

PALEOPATHOLOGICAL INTERPRETATION OF TREPANIMA PALLIDUM IN 18TH
CENTURY CRYPT ASSEMBLAGES FROM CHRIST CHURCH, ST. LUKE & ST. GEORGE,
LONDON

By

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Paleopathological Interpretation of *Trepanima Pallidum* in 18th Century Crypt Assemblages from Christ Church, St. Luke & St. George, London

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This paper covers both the osteological and paleopathological interpretation of three crypt assemblages from Christ Church, St Luke and St George London. Each of the three sites had varying numbers of individuals analyzed. St George's assemblage contained 111 individuals; St Luke's contained 896 while Christ Church's was made up of 968 individuals, statistical analysis was taken to understand the demographic and spatial distribution of *Trepanima Pallidum*. Rates at St George were higher than the remaining other two sites. This was due to the wealth of the parish and its proximity to Covent Garden. St Luke's rates were comparable if lower, due to their proximity to The Rookery and their economic status. Lastly, Christ Church's rates were the lowest, due to their distance from the city center and the strength of their family units.

I would like to acknowledge the aid given by Lawrence Owens in regards to his astute and sharp tongue in regards to anything dealing with bones. The aid given by Dr. Anderson and Dr. McAndrews and their tireless support of what sometimes seemed a futile thesis. Lastly, my parents for supporting me even when they didn't understand anything I've been working on during the last 4 years.

INTRODUCTION

The churches and crypts of St George in Bloomsbury, Christ Church Spitalfields and St Luke in Islington are excellent examples of the dynamic and class stratified London of the A.D. 18th and early A.D. 19th century. In 2000, and 2003, excavations by Oxford Archaeology were undertaken on St Luke and St George crypts respectively, in order to record and excavate a series of burials. Christ Church on the other hand was excavated in 1986 by the Council for British Archaeology. The presence of named individuals in the crypt allowed for extensive documentary research that confirmed that the burial populations were represented by the wealthy upper middle classes at Bloomsbury, the middle classes at St Luke and the lower and middle class at Christ Church. The dates of birth at these sites ranged from the late A.D. 17th century to the middle of the 19th century. The known age of skeletons have provided the basis for an analysis of pathology patterns among age groups, sex and geographical locations at each of the three churches' respective parish.

The location of these three churches creates a unique look into three churches from similar chronological and geographic backgrounds that have different economic backgrounds. The skeletal data is key to the parishioners that attended each church's services and chose to be interred within the churches' crypts.

The reconstruction of the social backgrounds of the named individuals from each church has shown us the professions, health, disease, social and economic status in relation to skeletal traits. By utilizing a detailed record of the skeletal assemblages and the known class, profession, age and sex we are able to compile a series of statistical prevalence graphs of syphilis and periostitis in hopes that we can track any correlates between the churches' parishioners and the

overall prevalence of pathologies. When examining the rates of specific pathologies at the three sites, a pattern arises. I intend to demonstrate through my research that the geographical location of these three churches in correlation to areas considered to be “beds of crime and vice”, directly affected their rates of both syphilis and periostitis. If the Oxford research showing that the rates at St George were higher because of its proximity to Covent Garden are true, then the rates at St Luke's should be higher than Christ Church which was further on the fringes of the metropolis and was not within the proximity of the Rookery. Secondly, what patterns exist in regards to levels of pathologies in correlation to age? Thirdly, what are the patterns seen in regards to prevalence of pathologies with regards to sex? We can learn from this research how prevalent syphilis was in the communities around these churches in the A.D. 18th and early A.D. 19th century London.

BACKGROUND

Hanoverian London

In A.D. 1711 the Commission for Fifty New Churches found that there was a need for an extensive construction plan to build new places of worship. This was to help alleviate the overcrowding at churches that had survived the Great Fire and the rapid population growth that was occurring in the early A.D. 18th century. This committee calculated that an additional seventy-two churches were needed; however the number was reduced to fifty, when financial problems arose. Three of the churches that were built as a result of this plan were Saint Luke:

Bloomsbury, Christ's Church: Spitalfields and Saint George, Bloomsbury (Boyle 2005).

Hanoverian London was unique among cities of its time. At the beginning of the 18th century the population of London was only second to that of Paris (Rude 1971). Within in the next fifty years London's population boomed and by A.D. 1801 the population of London exceeded that of Paris by one-third or more (Rude 1971). A consequence of the concentration of people living in London created a consumers' market that was able to exercise an immense amount of influence over the British economy and political systems (Rude 1971). Along with the city being a great center of population it was a giant, breathing and constantly growing city, with a shifting population from around Europe.

The great London merchants who had their offices, banks and warehouses at the center of this thriving city, became richer and more powerful throughout the A.D. 18th century. These merchants made up a powerful and growing class of 'middling' individuals. Nevertheless England was still an aristocratic society in which political and land authority was vested in a small number of families who controlled both Houses of Parliament (Rude 1971). The aristocratic control permeated culture and religious life and developed slowly into an indifferent and conformist sub-cultural group over the next 100 years (Rude 1971).

Hanoverian London was unique among great cities of the age, for the aristocratic families quite often lived in simple terrace houses throughout the city of London. By the middle of the century the fashionable quarters of London were becoming the residential areas for the 'middling' classes (Rude 1971). From the A.D. 1760s onward the middle-class individuals began to make their presence felt in the cultural centers of London such as Haymarket and Covent Garden. This burgeoning middle-class began to flex its democratic power and exercised its power in the government of the City. The middle-classes were enjoying rents and prices that

remained relatively stable while the cultural scene of London flourished (Rude 1971).

By the A.D. 1780s London had changed with the first major challenges to the aristocratic control of Parliament. Even with war, London was growing and evolving. London's economy flourished and the arts and sciences were growing every year. The war proved to be a successful muse for poets and writers. London's population grew to a million and for the first time, the increase was due to an excess of births over deaths (Rude 1971). The London square, which had been built for the aristocracy, was becoming increasingly filled with the commercial and 'middling' classes (Rude 1971). The city of London through a short span of a hundred years had evolved and become a center of middle-class families that would continue to flex their political and economic power through the next several hundred years.

Sites Under Consideration in this Study

Each of the three sites that I am looked at were excavated in order to protect the internments from future refurbishments and redevelopments of their respective crypts.

Spitalfields

The Spitalfields Project was a result of the need to clear the Crypt of Christ Church during a restoration program for the church. Over a thousand skeletons were removed, including nearly 400 with intact *depositum* plates, which gave information on the individual regarding their name, age and date of death. These individuals had their osteological data recorded in full, while the remainder fell into what was referred to as "the low resolution category" and were simply

evaluated in regards to their demographics. At this site, dates of birth ranged from A.D. 1646 to A.D. 1852, and dates of death from A.D. 1729 through A.D. 1852 (Molleson 1993).

Saint Luke's

The site of St Luke's Church, Islington, was excavated due to construction and refurbishment of the church. During the excavations a total of 1053 burials were removed and recorded. The skeletal sample contained 896 individuals that were divided into high and low resolution samples. The 241 individuals that had *depositum* plates and recorded demographics, were placed into the high resolution category and had their osteological data recorded in full. The unnamed individuals were utilized for their basic demographic information. A total of 712 coffins were recorded and removed for reburial (Boyle 2005).

St. George's Church

St. George's Church, Bloomsbury was excavated in order to clear the crypt for redevelopment. The major excavations that were undertaken consisted of the recording of 781 burials found in seven vaults, and their eventual removal and reburial. The coffins and their associated fittings were recorded in full, with over 86 percent of the names identified from *depositum* plate inscriptions. The researchers analyzed 111 of the skeletons, specifically from coffins where the identity of the individuals were known. As in the other two sites, in depth analysis of the named sample was carried out. In regards to the coffins with unknown identities, a lower level of analysis was conducted. The burials in the crypt were dated from A.D. 1804 to A.D. 1856 when

the crypt was sealed (Boston 2009).

Location

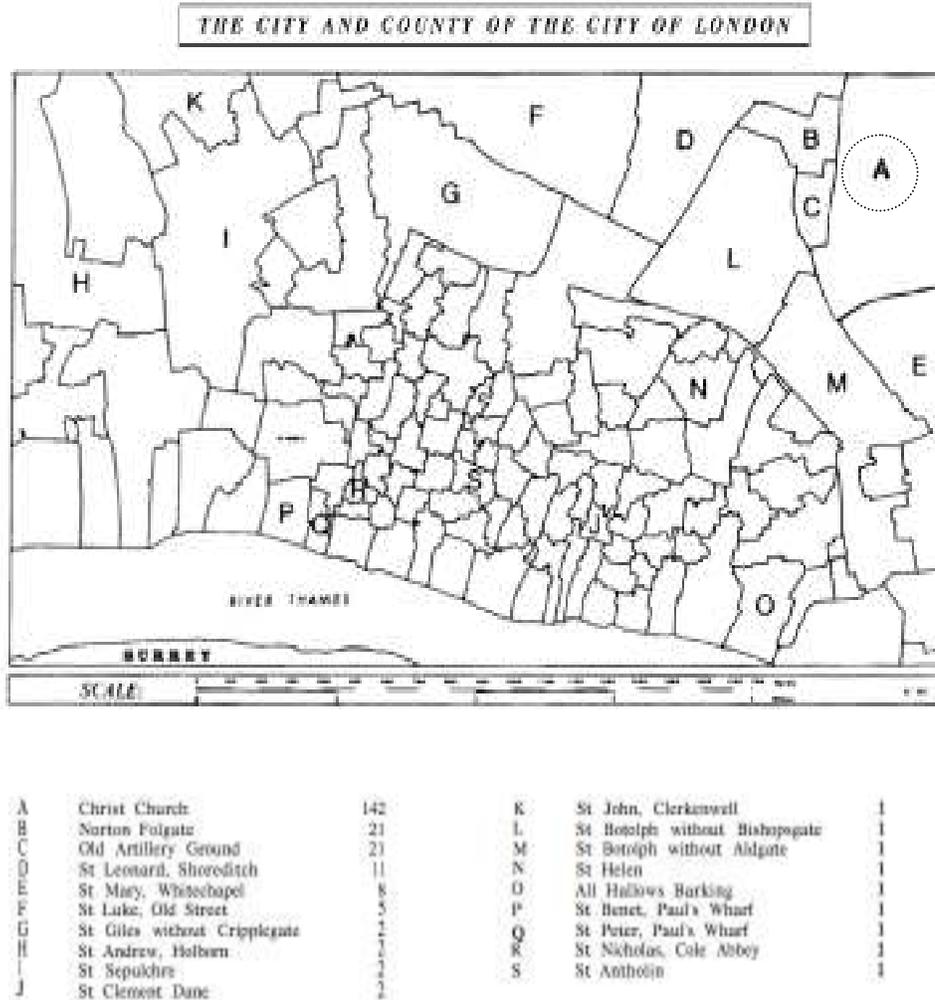


Figure 1.1. Plan of the parish boundaries of the City and County of London. Individual Churches are labeled by letters indicating their placement within the County (Molleson, 1993: 103).



A	Christ Church	142	S	Tottenham	1
B	St Matthew, Bethnal Green	48	T	St Pancras	1
C	St Dunstan, Stepney	24	U	St John, Hampstead	1
D	St Leonard, Shoreditch	11	V	St Marylebone	1
E	St John, Hackney	11	W	Twickenham	1
F	St Mary, Whitechapel	8	X	St George, Hanover Square	1
G	St Luke, Old Street	5	Y	Poplar	1
H	Edmonton	4	Z	St John, Clerkenwell	1
I	St George in the East	3	1	St Botolph without Aldgate	1
J	St Luke, Chelsea	3	2	St Sepulchre	1
K	St Mary, Stoke Newington	2			
L	St Clement Dane	2			
M	St Andrew, Holborn	2			
N	St George, Bloomsbury	1			
O	St James, Westminster	1			
P	St George the Martyr	1			
Q	St Martin in the Fields	1			
R	St John, Westminster	1			

Figure 2. Plan of the parish boundaries within the county of Middlesex. Insets are the smaller parishes that surround London. Letters and numbers indicate parishes in and around London (Molleson 1993: 103).

The three locations that were being examined fall in close proximity to each other. These locations can be seen in both Figure 1.1 and 2. St. Luke is located within the Borough of Islington, in the parish of St Giles without Cripplegate and is marked on Figure 1, as letter F and letter G on Figure 2 (Boyle 2005). St. George is located in the London Borough of Camden and

is bounded by streets on each side and is marked on Figure 2 as letter N. Lastly, Christ Church is located in the London Borough of Tower Hamlets on the eastern border and facing the City of London and is marked on Figure 1 and 2 as letter A.

Covent Garden

When examining the location of St George, it is important to note its proximity to the notorious red light district of the West End, which was centered on Covent Garden and Piccadilly. The *Harris's List of Covent Garden Ladies*, which was first produced in A.D. 1757, was a type of guide map for sexual tourists to navigate the Metropolis of London during the A.D. 18th and A.D. 19th century. The book gives insight into the sex trade at the time it was written and listed the names and locations of prostitutes throughout the area.

Rookery

The Parish of St Giles in the Fields, was not only the parish from which St George arose, but it contained the infamous slum known as the Rookery. Parishioners at the time of St George's creation objected so fiercely to traveling through this notorious district, they demanded a church be built somewhere else within the parish. The Rookery was located close to today's Tottenham Court road and was considered to be a center of crime and vice. This area was considered to be primarily the home of the destitute and the poor. This theme was immortalized in Hogarth's A.D. 1751 engraving of "Gin Lane" as seen in Figure 2.1 (Boston 2009). This area was less than a 10 minute walk from the Church of St Luke and the parishioners would have most likely either lived in this neighborhood or would have visited it for its night time revelries.



Figure 2.1. 'Gin Lane' by William Hogarth (Boston 2009: 67).

The Parishes

St Luke's parish was centered within the London watch making trade which had located its construction sector within the parish during the middle of the A.D. 18th century. The watch making artisans made up a large portion of the parish's population and by the end of the A.D. 18th century were estimated at around a thousand individuals. These members of the watch making trade along with working class individuals reflect both a lower class population and a

scattering of middleclass individuals (Boyle 2005). The actual parish was both sprawling and heavily populated, and by the A.D. 1840s was one of the most extensive and densely populated suburbs of London. Although the area around St Luke's may have been comprised of mainly working class individuals, they seem to not appear as deprived as the destitute working classes of other boroughs like Southwark (Boyle 2005).

The parish of Christ Church was created in A.D. 1782. This act was part of making the Hamlet of Spitalfields in the Parish of Saint Dunstan Stenbunheath, a distinct Parish. This was due to the growth in the area which caused overcrowding of the established Parish in the area (Molleson 1993). By the early to mid A.D. 18th century the Parish of Spitalfields had developed into a homogenous area of French immigrants and reflected the development of the silk industry in which the French were playing a key role (Molleson 1993).

By the A.D. 18th century, St George in Bloomsbury was comprised of the middle and upper classes. This area attracted many of the wealthier residents due to its location away from the industrial areas of the City and East End. The proximity of Courts of Law and centers of culture like the British Museum, led many to see this area as being desirable for comfort and luxury (Boston 2009).

Parishioners

The crypt assemblages of St Luke's seem to reflect both the middle to lower working classes. The area was considered a gracious suburb and was removed from the warehouses and slums of other boroughs like Southwark and had more in common with the West End. The working classes therefore seem to have benefited from the wealth that their wealthier merchants and

businessmen brought to the area (Boyle 2005).

The people who were buried in the crypt at Christ Church were men and women of substance with strong family ties and were mainly working as skilled craftsmen and in the professions (Molleson 1993).

The crypt population at St George's represented the wealthy professional classes in the parish of Bloomsbury. The crypt population seems to represent part of the elite of Bloomsbury society. It contains both lawyers, civil servants, army officers and wealthy merchants who were intent on improving their position in London society. (Boston 2009)

Demographics

The term 'demography' is utilized when attempting to scientifically express statistics of health and disease, which represent the condition of a population (Molleson 1993). In regards to the archaeological context, we attempt to utilize demographic information around age and sex. By utilizing data from an osteological analysis of the remains of the individuals recovered at the three sites we can gain information on demographics of the populations who utilized their respective crypts. As seen in Table 1, each site had slightly different age and sex distribution, but primarily fell along the same lines in regards to their respective data pools from their assemblages. The only significant difference was the usage of separate statistics from St Luke based on the unnamed and named samples.

Table 1: Comparative mortality rates within selected named burial assemblages and from the London Bills of Mortality (Boston 2009: 97).

<i>Assemblages</i>	<i>Mortality below the age of five years</i>	<i>Mortality below the age of 21 years</i>	<i>Survival > 70 years</i>
St George's crypt, Bloomsbury	11.35%	20.71%	24.23%
St Luke's Church, Islington	14%	22.8%	27.2%
St Brides, Fleet St	-	28%	-
Christ Church, Spitalfields	19.2%	23%	21.8%
London Bills of Mortality	40%	50%	6%

At St Luke, the unnamed individuals ranged from fetal to over 70 years in age. The assemblage was mainly composed of adults with only 102 skeletons being aged below 18 years of age (Boyle 2005: 132). In the named sample, there were 241 individuals comprised primarily of adults, with a gradual rise of mortality of adults over time. Out of this assemblage 162 individuals lived beyond 40 years (Boyle 2005: 187). When examining the sex distribution there was found to be 270 males and 244 females. There is a notable slight predominance of males over females (Boyle 2005: 132). Among those individuals for whom names were available, 98 percent of the overall sample were adults with 11 percent having lived beyond 40 years of age (Boyle 2005:187). Also, in the named sample, there were a slightly higher proportion of males over females, which was similar to the unnamed sample.

At Christ Church, the age and sex distribution of the total sample of skeletons from the assemblage shows a similar distribution to the other sites, with ages ranging from fetal to 99. As in the assemblages from St. Luke and St George, the prominent age categories fell between infants and <50 years of age (Molleson 1993: 209). The distribution of males was slightly more than females, where 354 males were identified and 345 females were identified from burials with

known sex (Molleson 1993: 98).

At St George, the ages of the entire crypt population at St. George's ranged from newborn to 99 years. As at Christ Church, researchers combined the two assemblages together for their demographics (Boston 2009: 95). The distribution of males was slightly less than females, where 317 males were identified and 328 females were identified from burials with known sex (Boston 2009: 98).

Analysis of Demographics

The demographics for these three sites reflect similar living conditions. There was a rapid decrease in the number of deaths after each sample's first year after birth. This is most likely due to these children living in areas of new urban development (Boston 2009). These three sites have a marked difference from the London Bills of Mortality. The mortality figures for the first 20 years of life are lower than the wider London population and the longevity of these three churches' parishioners surviving past 70 years of age. These figures show the highly stratified society that was late Georgian England, for these three churches had a dramatically different environmental and socio-economic factors playing into their overall health (Boston 2009: 97).

Crypts

The crypt of St. Luke's contains four west-east aligned barrel vaulted bays. Within those crypts there were 21 vaults containing 72 burials, 56 of which were named individuals. Within the larger central area of the crypt, there were a large number of coffins of many different families.

Unlike the churches of St George and Christ Church, many of the burials at St Luke were found in churchyard vaults and brick-lined shaft graves. St. Luke's Churchyard contained a high number of extramural vaults and brick-lined shaft graves with multiple individuals (Boyle 2005).

At Christ Church, the excavations were confined to the western half of the crypt since the eastern half had been previously cleared of burials. The crypt was divided into two distinct parts, an upper level of small vaults, and a lower level with a similar arrangement (Molleson 1993). Both St. Luke's and Christ Church's crypts were divided into small family vaults, usually containing between one to ten coffins (Boston 2009).

St George's crypt was comprised of a long, vaulted north to south room, with smaller vaults on the side. An issue at St George was that a number of interments could not be tracked by the parish burial records as they did not distinguish between those buried in the crypt and those interred in the burial ground. This was unlike the records at St Luke and Christ Church (Boston 2009).

Depositum Plates

Depositum plates were riveted onto the exterior, upper surface of upholstered coffins. These breastplates contained inscriptions giving the title, name, age and date of death of the deceased as can be seen in Figure 3. At several of the three sites, additional information was given, which may include their place of birth, residence, their profession and relationships to other family members (Boyle 2005).



Figure 3: Depositum plate showing name, age and date of death of the deceased (Molleson 1993: 21).

Systematic Recording

For each of the sites, a single context recording system was thought to be inappropriate. Each interment was assigned a unique number from a continuous sequence, and the same number was assigned to the coffin and any associated fittings.

Skeletal Pathology

When the skeletal remains of the individuals exhumed from the three sites were examined, a wide range of pathologies were observed in among both the named and unnamed individuals; most of these were age related. These pathologies fall into broad categories of: congenital disorders, joint disease, trauma, infectious disease, neoplastic disease and metabolic disorders.

For the present research, I have chosen to focus on examining the distribution of specific pathologies in the categories of both infectious disease and congenital disorder categories.

Infectious diseases

It is important to point out that in most of human skeletal remains recovered from the archaeological record, the specific bacteria responsible for any particular bone infections expressed through the presence of a skeletal pathology usually cannot be identified and is typically considered to be a 'non-specific' infection (White 2000). With bacterial bone infections, the bone tissue responds to infection by conducting both resorption and proliferation. When examining the morphological responses of bone, the term periostitis is utilized in order to describe the osteological conditions and to identify specific diseases. Periostitis is a symptom in a disease syndrome such as syphilis but is also common in many other diseases (White 2000).

Periostitis involves primarily the outer bone, without serious involvement of the marrow cavity. It may be acute or chronic and occurs any time that the inner surface of the periosteum reacts to invasion by forming bone that sleeves the underlying cortical bone (White 2000). As the infection penetrates deeper into the compact bone, it causes further osteoclastic activity, creating a thickening and distortion of the bone. This process is known as osteitis. If the infection penetrates the marrow cavity, resorption begins and causes pitting and thinning of the cortical bone, while at the same time enlarging the marrow cavity and causing intense fusiform bone hypertrophy on the diaphysis of long bones. These lesions are involved in an increase in the diameter of the cortex and may be a solid mass of new bone or may be layers of dense bone with intermediate spongy layers between (Ortner 2003).

For this study, I am choosing to focus upon the important infectious disease venereal syphilis which was considered the most serious and dreaded of sexual diseases from the time it was encountered in the western world in the A.D. 15th century. With its initial contact, it spread rapidly across Europe (Boyle 2005). By the time of the medieval period, the contagion had become a serious and widespread health concern. Medical practitioners attempted to prevent the contagion utilizing early forms of condoms, mercury and guaiacum, all which were generally unsuccessful (Boyle 2005).

The medical definition of venereal syphilis is that it is a sexually transmitted infection caused by the bacterium *Trepanima pallidum*, and is one of the treponematoses, or a group of diseases that includes yaws, pinta and endemic syphilis, all of which may be fatal (Ortner 2003). The actual contagion is spread by sexual contact or congenitally from mother to her fetus.

Venereal syphilis acquired during adulthood has three primary stages separated by latent stages of no visible symptoms (Ortner 2003). In the first stage, or primary syphilis, small painless ulcers appear on genitals a few weeks after initial infection. During the secondary stage, the individual will see widespread lesions on the skin and in internal organs. The tertiary stage develops in one-third of the untreated cases and only following a latent phase that can range in length from one to more than twenty years (Boyle 2005: 177). The tertiary stage, or last stage, causes the most systemic damage, with the bacterium progressively destroying the systems of the body including skin, bones, heart and blood vessels and the nervous system (Ortner 2003).

When looking at periosteal bone formations in the osteological record, it is important to look for the bone lesions of the tertiary period of venereal syphilis. These syphilitic bone lesions usually develop between two and ten years after the infection, but it is important to point out that they may occur earlier or significantly later. Usually more than one bone is affected and

involvement tends to be bilateral (Ortner 2003: 279). Any bone may be the location of a syphilitic lesion, but several areas are more likely: the tibia, the bones surrounding the nasal cavity and the cranial vault (Ortner 2003: 279). These three areas represent roughly 70 percent of all tertiary syphilitic bone lesions with the other 30 percent of cases seen in the cancellous bone, and other long bones (Ortner 2003: 279).

The syphilitic lesions in the skeletal record may be separated into nongummatous and gummatous osteoperiostitis. The nongummatous lesions are comprised of extensive periosteal thickening in combination with cortical thickening leaving the bone thick and heavy (Ortner 2003: 286). Gummatous osteoperiostitis is seen as a tumor-like enlargement of the affected bone area. The dry bone is covered in hypervascular periosteal bone that builds up and surrounds the defects, extending into the cortex, this reaction corresponds to the location of a destructive gumma (Ortner 2003: 286).

Congenital syphilis is the transmission of syphilis to the unborn child of a mother who is suffering from venereal syphilis who may or may not present obvious symptoms. The bacteria are transmitted 2-3 weeks in utero and often caused spontaneous abortions and stillbirth. The surviving infants frequently have developmental issues including deafness, cusp malformations of dentition, periostitis, osteochondritis and osteomyelitis and cognitive development. (Boyle 2005). Often these children develop an infection of the scalp which historically was described as 'scald head', and was considered an early and obvious manifestation of congenital syphilis (Boyle 2005).

The London Bills of Mortality attribute between one and thirty deaths per year to 'scald head' during the Hanoverian period. However, the true mortality rate was most likely higher when looking at congenital syphilis even though many sufferers of congenital syphilis survived

into mature adulthood (Boyle 2005).

METHODOLOGY: HUMAN BONE ASSEMBLAGES

This study intends to demonstrate that the rates of occurrence of the infectious diseases syphilis and periostitis in eighteenth century London populations were the result of proximity to areas of the city associated with the “sex trade.” Further, these same diseases occur differentially based on the age and sex of the individual. In order to examine whether a correlation exists between disease occurrence and spatial proximity to sources of prostitution it was necessary to select data from burial sites located in both close and distant proximity to such locations. As previously mentioned, the burial crypts from St. George, St. Luke and Christ Church were chosen. From the data available for each of the sites, a sample of individuals was selected based on the presence of diagnostic evidence of periostitis and syphilis. All individuals with these identifiable pathologies were included in the sample. Further analysis was facilitated by compiling the data from the three sites into Microsoft Excel. Once compiled, the data was used to identify and examine correlations in demographics of individuals with the selected pathologies in order to address the questions of correlation of the diseases with age and sex of the deceased.

Osteological Methodology

Two different types of recording were utilized at all three of the sites, Low-resolution and High-resolution. Skeletons that were not able to be identified by name, age and or sex were submitted to low-resolution recording. This system was comprised of a skeletal and dental inventory, age

and sex assessment, gross pathological observations, and uniform metrical recording for observations on stature and sex. The researches goal was to create information to reconstruct the demography of the assemblages. When referring to the Unnamed Samples, the skeletons placed in the low-resolution category are found there. Next, the individuals whose names were recorded on depositum plates were recorded with more detail. The individuals were submitted to skeletal and dental inventories, analysis of the skeletal preservation and completeness, age and sex estimation, metrical recordings, descriptions of pathology and differential diagnosis, and eventually formed the Named Sample (Boston 2009: 4).

DISCUSSION

The investigation into the occurrence and distribution of syphilis and periostitis began with an examination for patterns in the overall occurrence of the diseases throughout the entire burial sample. The data as seen in Figure 4 and Table 2 shows several things.

Table 2. Individual cases of periostitis, congenital and venereal syphilis by age from entire sample.

Age	Periostitis	Congenital Syphilis	Venereal Syphilis
0-11m		0	4
>5		0	2
6-11y		1	
12-17y		1	1
18-25y		6	3
26-40y		6	2
40+		8	

<u>Age</u>	<u>Periostitis</u>	<u>Congenital Syphilis</u>	<u>Venereal Syphilis</u>
50+		19	2
18-50y		1	
NA		59	2

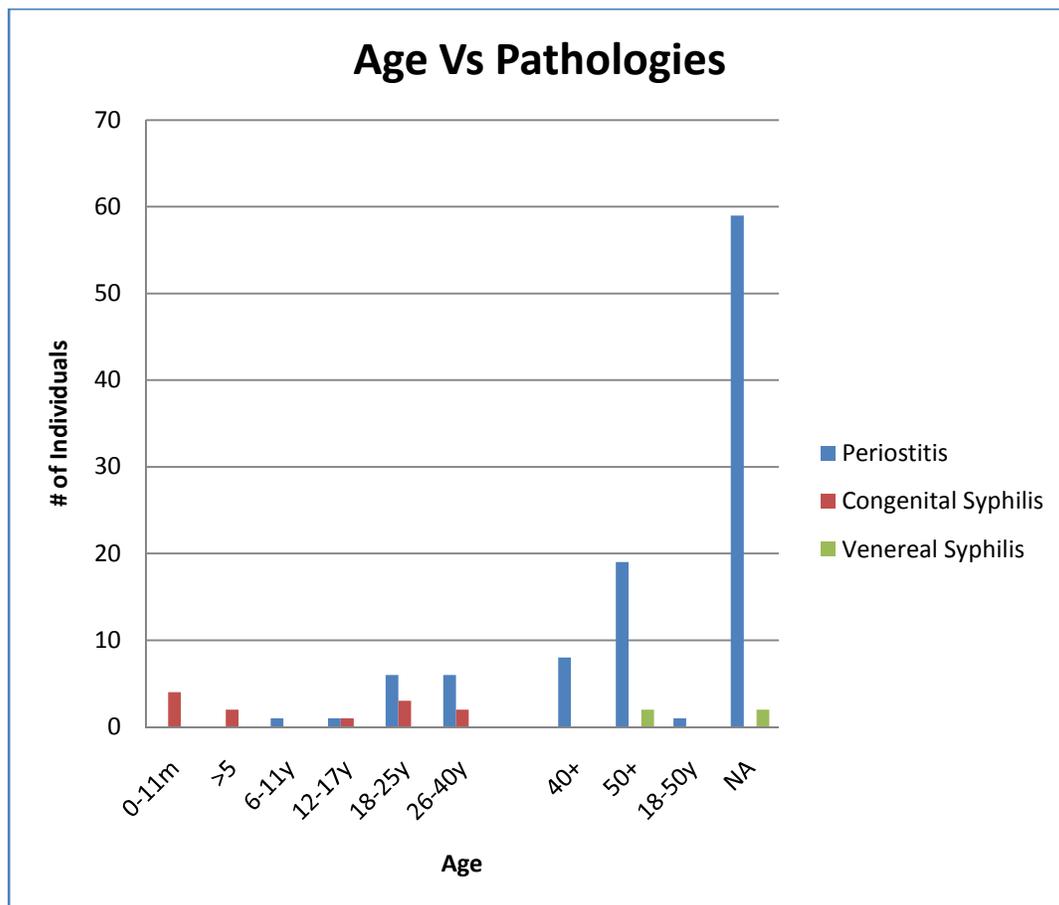


Figure 4. Age distribution of the three main pathologies from entire sample.

First, it demonstrates that the rates of periostitis increase with the age of the individual at death across all samples from the three burial populations with a peak occurrence in those individuals of 50+ years. This is most likely due to the fact that non-specific infections or periostitis may be caused by trauma or age specific infections that are causing infections of the bone. Second, the data shows that congenital syphilis is found among the 0<11 month age range followed by a

substantial decrease until a gradual occurs from age 12 year until age 40. This pattern of high occurrence among infants most likely reflects higher rates of child mortality due to the birth defects caused by congenital syphilis. The increase around age 12 likely represents individuals who were born with the disease, but survived into their teens and adulthood. Thirdly, the data shows that the individuals found in the osteological record who had venereal syphilis are clustered in the 50+ year range. This most likely points to individuals in adulthood contracting the disease at a later stage in life or may reflect the overall health of the individuals. Specifically if the individuals had not moved into the tertiary phase of the disease or may be a representation of the latent stages of the infection which may have lasted for more than 20 years of the individual's lives.

In Figure 5 and Table 3, we see the distribution of specific diseases in correlation to their location at their respective sites. This graph shows the overall percentage of individuals from each site's respective sample population.

Table 3. Percentages of individuals from each site's entire crypt population with periostitis, congenital and venereal syphilis by age and specific location.

Age	St Luke Periostitis	St George Periostitis	St Luke Congenital	St George Venereal	Christ Church Venereal	St George Congenital
0-11m			0.4%			
>5			0.2%			
6-11y			0.1%			
12-17y	0.1%		0.1%			
18-25y	0.6%					0.9%
26-40y			0.2%			
40+	0.8%	0.9%				

Age	St Luke Periostitis	St George Periostitis	St Luke Congenital	St George Venereal	Christ Church Venereal	St George Congenital
50+	2%	0.9%		2%		
18-50y	0.1%					
NA	0.3%	24%			0.2%	

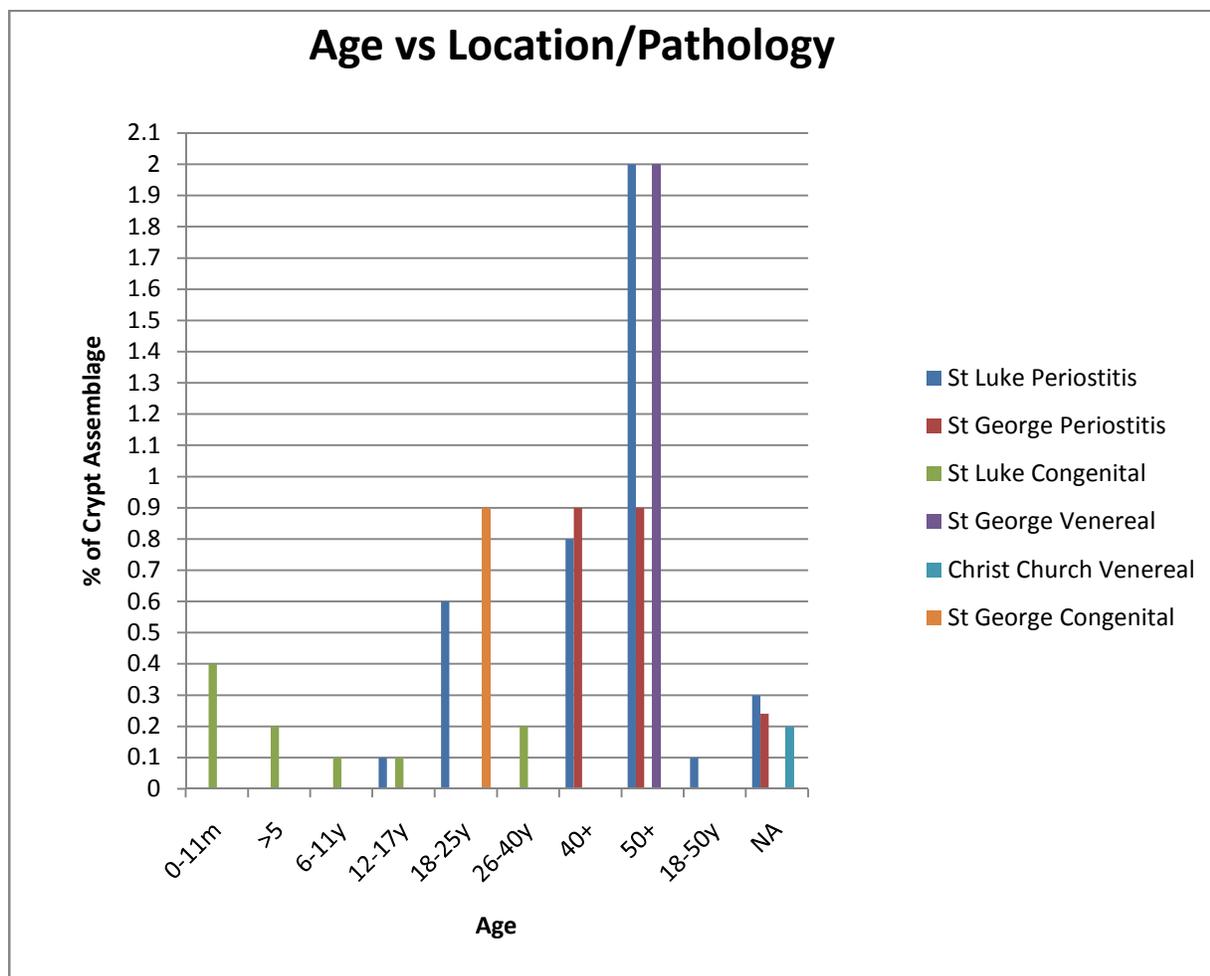


Figure 5. Distribution of pathologies in ratio of individuals from entire burial assemblages by age in relation to their location.

When examining the overall percentages from each population, it appears as if these are small percentages are reflective of an overall population. But, these prevalence rates are comparable to

other assemblages throughout London (Boston 2009). The graph shows the same general trends as the complete population graph. It shows elevated numbers of periostitis and venereal syphilis at St George in the 40+-50+ year ranges. St Luke's elevated numbers of periostitis reflect the trend at St George, without any confirmed cases of venereal syphilis. If any of the cases of periostitis could be confirmed in further research to be venereal syphilis, it would not be unexpected. Specifically we can infer that mothers were passing on the infection to their children as shown by the distribution of congenital syphilis.

In order to discover what the patterns seen in regards to prevalence of pathologies in regards to sex, it is necessary to examine the presence of the diseases under consideration with the sex of the individuals. Specifically, this focused on identifying the rates of women with either periostitis or venereal syphilis. Figure 6 and Table 4, shows the distribution of rates of periostitis, venereal syphilis and congenital syphilis in correlation to their location among men and women.

Table 4. Percentages of cases of disease broken into categories by sex from total populations.

	St Luke Periosti tis	St George Periostitis	St Luke Congenital Syphilis	St George Congenital Syphilis	St George Venereal Syphilis	Christ Church Venereal Syphilis
Male	6%	14%	1%		1%	2%
Female	2%	12%	0.3%			0.2%
Total	8%	26%	1.3%		1%	2%

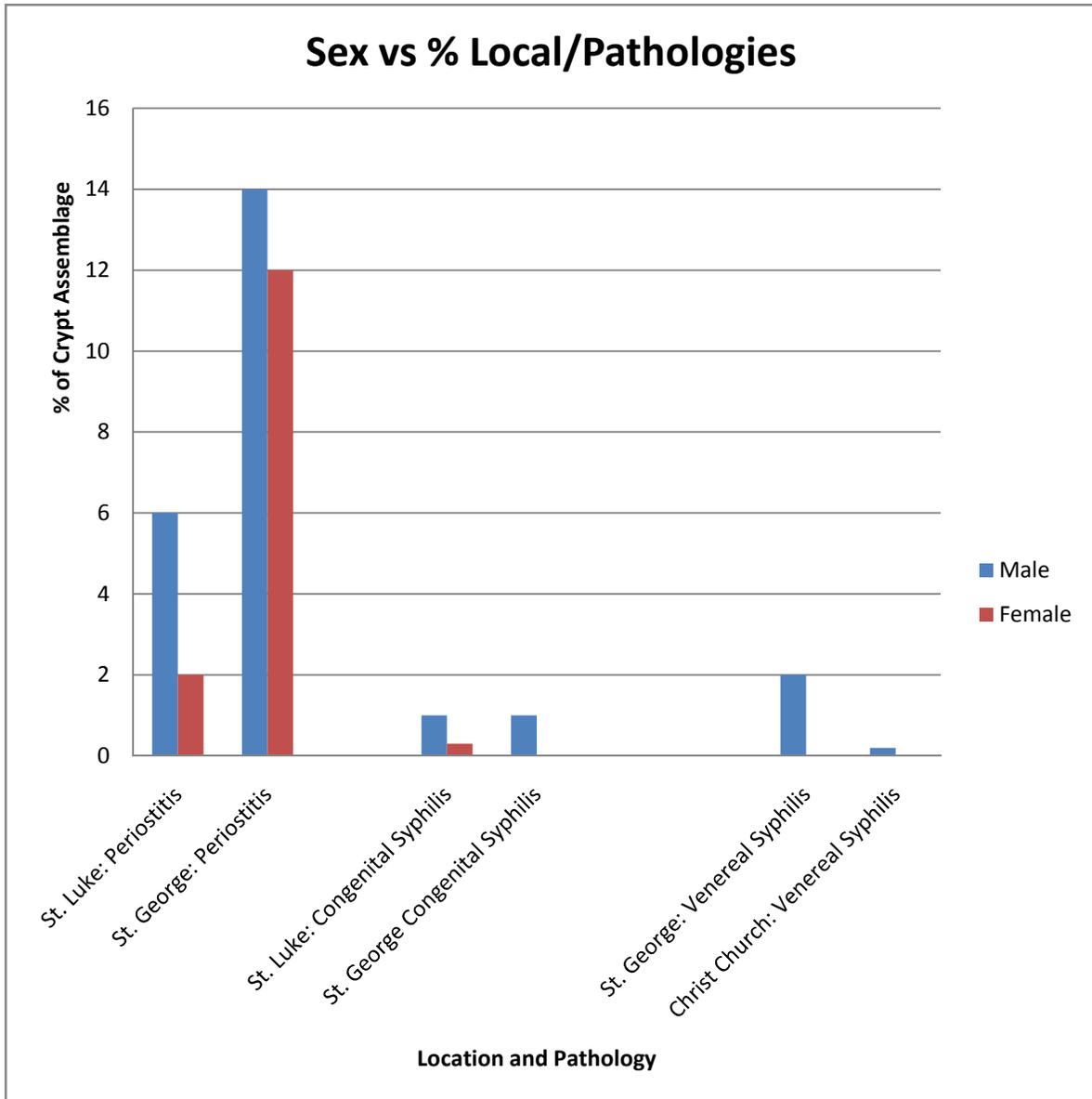


Figure 6. Percentage of pathologies from its relative site's sample in correlation to their sex.

Where we see elevated levels of periostitis we also see elevated levels of congenital syphilis.

This trend is reflected by the levels in which men and women are found to be positive for either periostitis or venereal syphilis. The primary difference in the data is the heightened levels of venereal syphilis are primarily from men. At both St George and at Christ Church four

confirmed cases of venereal syphilis were found, and all four cases were men. An interesting issue is the fact that Christ Church had neither any confirmed cases of periostitis nor congenital syphilis, which leads me to believe that either the parish that surrounded Christ Church had intensely strong family units or the osteologists missed indications of the disease on individuals among the crypt's assemblage.

The distribution of pathologies with regards to sex at each site, can be seen in Figure 7 and Table 5. These figures depict the percentages from each sample in regards to the three primary pathologies. When these pathologies were examined an interesting graph appeared.

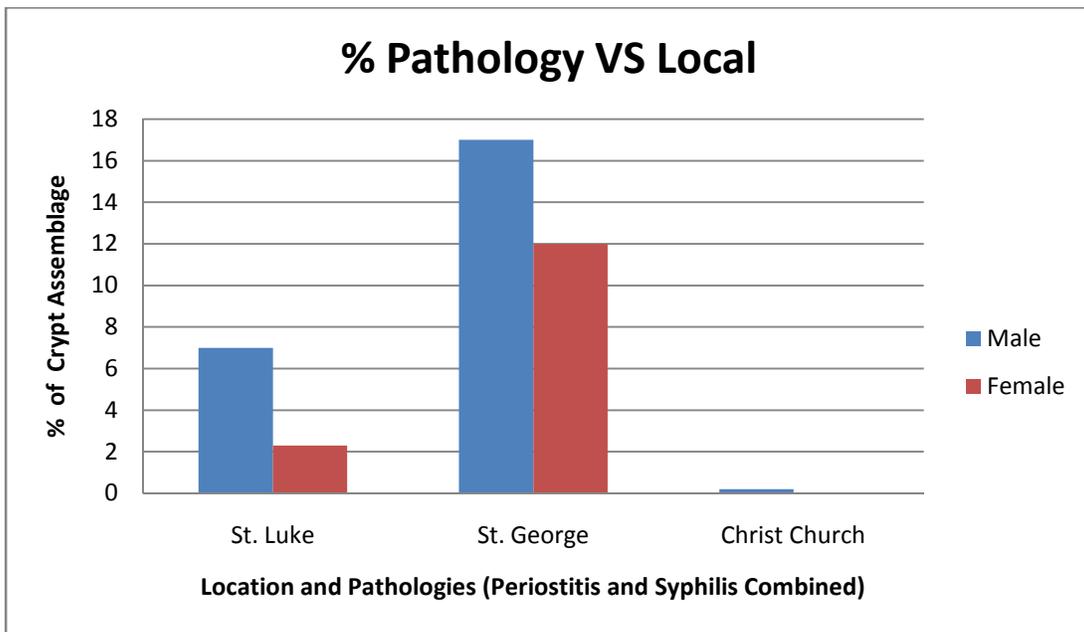


Figure 7. Distribution of total pathologies from their respective sample percentages in relation to their sex.

Table 5. Percentage of individuals from entire crypt assemblage with either periostitis, congenital or venereal syphilis with respect to their sex.

	St. Luke	St. George	Christ Church	
Male		7%	17%	0.2%
Female		2.3%	12%	

The graph showed similar distributions between St Luke and St George, while Christ Church was an outlier, showing a significantly different distribution of pathologies. This is because Christ Church only had 2 cases of venereal syphilis with 0 cases of periostitis or congenital syphilis. St Luke had lower ratios of all three when compared to St George but St Luke did reflect a similar distribution. This leads me to believe that although economically different, hence the lower prevalence of pathologies, St Luke reflects heightened levels of individuals contracting venereal syphilis.

CONCLUSION

These datasets point to a correlation between the geographical location of the churches and their proximity to areas of vice. The high number of syphilitic and periostitis cases at St George with its close proximity to Covent Garden point to a correlate. If these individuals were spending a disproportionate amount of money, which is possible since the majority of these individuals were considered wealthy in comparison to the other two churches examined, it may explain the inordinately high number of infected cases per sample size. The number of cases at St Lukes, in

combination to its proximity to the Rookery, also support a similar conclusion. This middling class of individuals, who were primarily craftsmen and laborers, were most likely living within an area that had a thriving community of taverns and prostitutes. This area at the time was already seen as an area of vice and crime specifically in regards to its gin intake. If the theory of St George's proximity to an area of vice holds true, then a similar conceptualization is appropriate at St Luke. As a sample, Christ Church seems to be a constant in regards to the variables examined. It was located farther from the bustling metropolis and slums that were situated in the heart of London. The distance and overall quiet of the area seems to have prevented or reduced the occurrence of syphilis and periostitis in individuals from the parish as seen in the skeletal assemblage. These specific locations can be seen in Figure 8, their locations are denoted by blue icons. Each church's respective parishes are outline around their specific locations.

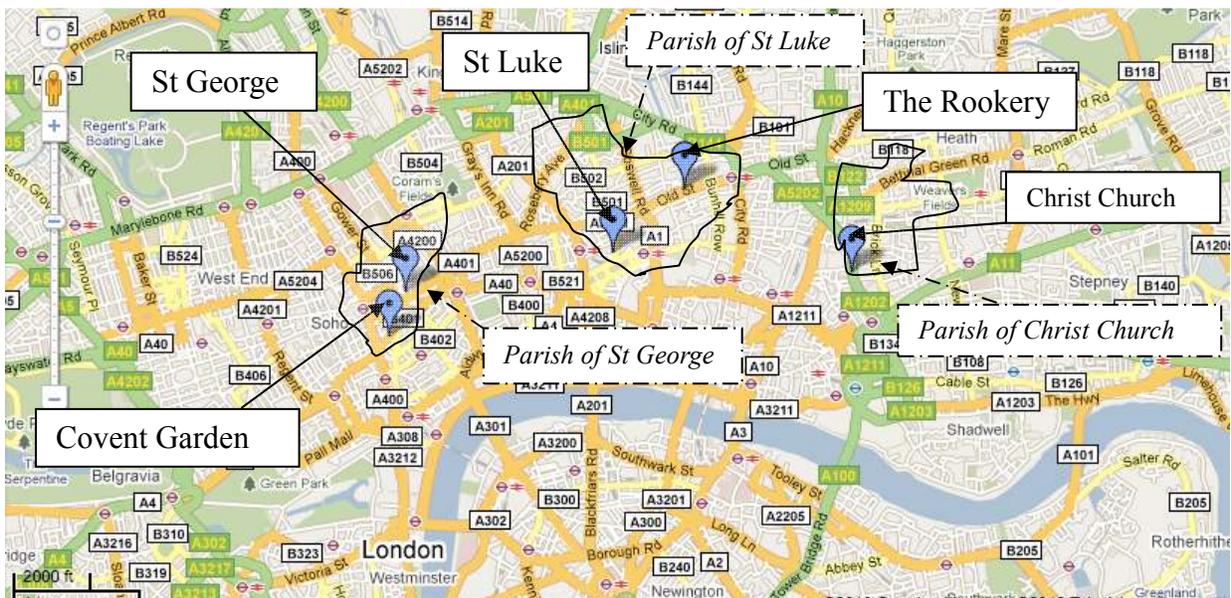


Figure 8. Google Map showing the relative locations of Christ Church, St Luke, St George, The Rookery, & Covent Garden within the City of London and their respective parishes.

Further Research

There were several problems that arose during the research. First, is that there really is no standard format for skeletal reports. Each site used a similar format but tended to regard non-specific infections differently. There seemed to be assigned characteristics from infectious disease or nutritional disease. I think it would be helpful if the researchers reported the rate of bones affected versus the bones present instead of just prevalence rates for non-specific infections by internment. If researchers can narrow down: age ranges of affected skeletons, level of severity, the location, if there is healing present, levels of nutrition, age and sex, further research can hopefully narrow down what type of infection it is.

The chances that some of the periostitis cases I counted were in actuality trauma, or another infectious disease or a reflection of metabolic disease is likely. If the issues stated above were covered more thoroughly in my research reports, I believe I would be able to narrow down the sample size and see if it is truly a representative sample of this geographically and chronologically similar population. It is also important to examine whether or not the family unite, and whether the strength of that family unite was a deterrent for the contraction of syphilis. If that is true what variables, such as class and location were tied into the family unit? If more data is collected on this biosocial issue, we might be able to create a better picture of what variables were affecting contraction and passing of a specific contagion.

APPENDIX

OSTEOLOGICAL DATA SET FROM ST. LUKE, ST. GEORGE AND CHRIST CHURCH

age	sex	pathology	location	ldtag	Name
0-11m	NA	CS	L	954	
0-11m	NA	CS	L	997	
0-11m	NA	CS	L	997	James MacCallum
0-11m	NA	CS	L	1072	Edna Coleman
>5y	NA	CS	L	608	
>5y	NA	CS	L	1024	
6-11y	NA	CS	L	783	
12-17y	M	CS	L	363	Keith Stewart
12-17y	F	P	L	1169	Emily Porter
18-25	M	CS	L	1258	William Clarke
18-25	M	CS	G	6071	
18-25y	F	CS	L	1258	
18-25y	F	P	L	970	Matilda Gibson
18-25y	M	P	L	495	William Wood
18-25y	M	P	L	538	Thos Giles
18-25y	M	P	L	859	James Lumley
18-25y	M	P	L	1142	Charles Frederick
18-50y	F	P	L	862	Elizabeth Baillie
26-40y	M	CS	L	975	
26-40y	M	CS	L	975	NA
26-40y	F	P	L	821	Sarah Cheswell
26-40y	F	P	L	1170	Mary Porter
26-40y	M	P	L	977	George Nightingale
26-40y	M	P	L	1065	William Bukridge
26-40y	M	P	L	1078	Thomas Robers
26-40y	M	P	L	1146	Thomas Lan
40+	F	P	L	851	Elizabeth Maxwell
40+	F	P	L	1145	Mary Lan
40+	F	P	L	1156	Elizabeth Farmer
40+	M	P	L	343	Charles Stokes

age	sex	pathology	location	ldtag	Name
40+	M	P	L	622	Cole
40+	M	P	L	628	Thomas Moore
40+	M	P	L	961	Edward Keat
40+	M	P	G	3044	
50+	F	P	L	477	Ann Turner
50+	F	P	L	603	Mary Deer
50+	F	P	L	626	Sophia Louch
50+	F	P	L	856	Margaret Lovell
50+	F	P	L	895	Hannah Hickin
50+	F	P	L	920	Sarah Fuller
50+	F	P	L	934	Catherine Allan
50+	F	P	L	1009	Mary Clark
50+	M	P	L	281	Noah Nicholls
50+	M	P	L	522	Laurance Sidney
50+	M	P	L	539	James Jones
50+	M	P	L	621	Thomas Cole
50+	M	P	L	629	Thos Coventry
50+	M	P	L	657	Cuthbert Wilkinson
50+	M	P	L	708	John Horton
50+	M	P	L	936	James Allan
50+	M	P	L	986	George Walford
50+	M	P	L	1071	Andrew Duff
50+	M	P	G	4061	
50+	M	VS	G	3085	Robert Thompson
50+	M	VS	G	4069	Edwin Barton
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	F	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		

age	sex	pathology	location	ldtag	Name
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	M	P	G		
NA	NA	P	L		191
NA	NA	P	L		209
NA	NA	P	L		217
NA	NA	P	L		234
NA	NA	P	L		245
NA	NA	P	L		269
NA	NA	P	L		275
NA	NA	P	L		278
NA	NA	P	L		280
NA	NA	P	L		313
NA	NA	P	L		314
NA	NA	P	L		319
NA	NA	P	L		330
NA	NA	P	L		374
NA	NA	P	L		455
NA	NA	P	L		482
NA	NA	P	L		519
NA	NA	P	L		527
NA	NA	P	L		588
NA	NA	P	L		589
NA	NA	P	L		595
NA	NA	P	L		652
NA	NA	P	L		663
NA	NA	P	L		667
NA	NA	P	L		667
NA	NA	P	L		700
NA	NA	P	L		744
NA	NA	P	L		811
NA	NA	P	L		866
NA	NA	P	L		892
NA	NA	P	L		958
NA	NA	P	L		1299

age	sex	pathology	location	ldtag	Name
NA	M	VS	C	2052	
NA	M	VS	C	2186	

BIBLIOGRAPHY

Boston, Ceridwen

2009 *'In the vaults beneath' Archaeological recording at St George's Church, Bloomsbury*. Information Press, Eynsham.

Boyle, Angela

2005 *The Archaeological Experience at St Luke's Church, Old Street, Islington*. Oxford Archaeology Report. Submitted to ABL Cultural Consulting Limited. Copies available from Oxford Archaeology, Oxford.

Buikstra, Jane

2006 *Bioarchaeology: The Contextual Analysis of Human Remains*. Academic Press, San Diego.

Clifford, James

1968 *Man Versus Society in Eighteenth-Century Britain*, Cambridge University Press, Cambridge.

Cowie, L.W.

1967 *Hanoverian England*. Humanities Press, New York.

Cox, Margaret

2000 *Human Osteology in Archaeology and Forensic Science*. Greenwich Medical Media, London.

Fritz, Paul

1973 *City & Society in the 18th Century*. Hakkert, Toronto.

Margetson, Stella

1971 *Regency London*. Praeger Publishers, New York.

Marshall, Dorothy

1956 *English People in the Eighteenth Century*. Spottiswoode, Ballantyne and CO LTD, London.

Molleson, Theya

1993 *The Spitalfields Project. Volume 2: The Anthropology- The Middling Sort*. CBA Research Report. Submitted to Council For British Archaeology, No 86. Copies available from the Archaeology Data Service, York.

- Plum, J.H.
1980 *Georgian Delights*. Little, Brown and Company, Boston.
- Ortner, Donald
2003 *Identification of Pathological Conditions in Human Skeletal Remains*. Academic Press, San Diego.
- Rubenhold, Hallie
2005 *“The Covent Garden Ladies’ Pimp General Jack & The Extraordinary Story Of Harris’s List*. Tempus Publishing Ltd, Gloucestershire.
- Rubenhold, Hallie
2005 *‘Harris’s List of Covent-Garden Ladies’ Sex in the City in Georgian Britain*. Tempus Publishing Ltd, Gloucestershire.
- Rude, George
1971 *Hanoverian London*. University of California Press, Berkely.
- Sofaer, Joanna
2006 *The Body as Material Culture*. Cambridge University Press, New York.
- Spencer Larsen, Clark
2000 *Skeletons in Our Closet*, Princeton University Press, Princeton and Oxford.
- Waldron, Tony
2009 *Paleopathology*. Cambridge University Press, New York.
- White, Tim
2000 *Human Osteolog*. Academic Press, San Diego.