

Sassafras in the New World and The Syphilis Exchange

Written By Fred L. Willard

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Dr. Angela Thompson

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The Syphilis Exchange

Syphilis and its rapid blazing spread through the Old World in the late 15th century is controversial, riddled with claims and counter-claims of how, when, and where it originated. Three theories of thought have been proffered and all have enough convincing evidence not to be discarded.

The Columbian Theory has gained the most credible following theme of its origin, and places the sexually-transmitted *Treponemia pallidum*---the spirochete that causes venereal syphilis---with the Arwak Indians of Espanola. It was reported in the *Relation of Fray Ramon Concerning the Antiquities of the Indians*, that “they had shared their hands with the illness as far back as their memory would go”¹. The Italian physicians Niccolo Leonicensi and Niccolo Massa were the defenders of this theory².

Many accounts place the illness, dubbed “The French Pox”, on the sailors that came back from the New World with Columbus³. However, another theory, **the Unitarian Theory**, postulates that the organism which causes treponematoses mutated into several forms, and became a sexually-transmitted venereal disease only after being transported from Africa into colder climates⁴. Supporting the above summary is that the three treponemal organisms (all spirochetes) most widely reported **cannot be differentiated** under a microscope⁵. In addition, if an immunity to one form of the microorganism is attained, the immunity also applies to the other manifested treponemal forms, including *pallidum*.

The Pre-Columbian Hypothesis states that treponemal disease, which includes syphilis, existed before 1492---in the old world---but was confused diagnostically with other illnesses, particularly leprosy⁶.

An alternant theory is that syphilis is the same spirochete bacteria pathogen as expressed as yaws, pinta and bejel, and slightly mutates as temperature vectors change⁷. The spirochetes are structurally the most complex of bacteria.

The new syphilitic malady was new and no known cure was at hand. The illness staged into periods of latency, and then aggression of symptoms, causing many to believe they had found a cure with a remedy they were experimenting with. A decoction of guaiacum (boiling in water 5 parts of guaiacum to 100 parts of water, making a medicinal broth) caused the patient to perspire freely⁸. Historians completely miss how world health events were just as important as invading armies, and that the biological element (specifically the transference of spirochete-bearing body fluids) shaped global propagation⁹.

The 16th century produced two 'remedies' that became popular (and also desperate): mercury and guaiacum. Mercury was a successful cure---but only if it did not kill the victim itself (see addenda, p. 12, for picture). It became the standard treatment for the illness, but it is still unclear if it really did cure, as syphilis sometimes cleared up on its own spontaneously, and of course went into periods of dormancy. Regardless, the use of mercury continued into the 20th century¹⁰. Guaiacum (*Ligma vita*, or Ironwood) did not prove to be an effective cure, but the importation (and profits) from it and sassafras, and other

wood product cures, lasted for fifty years¹¹.

The Columbus Exchange



The chief importers in Europe were from the greatest banking family of Europe if not the world, the Fuggers of Augburg, who attained great riches from the New World commodity¹². Fifty years before Thomas Harriot, Sir Walter Raleigh and his investors became interested in sassafras as a cure for syphilis, and made large investments in procuring it (which included the Lost Colony). Raleigh's marketing tool for his New World adventures was Thomas Harriot, and he studied the past use of sassafras and was aware of the earlier Spanish discovery of it.

Raleigh and his investors profited from the export/import of the sassafras with voyages between 1590 and 1603¹³. Harriot referred to a secret commodity in a secret location which could only be sassafras¹⁴. According to Harriot:

“Sassafras, called by the inhabitants Winauk, a kind of wood of most pleasant and sweet smell; and of most rare virtues in physic for the cure of many diseases. It is found by experience to be far better and of more uses than the wood which is called *Guaiacum*, or *Lignum vita*. For the description, the manner of using and the manifold virtues thereof, I refer you to the book of Monardes, translated and entitled in English, *The Joyful News from the West Indies*.”¹⁵

As proffered above, an early account of the benefits of sassafras was documented by Nicolás (sic Nikolas) Monardes between 1565 and 1574. His most significant and well-known work was *Historia medicinal de las cosas que se traen de nuestras Indias Occidentales*, published in three parts under varying titles (in 1565, 1569, and completed in 1574; unchanged reprint in 1580). This was translated into Latin by Charles de l'Écluse and into English by John Frampton with the title “Joyfull News out of the New Found World” (see addenda, p. 13, for title page)¹⁶.



Nicolas Monardes at the age of 57

Nicolás Bautista Monardes (1493 – 10 October 1588) was a Spanish physician and botanist. The genus *Monarda* was named for him. Monardes published several books of varying importance. In *Diálogo llamado pharmacodilosia* (1536), he examines humanism and suggests studying several classical authors, principally Pedanius Dioscorides. He discusses the importance of Greek and Arab medicine in *De Secunda Vena in pleuriti Inter Grecos et Arabes Concordia* (1539). *De Rosa et partibus eius* (1540) is about roses and citrus fruits¹⁷.

Monardes claims he was given the sassafras roots from a French man who found out about it from the Indians in Florida:

“The Spaniards dug up the root and cut it into very thin pieces and cast it in water, and boil it till it comes to a good color, and they drink it in the morning, during the day, and at dinner. The trees grow to be large and the rind from the root has a sweet smell like to the smell of fennel.

“The roots are slender and are near the surface and are easy to dig up. The root is the best of all the tree. Water soddened with the root is much sweeter than all the rest of the tree and the Spaniards believe it works better in curing than any other part. The tree grows near to the sea. The water made from this root is just as strong as cinnamon. The best is the root, next are the boughs and then the wood. The rind is the best of all, and just as good. The Indians call this pauanae and the French call it sassafrax. The Indians put a piece of the wood in water and seethe it as long as they think best. A gentle woman, it cured them of fevers.”¹⁸

Nees, Sassafras

(*Sassafras albidum* Nutt.)



The second part of the things that
The Sassafras.



Of

By the mid-1560's it was universally accepted that the syphilis origin was the Americas, and considering its origin, that a remedy would also be found there. Two original sources were thought to be guiac, guayacan or palo-santo (*guaiacum officinal*)¹⁹---a type of wood that is very dense and heavy---and sassafras, first reported in a book called *Joyful News Out of the Newfound World*, translated by John Frampton²⁰. The wood became a fad for the cure of many maladies, and the cost rose to in-explicable heights. By 1530, the lack of success was realized and the zeal for it died down somewhat. Europeans switched back to china root, sassafras, prayer and mercury for relief²¹.

The Just Rewards of Unbridled Lust: Syphilis in Early Modern Europe

Syphilis became a rampant disease shortly after 1492, manifesting as horrifying acorn-sized pustules which erupted on the face, genitals and hands. Whatever part of the body came into contact with the pathogen is where the first expression developed (see addenda, pgs 14 and 15). Ulrich von Hutten (1488-1523), a German knight, wrote a popular book about the trials and tribulations as he was personally struggling with syphilis:

“From the boils there emitted a foul, dark-green pus. This secretion was so vile (von Hutten affirmed), that even the burning pains of the boils troubled the sick less than their horror at the sight of their own bodies. Yet this was only the beginning. People's flesh and skin filled with water; their bladders developed sores; their stomachs were eaten away.”²²

Girolamo Fracastoro, a professor at the University of Padua:

“The symptoms progressively got worse: the syphilis pustules developed into ulcers that dissolved skin, muscle, bone, palate, and tonsils—even lips, noses, eyes, and genital organs. Rubbery tumors, filled with a white, sticky mucus, grew to the size of rolls of bread. And many of the people died.”²³

The poor souls who contracted syphilis were reviled in their own time because people believed they brought the illness on themselves for dipping into places of lust, debauchery, and sin. Unbridled fornication was the root of this outbreak and the people were getting their just deserts. Prostitutes and soldiers were the first to succumb to it, and that the sores were causing eruptions and disfigurement seen on the genital organs; it was taken as a sign that it came rightfully so to sinful souls who dabbled in the forbidden treats of sexual inhibition.

Von Hutten reported that physicians were so terrified that they would not treat their patients, even though the patients with the terrible malady desperately sought treatment and psychological support. The idea of infection began to be taken far more seriously than it ever had before²⁴. They castigated and persecuted the sick. As infection spread, so did fear; and where fear went, blame followed close behind.

William Clowes (1540-1604), who counted Queen Elizabeth among his patients, announced:

“That syphilis was "loathsome and odious, yea troublesome and dangerous, a notable testimony of the just wrath of God.”²⁵

A century later, a French physician, M. Flamand, summed up this point, that:

“Venereal diseases were "the just rewards of unbridled lust." Disease commonly invited theological speculation, but in the case of syphilis people felt that little speculation was necessary. Just as fornication opened the door to the pox, so the pox opened the door to chastisement and blame.”²⁶

Hospitals did not know how to handle the new illness. They could not deal with the social expungement, physical deformities and mental insanity that syphilis sufferers were confronted with. Institutions that had always treated the sick started turning away syphilis patients. The most famous of them, the Paris Hôtel-Dieu, prided itself with one single exception, on the breadth of its generosity. This hospital boasted that it "receives, feeds, and tends all poor sufferers, wherever they come from and whatever ailment they may have, even plague victims—though not if they have the pox." The Hôtel-Dieu expelled its syphilitic patients in 1496, and, after relenting briefly, did so again in 1508²⁷.

Despite the cruelties fear produced (see addenda, p. 16, for pictures), some doctors did at least try to help. According to Peter Lewis Allen, in his book *The Wages of Sin, Sex and Disease, Past and Present*:

“Doctors warned of the dangers of promiscuous sex, particularly with prostitutes; some even proposed safer sex techniques for preventing the pox, such as washing the genitals, before or after intercourse, in hot vinegar or white wine. It probably took physicians a while to realize that these mild remedies, while doing no harm, did little good, either. Syphilis was new, after all, and nobody knew at first that the disease passed through primary, secondary, and tertiary stages, each with distinct symptoms and with quiescent periods in between.”²⁸

Penicillin eventually did become the ultimate cure for this pathogen, but the spirochetal pathogen still exists today with millions of new cases each year²⁹. Over 500 years later, and we’re still paying the price for our ancestors’ follies. At least this time, in our time, we know now how to fight it correctly.

Footnotes

- ¹ Alfred W. Crosby Jr., *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Connecticut: Praeger, 2003, p. 122-140
- ² The Cambridge Encyclopedia of Human Paleopathology by Arthur C. Aufderheide and Conrado Rodriguez-Martin. Cambridge UK: Cambridge University Press, 1998: 154
- ³ Crosby: 122-140
- ⁴ Crosby: 142
- ⁵ Crosby: 144; see electron photomicrograph of the spirochete *Treponemia pallidum* on p. 129
- ⁶ Cambridge: 167
- ⁷ Cambridge: 167
- ⁸ Crosby: 154
- ⁹ William H. McNeal. *Plaques and Peoples*. New York: Anchor Books, 1977: Introduction
- ¹⁰ Mercury: <http://corrosion-doctors.org/Elements-Toxic/Mercury-medical.htm>
- ¹¹ Crosby: 151-155
- ¹² Crosby: 156
- ¹³ David Beers Quinn, *The Roanoke Voyages, 2 Vols.* The Hakluyt Society Second Series. London: The Hakluyt Society, 1955: pgs. 314, 318, 337, 388
- ¹⁴ Harriot: 12; and Quinn: 314, 318, 337, 388
- ¹⁵ Thomas Harriot, *A Brief and True Report of the Newfound Land of Virginia*. New York: Dover Publications, 1972: p. 9
- ¹⁶ Nicolás (Nikolas) Monardes. Wikipedia Encyclopedia. http://en.wikipedia.org/wiki/Nicol%C3%A1s_Monardes. Accessed May 4, 2009
- ¹⁷ Nikolas Monardes, *Joyful News Out of the Newfound World*. Translated by John Frampton, London: Printed by E. Aide by the assign of Bonham Norton, 1596. Accessed online May 1, 2009 at Sabin Americana, 1500-1926: <http://galenet.galegroup.com/servlet/>

[Sabin?dd=0&locID=ncliveecu&d1=SABCA05995900&srchtp=b&c=1&df=f&d2=4&docNum=CY3800479932&b0=Monardes&h2=1&l0=1596&vrsn=1.0&b1=0X&d6=4&d3=4&ste=10&stp=DateAscend&d4=0.33&n=10&d5=d6](http://www.sabin.org/locID=ncliveecu&d1=SABCA05995900&srchtp=b&c=1&df=f&d2=4&docNum=CY3800479932&b0=Monardes&h2=1&l0=1596&vrsn=1.0&b1=0X&d6=4&d3=4&ste=10&stp=DateAscend&d4=0.33&n=10&d5=d6)

¹⁸ Monardes, Wikipedia

¹⁹ The Cambridge Encyclopedia: 167

²⁰ Monardes, Sabin Americana, 1500-1926

²¹ Crosby: 155

²² An excerpt from *The Waqes of Sin, Sex and Disease, Past and Present* by Peter Lewis Allen, <http://www.press.uchicago.edu/Misc/Chicago/014606.html>

²³ Allen

²⁴ Allen

²⁵ Allen

²⁶ Allen

²⁷ Allen

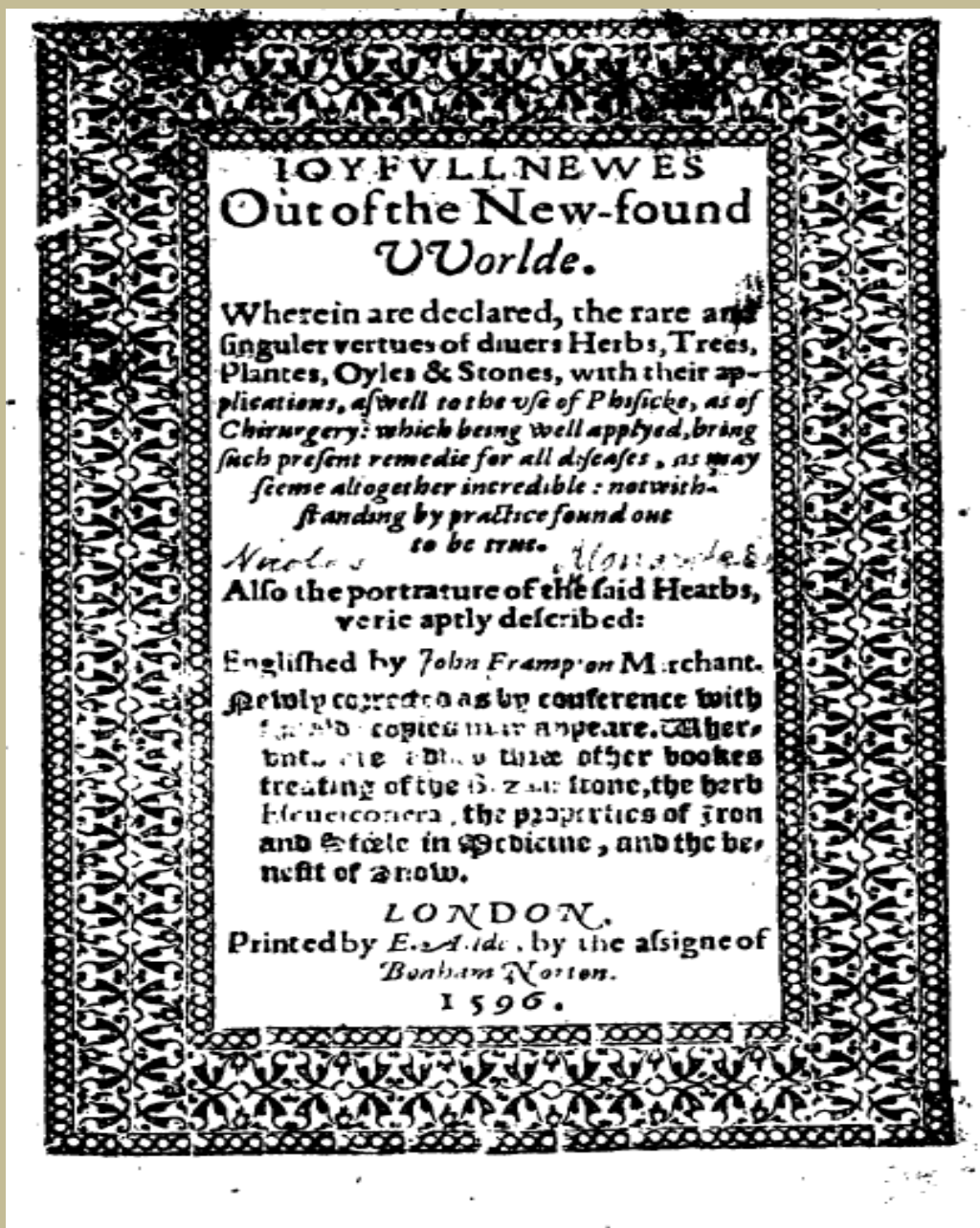
²⁸ Allen

²⁹ Mercury

Addenda



Engraving of Mercury Treatment Process for Syphilis



Monardes, Nikolas. Joyful News Out of the Newfound World.
Translated by John Frampton, London: Printed by E. Aide by the assign of
Bonham Norton, 1596.

One form of Treponemia only affects soft tissues of nasal passages



Lost Noses Due To Syphilis

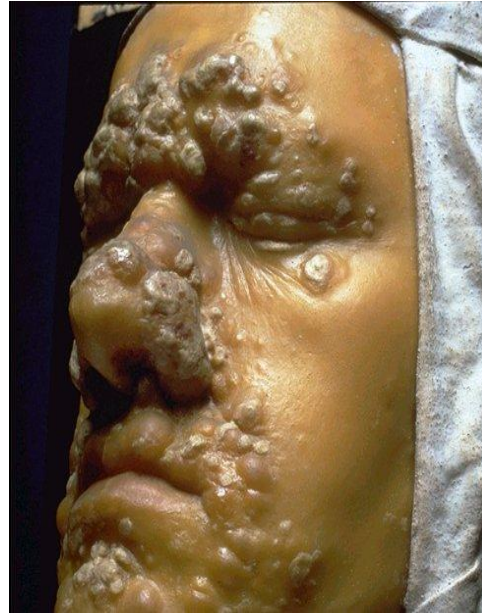
The Leager Ladies (women attached to the camp) had no sooner lost their Spanish Dons, but found themselves as well-entertained by the French, whose camp they traded in, giving the monsieurs as large a share of the "pocky spoils" within their own lines as the Spanish had (Lawson, 1967: 26).

We being well enough assured that the Pox bandits first rose in the New World, it being caught of the Indian women, by the Spanish soldiers that followed Columbus in one of his American expeditions, who after their arrival in Old Spain were hastened to relieve Naples, at the time besieged by the French (Lawson: 25-6).

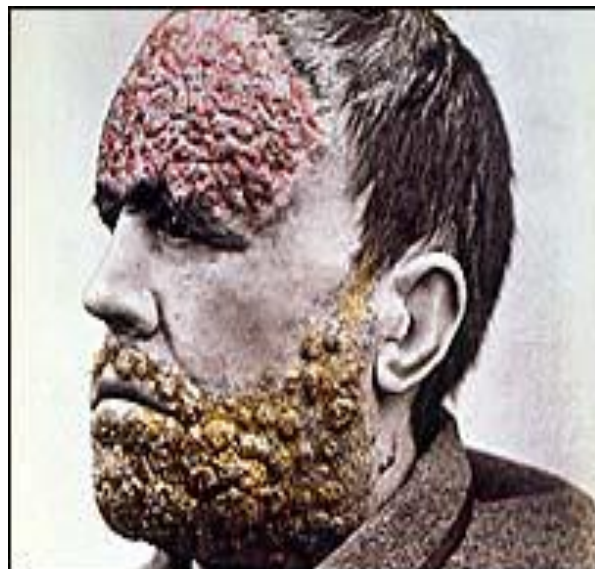
The Indians have a distemper which is similar to the pox, but not associated with gonorrhoeas. This affliction is often expressed in their noses. For a cure they use the juice of the tulip tree. Many that have this affliction became Indian doctors Lawson accounted for there as "no-nosed doctors" (Lawson: 231).

From the Spanish, who brought the pocky pox in their britches from America were deployed to Naples where the courtesans gave it to the French, who were then deployed to Flanders (now Belgium and Northern France) where the disease spread quickly (Lawson: 26) and crowded into every part of the world.

Another form of Treponemia is expressed in skin lesions & only pass by skin contact



Another Example of Skin-Expressed Treponemia



Treatment Methods for Syphilis



Trepan (tool for drilling holes in the skull)

The Wages of Sin, Sex and Disease, Past and Present by Peter Lewis Allen,
<http://www.press.uchicago.edu/Misc/Chicago/014606.html>



Cautery Irons

The Wages of Sin, Sex and Disease, Past and Present by Peter Lewis Allen,
<http://www.press.uchicago.edu/Misc/Chicago/014606.html>

Illustrations from *“The Works of That Famous Chirurgion Ambrose Parey”*,
 trans. Thomas Johnson (London, 1649). Courtesy of Archives & Special
 Collections, Columbia University Health Sciences Division.

Bibliography

- Aegerter, E., and J. A. Kirkpatrick. *Orthopedic Diseases*. Philadelphia: W.B. Saunders, 1968
- Allison, M.J., E. Gerszten, J.R. Munizaga, C. Santoro, and D. Mendoza. "Tuberculosis in pre-Columbian Andean Populations". *Prehistoric Tuberculosis in the Americas*. Edited by J.E. Buikstra, 49-62. Scientific Papers, No. 5. Evanston, IL: Northwestern University Archaeological Program, 1981
- Allen, Peter Lewis. *The Wages of Sin, Sex and Disease, Past and Present*. <http://www.press.uchicago.edu/Misc/Chicago/014606.html>
- Allison, M.J., D. Mendoza, and A. Pezzia. "Documentation of a Case of Tuberculosis in pre-Columbian America". *American Review of Respiratory Diseases* 107, 1973
- Anderson, T., C. Arcini, S. Anda, A. Tangerud, and G. Robertson. "Suspected Endemic Syphilis (Treponarid) in Sixteenth-Century Norway". *Medical History* 30, 1986
- Antal, G.M. S.A. Lukehart, and A.Z. Mehus. "The Endemic Treponematoses". *Microbes and Infection* 4(1), 2002
- Arrizabalaga, J. "Syphilis". *The Cambridge World History of Human Disease*. Edited by Kenneth F. Kiple. Cambridge: Cambridge University Press, 1993
- Aufderheide, Arthur C. and Conrado Rodriguez-Martin. *The Cambridge Encyclopedia of Human Paleopathology*. UK: Cambridge University Press, 1998
- Baker, B.J., and G.J. Armelagos. "The Origin and Antiquity of Syphilis: Paleopathological Diagnosis and Interpretation". *Current Anthropology* 29 (5), 1988
- Biocca, E. "Estudios Etno-Biológicos Sobre os Índios da Região do Alto Rio Negro-Amazonas". *Arquivos de Biologia, São Paulo* 29, 1945
- Bradlaw, R.V. "The Dental Stigmata of Prenatal Syphilis". *Oral Pathology* 6, 1953
- Brailsford, J.F. *The Radiology of the Bones and Joints, 3rd ed.* Baltimore:

- Williams and Wilkins, 1945
- Braun, D., D.C. Cook, and S. Pfeiffer. "DNA from the *Mycobacterium tuberculosis* Complex Identified in North American, pre-Columbian Human Skeletal Remains". *Journal of Archaeological Science* 25 (3), 1998
- Brothwell, D.R. "The Real History of Syphilis". *Science* 6 (9). 1970
- Brothwell, D.R. "Possible Evidence of the Parasitisation of Early Mexican Communities by the Micro-organism *Treponema*". *Bulletin of the Institute of Archaeology* 15, 1978
- Brothwell, D.R. "Microevolutionary Change in the Human Pathogenic Treponemes: An Alternative Hypothesis". *International Journal of Systematic Bacteriology* 31 (1), 1981
- Brothwell, D.R. "Pinta". *The Cambridge World History of Human Disease*. Edited by Kenneth F. Kiple. Cambridge: Cambridge University Press, 1993a
- Brothwell, D.R. "Yaws". *The Cambridge World History of Human Disease*. Edited by Kenneth F. Kiple. Cambridge: Cambridge University Press, 1993b
- Brothwell, D.R., and R. Burleigh. "Radiocarbon Dates and the History of Treponematoses in Man". *Journal of Archaeological Science* 2, 1975
- Brown, W.J., J.F. Donohue, N.W. Axnick, J.H. Blount, N. Ewen, and O. Jones. *Syphilis and Other Venereal Diseases*. Cambridge: Harvard University Press, 1970
- Brues, A.M. "Skeletal Material from the Nagle Site". *Bulletin of the Oklahoma Anthropological Society* 5, 1957
- Brues, A.M. "Skeletal Material from the Horton Site". *Bulletin of the Oklahoma Anthropological Society* 6, 1958
- Brues, A.M. "Skeletal Material from the Morris Site". *Bulletin of the Oklahoma Anthropological Society* 7, 1959
- Buckley, H.R., and N.G. Tayles. "The Functional Cost of Tertiary Yaws (*Treponema pertenue*) in a Prehistoric Pacific Island Skeletal Sample". *Journal of Archaeological Science* 30, 2003a
- Buckley, H.R., and N.G. Tayles. "Skeletal Pathology in a Prehistoric Pacific Is-

- land Sample: Issues in Lesion Recording, Quantification, and Interpretation. *American Journal of Physical Anthropology* 122 (4), 2003b
- Bugsby, G., Z. Ali, D.T. Simeon, O. Khan, and V. Abhang. "Value of Routine Long Bone Radiographs in Management of Babies with a Positive VDRL at the Mount Hope Women's Hospital". *West Indian Medical Journal* 51 (4), 2002
- Butler, C.S. Syphilis Sive Morbus Humanus: A Rationalization of Yaws, So-Called". *Lancaster: Science Press Printing Company*, 1936
- Callahan, B. "Veni, Vidi, Vici? Reassessing the Ila Syphilis Endemic, 1900-1960". Paper presented at the conference "Comparative Perspectives on the History of Sexually-Transmitted Diseases", organized by Karen Jochelson, Institute of Commonwealth Studies, University of London, 1996
- Cameron, C.E., C. Castro, S.A. Lukehart, and W.C. Van Voorhis. "Sequence Conservation of Glycerophosphodiester Phosphodiesterase among *Treponema pallidum* Strains". *Infection and Immunity* 67 (6), 1999
- Cannefax, G.R., L.C. Norins, and E.J. Gillespie. "Immunology of Syphilis". *Annual Review of Medicine* 18, 1967
- Centurion-Lara, A., C. Castro, R. Castillo, J.M. Shaffer, W.C. Van Voorhis, and S.A. Lukehart. "The Flanking Region Sequences of the 15-kDa Lipoprotein Gene Differentiate Pathogenic Treponemes". *Journal of Infectious Diseases* 177, 1998
- Centurion-Lara, A., C. Godornes, C. Castro, W.C. Van Voorhis, and S.A. Lukehart. "The tprK Gene is Heterogeneous Among *Treponema pallidum* Strains and has Multiple Alleles. *Infection and Immunity* 68, 2000
- Chaplin, J.E. "Natural Philosophy and an Early Racial Idiom in North America: Comparing English and Indian Bodies". *William and Mary Quarterly* 54 (1), 1997
- Charcot, J.M., *Charcot, the Clinician: The Tuesday Lessons: Excerpts from Nine Case Presentations on General Neurology Delivered at the Salpêtrière Hospital in 1887-88*. Translated with commentary by Christopher G. Goetz. New York: Raven Press, 1987
- Chulay, Jeffery D. *Treponema* Species (Yaws, Pinta, Bejel)". *Principles and Practice of Infectious Diseases*. Edited by G.L. Mandell, R.G. Douglas, and J.E. Bennett, 1808-12. New York and London: Churchill and Livingstone, 1990

- Clark, E.G., and N. Danbolt. "The Oslo Study of the Natural History of Untreated Syphilis: An Epidemiologic Investigation Based on a Restudy of the Boeck-Bruusgaard Material". *Journal of Chronic Diseases* 2, 1955
- Cockburn, T.A. *The Evolution and Eradication of Infectious Diseases*. Baltimore: John Hopkins Press, 1963a
- Cockburn, T.A. "The Origins of the Treponematoses". *Bulletin of the World Health Organization* 24, 1963b
- Cook, D.C. "Pathologic States and Disease Process in Illinois Woodland Populations: An Epidemicologic Approach". Doctoral diss., University of Chicago, 1976
- Cook, D.C. "Dental Evidence for Congenital Syphilis (and its absence) Before and After the Conquest of the New World". *L'Origine de la Syphilis en Europe: Avant ou Après 1493?*. Edited by O. Dutour, G. Pálfi, J. Bérato, and J.P. Brun. Paris: Éditions Errance, 1994
- Crosby, Alfred W. Jr. *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Connecticut: Praeger, 2003
- Crosby, Alfred W. Jr. "The Early History of Syphilis: A Reappraisal". *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Connecticut: Greenwood Press, 1972
- Csonka, G.W. "Clinical Aspects of Bejel". *British Journal of Venereal Diseases* 29, 1953
- Demis, D.J. "Nonsyphilitic Treponematoses". *Infectious Diseases, A Modern Treatise of Infectious Processes, 2nd ed.* Edited by P.D. Hoerich. Philadelphia: Harper and Row, 1977
- Dennie, C.C. *A History of Syphilis*. Springfield, IL: C.C. Thomas, 1962
- Dennie, C.C. and S.F. Pakula. *Congenital Syphilis*. Philadelphia: Lea and Febiger, 1940
- Desowitz, R.S. *Who Gave Pinta to the Santa Maria? Torrid Diseases in a Temperate World*. New York: W.W. Norton, 1997
- D.H.E.W. "Findings on the Serological Test for Syphilis in Adults". *Vital and Health Statistics Series 11, No. 9. D.H.E.W. Publication No. (HRA) 74-1275*. Rockville, MD, 1973

- Dutour, O., G. Pálfi, J. Bérato, and J.P. Brun, eds. *L'Origine de la Syphilis en Europe: Avant ou Après 1493?*. Paris: Éditions Errance, 1994
- Edwards, A.M., D. Dymock, and H.F. Jenkinson. "A Review: From Tooth to Hoof: Treponemes in Tissue-Destructive Disease". *Journal of Applied Microbiology* 92: 2003
- Engelstein, L. "Syphilis, Historical and Actual: Cultural Geography of a Disease". *Review of Infectious Diseases* 8, 2003
- Fiumara, Y., and R. Lessell. "Manifestations of Late Congenital Syphilis". *Archives of Dermatology* 102, 1970
- Fornaciari, G., M. Castagna, A. Tognetti, D. Tornaboni, and J. Bruno. "Syphilis in a Renaissance Italian Mummy". *Lancet* 2 (8663), 1989
- Fournier, A. "Syphilitic Teeth". *Dental Cosmos* 26, 1884
- Fraser, C.M., S.J. Norris, G.M. Weinstock, O. White, G.G. Sutton, R. Dodson, M. Gwinn, E.K. Hickey, R. Clayton, K.A. Ketchum, E. Sodergren, J.M. Hardham, M.P. McLeod, S. Salzberg, J. Peterson, H. Khalak, D. Richardson, J. Howell, M. Chiadambaram, T. Utterback, L. McDonald, P. Artich, C. Bowman, M.D. Cotton, C. Fujii, S. Garland, B. Hatch, K Horst, K. Roberts, M. Sandusky, J. Weidman, H.O. Smith, and C.J. Ventner. "Complete Genome Sequence of *Treponema pallidum*, the Syphilis Spirochete". *Science* 281, 1998
- Frazier, C.N., and H.C. Li. *Racial Variations in Immunity to Syphilis*. Chicago: University of Chicago Press, 1948
- Garner, M.F., J.L. Backhouse, and G.J. Tibbs. "Yaws in an Isolated Australian Aboriginal Population". *World Health Organization Bulletin* 43, 1970
- Gilman, S.L. *Difference and Pathology: Stereotypes of Sexuality, Race, and Madness*. Ithaca: Cornell University Press, 1985
- Gilman, S.L. *Disease and Representation: Images of Illness from Madness to AIDS*. Ithaca: Cornell University Press, 1988
- Goetz, C.G., M. Bonduelle, and T. Gelfand. *Charcot: Constructing Neurology*. New York: Oxford University Press, 1995
- Goff, C.W. "Syphilis". *Diseases in Antiquity*. Edited by D.R. Brothwell and A.T. Sandison. Springfield, IL: C.C. Thomas, 1967

- Goldman, C.H., and S.J. Smith. "X-Ray Appearance of Yaws in Bone". *British Journal of Radiology* 16, 1943
- Grieco, M.H. "The Voyage of Columbus That Led to the Spread of Syphilis to Europe. *Columbus and the New World: Medical Implications*. Edited by G.A. Settipane. Providence, RI: Oceanside Publications, 1995
- Grin, E.I. *Epidemiology and Control of Endemic Syphilis: Report on a Mass-Treatment Campaign in Bosnia*. World Health Organization Monograph, No 11. Geneva: World Health Organization, 1953
- Grin, E.I. "Endemic Syphilis and Yaws". *Bulletin of the World Health Organization* 15, 1956
- Gruber, F. "Škrljevo Disease---Two Centuries of History". *International Journal of STD and AIDS* 11, 2000
- Guerra, F. "The Dispute over Syphilis: Europe versus America". *Clio Medica* 13, 1978
- Guimarães, F.N., and B.A. Rodrigues. "O Puru-Puru da Amazônia (Pinta, Carate, Mal de Pinto, etc)". *Memórias do Instituto Oswaldo Cruz (Rio de Janeiro)* 46, 1948
- Guthe, T. "Measure of Treponematoses Problem in the World". *World Forum on Syphilis and Other Treponematoses, Washington DC, 1962*. Proceedings. Atlanta: US Department of Health, Education, and Welfare, 1964
- Guthe, T. "Clinical, Serological, and Epidemiological Features of *Framboesia tropica* (Yaws) and its Control in Rural Communities". *Acta Dermatology and Venerology* 49, 1969
- Guthe, T. J. Ridget, F. Vorst, J. D'Costa, and B. Grab. "Methods for the Surveillance of Endemic Treponematoses and Sero-Immunological Investigations of 'Disappearing' Disease". *Bulletin of the World Health Organization* 46, 1972
- Hackett, C.J. *Bone Lesions of Yaws in Uganda*. Oxford, UK: Blackwell Scientific Publications, 1951
- Hackett, C.J. "On the Origin of the Human Treponematoses (Pinta, Yaws, Endemic Syphilis and Venereal Syphilis)". *Bulletin of the World Health Organization* 29, 1963
- Hackett, C.J. *Diagnostic Criteria of Syphilis, Yaws, and Treponarid (Treponematoses)*. Oxford, UK: Blackwell Scientific Publications, 1951

- matoeses) and of Some Other Diseases in Dry Bones (for use in osteo-archaeology)*. Berlin: Springer-Verlag, 1976
- Haltom, W.L., and A.R. Shands Jr. "Evidences of Syphilis in 'Mound Builders' Bones". *Archives of Pathology* 25, 1938
- Hardham, J.M., J.G. Frye, N.R. Young, and L.V. Stamm. "Identification and Sequences of the *Treponema pallidum* flhA, flhF, and orf304 Genes". *DNA Sequence* 7, 1997
- Harriot, Thomas. *A Brief and True Report of the Newfound Land of Virginia*. New York: Dover Publications, 1972
- Harrison, L.W. "The Origin of Syphilis". *British Journal of Venereal Diseases* 35, 1959
- Hillson, S., C. Grigson, and S. Bond. "Dental Defects of Congenital Syphilis". *American Journal of Physical Anthropology* 107, 1998
- Holcomb, R.C. *Who Gave the World Syphilis? The Haitian Myth*. New York: Froben Press, 1930
- Holcomb, R.C. "The Antiquity of Congenital Syphilis". *Bulletin of the History of Medicine* 10, 1941
- Holcomb, R.C. "Pinta, A Treponematosis". *U.S. Naval Medical Bulletin* 40, 1942
- Holmes, K.K., P.A. Mårdh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit, eds. *Sexually Transmitted Diseases, 3rd ed.* New York: McGraw Hill, 1999
- Hook, E.W. III, and R.W. Peeling. "Syphilis Control---A Continuing Challenge". *New England Journal of Medicine* 351 (2), 2004
- Howles, J.K. *A Synopsis of Clinical Syphilis*. St. Louis: C.V. Mosby, 1943
- Hoyme, L.E., and W.M. Bass, "Human Skeletal Remains From the Tollifero and Clarksville Sites, John H. Kerr Reservoir Basin, Virginia". *Bureau of American Ethnology Bulletin* 153, 1962
- Hudson, E.H. "Treponematosis among the Bedouin Arabs of the Syrian Desert". *U.S. Naval Medical Bulletin* 26(4), 1928

- Hudson, E.H. "Syphilis in the Euphrates Arab." *American Journal of Syphilis* 16-17, 1932-33
- Hudson, E.H. *Treponematosi*. Oxford: Oxford University Press, 1946
- Hudson, E.H. *Non-Venereal Syphilis, A Sociological and Medical Study of Bejel*. Endinburg: E.S. Livingstone, 1958
- Hudson, E.H. "Endemic Syphilis---Heir of the Syphiloids". *Archives of Internal Medicine* 108, 1961
- Hudson, E.H. "Treponematosi and Pilgrimage". *American Journal of the Medical Sciences* 246 (6), 1963
- Hudson, E.H. "Treponematosi and Man's Social Evolution". *American Anthropologist* 67, 1965
- Hudson, E.H. "Christopher Columbus and the History of Syphilis". *Acta Tropica* 25, 1968
- Hunter, G.W., W.W. Frye, and J.C. Swartzwelder. *A Manual of Tropical Medicine, 4th ed.* Philadelphia: W.B. Saunders, 1966
- Hutchinson, J. "On the Influence of Hereditary Syphilis on the Teeth". *Transactions of the Odontological Society of Great Britain* 2, 1857
- Hutchinson, J. "Heredito-Syphilitic Strauma: And on the Teeth as a Means of Diagnosis". *British Medical Journal* 1, 1861
- Jacobi, K. D.C. Cook, R.S. Corruccini, and J.S. Handler. "Congenital Syphilis in the Past: Slaves at Newton Plantation, Barbados, West Indies". *American Journal of Physical Anthropology* 89, 1992
- Jaffe, H.L. *Metabolic, Degenerative, and Inflammatory Diseases of Bone*. Philadelphia: Lea and Febiger, 1972
- Jochelson, K. *The Color of the Disease: Syphilis and Racism in South Africa, 1880-1950*. Oxford: Palgrave, 2001
- Jones, J. "Explorations of the Aboriginal Remains of Tennessee". *Smithsonian Contributions to Knowledge, No. 22 (259)*. Washington, DC: Smithsonian Institution Press, 1876
- Jones, J. H. *Bad Blood: The Tuskegee Syphilis Experiment*. New York: Free Press, 1981

- Kelley, M.A. "Skeletal Changes Produced by Aortic Aneurysms". *American Journal of Physical Anthropology* 51 (1), 1979
- Kiple, K.F. "Syphilis, Non-Venereal". *The Cambridge World History of Human Disease*. Edited by Kenneth F. Kiple. Cambridge: Cambridge University Press, 1993a
- Kiple, K.F. "The Treponematoses". *The Cambridge World History of Human Disease*. Edited by Kenneth F. Kiple. Cambridge: Cambridge University Press, 1993b
- Kolman, C.J., A. Centurion-Lara, S.A. Lukehart, D.W. Owsley, and N. Tuross. "Identification of *Treponema pallidum* subspecies *pallidum* in a 200-Year-Old Skeletal Specimen". *Journal of Infectious Diseases* 180 (6), 1999
- Lawson, John. *A New Voyage to Carolina, Containing the Exact Description and Natural History of that Country*. London. 1709.
- Lee, R.V., F.L. Black, W.J. Hierholzer, and B.L. West. "A Novel Pattern of Treponemal Antibody Distribution in Isolated South American Indian Populations". *American Journal of Epidemiology* 107, 1978
- Litchenstein, L. *Disease of Bones and Joints*. St. Louis: C.V. Mosby, 1970
- Livingstone, F.B. "On the Origin of Syphilis: An Alternative Hypothesis". *Current Anthropology* 32 (5), 1991
- Lomax, E. "Infantile Syphilis as an Example of the Nineteenth-Century Belief in the Inheritance of Acquired Characteristics". *Journal of the History of Medicine* 34, 1979
- Maegraith, B.G. *Exotic Diseases in Practice*. New York: American Enlsevier, 1965
- Mafart, B. "Goundou: A Historical Form of Yaws". *Lancet* 360, 2002
- Mann T. *Doctor Faustus*. Translated by H.T. Lowe-Porter. New York: Modern Library, 1966
- Manning, L.A. and G.D. Ogle. "Yaws in the Periurban Settlements of Port Moresby, Paupa New Guinea. *Paupa New Guinea Medical Journal* 45 (3-4), 2002
- May, J.M. *The Ecology of Human Disease*. Philadelphia: Harper and Row, 1958

- McAllister, M.E. "Stories of the Origin of Syphilis in Eighteenth Century England: Science, Myth, and Prejudice." *Eighteenth Century Life*. 2000
- McLean, S. The Osseous Lesions of Congenital Syphilis. *American Journal of the Diseases of Children* 41, 1931
- McNeal, William H. *Plagues and Peoples*. New York: Anchor Books, 1977
- Meheus, A., and E. Tikhomirov. "Endemic Treponematoses". *Sexually Transmitted Diseases*, 3rd ed. Edited by K.K. Holmes, P.A. Mårdh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit. New York: McGraw Hill, 1999
- Merbs, C.F. "A New World of Infectious Diseases". *Yearbook of Physical Anthropology* 35, 1992
- Mercury: <http://corrosion-doctors.org/Elements-Toxic/Mercury-medical.htm>
- Meyer, C., C. Jung, T. Kohl, A. Poenicke, and K.W. Alt. "Syphilis: A Paleoanthropological Reappraisal". *Homo* 53 (1), 2002
- Monardes, Nikolas. *Joyful News Out of the Newfound World*. Translated by John Frampton, London: Printed by E. Aide by the assign of Bonham Norton, 1596. Sabin Americana, 1500-1926: <http://galenet.galegroup.com/servlet/Sabin?dd=0&locID=ncliveecu&d1=SABCA05995900&srchtp=b&c=1&df=f&d2=4&docNum=CY3800479932&b0=Monardes&h2=1&l0=1596&vrsn=1.0&b1=0X&d6=4&d3=4&ste=10&stp=DateAscend&d4=0.33&n=10&d5=d6>
- Moon, H. "On Irregular and Defective Tooth Development". *Transactions of the Odontological Society of Great Britain* 9, 1877
- Moore, C.B. "Moundville Revisited". *Journal of the Academy of Natural Sciences of Philadelphia* 13, 1907
- Moore, J.E. *The Modern Treatment of Syphilis*, 2nd ed. Springfield, IL: C.C. Thomas, 1941
- Morton, R.S. "The Sibbens of Scotland". *Medical History* 11, 1967
- Moulton, F.R., ed. *Syphilis*. Publications of the American Association for the Advancement of Science, No. 6. Washington, DC, 1938
- Munger, R.S. "Guaiacum, the Holy Wood from the New World". *Journal of the History of Medicine and Allied Sciences* 4, 1949

- Murray, J.F., A.M. Merriweather, and M.L. Freeman. "Endemic Syphilis in the Bakwena Reserve of the Bechuanaland Protectorate". *Bulletin of the World Health Organization* 15, 1956
- Musher, D.M. "Early Syphilis". *Sexually Transmitted Diseases, 3rd ed.* Edited by K.K. Holmes, P.A. Mårdh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit. New York: McGraw Hill, 1999
- Naranjo, P. "On the American Indian Origin of Syphilis: Fallacies and Errors." *Columbus and the New World: Medical Implications*. Edited by G.A. Settipane. Providence, RI: Oceanside Publications, 1995
- Neiburger, E.J. "Lesions in a Prehistoric Bear: Differential Diagnosis". *Paleopathology Newsletter* 48, 1984
- Neiburger, E.J. "Syphilis in a Pleistocene Bear?". *Nature* 333, 1988
- Nicolás (Nikolas) Monardes*. Wikipedia Encyclopedia. http://en.wikipedia.org/wiki/Nicol%C3%A1s_Monardes
- Noordhoek, G.T., A. Cockayne, L.M. Schouls, R.H. Melenon, E. Stoltz, and J.D.A. van Embden. "A New Attempt to Distinguish Serologically the Subspecies of *Treponema pallidum* Causing Syphilis and Yaws". *Journal of Clinical Microbiology* 28, 1990
- Noordhoek, G.T., B. Weiles, J.J. van der Sluis, and J.D.A. van Embden. "Polymerase Chain Reaction and Synthetic DNA Probes: A Means of Distinguishing the Causative Agents of Syphilis and Yaws". *Infection and Immunity* 58, 1990
- Norris, S.J., D.L. Cox, and G.M. Weinstock. "Biology of *Treponema palidum*: Correlation of Functional Activities with Genome Sequence Data". *Journal of Molecular Microbiology and Biotechnology* 3 (1), 2001
- Olansky, S.S., H. Schuman, J.J. Peters, C.A. Smith, and D.S. Rambo. "Untreated Syphilis in the Male Negro: 20 Years of Clinical Observations of Untreated Syphilitic and Presumably Non-Syphilitic Groups". *Journal of Chronic Diseases* 4, 1956
- Oosthizen, S.F. "Yaws". *British Journal of Radiology* 22 (23), 1949
- Ortner, D.J., and W.G.J. Putschar. "Identification of Pathological Conditions in Human Skeletal Remains". *Smithsonian Contributions to Knowledge, No. 28*. Washington, DC: Smithsonian Institution Press, 1985

- Pampiglione, S., and A.E. Wilkinson. "A Study of Yaws among Pygmies in Cameroon and Zaire". *British Journal of Venereal Disease* 51, 1975
- Parramore, T.C. "Non-Venereal Treponematosis in Colonial North America." *Bulletin of the History of Medicine* 44, 1970
- Perine, P.L., D.R. Hopkins, P.L.A. Niemal, Rr.K. St John, G. Causse, and G.M. Antal. *Handbook of Endemic Treponematoses*. Geneva: World Health Organization, 1984
- Peters, J.J., S. Olansky, H. Schuman, J.C. Cutlet, and G.A. Gleason. "Untreated Syphilis in the Male Negro: 20 Years of Clinical Observations of Untreated Syphilitic and Presumably Non-Syphilitic Groups". *Journal of Chronic Diseases* 1, 1955
- Pillay, A. H. Lui, S. Ebraihim, C.Y. Chen, W. Lai, G. Fehler, R.C. Ballard, B. Steiner, A.W. Sturm, and S.A. Moore. "Molecular Typing of *Treponema pallidum* in South Africa: Cross-Sectional Studies". *Journal of Clinical Microbiology* 40 (1), 2002
- Pollack, J.S.M. "Sibbens or Sivvens, the Scottish Yaws". *Transactions of the Royal Society of Tropical Medicine and Hygiene* 47, 1953
- Powell, M.L. *Status and Health in Prehistory, a Case Study of the Moundville Chiefdom*. Washington, DC: Smithsonian Institution Press, 1988
- Pusey, W.A. *The History and Epidemiology of Syphilis*. Springfield, IL: C.C. Thomas, 1933
- Putkonen, T. "Dental Changes in Congenital Syphilis. Relation to Other Syphilitic Stigmata". *Acta Dermatology and Venerology* 42, 1962
- Quétel, C. *History of Syphilis*. Translated by Judith Braddock and Brian Pike. Baltimore: John Hopkins University Press (originally published as *Le Mal de Naples: Histoire de la Syphilis*. Paris: Editions Seghers, 1986), 1990
- Quinn, David Beers. *The Roanoke Voyages, 2 Vols*. The Hakluyt Society Second Series. London: The Hakluyt Society, 1955
- Roberts, C.A., and K. Manchester. *The Archaeology of Disease*. Ithaca: Cornell University Press, 1995
- Rosahn, P.D. "Autopsy Studies in Syphilis". *Journal of Venereal Disease* 649: *Supplement #21*. Washington, DC: U.S. Public Health Service Venereal

- Disease Division, 1947
- Rost, G.S. "Roentgen Manifestation of Bejel ("Endemic Syphilis") as Observed in the Euphrates River Valley. *Radiology* 38, 1942
- Rothschild, B.M., and W. Turnbull. "Treponemal Infection in a Pleistocene Bear". *Nature* 329, 1987
- Rudolph, A.H. "Syphilis". *Infectious Diseases, A Modern Treatise of Infectious Processes, 2nd ed.* Edited by P.D. Hoeprich. Philadelphia: Harper and Row, 1977
- Salo, W.L., A.C. Aufderheide, J.E. Buikstra, and T.A. Holcomb. "Identification of Mycobacterium tuberculosis DNA in a pre-Columbian Peruvian Mummy". *Proceedings of the National Academy of Sciences* 91, 1994
- Sarnat, B.G., and N.G. Shaw. "Dental Development in Congenital Syphilis". *American Journal of the Diseases of Children* 64 (5), 1942
- Schell, R.F., and D.M. Muscher. "Pathogenesis and Immunology of Treponemal Infection". *Immunology Series, No. 20*. New York: Marcell Dekker, 1983
- Schmid, G.P. "Epidemiology and Clinical Similarities of Human Spirochetal Diseases". *Reviews of Infectious Diseases* 11 (suppl. 6), 1989
- Skerman, V.B.D., V. McGowan, and P.H.A. Sneath. "Approved Lists of Bacterial Names". *International Journal of Systematic Bacteriology* 30, 1980
- Soloman, S.G. "The Soviet-German Syphilis Expedition to Buriat Mongolia, 1928:
- Sommer, T.C., and T.H. Lee. "Charcot Foot: The Diagnostic Dilemma". *American Family Physician* 64, 2001
- Stamm, L.V. "Biology of Treponema pallidum". *Sexually Transmitted Diseases, 3rd ed.* Edited by K.K. Holmes, P.A. Mårdh, P.F. Sparling, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit. New York: McGraw Hill, 1999
- Starling, P.F. "Natural History of Syphilis". *Sexually Transmitted Diseases, 3rd ed.* Edited by K.K. Holmes, P.A. Mårdh, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit. New York: McGraw Hill, 1999
- Steinbock, R.T. *Paleopathological Diagnosis and Interpretation: Bone Diseases in Ancient Human Populations*. Springfield, IL: C.C. Thomas, 1976

- Stokes, J.H. "Modern Clinical Syphology: Diagnosis---Treatment---Case Studies." Philadelphia: W.B. Saunders, 1928
- Stokes, J.H. *Modern Clinical Syphology, 3rd ed.* Philadelphia: W.B. Saunders, 1944
- Swartz, M.N., B.P. Healy, and D.M. Musher. "Late Syphilis". *Sexually Transmitted Diseases, 3rd ed.* Edited by K.K. Holmes, P.A. Mårdh, S.M. Lemon, W.E. Stamm, P. Piot, and J.N. Wasserheit. New York: McGraw Hill, 1999
- Tramont, E.C. "*Treponema pallidum* (Syphilis)". *Principles and Practice of Infectious Diseases.* Edited by G.L. Mandell, R.G. Douglas, and J.E. Bennett, 1794-1808. New York: Churchill and Livingstone, 1990
- Trott, D.J., M.R. Moeller, R.L. Zuerner, J.P. Goff, W.R. Waters, D.P. Alt, R.L. Walker, and M.J. Wannemuehler. "Characterization of *Treponema Phagedenis*-Like Spirochetes Isolated from the Papillomatous Digital Dermatitis Lesions in Dairy Cattle". *Journal of Clinical Microbiology* 41 (6), 2003
- Turk, J.L. "Syphilitic Caries of the Skull---The Changing Face of Syphilis". *Journal of the Royal Society of Medicine* 88, 1995
- Turner, T.B. "The Race and Sex Distribution of the Lesions of Syphilis in 10,000 Cases". *Bulletin of John Hopkins Hospital* 46, 1930
- Turner, T.B., and D.H. Hollander. "Biology of the Treponematoses". *World Health Organization Monograph, No. 35.* Geneva: World Health Organization, 1957
- Valdez, M., R. Haines, K.H. Riviere, G.R. Riviere, and D.D. Thomas. "Isolation of Oral Spirochetes from Dogs and Cats and Provisional Identification Using Ploymerase Chain Reaction (PCR) Analysis Specific for Human Plague *Treponema* spp". *Journal of Veterinary Denistry* 17 (1), 2000
- Vaughn, M. "Syphilis in Colonial East and Central Africa: The Social Construction of an Epidemic". *Epidemics and Ideas: Essays on the Historical Perception of Pestilence.* Edited by Terence Ranger and Paul Slack. Cambridge: Cambridge University Press, 1992
- Virchow, R. "Über die Naturmder Constitutionell-Syphilitischen Affectionen." *Virchows Archiv für Pathologische Anatomie und Physiologie und für klinische Medizin* 15, 1858
- Virchow, R. "Beiträge zur Geschichete der Lues". *Dermatologische Zeitschrift*

3 (317), 1896

- Vogel, V.J. *American Indian Medicine*. Norman: University of Oklahoma Press, 1970
- Vogt, E.C. "Value of Rotentgenography in Diagnosis of Congenital Syphilis; Infants Considered". *American Journal of Rotentgenography and Radiation Therapy* 26, 1931
- Wells, C. *Bones, Bodies, and Diseases: New Evidence of Abnormalities in Early Man*. London: Thames and Hudson, 1964
- Wicher, K., V. Wicher, F. Abbruscato, and R.E. Baughn. "*Treponema pallidum* subsp. *pertenue* Displays Pathogenic Properties Different from those of *T. pallidum* subsp. *pallidum*". *Infection and Immunity* 68, 2000
- Wilcocks, C., and P.C.E. Manson-Bahr. *Manson's Tropical Diseases*, 17th ed. Baltimore: Williams and Wilkins
- Wilcox, R.R. "Endemic Syphilis in Africa". *South African Medical Journal* 25, 1951
- Wilcox, R.R. "The Non-Venereal Treponematoses". *Textbook of Venereal Disease and Treponematoses*. Springfield, IL: C.C. Thomas, 1964
- Wilcox, R.R. "The Treponemal Revolution". *Transactions of the St. John's Hospital Dermatological Society* 58, 1972
- Williams, H.U. "The Origin and Antiquity of Syphilis: The Evidence from Diseased Bones: A Review with Some New Material from America". *Archives of Pathology* 13, 1932
- Williams, H.U. "The Origin of Syphilis: Evidence from Diseased Bones." *Archives of Dermatological Syphilis*, 1936
- Williams, H.U., J.P. Rice, and J.R. Lacayo. "The American Origin of Syphilis, with Citations from Early Spanish Authors". *Archives of Dermatology and Syphilology* 16(6), 1927
- Wilson, P.W. "Incidence of Yaws and Syphilis in Five Rural Villages, Republic of Panama". *U.S. Naval Medical Bulletin* 32, 1934
- Wood, C.S. "Syphilis in Anthropological Perspective". *Social Science and Medicine* 12, 1978

Wyss, C., F.E. Dewhirst, R. Gmur, T. Thurnteer, Y. Xue, P. Schupbach, B. Guggenheim, and B.J. Paster. "Treponema parvum sp. Nov., a Small Glucuronic or Galacturonic Acid-Dependent Oral Spirochete from Lesions of Human Periodontitis and Acute Necrotizing Ulcerative Gingivitis". *International Journal of Systematic and Evolutionary Microbiology* 51 (pt. 3), 2001