

Research Article

Syphilis: A Review of the Controversies on Its Origins and Research of Its Arrival in Quebec, Canada

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Introduction: The origins of syphilis, caused by *Treponema pallidum subsp. pallidum*, have long intrigued researchers and artists alike, resulting in significant scholarly focus in historical and contemporary contexts. This article revisits theories and examines the current literature on the emergence of syphilis in the Americas, particularly Quebec.

Methods: We performed a comprehensive search of online databases, such as PubMed, and historical archives, such as the Osler Library of History of Medicine at McGill University in Montreal, Canada.

Results: The prevalent hypothesis is that syphilis was present in the Americas before European contact. There are significant similarities between *T. pallidum subsp. pallidum* and the non-sexually transmitted *T. pallidum subsp. endemicum*, underscoring the evolutionary pathways of treponematoses. The theory is that yaws (*T. pallidum subsp. pertenue*) originated in Africa, spread throughout Asia, and underwent mutations as it moved across continents. As the bacteria reached North America, this spread and mutation likely resulted in bejel (*T. pallidum subsp. endemicum*). In turn, bejel may have mutated into syphilis.

Syphilis is propagated via the blood and can reach the bone. Typical periosteal reactions, which are characteristic of syphilis, may result from this.

Bone involvement, typically osteitis or periostitis, is common but not always clinically apparent. Such a bone reaction has been shown in 6%–14% of pre-Columbian skeletons found at different sites in the Americas. A well-documented epidemic resembling syphilis occurred in 1771 in Quebec.

Conclusions: Today, it seems likely that syphilis originated in the Americas. Evidence from pre-Columbian skeletons shows the presence of syphilis in the Americas. Syphilis probably developed as a mutation from other treponemes. The first historical evidence of syphilis in Quebec dates to 1773.

Introduction

Syphilis is caused by the bacterium *Treponema pallidum* subspecies (subsp.) *pallidum*, which belongs to a group of infections known as treponematoses. This group also includes yaws (*T. pallidum* subsp. *pertenue*), endemic syphilis (*T. pallidum* subsp. *endemicum*), and pinta (*T. carateum*) ^[1].

There was heightened interest in syphilis research during the early 19th and 20th centuries; the disease fascinated many artists and influenced daily living during many time periods. The hypothesis that syphilis originated in the “New World” before spreading to Europe through the sailors accompanying Columbus is supported by the absence of skeletal evidence of treponemal disease in pre-Columbian Europe ^[1].

In this study, we reviewed historical and contemporary literature on the origins of syphilis and analyzed past theories and current research findings. We also investigated documented instances of syphilis among Native Americans in what is now Quebec, an area colonized by European settlers from the early colonial period. Our research aimed to comprehensively understand the history of the disease and its spread in Canada.

Methods

We conducted a structured literature review for this study. We searched PubMed and Scopus for articles using combinations of the terms: “syphilis,” “*Treponema pallidum*,” “pre-Columbian,” “archaeology,” “Quebec,” “Canada,” and “history.” We also searched the Osler Library of the History of Medicine at McGill University for materials on syphilis in North America and Quebec. The reference lists of key papers and relevant review articles were hand-searched for additional citations.

The inclusion criteria were as follows: peer-reviewed original research, systematic reviews, and historical or archeological reports in English or French that addressed archeological, genetic, paleopathological, or historical evidence relevant to the origins or early presence of treponemal disease. The inclusion criteria were as follows: peer-reviewed original research, systematic reviews, and historical or archeological reports published between 1990 and 2024 in English or French that addressed archeological, genetic, paleopathological, or historical evidence. Seminal historical sources published prior to 1990 were included only if identified through archival research. We excluded clinical reports without historical or

archeological context, nonscholarly opinion pieces, and publications outside the date/language limits unless they were seminal historical sources identified in the library archives. Two authors (JSE, DT) independently screened titles and abstracts, retrieved full texts for potentially relevant items, and extracted data on study type, geographic and temporal setting, diagnostic criteria for treponemal disease, and the main findings. Disagreements were resolved through consensus.

Results and Discussion

The treponematoses

There are four different treponematoses: syphilis (*T. pallidum* subsp. *pallidum*), yaws (*T. pallidum* subsp. *pertenue*), endemic syphilis (*T. pallidum* subsp. *endemicum*), and pinta (*T. carateum*). Only syphilis (subsp. *pallidum*) is transmitted through sexual contact, whereas the other three diseases caused by *Treponema* are transmitted through close non-sexual contact ^[1]. The theory about the origins of syphilis is that treponematoses originated in Africa in the form of yaws and passed through Asia to North America, spinning off a mutation in the form of bejel, an endemic form of syphilis. Bejel has been found in bones in South America ^[2]. In North America, another mutation occurred that resulted in syphilis. This theory is supported by the fact that the typical osseous characteristics of syphilis are mostly absent in specimens from pre-Columbian Europe, Africa, and Asia ^[3]. Although these infections are caused by different subspecies, they are morphologically and antigenically indistinguishable and share more than 99.8% DNA sequence homology, indicating a shared ancestry in the evolutionary history of life ^[4]. Notably, *Treponema pallidum* subsp. *pallidum* shares many similarities and characteristics with *Treponema pallidum* subsp. *endemicum* compared to other treponematoses ^[1]. The similarities between *Treponema pallidum* subsp. *pallidum* and *T. pallidum* subsp. *endemicum* highlight the evolutionary pathways of this group of bacteria ^[4].

Studies have shown that the strains causing syphilis, yaws, and bejel share a common ancestry. Bejel (*Treponema pallidum* subsp. *endemicum*), a form of endemic syphilis, has been found in ancient bones dating back over 2,000 years in South America ^[2]. These findings suggest that yaws originating in Africa spread throughout Asia and underwent mutations as they moved across continents. As the bacteria reached North America, this spread and mutation likely resulted in bejel and eventually syphilis.

Genetic research on treponemal bacteria has provided further evidence for this ^[5]. Studies have shown that strains causing syphilis, yaws, and bejel share a common ancestry. Bejel (*Treponema pallidum* subsp.

endemicum), a form of endemic syphilis, has been found in ancient bones dating back over 2,000 years in South America [2]. Moreover, these findings suggest that yaws originating in Africa spread throughout Asia and underwent mutations as they moved across continents. As the bacteria reached North America, this spread and mutation likely resulted in bejel and, eventually, syphilis.

The bacterium responsible for syphilis, *Treponema pallidum*, was first identified in 1905 by Schaudinn and Hoffmann [6]. This discovery marked a significant milestone in understanding the causative agent of syphilis and facilitated subsequent research on its pathology and transmission. Identification is critical, as it shifts the focus from merely describing symptoms to understanding the underlying bacterial cause, enabling more targeted and effective treatment [6]. Penicillin was first used to treat syphilis in the early 1940s. This period marked the beginning of a new era in the treatment of infectious diseases, highlighting the potential of antibiotics to control and eradicate infections [7].

Evidence of treponematosi s in pre-Columbian Europe

There was no clear evidence of treponematosi s in Europe before Columbus traveled to the Americas in 1492. According to some authors, the absence of skeletal evidence of any treponemal disease in continental Europe before Columbus's time excluded it as the site of origin for syphilis [3].

Detection of osseous signs of syphilis in pre-Columbian remains

Osseous characteristics of syphilis have been identified in North American remains as old as 8,000 years, and its presence in the Caribbean at the time of Columbus's arrival is well documented [3]. One significant source of evidence comes from skeletal remains with signs of treponemal disease found at pre-Columbian sites. Lesions typical of syphilis have been identified in remains dating back as far as 8,000 years ago. These findings are particularly notable at sites such as Windover, Florida; Frontenac Island, New York; Libben, Ohio; Amaknak; and Alaska [3][8].

One must bear in mind that one of the problems of tracing syphilis is that the different manifestations of syphilis are not necessarily considered to be associated with a single disease. Skin eruptions can be caused by several diseases, and *Treponema pallidum* was identified as the causative agent of syphilis in 1905 [9]. However, a recent publication questioned the previous theory of the American continental origin of syphilis: *T. pallidum* was found in remains from the seventh or eighth century unearthed near Marseille in the south of France. This finding predates the detection of *Treponema pallidum* in Europe by over eight centuries [10].

Syphilis today

Primary syphilis is often associated with genital lesions, whereas secondary syphilis typically presents 3–8 weeks after the initial presentation and is often associated with a rash. Untreated women can infect their fetuses with congenital syphilis in utero ^[11].

In Canada, the rate of infectious syphilis increased from 5.1 per 100,000 population in 2011 to 24.7 per 100,000 in 2020. The increase was most pronounced in the Prairie provinces (Mid-to-West Canada) and higher in men, and is a growing concern in Canada ^[12]. Syphilis shows an increased prevalence in several Indigenous populations and other ethnicities, such as African Americans, Hispanics, American Indians, Alaska Natives, Hawaiian natives, and Pacific Islanders ^[13]. Presently, the rate of congenital syphilis infections among Native Americans (644.7 cases per 100,000 people in 2022) is comparable to the rate in the U.S. in 1941 (651.1 per 100,000), before penicillin was used ^[14]. Indigenous people seem to be particularly vulnerable to syphilis. In Western Australia, Indigenous people accounted for 90.6% of the reported syphilis cases in 2002 ^[15]. Analysis in the 1990s in a remote Indigenous community in Northern Australia showed that 41% had or had had syphilis ^[16].

The reasons for the increased rate in these more vulnerable populations are poverty and limited access to healthcare, which create significant barriers to prevention and treatment. High rates of physical and sexual victimization, along with inadequate health education, exacerbate this situation. The erosion of traditional coming-of-age teaching and frequent interruptions in medical care have also been identified as critical risk factors for adolescent depression. These elements collectively create an environment in which syphilis can spread more rapidly and remain untreated for extended periods, posing significant health risks to the affected populations ^[17]. In the 1930s and 1940s, the commonly called Tuskegee Syphilis Study withheld treatment for syphilis from African American patients, although penicillin was already available. This study illustrates that health systems can exploit minorities and contribute to mistrust in the health systems of these populations ^[18].

First signs of syphilis in Quebec, Canada

We hypothesized that if the theory was true that syphilis was present in North America before the arrival of the settlers, then we would find historical evidence of syphilis in Quebec in descriptions of First Nations.

Jacques Cartier was the first European to navigate the St. Lawrence River. He described that during his second voyage to Nouvelle France (1535–1536), one member of his team suffered from syphilis. Peter Kalm, a Swedish explorer and natural historian, was the first to describe, on his journey to New France in 1749, the presence of syphilis in the First Nations and French Canadians ^[19].

E. Gaumond, a dermatologist at the University of Laval in Quebec, researched the history of syphilis and documented contemporary cases. He described that in 1773, a mysterious illness appeared in the small village of Baie Saint-Paul, which had a population of 500 people. This small village is located close to the St. Lawrence River, approximately 100 km northeast of Quebec City. The disease quickly became an epidemic, spreading rapidly and reaching the western fringes of Lower Canada along both banks of the St. Lawrence River by 1785. The villagers, accustomed to periodic epidemics in Quebec, initially responded slowly to this new outbreak. The origin of this affliction remains unclear, prompting the development of speculative theories. Some unusual symptoms that appeared in people from this region until the beginning of the 20th century were attributed to this mysterious illness ^[20].

In conclusion, it is difficult to attribute the symptoms or clinical manifestations of syphilis to individuals without microbiological proof ^[3]. Syphilis is known to mimic many different diseases ^[21]. Scientists believe that syphilis was present in the New World at the time of Columbus's arrival. However, when an early edition (*eighth edition, 1915*) of Sir William Osler's textbook "*The Principles and Practice of Medicine*" was analyzed, there was no specific mention of syphilis in Quebec. Osler spent several years in Montreal, Quebec, and was exposed to patients with syphilis. This attests to the fact that syphilis was not as well documented in Canada as in Europe. We could not find any evidence of genetic analysis of treponemal disease in human remains from Canada. Our review shows that contemporary research should concentrate on the impact of diseases on vulnerable populations. We hope that our present work can change the perception of syphilis as a mostly eradicated, or at least well-contained, disease. Syphilis is an interesting illustration of the stigmata associated with and social impact of different diseases, especially the ones associated with sexual transmission. We must aim for the best education and healthcare to prevent the transmission of this very old but still current disease, which is an important health problem in First Nations and other high-risk populations. In our literature review, we could not find any arguments for the presence of syphilis in Quebec, Canada, before the arrival of the explorers.

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Conflicts of Interest

None.

Declaration of Generative AI and AI-assisted technologies in the writing process

The authors used “paperpal” to improve the language, grammar, and readability during the preparation of this work. After using this tool, the authors reviewed and edited the content as needed. We have taken full responsibility for the content of this manuscript.

Author Contributions

JSE and DT performed the literature review and drafted the manuscript, and ML and DL drafted the manuscript.

Data Availability

Data are available from the authors upon request.

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