

African Contributions to World Medicine

Week 09 Lecture 02

African Medical Gifts to the World Vaccination and Anti-Malaria Drugs

This slideshow was last updated on 27 and on 19 March, 2016 and on 25 September, 2019

African Medical Gifts to the World

The learning objectives for week 09 part 02
are:

- to appreciate some of Africa's major medical gifts to the world - especially including one type of smallpox vaccination and new medications for malaria

African Medical Gifts to the World

Terms you should know for week 09 part 02 are:

- Cotton Mather
- Hausa

African Medical Gifts to the World

Week 09 Lecture 02 Sources:

- Carney, Judith and Richard Rosomoff. 2009. *In the Shadow of Slavery: Africa's Botanical Legacy in the Atlantic World*. Berkeley: University of California Press.
- Cross, Stephen. 2016. *The Fever of 1721: The Epidemic That Revolutionized Medicine and American Politics*. New York: Simon and Schuster.
- Etkin, Nina L. and Paul J. Ross. 1991. Recasting malaria, medicine and meals: a perspective on disease adaptation. In Lola Romanucci-Ross, Daniel E. Moerman and Laurence R. Trancredi, editors. *The Anthropology of Medicine: From Culture to Method*. New York: Bergin and Garvey. Second edition. Pages 230-258.
- Herbert, Eugenia. 1975. [Smallpox Inoculation in Africa](#). *Journal of African History* 16(4):539-59.
- Pierson, William D. 1993. *Black Legacy: America's Hidden Heritage*. Amherst: The University of Massachusetts Press.
- St. Croix, F. W. de. 1944. *The Fulani of Northern Nigeria*. Lagos: Government Printer. (Available in the New York Public Library).

African Contributions to World Medicine

1. Africa south of the Sahara has made at least two major contributions to world medical knowledge:
 - Vaccination
 - Anti Malarial compounds

African Contributions to World Medicine

2. Other African contributions may only be awaiting a fuller understanding of African medical knowledge by the outside world.
3. African traditional healers have rich traditions of knowledge and practices some of which may be medically sound by Western standards.

Vaccination

4. One key African invention was vaccination against pneumonia and smallpox.
5. Vaccination - originally called "variolation" - has also been reported from China and from Turkey many years before the knowledge of it developed in Europe.

Vaccination

6. The usual histories of medicine attribute smallpox vaccination to the British doctor Edward Jenner.
7. Jenner was a country doctor in Gloucestershire in Western England.

Vaccination

8. In 1796 he carried out the first experimental vaccination against smallpox.
9. Jenner was aware of tales by elderly ladies that milkmaids did not get smallpox

Vaccination

10. Jenner was known as a careful observer.

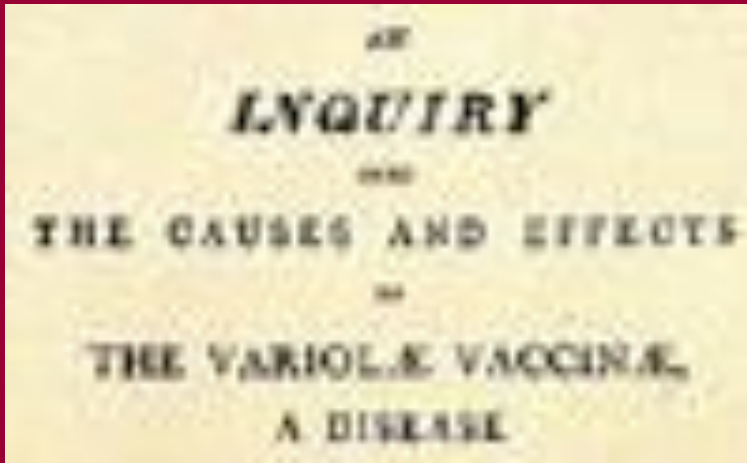
11. He reasoned that somehow having cowpox must produce immunity against smallpox.



Vaccination

12. So...he took some pus from the cowpox blisters of a milkmaid named Sarah... and...

13. Injected it into a young boy named James Phipps.



Vaccination

14. He then injected Phipps with smallpox pus.

15. But Phipps survived, demonstrating the correct deduction and the life-saving discovery.

16. Jenner refused to patent his new technique, giving it to the world for free.

Vaccination

17. It is said he did not want the vaccination to be kept from the poor because of patent costs.

Vaccination

18. But there is more to the Edward Jenner discovery than this official history.

19. Vaccination using a horse serum was already known from Turkey at least 100 years before Jenner.

Vaccination

20. The Turkish process is now thought to have originated in China at least 1,000 years earlier and is documented in Chinese writings.

21. We shall note the Chinese discovery later in this course - in week 15.

Vaccination

22. By the way, the word "vaccination" comes from "vacca," the Latin word for "cow."

23. But vaccination is a more general procedure in which an illness is prevented by the body building up immunity against a serious disease through experiencing a weaker disease.

Vaccination

24. The means by which vaccination works was only discovered in the 1880s by the famous French scientist Luis Pasteur.

Vaccination

25. Pasteur extended Jenner's method to develop a vaccine against rabies.



Vaccination

26. The entire history of vaccination, then, goes forward from Jenner to Pasteur and others - including Polio vaccine inventor Dr. Jonas Salk - and back through Turkey to ancient China.

Vaccination

27. But a separate vaccination history has been given less attention historically...

28. This is the vaccination originating from Africa.

Vaccination

29. You will recall the Fulani animal herders from the previous slide presentation on the Sahel.

30. The Fulani live with their animals and spend much time caring for them.

Vaccination

31. Scattered traveler reports in the 19th century suggested Fulani knowledge of vaccination of animals and possibly humans.

32. Then, in 1944 a British veterinarian working in Nigeria reported a more official finding:

Vaccination

33. ...for...“vaccination against contagious bovine pleuropneumonia...A piece of infected lung is left in milk for 2 or 3 days until of a sufficient 'sourness.' A small piece is inserted under the skin of the nose of each beast to be treated, a cut being made to receive it, and the piece pressed well in...

Source: F. W. de St. Croix. 1944. *The Fulani of northern Nigeria*. Lagos. Government Printer. Page 23. This document is available in the New York Public Library

Vaccination

...Some days later the beasts are again caught and fired, [burnt or cauterized] an oval being described about the seat of vaccination on the nose. Other lines are made, one on either side of the face, later, in cases where extensive reaction threatens; in order to encircle swellings which spread towards the neck, in an attempt to limit them”

Vaccination

34. This description suggests extensive understanding of various aspects of infectious disease, without the specific knowledge of the germ theory later developed by Pasteur in France.

Vaccination

35. The British officer, F. W. St. Croix, also reported advanced surgical practices and awareness of the dangers of infected water among the Fulani.
37. The Fulani are among the widest spread-out ethnic groups in Africa.

Vaccination

38. Their knowledge is likely to have been picked up by other groups seeking escape from dangerous diseases such as small pox.

Vaccination

39. Perhaps that is how the Fulani vaccination method made its way to colonial America via the slave trade.

40. It was 1721 in Boston, Massachusetts.

Vaccination

41. A smallpox epidemic was raging.

**42. And among the town's citizens was
a man named Cotton Mather...**

Vaccination

43. Cotton Mather was from one of New England's most illustrious families.

44. He had graduated from Harvard in 1678.



Vaccination

45. And became an influential Puritan minister in the city.

46. By chance Mather happened to ask a slave named Onesimus if he was infected.



Vaccination

47. Onesimus replied that he had taken a small dose of the disease as a child and was now immune from it. He showed Mather the scar on his arm.

48. Mather was astonished and wished to try the African medical practice on Bostonians to protect them from the epidemic.

Vaccination

49. But most physicians were opposed to ideas coming from Africa which they regarded as an un-Christian lair of the devil.
50. Only one doctor, Zabdiel Boylston - also from an aristocratic family - was willing to try it.

Vaccination

51. Boylston took some puss from a smallpox sufferer and inserted it with a needle under the skin of Mather's son - just like the Fulani technique for cattle inoculation described earlier.



Vaccination

52. The boy survived - eventually of 244 who were "vaccinated" only 6 died (2.5%) compared with 844 of 5,980 persons (14%) who got smallpox and had not been inoculated.

Vaccination

53. Gradually the African vaccination technique spread throughout the American colonies.

54. Mather called it the "Guaramantees cure," named after the ethnic group he claimed Onesimus was from.

Vaccination

55. The term *Guaramantees* was used at the time to describe Africans brought from the slave trading fort of Kormantin on the Gold Coast of West Africa - now called Ghana.

56. The "real" *Guaramantes* were a Saharan North African people mentioned by Herodotus

Vaccination

57. In 1753 Cadwallader Colden of New York wrote about learning from his “Negro servants” of a method for preventing smallpox that they had learned growing up in Africa.

58. Onesimus himself was a first generation slave - educated in Africa.

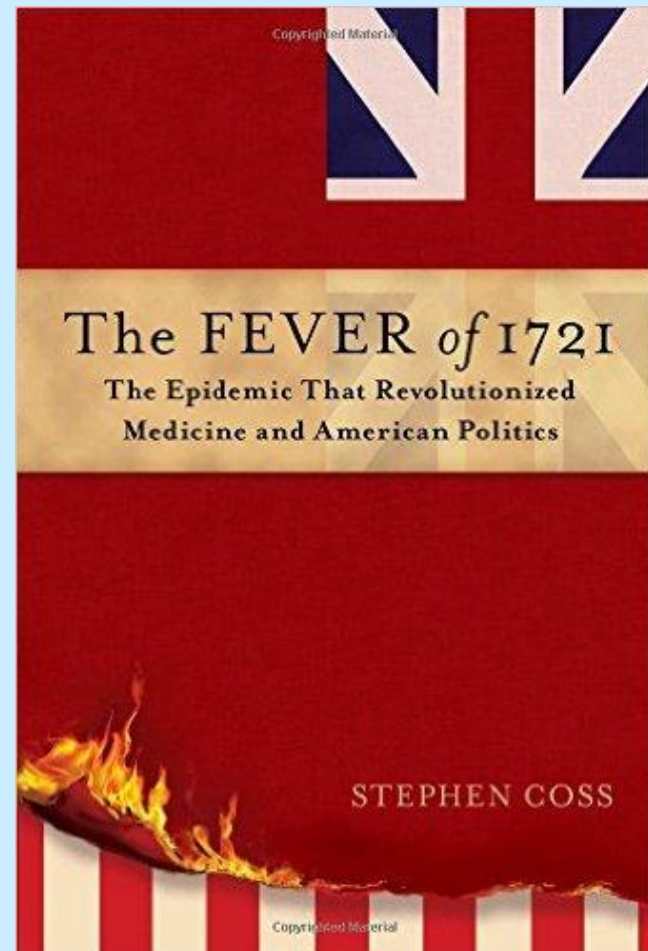
Source: Pierson, William D. 1993. *Black Legacy: America's Hidden Heritage*. Amherst: The University of Massachusetts Press. Page 102.

Vaccination: March 27, 2016 Update

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Anth 140: Non Western Contributions to the Western World
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57a. A just published book about the 1721 smallpox epidemic in Boston confirms the story by Mather and explores its relevance for U.S. history. For a pdf summary of the book click on [this link](#):

Cross, Stephen. 2016. *The Fever of 1721: The Epidemic That Revolutionized Medicine and American Politics*. New York: Simon and Schuster.



Vaccination

59. The evidence thus strongly suggests that:

- Africans learned about vaccination from the Chinese - this is possible because East Africa engaged in commerce with India and China for hundreds of years, or
- Africans - probably Fulani - discovered vaccination independently

Vaccination

60. The lack of any Chinese terms for the Fulani practices and the fact that the Fulani practices originated with their cattle - a practice not known in China - support the view that the Fulani independently developed vaccination.

Vaccination

61. During the American revolution, US soldiers received "African" style vaccinations. Few of them got smallpox.
62. By contrast the British mercenaries (Hessians) were not vaccinated and often succumbed to the disease.

Vaccination

63. It is thus possible that Onesimus and his African ancestors helped America win its independence.

64. At the very least they saved the lives of many thousands of colonial Americans

Vaccination

65. And - like Edward Jenner (though for different reasons?) - they received no patent royalties for the invention of their people.

Vaccination: 2010 Update

65a. You can read more about the African-invented means of preventing smallpox and its North American consequences in:

Herbert, Eugenia. 1975. [Smallpox Inoculation in Africa](#). *Journal of African History* 16(4):539-59.

(Click on the title to access the article.)

Anti-Fever Medications

65b. An African-born Brazilian slave named Quassi in 1730 discovered a tree whose bark could reduce fevers in humans.

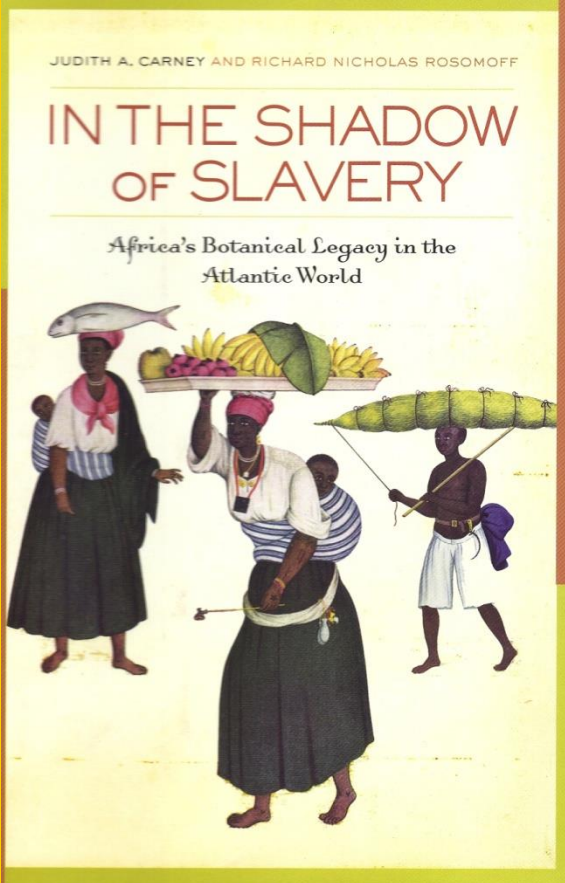
2010 Update



2010 Update: Anti-Fever Medications

65c. This tree became so famous that the Swedish plant classifier Linnaeus named it after him: *Quassia amara*. It is the only plant species named after an enslaved person.

Source: Carney, Judith and Richard Rosomoff. 2009. *In the Shadow of Slavery: Africa's Botanical Legacy in the Atlantic World*. Berkeley: University of California Press. Page 90.



Fighting Malaria

66. Earlier in this course we discussed how the quinine bark discovered by the ancient Peruvians allowed humans to prevent and cure malaria.

67. But in recent years new strains of malaria have developed that are resistant to quinine.

Fighting Malaria

68. The search is thus on for alternative drugs to quinine and its synthetic offshoots.

69. Existing alternative synthetics have proven to be expensive and have harmful side effects in many patients - eg Fansidar

2012/2016 Update: Fighting Malaria

To learn about how malaria attacks the human body in a short, illustrated report, click on:

http://sickle.bwh.harvard.edu/scd_background.html

This source also explains the relation between malaria and the sickle cell. It will also help you follow the next few slides about Hausa traditional medicine

Fighting Malaria

70. But - the Hausa people of West Africa have developed a series of traditional plant-based compounds that are

- Effective
- Inexpensive
- Easy to manufacture
- Come from plants they already know how to grow

Fighting Malaria

71. The ethno-medicine of the Hausa people thus offers great promise in fighting malaria worldwide.

72. But we need to verify the Hausa medicines with Western science.

Fighting Malaria

73. In 1975 medical anthropologist Nina Etkin from the University of Hawaii joined several researchers to evaluate the Hausa plant based compounds

74. They studied 400 people who used 637 plants and displayed 808 diseases and symptoms.

Source: Etkin, Nina L. and Paul J. Ross. 1991. Recasting malaria, medicine and meals: a perspective on disease adaptation. In Lola Romanucci-Ross, Daniel E. Moerman and Laurence R. Trancredi, editors. *The Anthropology of Medicine: From Culture to Method*. New York: Bergin and Garvey. Second edition. Pages 230-258.

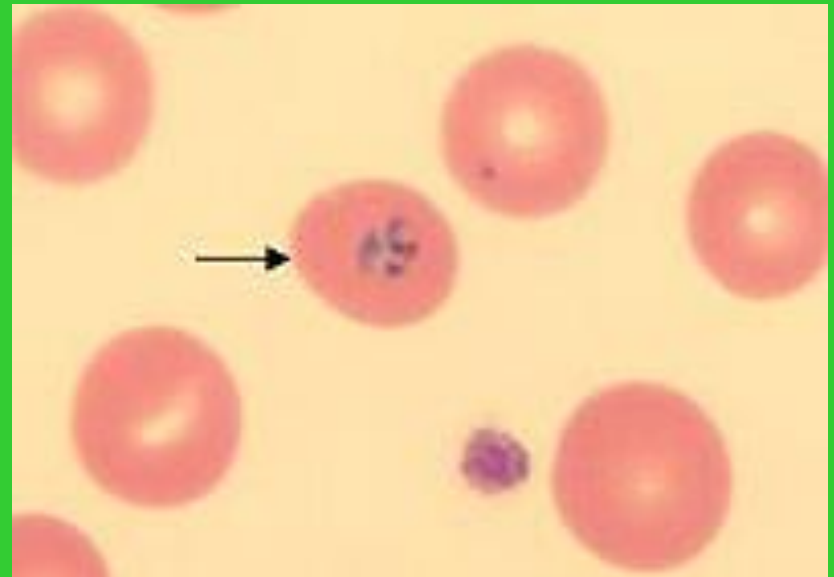
Fighting Malaria

75. They subjected the plants used by the Hausa for malaria to analysis by modern Western scientific methods.
76. The plants are now cataloged at the Missouri botanical garden herbarium.

Fighting Malaria

77. Malaria is a parasite
inside the red blood
cells.

78. Note that normal red
blood cells are puffed
up



Fighting Malaria

79. The normal
puffed up red blood
cells carry oxygen
throughout the
body.

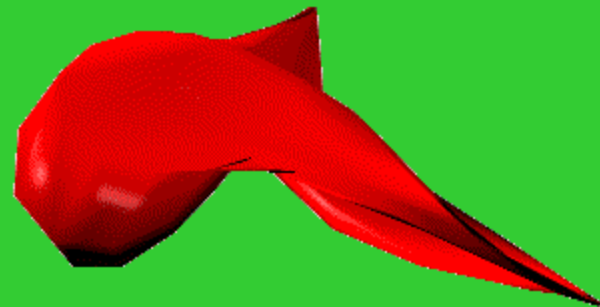


Fighting Malaria

80. Malaria requires puffed up or
"oxidized" red blood cells.

Fighting Malaria

81. Sickle cell - a genetically transmitted condition of a percentage of the red blood cells - reduces the oxygen levels in the red blood cells.



Fighting Malaria

82. More than 15% of “sickled cells” can cause sickle cell anemia - a painful and sometimes lethal disease.

83. But a smaller number of sickled cells “only” has one effect: it protects the carrier against malaria.

Fighting Malaria

84. The correlation of sickle cell and resistance to malaria was discovered in the 1950s by medical anthropologists.
85. This proved that sickle cell was not a “racial disease” as had been thought earlier but instead is a mutation following the laws of the theory of evolution.

Fighting Malaria

86. By lowering oxygen levels in the blood, the sickle cell causes premature release of immature malaria parasite “babies” that are incapable of prolonging the infection.

87. Based on this understanding we can predict that...

Fighting Malaria

88. ...serious blood antioxidantizing agents should be able to parallel in a short term way the long term effects of the sickle cell.

89. Which - should help suppress the malaria infection.

Fighting Malaria

90. The antioxidizing effects of chemicals in the blood are difficult to measure except in the case of the sickle cell.
91. But - it turns out - when red blood cells decompose they produce a compound called methemoglobin.

Fighting Malaria

92. When methemoglobin is produced we can surmise that antioxidizing is occurring and can guess that antimalarial effects are likely.

93. The Hausa eat a ground up root called *Guiera senegalensis*...

Fighting Malaria

94. Which...in US medical tests caused a 100% methemoglobin transformation within 2 hours of contact with human red blood cells.
95. Four other Hausa medicinal plants caused over 50% methemoglobin creation.

Fighting Malaria

97. Whereas control plants - just regular plants not suspected of antimalarial properties - caused only a 0.5% methemoglobin creation.

98. So...does this mean the Hausa plants actually cure malaria?

Fighting Malaria

99. Etkin and Ross injected extracts of the 5 most methemoglobin-creating compounds into humans suffering from malaria.

100. Three of the extracts reduced malaria to 0-1% after 7 days.

Fighting Malaria

101. Of great importance in this study: the Hausa plant based chemicals suppress malaria in the manner of the sickle cell but without any of the sickle cell side effects.

102. Quinine and its derivatives operate in an entirely different way.

Fighting Malaria

103. The Hausa consciously choose to ingest their antimalarials at the time of year when they know infections are most likely - that is, when mosquitoes start to bite.

Fighting Malaria

104. It thus seems likely that the Hausa have discovered a set of antimalaria medicines that avoid the sickle cell and could also bypass the resistance of some of the newly mutated malaria parasites to quinine and related drugs.

Fighting Malaria

105. That the battle against malaria might thus be won by learning from the knowledge of the Hausa people of Nigeria and surrounding areas of West Africa.

African Contributions to World Medicine

End of Week 09 Lecture 02 on African Contributions to Preventing Smallpox and Curing Malaria