

The Problem: Health and the Panama Canal



In the 19th century, travel between the Atlantic and Pacific oceans by boat was a long and arduous trip - down around the tip of South America. Travel across North America was time consuming and challenging and travel across the narrowest part of the continent - the Isthmus of Panama - could greatly shorten the travel time. The discovery of gold in California in 1849 generated more interest in crossing more quickly. To that end, a railroad across the Isthmus was opened in 1855; an effort that although accomplished rapidly, still resulted in 12,000 deaths. But it was still thought that a shipping route across the Isthmus, a canal, would facilitate travel and shipping.

An engineer surveyed the route and proposed a canal. The French, encouraged by their success with the Suez Canal, set out to build a sea level canal in a tropical and mountainous area far less salubrious than the Suez. Beginning in 1880, the French effort was plagued by geographical, climatic and health issues; ranging from landslides, accidents, and deaths.

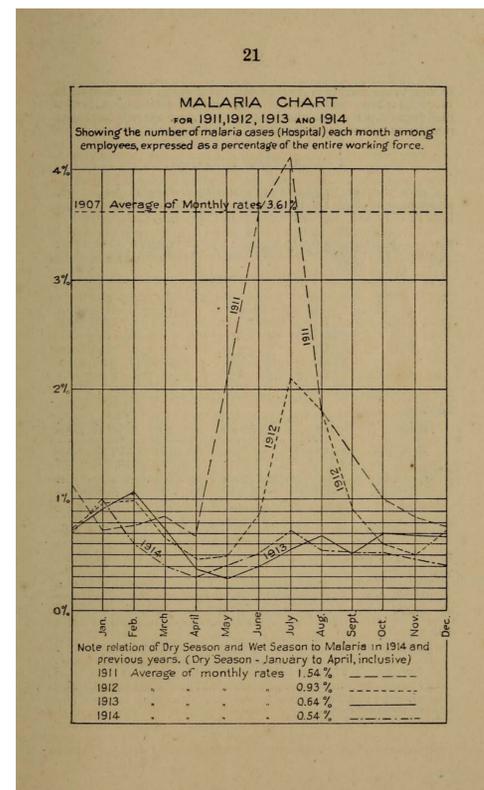
Diseases that plagued the tropical region included typhoid, pneumonia, cholera, bubonic plague, beriberi and dysentery. But the most serious were tropical diseases prevalent in hot, swampy regions; yellow fever and malaria. The working conditions created by engineering difficulties and disease resulted in high death rates that decimated the work force; 22,000 workers perished in the nine years of the French effort. When news of the working conditions spread, skilled laborers refused to sign on or to continuing working. By 1889 the French effort to build the canal, plagued especially by tropical fevers, had collapsed.



History and Impact of Disease

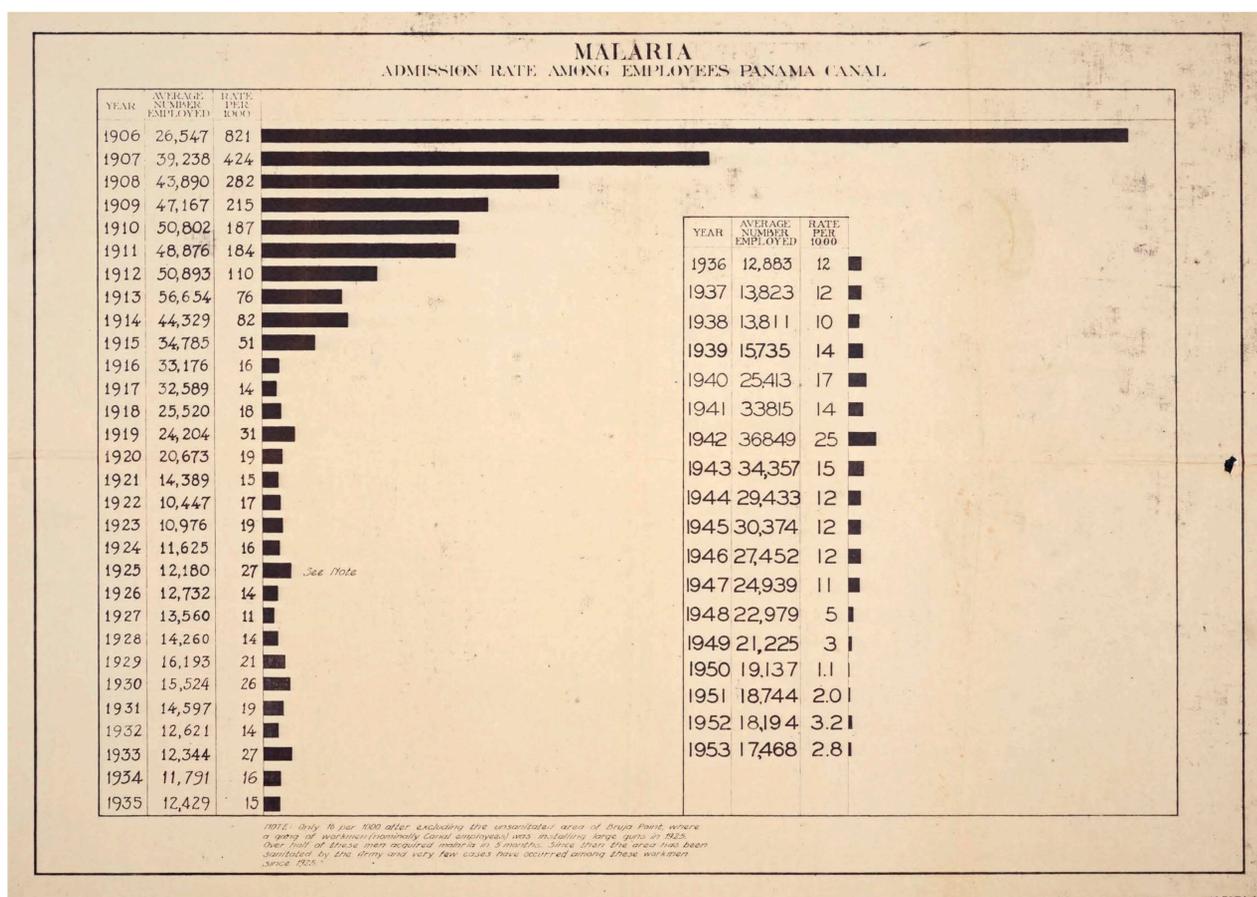
Epidemic and infectious diseases played major roles in shaping history. Of these diseases, malaria and yellow fever stand out for their mortality/morbidity rates, seasonality, and presence in warm, swampy regions. Because of this association, they could render particular areas uninhabitable, and affected migration and settlement patterns. Because malaria and yellow fever both were common in these warmer, damper, mosquito-ridden areas (although the mosquito connection was invisible for many centuries), and fever was part of the disease, they often were lumped together as “tropical fevers.” They also were believed to be associated with miasmas, or “bad air”- the Italian origins for the word “malaria.”

Malaria had a geographic wide distribution ranging from England, the Mediterranean, Africa and Asia, and in North America into the Great Plains. Malaria is caused by a single-celled parasite, *Plasmodium*, which is injected into the bloodstream by the *Anopheles* mosquito. It is characterized by a fever that waxes and wanes as the parasite breeds within the host’s red blood cells. Malaria is more likely to cause illness and to weaken than to kill, although certain strains are deadlier than others. This disease has affected human genes, with at least 5 mutations, including the gene for sickle cell anemia, conferring some resistance to malarial infection. It also was thought to affect settlement patterns in China, the Middle East, and even North America. A more deadly strain of malaria, *Plasmodium falciparum*, brought from Africa through the Atlantic Slave Trade, would make Western Hemisphere tropics deadly.



Yellow fever was more deadly and had higher mortality rates than malaria. Carried by the *Aedes* mosquito, it is an unmistakable illness, with symptoms including jaundice and black vomit. It probably originated on the African continent and was brought to the Americas along with malaria. It became endemic in the Caribbean and made periodic inroads into North America. Epidemics struck as ships brought infection from warmer climates causing panic, flight, social upheaval and disruption. During the 1793 yellow fever epidemic in Philadelphia different political parties were associated with different treatments with one party losing power partly because of this association. After the 1878 yellow fever epidemic, Memphis rescinded local control to

create a municipal government and sanitation system. The need for centralized responses led to creation of the National Board of Health.

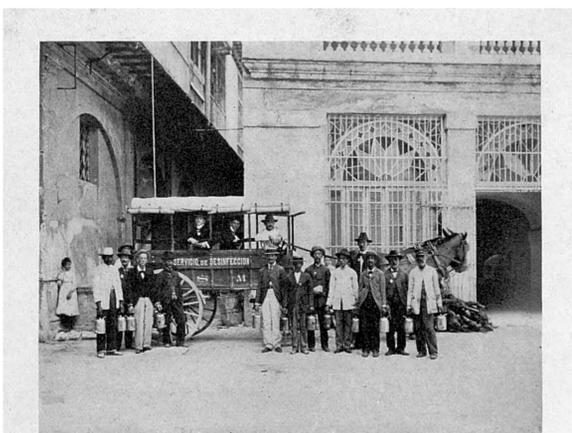


The two diseases shaped populations and relations in the tropical world and elsewhere. Nowhere was this influence more dramatic and important than in building the Panama Canal and especially in the early French failure. And without the discovery of the disease vectors, the U.S. would have had more difficulty - and lost far more lives.

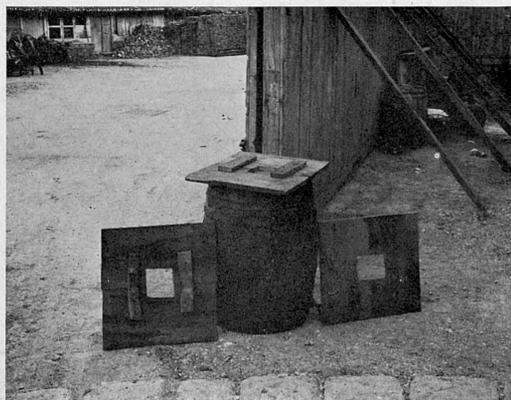
Addressing the Problem

In the period between French efforts to build a canal (1880-1889) and American acquisition of the territory (1904), medical breakthroughs identified the sources of malaria and yellow fever, focusing disease control efforts on preventing transmission by eradicating mosquitoes. Prior to this knowledge, focus on sanitation - quarantine and cleanliness - had limited success. Ultimately, eliminating mosquito breeding sites and excluding the insects from homes would dramatically decrease death rates in urban areas (Cuba) and swampy rural areas (Panama).

Discovered in 1880 by Charles Alphonse Laveran, malaria parasites were shown to be transmitted by mosquitoes by Ronald Ross - a British medical officer- in 1897. In 1898, Giovanni Batista Grassi and a team of Italian investigators showed human transmission and the lifecycle of *Plasmodium* in humans.



Stegomyia Squad. Havana.



Screened Water Barrel. Havana.

Malaria provided an example of a mosquito borne disease, but the search for yellow

fever's cause occurred generally without reference to this work. In 1881, in Cuba, Dr. Carlos Finlay first postulated a mosquito vector. Dr. Finlay's personal observations in Havana provided the basis for his theory which included identifying the responsible mosquito, although he was unable to prove it experimentally. His theory was discounted at first. However, a rising interest in tropical fevers after the Spanish American War led the U.S. to focus more research on finding the cause of yellow fever. In 1900, Walter Reed returned to Cuba as part of the U.S. Army Yellow Fever Commission to study yellow fever.

Walter Reed was able to show that mosquitoes transmitted the disease and that it was not caused by contact with infected individuals, or their bedding. The process required human volunteers who were willing to risk contracting the disease. Several of the volunteers died from their exposure.

Once the mosquito was identified, it was possible to target their breeding grounds. William Gorgas, chief sanitation officer in Havana, led the efforts to address eradication. Habits of the *Aedes* mosquito made it possible to fumigate homes, eliminate standing water and control the mosquito in urban areas. Thus, within a short period of time, yellow fever was eradicated in Havana.

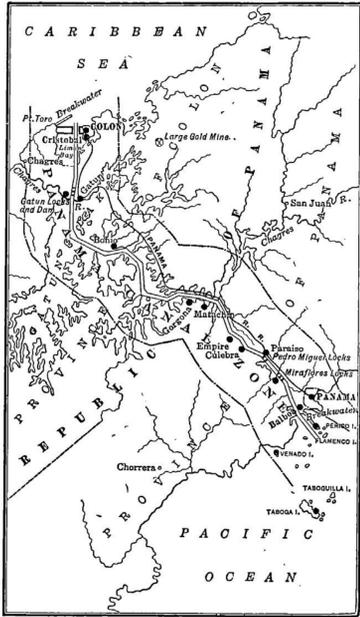
When he heard about the U.S. plans to build the canal, Gorgas requested a transfer to Panama, believing methods for eliminating the yellow fever-carrying mosquito could translate to the rural areas of Panama. Malaria would be a bigger challenge but efforts could reduce morbidity.



Applying Knowledge of Mosquitoes



William Gorgas was appointed chief Sanitation Officer of the Canal in 1904 and began the effort to control mosquitoes in the Canal Zone, which was acquired by the United States that same year.



Map of the Panama Canal Zone, Showing Hospitals of the Sanitary Department.



Screened Yellow-fever Ward. Ancon Hospital, Panama.



St. Charles Ward, Ancon Hospital. Building in Which Twelve Hundred Frenchmen Died of Yellow Fever.



Distilled Water Cart. Culebra.



Ward at Ancon Hospital.



Ancon Hospital

Ancon Hospital was renamed Gorgas Hospital in 1928

Request from Isthmus for Employment of
Form 110
Nurses - Reg. 3/25 to 5/1/17

ISTHMIAN CANAL COMMISSION
WASHINGTON OFFICE

CANAL ZONE GOVERNMENT
File No.
JUL 18 1907
CHIEF SANITARY OFFICER
June 21, 1907.

Madam:-
You are hereby provisionally employed as Nurse, -----
under the Isthmian Canal Commission for duty on the Isthmus of Panama, your compensation to be at the rate of Sixty dollars (\$60) a month ----- United States currency value, for the performance of such duties as may be determined by the head of the Department to which you are assigned upon arrival on the Isthmus, to serve at the pleasure of that official, subject only to the allowances and conditions shown on the reverse of this sheet.
This paper should be presented by you upon arrival in the harbor at Colon to the authorized representative of the Isthmian Canal Commission, who will come aboard ship at that port and advise you as to your assignment to duty.
Very respectfully,
Rufus A. Lane
Assistant to the Secretary.

Miss Anna L. Doolittle,
Williamson,
West Virginia.

I certify that in accordance with the above contract, I called upon New York by the Steamer
Panama July 3-07
H.P. Carter
CHIEF SANITARY OFFICER

170 C. E. Rev. Ancon, C. Z., October 15, 1909.

APPLICATION FOR INCREASE OF PAY FORCE

At Ancon Hospital,

Department of Sanitation, Division

| No. of MEN OR PAY No. | NAME | PRESENT RATING | PROPOSED RATING | PRESENT PAY | PROPOSED PAY | TAKES EFFECT |
|-----------------------|-------------------|----------------|-----------------|-------------|------------------|----------------|
| | Anna L. Doolittle | Nurse | Nurse | \$60. | \$75. per month. | Oct. 16, 1909. |

TOTAL AMOUNT INCREASE \$ 15.00 GOLD LOCAL CURRENCY \$

Explanation and Remarks:
Citizen of U. S. A.
Color White
Age
First employed July 3rd, 1907.
In present rating Since.
Experience in proposed rating
Recommended by (Signed) W. C. Gorgas
Grade Chief Sanitary Officer.
Approved:
General Order No.

(This column should be left blank.)
Checked for
Age
Citizenship
Medical Certificate
Previous Record
Length of Service
Authorization
Approved by direction of Chairman:
Miss Doolittle

NOTE: When appointment or promotion is to fill vacancy in approved organization identify vacancy by citing name of last incumbent.

Images Top Row: Gen. W. C. Gorgas, between ca. 1910 and ca. 1915. Library of Congress; Pages from *Sanitation in Panama* (William C. Gorgas). University of Florida Digital Collections. Middle Row: *Ancon Hospital, Ward 13 (Colored) Section C - Aug 1919*. Images from the History of Medicine (NLM). Bottom Row: *Employment Documents for Miss Anna L. Doolittle (nurse)*. George A. Smathers Libraries Panama Canal Collection.