

The Soil and the Seed – Osler's Contributions to the Pathologic and Social Aspects
of Tuberculosis

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“The problem in tuberculosis is as much social as medical.”

-Sir William Osler (Nation, 1973)

Few physicians in history could be considered as irreplaceable in their position of a pillar of modern medicine quite like Sir William Osler. Known for his medical maxims, the words of which ring resoundingly true over a century later, Osler brought the practice and study of medicine straight to the bedside (Cowley, 2018). After becoming one of the founding fathers of Johns Hopkins Medical School, Osler instituted the first formalized residency training program, where his holistic approach was as patient-focused as it was scientifically informed (Molnar, 2018). Famously quotable, extensively well-read and well-written, with authoring contributions on over 1200 articles (Parfitt, 1942), Osler quickly became a leading figure whose words carried significant weight, a quality which would assist him in giving speeches, heading organizations, and advocating for the health of his patients. Osler’s writings are so apt, standing the test of time, that many observations have kept their relevancy despite over a century of medical and clinical discovery. Tuberculosis, or consumption as it was often called in those days, was a subject he frequently wrote about throughout his life, publishing over 50 articles on the topic (Knopf, 1920). The slings and arrows Osler would eventually use in the fight against tuberculosis came about by way of public health measures, taken to the battleground of national associations and public research. His words quoted above have never been so particularly poignant as in Canada today, where our Indigenous population faces a tuberculosis rate akin to

epidemic countries and TB remains a social disease despite all of our medical knowledge (Graham, 2010).

Osler's path in medicine, the path that would become entwined with a lifelong academic interest in tuberculosis, began while enrolled in medical studies at McGill University. Even in the dawn of his career in medical school, he was a precocious pathologist. One of his professors, R. Palmer Howard, commended his skill, praising the beautiful slides Osler had prepared for viewing (Nation, 1973). In 1874, following a two-year post-graduate study period in Europe, Osler returned to McGill to take a faculty position in the institute of medicine. Shortly thereafter, Osler was appointed Professor of the Institutes of Medicine, and in 1876, became the first pathologist at the Montreal General Hospital (Parfitt, 1942). While in this capacity, Osler produced the majority of his publications about the pathology of tuberculosis (Golden, 1987). His first work related to TB consisted of a series of 100 autopsies, 32 of which were cases of TB, with 23 of those being described in detail. Following this, he published a second report of 225 autopsies, this time detailing 6 cases specific to TB. In 1882, Robert Koch shook the medical community with the discovery of the tuberculosis bacilli, a feat which Osler duplicated a month later in front of his students to prove the presence of the bacteria in the lungs of a man who passed with tuberculosis. As his reputation was increasing, Osler was invited to take the position of professor of clinical medicine at the University of Pennsylvania, where he continued to perform autopsies and publish his findings, a large portion of which contained tuberculosis lesions (Becker, 2014). Throughout his time at both McGill and the University of Pennsylvania, Osler maintained a healthy academic interest in tuberculosis, an

interest that would eventually remove him from his position behind the microscope and into the domain of public health.

If Osler's pre-Hopkins achievements were realized in the laboratory and autopsy room, his subsequent work was accomplished through committees and stethoscope. Osler was invited to become one of the newly minted Johns Hopkins hospital's Chiefs of Medicine, a role which led him to contribute in the founding of Johns Hopkins's School of Medicine (Molnar, 2018). As one of the four founding fathers of the school, Osler's reputation vaulted beyond that of the renowned scholar and into medical legend. To further contribute to his growing eminence, Osler penned a clinical textbook, "The Principles and Practice of Medicine", written in the lucid yet poetic style which characterizes Osler's writings and speeches. In the pre-streptomycin era, treatments for tuberculosis were few and far between. For his textbook, Osler espoused the open-air treatment of TB as researched by Edward L. Trudeau's work (Bliss, 2002). A glimmer of Osler's future advocacy efforts showed forth even in the first iteration of his text, where Osler petitioned for municipalities to build open-air sanitariums for the "poor consumptive".

In another revolutionary move, Osler brought treatment straight to the homes of the needy by developing the Fund for the Special Study of Tuberculosis, financed with his own money (Bliss, 2002). Two medical students at Johns Hopkins were enlisted to visit the homes of consumptive patients, where they would educate on proper nutrition and provide care. Again at Johns Hopkins, Osler formed the Laennec Society, a group geared towards research in all things tuberculosis. To increase public interest and awareness in tuberculosis, the Maryland Tuberculosis Commission planned an exposition, a conference which would shed light on the current state of tuberculosis (Parfitt, 1942). Osler was a primary driving force in this exposition,

servicing on several important committees including the general commission itself, and giving a crucial address that packed the lecture hall. The Tuberculosis Exposition was a huge success, putting pressure on public officials. As a direct result of the exposition, events were put in motion that led to the formation of the National Association for the Study and Prevention of Tuberculosis, of which Osler was named lifelong vice-president (Nation, 1973).

The storm was gathering, an electric social-medical thunderhead, with Osler as the rider before. Greater public awareness, political pressure, scientific understanding and the importance of social factors was leading to a movement focused against TB. Following his momentous time in Baltimore, Osler was offered the position of Regius Professor of Medicine at the University of Oxford, where he would remain until his death (Parfitt, 1942). In moving to the UK, Osler brought his experience from the anti-tuberculosis campaign going on in North America. He spent time in Ireland, recognizing that the country was particularly socially disadvantaged during this period in time, which showed in increasing rates of tuberculosis. Osler brought the fight to Europe in the way that he knew how, through public addresses, publications, and associations. The National Association endorsed another exhibition, this time at Oxford and organized by Osler, where he gave an address entitled, "What the Public Can Do in the Fight Against Tuberculosis" (Nation, 1973). Once again, the exhibition was a success, resulting in the creation of a branch of the National Association at Oxford, of which Osler was made president. The war against tuberculosis continued for the rest of Osler's life, where he remained a leading public figure in the movement (Sarrel, 2000).

Although there are certainly aspects of Osler's view on tuberculosis that remain archaic, it is incredible that he was able to recognize how closely intertwined the disease

remained to that of the environment in which it originated, and to use that in advocating for a socially-based approach to treatment. It is important to remember that during his lifetime, before the discovery of streptomycin, any advantage that one could get in treatment of TB would be crucial. His writings often use warfare analogies, vivid descriptions that are meant to be incendiary to the reader, a call to arms. "To know the enemy in this case, to know that his strength lies in the homes of the poor, is more than half the battle." (Osler, 1903) In "The Home in its Relation to the Tuberculosis Problem", Osler outlines his battle plan for the treatment, a six step approach. Firstly, there should be an educational health campaign in the homes, administered by home care workers for the sufferers of TB. His second step is to have a compulsory notification system for affected individuals. Thirdly, Osler felt that the authority of major health boards in cities should be increased. Next, there should be a focus on the housing of the poor, so that overcrowding is more tightly regulated. In Osler's fifth step, ensuring proper sanitation of housing for new tenants is the onus of the landlord. Finally, unsanitary streets and blocks should be condemned and replaced by the city. Quite socially progressive for 1903, this battle plan has a focus on the living conditions that predispose populations to tuberculosis infection, astute observations that carry through even to this day.

For Osler, part of the answer to this, an important link in the chain, was open-air sanitarium treatment. He understood that the sanitarium wasn't a miracle cure, but it was more about improving the environment which created a perfect storm for the greatest risk of infection, that those in lower social classes have less access to proper nutrition and sanitation (Allbutt et al., 1911). It's amazing how simple and practical Osler's observations are, "To put all in healthy environments with good housing and proper food", so that despite the intervening

years of medical advancements, a disruption of these basic factors will still result in a TB epidemic much like the current one in Canadian Indigenous populations (Nation, 1973).

This social disease has been disproportionately targeting our Indigenous populations. Among Inuit populations, the rate of tuberculosis infections is 277 times higher than non-aboriginal Canadians, for the same reasons as recognized by Osler over a century ago (Bambury, 2017). Malnutrition runs rampant in food-insecure communities, where the price of healthy food is prohibitively high (Graham, 2010). Overcrowding and poor ventilation exacerbate the problem, as infected air circulates throughout the household and into susceptible lungs (Alvarez et al., 2014). Sanitation, poor access to health care, comorbidities that predispose to TB -- these are all factors contributing to the development of the high rates of infection seen, analogous to the "consumptive poor" Osler identified in his day (Kulmann et al., 2011). Effective treatments for tuberculosis exist in the present day and age, leading to a low incidence among non-aboriginal Canadians, but the socioeconomic determinants of health can outweigh our ability to treat this disease. Osler understood this, capturing the essence of the problem by saying TB is primarily a social disease and implying that the role of medicine takes a back seat when a population's environment propagates infection. "The care of the soil is as important as the care of the seed." (Osler, 1903). Osler is highlighting the fact that many in the population are exposed to tuberculosis, the seed, and that it is the soil, or the socioeconomic environment in which we live, that determines whether or not an infection has the opportunity to take hold. Once again, despite the medical knowledge accrued in the century since Osler's passing, the soil is the determining factor in the current Canadian TB incidence rates among indigenous populations.

Sir William Osler has been one of the most famous, accomplished, and influential physicians of all time, writing and publishing on many medical subjects, including a lifelong interest in tuberculosis. Initially in his career, Osler's perspective on TB was academic, publishing autopsy reports and describing cases. As the scientific community's knowledge of the disease grew, the mature Osler began to advocate for greater measures in the treatment of TB, leading to a greater public awareness and public health approach. From this vantage point, Osler was able to recognize the factors that contributed to TB infections, recognizing that this disease preys disproportionately on the poor due to malnutrition, overcrowding, and poor sanitation. His writings on the subject, characteristically Osler in their analogies and prose, have maintained their relevancy today. Those words echo with truth when considering the disadvantaged position of indigenous populations and their resulting higher rates of tuberculosis infection.

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