousness of his illness, which was, however, of grave concern to the College Board. He set himself a demanding pace, despite his frailty. He is believed to have been afflicted with tuberculosis from an early point in his career. To fight the disease he spent the summers travelling around Newfoundland in his sailing yacht, camping at various places and carrying the cumbersome photographic equipment and the glass plate negatives that became an important and tangible legacy of his talent and a record of his love for the natural beauty of the island and his desire to let others know about it as well.

Even in the isolation of nineteenth-century Newfoundland, with virtually no colleagues of his own stature in science, Robert Holloway was able to keep abreast of developments by reading scientific journals, returning to England for additional courses, corresponding with people with common interests and conversing with naturalists and other scientists visiting Newfoundland. Marconi, for instance, had found time to call on him for a half hour, as did many other visitors who shared his interest in science.[95] His correspondence with A.H. Mackay, secretary of the Botanical Club of Canada, led to Holloway's membership in the association, and through this contact St. John's became a station for the reporting of phenological observations.[96] A Newfoundland branch of the Botanical Club was formed which, in effect, was the forerunner of the Newfoundland Natural History Association.[97] Rev. A. Waghorne, the Anglican clergyman who collected and named 130 species of Newfoundland flora, sent Holloway his publications on the topic,[98] and is believed to have bequeathed to him the collections of lichens, plants and leaves which were later donated to Memorial University College by Holloway's daughter Elsie for the use of teachers attending Summer School.

Holloway shared his collections of Newfoundland flora with visiting naturalists, such as the two young Swedish scientists, Björling and Calisthenius, who came to see him before their departure with the Peary expedition, and who were later lost in the Arctic. During their visit he drove them out to the marshes on Blackmarsh Road to find the Pitcher Plant, *Saracenia purpurea*, and later, following afternoon tea with preserves made from wild berries, gave them duplicates of most of his botanical specimens to take with them.[99]

As a practical scientist Robert Holloway was greatly influenced and intrigued by scientific developments as demonstrated by the discoveries and inventions of the day. With experienced hands he constructed apparatus and constantly improved on it, noting that Newfoundland was not an ideal place for experimentation in science. There was a need for the experimenter to know his work thoroughly and to be able when necessary to construct or mend apparatus.[100] He shared with his students and an interested public his own excitement over scientific developments, recapitulating the history of science as he demonstrated the efforts of physicists to produce light, reproduced key experiments in chemistry, trained students and adults in chemical analysis of ores, and prepared them for jobs as technicians in the mines.

As a nineteenth-century scholar, Holloway was also interested in the theoretical basis for these discoveries, and the scientist's search for understanding was an important component of his lectures. With clarity of expression he lectured not only in the college laboratory but also in public halls crowded to overflowing, sharing his discipline with the general public and with members of the literary and scientific institutes that were part of the nineteenth-century colonial culture.

In January, 1878, in the College laboratory, Holloway gave a course of six lectures, "practical and experimental," on the metallic ores of Newfoundland. It was a class specially designed for adults. The *Morning Chronicle* complained afterwards about the overcrowded conditions and the fact that "the doors had been opened a half-hour early, so that the best seats were taken up before each lecture, always by the same individuals!"[101]

Other lectures were given, often to an audience of one thousand, in the ornate auditorium of the newly-built Athenaeum, with larger than life-size paintings of Shakespeare, Raphael, Sir Walter Scott and Edmund Burke on its cupola-shaped ceiling. One of the lectures was on "Electric and Other Lights, Experimentally Treated," for which Holloway's pupils had helped him to prepare by constructing the Bunsen cells and lamps that, when connected in series, introduced the citizens of St. John's to electric light. Interest in the "new light" was so great that the hall was crowded on three consecutive nights, and, because of the success of the lectures, the Athenaeum received a large addition to its book collection.[102] In January, 1880, one of the Athenaeum rooms was the venue for another adult class. The *Evening Telegram* had advertised it as "a course of five lectures in Magnetism and Sound (the telephone, microphone and phonograph); Chemistry of Air, Water

and Common Things; Heat; Physiology — all to be treated simply and illustrated with experiments."[103]

Another series of public lectures in chemistry was given in the College hall, covering topics such as hydrogen, oxygen, copper, and analysis of an iron ore.[104] Annual lectures to the Methodist College Literary Institute, of which Holloway was president in 1885, were presented between 1881 and 1902. The 1892 "Evening with Professor Holloway" dealt with physics, while the 1898 lecture topic was X-rays, a subject which was the focus of presentations to other groups, such as the St. Andrew's Society in 1897 and the Newfoundland Teachers' Association at their conference in 1898.[105]

Perhaps Holloway's most interesting work was his experimentation with X-rays, which began within a year of their discovery by Roentgen. Early in 1896 Holloway had in his laboratory "all the apparatus necessary to produce the results" but of "too small a size."[106] He had been reading in scientific magazines how "those wonderful 'shadowgrams'" were produced, but a larger Ruhmkorff coil was needed and his Crookes' tubes were insufficiently exhausted.[107] Through the generosity of the Chairman of the Board, Mr. James Pitts, and other friends, the larger apparatus was soon available. [108] In recognition of their assistance in procuring the apparatus for him, the first demonstration was given to the College executive and the next to the College Aid Society. Holloway's class came next, and so many questions were asked that the "experiments took much more time than the usual hour."[109]

The class began with a lecture on the history of events preceding the discovery of X-rays, a simple account of the experiments of Gassiot and Geissler, and of Crookes and Lenard.[110] The demonstrations followed, as various objects enclosed in packages were detected, and their shadows cast on a fluorescent screen. Volunteers were invited to have the bones of their hands X-rayed; this made a life-long impression on some members of Holloway's audience.[111]

By this time Holloway was assisting some of the city doctors with diagnoses of fractures and dislocations and, with the newest apparatus, was asked to assist with the treatment of lupus.[112] Patients were brought to the College laboratory for treatment. This is Holloway's description of events in the spring and summer of 1902:

> Our X-ray equipment, the gift of our chairman, has been doing good work lately. Three of the city's doctors have applied to us and in every case their diagnosis has been much assisted by the Radiograph made. In one difficult case—a dislocated humerus—our picture is much superior to a typical one of the same trouble published by one of the New York hospitals. Mr. Pitts has given us a new accumulator which is constantly useful in our electrical experiments and our special X-ray work.
>
> During the spring and summer our X-ray apparatus has been called into use on a number of occasions. Broken arms, dislocated arms and shoulders, injured feet have been examined. The treatment of cancer, also, in a systematic way has, we are glad

> to say, shown that the X-rays have the power to ameliorate, if not cure, this dread disease.[113]

In September, 1903, Holloway was continuing his work with X-ray therapy. Seven patients, most of them suffering from lupus, were being treated at the College hall, where the apparatus was available and Holloway was able to operate and maintain it. An article in the *Evening Herald* of September 23 reported on Holloway's work in constructing and operating the X-ray equipment being used at the College to assist in the treatment of lupus cases brought there by one of the three St. John's doctors who had taken advantage of Holloway's expertise. Dr. Duncan was interviewed by the *Herald* about the potential of the treatment for ameliorating diseases such as lupus and cancer. A demonstration of the procedure was given, and Dr. Duncan spoke of the hospital's plans to obtain an X-ray machine so that patients could then go to the hospital for therapy and relieve the pressure on the facilities at the College hall.[114]

The Board, proud of the involvement of the College in this humanitarian project, continued to advance money to update the X-ray machine at the College, and Holloway, despite his deteriorating health, continued to operate it in the 1903-1904 school year. "The article in the *Evening Herald*," he wrote, "has brought so many sufferers that we are obliged even to keep some waiting."[115]

The discovery of radium led Holloway to test some of the specimens in the cabinets for radioactivity. Once again James Pitts, the chairman of the College Board of Governors, was ready to help and to encourage him with his experiments. One of the older boys found four likely specimens, and a rapid photographic plate was enclosed in a dark box, with the specimens placed on the cover, separated from the plate by an opaque ebonite plate. A lump of pitchblende which had been in the cabinet for ten years and another specimen labelled *Uranite* were found to have left a dark shadow when the plate was developed.[116] Holloway was excited by the thought of the lump of pitchblende "during all this period, night and day... sending out rays, similar to X-rays, of inconceivable minuteness, and at an inconceivable rapidity."[117] More than this, he was excited by the revised concepts of matter and energy and of the nature of chemical reaction which the discoveries called forth. A milligram of radium had been sent for, and he hoped to show its "marvellous" powers to the senior pupils when it arrived.

* * *

Although this essay has focused primarily on Robert Holloway as a science teacher and scientist, his artistic side should not be ignored. In addition to being a fine scientist, he was also a first-rate photographer. He travelled around the island in the summer months, sometimes with his son, at other times accompanied as well by his wife and daughter,[118] or an Indian guide. His travels by coastal boat, horse and carriage, occasionally by train, and often in his sailing yacht, are portrayed in

his photographs of Labrador, Notre Dame Bay and Green Bay, Burin and the West Coast of the Island, especially the Bay of Islands and Bonne Bay.[119]

Holloway's artistry is expressed in images of Newfoundland landscapes, many with the mirrored reflections which became his trademark. A representative selection of 120 such photographs is reproduced in his book *Through Newfoundland with the Camera*, published by his family after his death. Also effective in bringing the beauty of Newfoundland scenery to the attention of others is his prose.[120] This description of the Long Range Mountains reflects his dual nature— Holloway as scientist and Holloway as artist:

> Their cool, often snow-patched tops seem to condense from the summer sky all the moisture of the summer's day, so that the hills, softened by distance, are capped with beautiful cumulus clouds, perfectly shaped, constant in form, as if they were as unalterable as the mountains under them.[121]

To browse through the photographs in *Through Newfoundland with the Camera*, "selected from an immense number taken over a period of twenty years," and to read the preface and text of the book are unique opportunities to observe and appreciate nineteenth-century Newfoundland through Holloway's eyes. He wrote the text and selected the pictures in the full knowledge that he might not live to see the book in print. This is expressed poignantly in the epilogue to the first edition:

> Much might be added to these notes and much might be altered and improved, but the author ventures to point out in conclusion that he has written only of what he knows or has seen, that the work has been a work of love commenced under difficulties which few can appreciate, and carried to a conclusion in face of death. He trusts therefore that the reader, while not failing to see faults of omission and commission, will find also something to interest and something to remember, and that he may look back on his visit to Newfoundland with feelings akin to the mixture of pleasure and regret with which the author pens these concluding lines.
>
> AND SO FAREWELL! R.E.H.[122]

Although there are frequent references to Holloway's health in the minutes of the meetings of the Board and in Milligan's reports, there are few acknowledgements of the seriousness of his illness in his own writings. Through his summer travels he continued to fight the ravages of tuberculosis, the disease that he refused to acknowledge at first. He kept up a tremendous pace in all aspects of his work, despite his growing depression as circumstances became more difficult.

In September, 1902, he wrote with sadness, "We confess that we do not look forward to opening day with much pleasure. The loss of the faces that have greeted us for so many successive years causes heartfelt regret."[123] He also felt a deep sense of loss on the death of Dr. Milligan, who had supported and encouraged all his ideas for the improvement of the College, and rejoiced with him on its increasing success.[124]

In December of that year the Board of Governors met to consider Holloway's deteriorating health. It is to the credit of the Board that he was to retain the position of principal to the end, and to continue with his work as teacher of the advanced

classes, supervision of the school, and his experimental work in the College laboratory. In the winter of 1903 his classes were rearranged so that he could seek a warmer climate. Holloway had written his brother George in London to recommend a replacement teacher, but the Board had taken no action. After a severe attack of bronchitis in January, 1903, he spent the remaining winter months in Jamaica, returning too soon, however, to the rigour of a Newfoundland spring. His students showed their concern by presenting him with a comfortable armchair which he valued "very highly, but most of all...the sincere expressions of pleasure at his return to work with them, which accompanied it."[125]

Holloway took the advanced students in his home for Latin and French and the intermediate classes as well for mechanics and chemistry. Solomon P. Whiteway was responsible for the remaining senior classes, and two of Holloway's former pupils, George Taylor and William Canning, joined the staff.[126]

During the 1903-1904 school year Holloway taught two or three classes a day, continued his diagnostic work with X-rays and radiotherapy, wrote about the successes of his students, read a series of articles on astronomy by an astronomer whom he rated excellent in science but poor in English, and made enlargements of the College staff and the champion cricket team.[127]

It is not known whether Holloway's work with X-rays (at a time when little was known of the danger involved, and protection was not considered necessary) may have contributed to his poor health and untimely death. It is almost certain that his love of life and especially his love of teaching kept him alive and capable of tremendous effort for so long.

Robert Holloway died on September 4, 1904, leaving behind him a successful school, highly rated for its level of scholarship and possessing traditions which had been largely developed in the institution through the interaction of students, board members and friends of the school with this one creative personality, "who left untouched scarcely any branch of scholarship, who touched no department of learning which he did not adorn."[128]

The development of science education at the Methodist College coincided with the building of the institution and reached its peak within the lifetime of the man who had believed so strongly in its importance in the educational process. At a meeting of the Board of Governors in 1907, a decision was made to place a portrait of Holloway in the College Hall. In 1929 the building where he had conducted many of his experiments was renamed in his honour. Prince of Wales College had been built in 1928, and the old College on Long's Hill now became known as Holloway School, a fitting memorial to Robert Edwards Holloway—teacher, scientist, humanist and popularizer of science in nineteenth century Newfoundland.

Notes

[1]*Minutes of the Proceedings of the Board of Directors of the Wesleyan Academy*, May 2, 1874.

[2]*Daily News*, January 18, 1861.

[3]*Evening Telegram*, January 17, 1882.

[4]L. Whiteway, "Newfoundland in 1867," *Dalhousie Review*, Vol. 46, No. 1, 41.

[5]*Ibid.*, 45.

[6]J. Hatton and M. Harvey. *Newfoundland: Its history, its present condition and its prospects for the future* (Boston: Doyle and Whittle, 1883.)

[7]*Journal of the House of Assembly*, 1845. Quoted in W.B. Hamilton, "Society and Schools in Newfoundland," *Canadian Education: A History* (Scarborough, Ontario, Prentice-Hall, 1971), 138.

[8]"The Story of the Wesleyan Academy 1860-86 and The Methodist College 1886-1900," *Collegian*, 1960, Centenary Edition, 67.

[9]T. Murphy, "Prominent Figures from our Recent Past: Robert E. Holloway," *Newfoundland Quarterly*, 84:1 (Summer, 1988), 17. Holloway was later to comment that it was Rev. George S. Milligan who "conducted the negotiation and correspondence that resulted in our becoming a Newfoundlander." *Collegian*, February, 1902, 29.

[10]*Collegian*, 1960, 71.

[11]*Barton on Humber in the 1850s* (Barton on Humber Branch, Workers' Education Association, 1984), 35-42. Pamphlet.

[12]*Collegian*, March, 1897, 54.

[13]The Schools Inquiry Commission presented the following arguments for the teaching of science in the schools: "It quickens and cultivates the faculty of observation...the power of accurate and rapid generalization and the mental habit of method and arrangement; it accustoms young people to trace the sequence of cause and effect; it familiarizes them with a kind of reasoning which interests them, and which they can quickly comprehend...." *Report of the Schools Inquiry Commission, 1864-1868*, Vol. I, 337, 435, quoted by D.M. Turner, *History of Science Teaching in England*. (London: Chapman and Hall, 1927), 89-90.

[14]D.M. Turner, *History of Science Teaching in England*, 77-82.

[15]Louise Whiteway, personal communication. Whiteway had been given this information by Holloway's daughter, Elsie. The date appears in the University of London Register, 1901.

[16]University of London Register, 1901.

[17]The references here are obscure, but probably allude to Holloway's teaching positions for the two years preceding his coming to Newfoundland. He reminisces about Northampton in the pages of the *Collegian*, and it has been established that in his second year he taught at a highly successful private school at Eastbourne under a progressive headmaster, Frederick Samuel Schreiner. Louise Whiteway (personal communication, 1971) cites as her authority for this information Holloway's daughter, Elsie.

[18]*Collegian*, May, 1898, 62.

[19]C. Bibby, *Scientist Extraordinary: The Life and Scientific Work of Thomas Henry Huxley, 1825-1895* (Oxford: Pergamon Press, 1971), 77. A section of this book, 157-182, includes short biographical notes relating to contemporaries of Huxley who are mentioned in the text. Among them are William Kitchen Parker and his two sons, T.J. and W.N. Parker.

[20]*Minutes of the Proceedings of the Board of Directors of the Wesleyan Academy*, July 18, 1867.

[21]*Collegian*, June, 1898, 82.

[22]D.M. Turner, *History of Science Teaching in England*, 42-43.

[23]For a detailed treatment and comparative study of science in the three colleges, see R.L.Gough, "An Historical Study of Science Education in Newfoundland." Unpublished doctoral dissertation, Boston University, 1972, Chapter Five. For statistical comparisons during this period see McCann, Note 24.

[24]P. McCann, *Schooling in a Fishing Society: Education and Economic Conditions in Newfoundland and Labrador 1836-1986*. (Memorial University of Newfoundland: Institute of Social and Economic Research, 1994). See Part II(C) for academic data as well as other information in tabular form on teaching staff, finances, and enrolment.

[25]*Minutes, Board of Directors Methodist Academy*, January 12, 1876.

[26]*Ibid.*, January 12, 1876.

[27]Report of the Public Schools of Newfoundland under Methodist Boards, 1877. *Journal of the House of Assembly*, 1878, 327.

[28]Report, Methodist Schools, 1878, *Journal of the House of Assembly*, 1879, 95-96.

[29]*Collegian*, May, 1898, 62.

[30]*Collegian*, December, 1898, 140-41.

[31]*Collegian*, January, 1899, 2.

[32]Report, Methodist Schools, 1877, *Journal of the House of Assembly*, 1878, 368-69.

[33]L. Whiteway, Personal communication, 1971. All of these subjects were taught when students needed them for the next stage of their education. However, L. Whiteway suggests that in some of the language courses it was a matter of the teacher's keeping a few pages ahead of the student in the prescribed textbook.

[34]A. Mews, "Reminiscences." Address at the United Church College, St. John's, December 16, 1930. *Collegian*, Easter, 1931, 12-13.

[35]*Ibid.*, 13.

[36]*Ibid.*

[37]*Ibid.*, 12.

[38]See *Collegian*, October 1898, January 1899, and May 1901.

[39]Report, Methodist Schools, 1881. *Journal of the House of Assembly*, 1882, 16.

[40]*Collegian*, November, 1901, 148.

[41]*Collegian;* January, February and March, 1897, provide information on one such series of chemistry lectures attended by fifty students. The series began with an introduction to the daily work of a laboratory and to the apparatus to be used for the various procedures, and covered these topics: Hydrogen, Analysis of an Ore, Iron, Copper, Oxygen. The last included a demonstration of limelight, electrolysis of water, and various oxidation experiments.

[42]Humphry Davy, president of the Royal Institution in the early nineteenth century, used two carbon electrodes and a powerful battery of 2,000 cells to make an electric arc of a clear white light which, many years later, was to become the carbon arc-light, a practical form of illuminant.

[43]Limelight was an intense white light obtained by heating a cylinder of lime in an oxy-hydrogen flame. The oxygen and hydrogen gases were obtained by electrolysis of water.

[44]The lecture on "Electric and Other Lights" drew much public attention, and was reported on in detail in the *Morning Chronicle*, March 4, 1879.

[45]*Collegian*, December, 1896, 98.

[46]*Ibid.*

[47]Louise Whiteway, Personal communication and notes on Holloway, 1970.

[48]Report, Methodist Schools, 1876. *Journal of the House of Assembly*, 1877, 618-19.

[49]*Minutes of the Board of Directors*, August, 1885. The Board recommended securing a vice-principal and second master to free the principal for management of the highest classes.

[50]The illness was tuberculosis, which was perhaps not diagnosed at this stage.

[51]Report, Methodist Schools, *Journal of the House of Assembly*, 1887, 20. 1886 was considered "a year of very great, perhaps unprecedented, success."

[52]Report, Methodist Schools, 1887, *Journal of the House of Assembly*, 1888, 21.

[53]Report, Methodist Schools, 1891, *Journal of the House of Assembly*, 1892, 11. The preceptress was Margaret Wilson, and the other teachers Annie Dove and S.A. March.

[54]Report, Methodist Schools, 1892, *Journal of the House of Assembly*, 1893, 3-4, 16-17.

[55]Report, Methodist Schools, 1892, *Journal of the House of Assembly*, 1893, 18.

[56]The advanced class in 1898 was responsible for setting up laboratories for the elementary classes. (*Collegian*, December, 1898, 153). Later, students were hired as demonstrators in science (*Collegian*, January 1899, 91).

[57]*Collegian*, February-March, 1896, 26.

[58]*Collegian*, January, 1896, 15.

[59]*Collegian*, November, 1896, 87.

[60]*Collegian*, November, 1900, 141.

[61]*Collegian*, January, 1901, 24.

[62]*Collegian*, June, 1900, 95.

[63]*Collegian*, May, 1896, 56.

[64]*Collegian*, March, 1901, 34. The investigation was followed up with this explanation: "They found (1) that it was a sulphate, (2) that it contained magnesium; therefore that it was, or largely consisted of, sulphate of magnesia (Epsom Salts). Its origin is rather difficult of explanation, but it results probably from the action of the sulphur dioxide of the town fires on the salts of magnesia contained in the sea-sand used in the mortar of the buildings. In a similar manner the lime which is used to whiten our fences and stables quickly becomes chalk by action of the carbon dioxide of the air on the lime hydrate."

[65]This last is reminiscent of a quotation which became identified with Dr. A.G. Hatcher, later President of Memorial University College, and professor of mathematics. The writer remembers his often-uttered statement, "Every lesson in mathematics must be a lesson in something else." He was one of Holloway's pupils, and the words may have originated there.

[66]*Collegian*, February, 1902, 33.

[67]E.J. Pratt, "Memories of Newfoundland," *The Book of Newfoundland*, Vol. 2, 56. This reminiscence of Pratt does not agree with Holloway's account in the *Collegian*. Both Blackall (*Feildian*, March, 1900, 88-89) and Holloway mention having been invited to the Colonial Building to see a demonstration of wireless telegraphy by Bowden, one of

Marconi's assistants. It may be that Pratt confused Marconi's visit to the school with seeing him at the Colonial Building. In any event the personal contact with Marconi is substantiated.

[68] *Ibid.*, 56.

[69] *Collegian*, 1962-63, 141-42.

[70] Report, Methodist Schools, 1882. *Journal of the House of Assembly*, 1883, 16.

[71] Report, Methodist Schools, 1879. *Journal of the House of Assembly*, 1880, 346. The matriculation examinations set by London University were held in high esteem because of the high standard of achievement required. They were used either for a school-leaving certificate or to prepare students planning to go on to university. In 1888 the requirements were a pass in Latin, another language other than English, English language and English history or geography, mathematics, mechanics and hydrostatics, and one of a number of branches of experimental sciences, such as chemistry or physics. Requirements changed from time to time. Botany was added from 1890-98 and by the end of the century chemistry or physics was required of all London University matriculants.

[72] *Collegian*, September-October, 1901, 113-14. The list of Methodist College London undergraduates is accompanied by the comment that the total is a greater number than had passed this examination from all other local institutions combined.

[73] *Minutes of Meeting of Council of Higher Education*, June 30, 1893.

[74] Report, Methodist Schools, 1893, *Journal of the House of Assembly*, 1894, 7-8.

[75] *Minutes of Meeting of Council of Higher Education*, February 5, 1894.

[76] *Ibid.*, June 30, 1893. Report completed November, 1894.

[77] *Supplement to the Royal Gazette*, November 26, 1895.

[78] *Collegian*, December, 1895, 1.

[79] Whereas science and mathematics were compulsory in the London Matriculation examinations, and a pass was required in every subject, candidates for the Associate examinations set by the Council of Higher Education could obtain a pass without writing papers in science and mathematics and by passing only four out of five of the examination papers.

[80] *Collegian*, September-October, 1901, 111.

[81] *Collegian*, May, 1898, 64.

[82] See also in the *Collegian*, May,1898, 65, an interesting passage in which Holloway rhapsodizes about what an educated girl should know. It ends in this way: "And we like the educated girl too to appreciate the fun of the great mathematician's tale of nightmare when he awoke from the horrible dream that he was a minus quantity under an even root,— and therefore *impossible*."

[83] *Collegian*, February, 1902, 14. For example, of the 29 London matriculants (a list corresponding as well to the names of Associates), five had become lawyers, two ministers, four doctors, thirteen teachers, while the rest were continuing their studies.

[84] *Collegian*, January, 1902, 5.

[85] *Methodist Monthly Greeting*, 12:8, August, 1900. See report of the Executive Board of Governors for the year ending June 30, 1900.

[86] *Methodist Monthly Greeting*, 12:8, August, 1900.

[87] *Collegian*, January, 1900, 10.

[88] *Collegian*, September-October,1900, 116. A list of students then attending universities in Canada and Britain included eight students at McGill (five in Medicine, three in Engineering); three at Victoria College in Toronto; one at Dalhousie and one at Edinburgh.

[89]*Collegian*, September-October, 1901, 115-18.

[90]Scientific progress in electricity was accelerated in the last decades of the nineteenth century when physicists such as William Crookes succeeded in partially evacuating glass tubes (known as "Crookes' tubes"), through which an electrical discharge could be passed from an induction coil. Wilhelm Roentgen's discovery of X-rays on November 8, 1895 was made when he covered the tube with black paper and observed that a paper screen covered with the fluorescent material barium platinocyanide became illuminated. Later he observed that not only black paper but other opaque objects such as the bones of his hand were also penetrated by these X-rays.

[91]There are frequent references to Boyle in the Old Pupils' Page of the *Collegian*. Holloway mentions his success during his first year at McGill in projection, a subject he had introduced at the College the previous year. He writes of letters received early in 1902, news of his "unprecedented" successes later that year; a visit from him on his return from McGill in June,1903, and more correspondence in the November 1903 issue—coincidentally the same issue in which Holloway records his testing of minerals for radioactivity and theorizes on the implications of the discovery for currently-held concepts of matter and energy.

[92]See David A. Keys, "Robert William Boyle: 1883-1955," *Proceedings of the Royal Society of Canada*, 1955, 63-67. See also "Carbonear Boy Gets High Honour," *Daily News*, St. John's, September 27, 1929.

[93]*Collegian*, March, 1907, 59.

[94]*Collegian*, January, 1900, 10.

[95]*Collegian*, January, 1902, 13.

[96]The adjective "phenological" was used in Holloway's correspondence with the Botanical Club of Canada to denote observations relating to the natural history of the island. Pupils were encouraged to gather data on the time of flowering and fruiting of wild plants, migratory patterns of birds, etc.

[97]*Daily News*, April 1, 1894 lists Rev. A.S. Waghorne and R.E. Holloway as members of the Botanical Club of Canada, as well as A.W.J. McNeily, Q.C. and Arthur White, one of Holloway's pupils.

[98]*Collegian*, March, 1899, 28.

[99]*Collegian*, December, 1895, 12.

[100]*Collegian*, December, 1896, 98.

[101]*Morning Chronicle*, January 22, 1878.

[102]*Collegian*, May, 1903, 106.

[103]*Evening Telegram*, January 21, 1881.

[104]*Collegian*, January, 1897, 6-8.

[105]*Collegian*, September-October, 1892, 160. See complete text of this lecture in *Collegian*, February, 1897, 25-27, and details of the accompanying experiments in *Collegian*, March, 1897, 52-53.

[106]*Collegian*, April 1896, 40.

[107]*Ibid.*

[108]*Collegian*, February 1897, 24.

[109]*Ibid.*, 25.

[110]Blackall, principal of Bishop Feild College, after attending a lecture on mineralogy given by Holloway at the Teachers' Convention in 1899, commented, "It was wonderful how simple he was able to make his subject appear, and even those who knew least of natural

science were able to follow the lecturer with interest." (*Feildian*, August-September, 1899, 136). Louise Whiteway noted a similar comment by her father, S.P. Whiteway, as he recalled Holloway's lecture on X-rays to the Newfoundland Teachers' Convention in 1898.

[111]For example, see reminiscences of E.J. Pratt in *The Book of Newfoundland*, Vol. 2, 56. Pratt recalls that "to see through an opaque object was a marvel like listening for the first time through a telephone or hearing the reproduction of a voice on a gramophone."

[112]*Collegian*, May, 1902, 102.

[113]*Collegian*, November, 1903, 190-91. See also accounts of this in the *Evening Herald*, September 23, 1903.

[114]*Evening Herald*, September 23, 1903.

[115]*Collegian*, November, 1903, 190.

[116]*Ibid.*, 195-196.

[117]*Ibid.*, 196.

[118]Four years after his arrival in Newfoundland Holloway married Henrietta Palfrey, on June 25, 1878. Two of their three children survived—daughter Elsie and a son Bert. In the pages of the *Collegian* there are interesting references to Bert as a boy at home, involved at one time with an experiment on light, and to Elsie and her success in the A.A. and London Matriculation examinations. Her skill as a photographer is the subject of another such reference. Holloway's wife and daughter are included in a photograph of a school picnic celebrating Richard Squires' winning of the Jubilee Scholarship.

[119]I am indebted to Tony Murphy and Anne Devlyn Fischer of the Provincial Archives of Newfoundland and Labrador (PANL) and to Bert Riggs of the Archives of Memorial University's Centre for Newfoundland Studies for information about and access to the collections of Holloway's photographs and negatives. Several displays of Holloway's photographs have been arranged from the Still and Moving Images Collection of the Provincial Archives. The "One Man's Images" exhibit consists exclusively of Holloway's photographs, and his photography is well represented in the "Views from the West" display, which is a collection of historic photographs of the west coast of Newfoundland. Both displays were curated by Tony Murphy of PANL. Bert Riggs directed my attention to the legacy of Holloway's photographs which has been preserved through the Historic Photographs Collection of Memorial University's Department of Geography, Vol. 1, 1987; Vol. 2, 1990; and Vol. 3, 1991, with text by Shirley and Maurice Scarlett.

[120]*Collegian*, December, 1902, 213-215. See Holloway's essay entitled "St. Paul's Inlet" in which he describes the changing panorama from Bay of Islands to Cow Head, focusing especially on the beauty of St. Paul's Inlet and expressing his desire to explore the area at closer range in the future.

[121]*Collegian*, December, 1902, 214.

[122]R.E. Holloway, *Through Newfoundland with the Camera* (St.John's: Dicks & Co. 1905), 22.

[123]*Collegian*, September-October, 1902, 143.

[124]*Collegian*, February, 1902, 29.

[125]*Collegian*, April, 1903.

[126]Report, Methodist Schools, 1903, *Journal of the House of Assembly*, 1904, 21.

[127]*Collegian*, November, December, 1903.

[128]L. Whiteway, "More About the Centennial Story," *Collegian*, 1962-63, 140. These words, which were engraved on Holloway's monument, are an adaptation of Dr. Johnson's epitaph for Oliver Goldsmith.