JAMES CRAIG WATSON (1838–1880)

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ABSTRACT

Canadians feel a bittersweet pride when young people leave to make their fame and fortune in the United States. The life of the eminent nineteenth century astronomer, J. C. Watson, is another example from history that our brightest and best emigrate when educational and career opportunities are lacking at home.

RÉSUMÉ

Les Canadiens ressentent une fierté douce-amère lorsque leurs jeunes gens se dirigent vers les États-Unis pour y faire gloire et fortune. La vie de l'astronome éminent du dix-neuvième siècle, J. C. Watson, offre un autre exemple historique de nos citoyens les plus doués qui émigrent lorsque les opportunités pour la poursuite d'études et de carrière ne sont pas disponibles chez nous.

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1. INTRODUCTION

At a gathering of Nobel laureates held in Toronto last year, Canada's prize-winning chemist, John Polanyi, said that we may not lose many, but we lose our best young scientists to the United States. It may be difficult to prove statistically, but history can provide many examples to illustrate his point. Astronomer James Craig Watson is one such case. Although he is not likely to be familiar to many astronomers today, his textbook *Theoretical Astronomy* may still be found in some university libraries, and the 22 asteroids he discovered visually are still listed in catalogues. Although he may seem unimportant now, 120 years ago Watson was a world-renowned astronomer, on a par with Simon Newcomb. Here is one bit of evidence for that claim: when plans were being made by the Lick trustees for an observatory to house the world's largest refractor, Watson was suggested as its first Director. Joseph Henry (1877), the dean of American science, wrote of him, "After Professor Newcomb, I know of no one in this country whom I can more freely recommend for the position in question."

That quote, which compares Newcomb and Watson, is likely to strike Canadians in a special way since both eminent astronomers were born in Canada. New-

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comb was born in Nova Scotia in 1835 and went to the United States when he was 19 years of age. Watson was born in southwestern Ontario in 1838 and moved to Michigan with his family when he was 12 years old. For both of them a lack of educational opportunities was an important consideration in the move to the United States. The fact that both families had roots in America may also have been a factor. During their careers the two men had few contacts with each other, though they both served on the Transit of Venus Committee of the National Academy of Sciences, and Newcomb was one of the executors or administrators of Watson's will (Osterbrock 1984).

2. HIS LIFE

James Craig Watson (figure 1) was born near Fingal, a few kilometres southwest of London in what was then Upper Canada, in 1838. His grandparents had been pioneers in the Talbot Settlement early in the 1800s, and the area had not advanced much beyond one of agrarian subsistence during the intervening years (Sims 1984). Opportunities were very limited for ordinary folk like James' parents and his two brothers and sister. James' special gifts became clear when he was quite young. At the age of nine he helped his father prepare rather intricate assessment rolls (Adams 1882). After elementary school there was no place in southwestern Ontario where James could continue his education, so the family moved to Ann Arbor, Michigan.

Once there James found little to keep him at high school, and financial necessity led him to seek work in various offices and a factory. In those occupations he developed business and trade skills which he found useful for the rest of his life. He studied Greek and Latin on his own initiative, and even tutored one of the Ann Arbor High School teachers in mathematics during 1851–52. Young James easily memorized long passages from the classics which he was able to recite, many years later, to the astonishment of his colleagues. In 1853, at the age of 15, he entered the University of Michigan, where he attained distinction as a student of ancient and modern languages as well as mathematics. When not engaged in studies he constructed his own refracting telescope, may have discovered a comet (in 1856), and read the entire *Mécanique Céleste* of Laplace (Winchell 1881), a feat which Newcomb (1903) admitted to attempting but not completing when he was a young man. Watson began to publish orbits and ephemerides for comets and minor planets before he received his Bachelor's degree in 1857.

It was fortunate for Watson that Franz Brünnow, former assistant to the famous German astronomer Encke, had come to the University of Michigan while Watson was half-way through his undergraduate education. That gave him an opportunity to learn astronomy from a real practitioner. Professor Brünnow — who, according to Curtis (1934), left Germany to escape the fate of having to marry

FIG. 1—James C. Watson. (Mary Lea Shane Archives of the Lick Observatory.)

Encke's daughter — took a special interest in Watson's development, and employed him as an assistant in the University observatory while James was studying for his Master's degree. His exceptional skill as an observer and marvellous rapidity at calculation were just what was needed for his work on comets and asteroids. Watson got his A.M. degree in 1859 and was immediately placed in charge of the observatory at the University of Michigan, while Brünnow spent a year at Dudley Observatory in Albany, New York, following a messy dispute between its Trustees and the Director, B. A. Gould. When Brünnow returned, Watson was assigned to the Chair of Physics at Michigan. During that

FIG. 2—The 1854 Observatory of the University of Michigan, Ann Arbor. The wooden dome still houses the 12–inch Fitz refractor, installed in 1857. The building and telescope are currently undergoing renovation.

period he showed an interest in popularizing astronomy, through lectures to general audiences in Detroit, Jackson, and Chicago, and even in his home town of Fingal (Watson 1859). His 363-page book *A Popular Treatise on Comets* was published in 1860.

James Watson was 22 years of age when he married a Michigan girl, Annette Waite. In addition to his university duties, he became a local agent for a Detroit insurance company, and undertook extra computational work previously carried out by Gould.

When Brünnow retired in 1863, Watson was made Professor of Astronomy and Director of the Observatory (figure 2), and he celebrated his promotion by discovering his first asteroid. He occupied those positions at the University of Michigan for 15 years, during which period he wrote dozens of papers as well as *Theoretical Astronomy*, an authoritative textbook which won him acclaim from many sources, including LeVerrier, the French astronomer famed for his role in the discovery of Neptune. In the course of routine meridian observations of stars with the transit telescope Watson discovered 22 asteroids, and for each of them he calculated orbital elements and ephemerides, in some cases including the perturbing effects of Jupiter and Saturn. Hundreds of pages of his calculations are

preserved, meticulously handwritten and carried through to seven decimal places. Those who knew what he was doing said he would leave out several steps from his written work, having done the intermediate steps mentally. It was also said that he would compute, from the observations, the elliptical elements of an orbit in one sitting (Curtis 1938).

A glimpse of his teaching load survives in a report of faculty activities for 1875–77. He taught five elective seniors and postgraduates theoretical astronomy one hour per day throughout the year, 25 junior engineers a six-week course in spherical astronomy, and 99 junior and sophomore engineers a seven-week course in descriptive astronomy.

Life was not all humdrum routine. Watson was a member of government eclipse expeditions to Iowa in 1869 and to Sicily in 1870, and was in charge of the government expedition to Wyoming in 1878. In 1874 he with his wife and brother embarked on a 15-month trip to China and around the world. The purpose was to observe the transit of Venus, which he was able to carry out with great skill. On the return trip, he spent several weeks in Egypt, helping to establish a geodetic survey of the country and making accurate measurements of the pyramids. For his trouble he was installed as Knight Commander of an honorific order in Egypt and Turkey. Among many other honours he received (and in some cases accepted during his travels) were election to the Royal Academy of Sciences in Italy, doctorates from the universities of Leipzig, Columbia and Yale, and the Lalande Prize from the Paris Academy. The latter was specifically for his discovery of six asteroids in one year.

During the period 1870–76 Watson kept a detailed diary, which is especially interesting in the light of his world tour. Perhaps he adopted the idea of maintaining a diary from Otto Klotz, who was a student at Michigan during the period 1870–72. Klotz became Canada's first government astronomer; the diaries he kept for most of his life continue to fascinate historians.

Watson's work as an insurance agent and his genius for calculations helped him to become an actuary for the Michigan Mutual Life Assurance Company and to publish interest tables, a task which demanded hundreds of hours of wearisome toil. He also took a financial interest in the Ann Arbor Printing and Publishing Company, and eventually became its President. The famous American Centenary Exposition in Philadelphia was held in 1876, and Watson was appointed as one of its judges. Part of his responsibility was the judging of clocks, watches, pianos and, most notably, an exhibit of a brand new device called the telephone. Some of the judging embroiled Watson in extensive controversy, but his defence of Alexander Graham Bell was the start of a lasting friendship between the two men.

With regard to Watson's astronomical work, it is necessary to give more than passing attention to his important role in the solar eclipse of 1878. Watson's main

interest in the eclipse was the opportunity it provided to search for planets closer to the Sun than Mercury. The theoretical basis for the search was a small unexplained component in the motion of Mercury, an effect which many thought could be explained by the gravitational pull of another planet inside Mercury's orbit. Of course, the "advance in the perihelion of Mercury" was ultimately accounted for after Einstein published his General Theory of Relativity in 1915. But, in 1878 the missing planet "Vulcan," so-named because of its supposed proximity to the Sun, seemed like the most promising explanation. A total solar eclipse provided an ideal opportunity to look for faint planets close to the Sun. In fact, Watson was convinced that he discovered two such planets during the solar eclipse of July 29, 1878 (Fontenrose 1973). Undoubtedly, Watson's demonstrated expertise in observing minor planets and in calculating their orbits lent credence to his claim. Admittedly there was scepticism, but his announcement did bring congratulations from some notable colleagues, including C. A. F. Peters in Germany and Tisserand in France. The success which he felt he had achieved led him to hope that he might some day confirm his finding by observing the Vulcans in transit across the solar disk.

He longed for better facilities to carry out the search, and, by good fortune, learned within months of the eclipse that the University of Wisconsin was planning to build a new observatory, the gift of Governor Washburn. James Watson was offered the directorship at an annual salary of $3000, which he accepted despite being tempted by another offer (at the immense salary of $18,000) to move to New York as an actuary for a leading insurance company. Science triumphed in this case, and Watson moved to Wisconsin. With characteristic energy he oversaw the construction of the observatory, the installation of the telescope, the construction of an underground solar observatory (Hargrave 1937), and the renovation of his residence. Evidently he did some of the manual labour himself, in addition to administrative work by day and observing by night, but it all proved too much even for a titan like Watson. At the age of 42 he suffered an attack of peritonitis, and died a week later on November 23, 1880.

His death at such a young age naturally deprived him of greater fame which one might expect would have been his due. The directorship of the Lick Observatory was certainly one of his ambitions. He wrote to Captain Floyd, the head of the Lick Trustees, on August 24, 1880: "Perhaps when the time comes I may enroll my name as one of the candidates for the Directorship. ... I am for the best scientific opportunity while I live" (Watson 1880). In hindsight, it seems an odd comment for someone who appeared to be in robust health and in the prime of life.

Watson's lasting legacy is his role in putting the University of Michigan on the astronomical map and in establishing a program where he taught such students as Otto Klotz, J. M. Schaeberle, and G. C. Comstock (Plotkin 1980). He also left to

the National Academy of Sciences over $18,000, with which the Academy established a fund to help finance a number of astronomical projects for at least fifty years after his death. The fund also ensured that Watson's asteroids continued to be well-observed and not lost (Leuschner 1910).

3. COMMENTARY

What can we learn by resurrecting the career of James Watson now, more than a hundred years after his death? On the one hand, the story of his life is one of hope and optimism. It suggests that those with great talent will find a way to overcome the odds of poverty and poor educational opportunities. On the other hand, one cannot help feeling disappointment that Canada could not provide openings for brilliant young people like Watson and Newcomb. Of course, Canada was not a nation at the time, but in moments of discouragement one sometimes wonders if we are not still exporting too much Canadian talent to the United States.

Comparing their two careers, one may wonder why Watson's name has not survived the rigorous test of history while that of Newcomb has. Certainly, Watson's life only spanned 42 years compared to Newcomb's 74. On the other hand, Watson tended to specialize in the more spectacular aspects of astronomy, those areas where he could achieve quick recognition, as in the discovery of minor planets, the revision of the astronomical unit through observations of the transit of Venus, and the search for Vulcan. Newcomb satisfied himself with a more cautious, synthetic approach to the grand problems of fundamental astronomy, the field still associated with his name.

Finally, I would like to make a small suggestion. Let us add Watsonia (#729), named in 1912, to the list of asteroids with a Canadian connection. Although we cannot be content with the lack of opportunity afforded Watson in our country, we should recognize his Canadian origins and remember why he did not remain here.

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References

Many obituaries and articles on Watson's life were published in newspapers, scientific periodicals, and biographical dictionaries. The most comprehensive is the one by Comstock cited below. An extensive collection containing Watson's diary, notebook, papers, correspondence, and photographs is in the University of Michigan Archives, Bentley Historical Library, Ann Arbor, and further articles, correspondence and photographs are in the Archives of the Department of Astronomy, University of Wisconsin, and in the Library of the Wisconsin Historical Society, Madison.

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