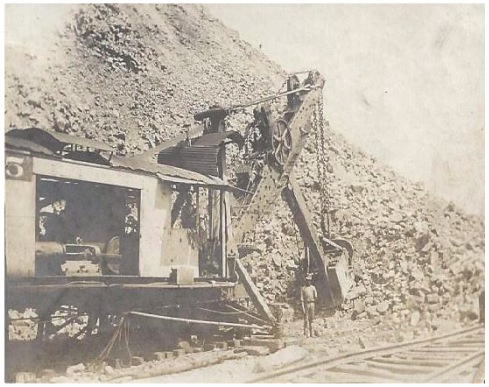
William C. Gorgas and the Panama Canal: Celebrating One Hundred Years



A steam shovel in the Canal's Construction Zone.
Photo from the Gorgas Family Collection, UA Museums.

As the need grew for a quicker way to transport goods from the Atlantic to the Pacific in the 1800s, European countries vied for the opportunity to build a canal across Central America in an effort to control transportation and trade along what was sure to be a heavily-travelled and profitable route. Both the British and the United States initially planned to build a canal through Nicaragua, but the French looked to the Isthmus of Panama, then part of the Republic of Columbia, for their canal. Ferdinand de Lessups, who had previously directed the construction of the Suez Canal, led the French project, despite his lack of training as an engineer and the physical differences between the two locales—the Suez was flat, desert terrain not far above sea level, while the Panamanian forest was mountainous, rocky, and split by rivers which drained the region's heavy rains. The most significant obstacle for the French was not the mountains or the rain, but tropical diseases such as yellow fever and malaria, which killed approximately 20,000 workers over the nine years of the French project.

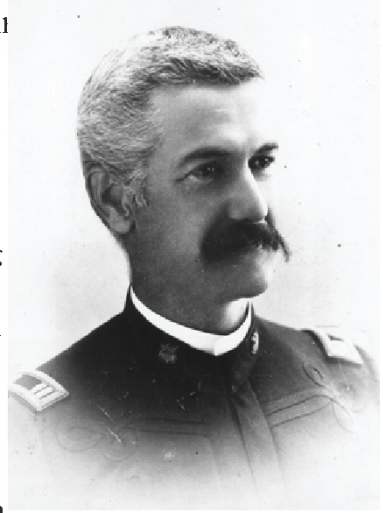
When de Lessup's attempt failed, the United States began negotiating with the Columbian government for their own canal project—but when diplomacy failed over financial terms in 1901, President Roosevelt dispatched U.S. warships to the isthmus in support of Panamanian independence. The newly-declared Republic of Panama agreed to permit the United States a ten-mile wide strip of land for their canal, which was completed in 1914—a fifty-mile route that proved to the world that the United States was an economical and technological superpower.

The United States maintained control of the Panama Canal Zone until 1999, when it was returned to Panama by the Torrijos-Carter Treaties of 1977. The Canal is currently undergoing an expansion project to enable it to accommodate more traffic and larger modern vessels.

A series of locks along the Panama Canal help move traffic through the changes in elevation.
Photo from the Gorgas Family Collection, UA Museums

Who was William C. Gorgas?

William Crawford Gorgas, born in 1854, was the eldest son of Josial and Amelia Gorgas. His work with yellow fever started when he was a student at the University of the South in 1972, when he travelled to the city of New Orleans with a group of students to help during a severe outbreak of the disease, which lasted seven months and killed 588 people, including two of Gorgas' fellow student volunteers.



William Crawford Gorgas
Photo from The Gorgas Family Collection, UA Museums

Gorgas enrolled in Bellevue Hospital Medical College after having been denied entry to the West Point military academy, and gained a military career by joining the U.S. Army Medical Corps in June of 1880. While stationed in Brownville, Texas, he contracted yellow fever himself and he met Marie Doughty, also a patient, while convalescing. The two fell in love and were married in 1885.

After the Spanish-American War, Gorgas was named Sanitary Officer for the City of Havana, Cuba in 1898. When he accepted the position, Gorgas knew that he would be in charge of a city with a yellow fever casualty rate of approximately 500 yearly. Within months, Gorgas, working with Major Walter Reed and Cuban physician Carlos Finlay had brought the death toll down to zero.

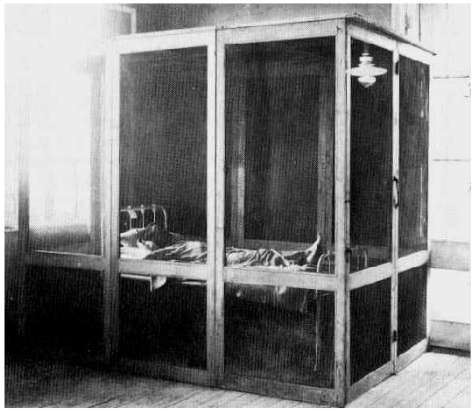
Gorgas' work in Cuba led to his appointment as Chief Sanitary Officer of the American canal project in 1904. His success at eradicating yellow fever and malaria in Panama gave him international acclaim, and he was named United States Surgeon General in 1914, at the beginning of World War I. Under Gorgas' leadership, that war was the first conflict in American history where fewer casualties were attributed to disease brought on by a lack of medicine and poor sanitation than by enemy fire.

William Crawford Gorgas
Photo from The Gorgas Family Collection, UA Museums

Gorgas received many national and international awards in recognition of his achievements in public sanitation and disease control, including the Distinguished Service Cross, appointment as a grand officer of the Order of the Crown of Italy, the Star of Belgium, and the Grand Cross of the Legion of Honor of France.

Gorgas retired from the Office of the Surgeon General in 1918, but remained much sought after internationally for new sanitation projects. He was on his way to West Africa as Director of the Yellow Fever Control Program when he suffered a stroke in London, England. King George V visited Gorgas in the hospital, awarding him an honorary knighthood. Gorgas was given a state funeral service in St. Paul's Cathedral, before being returned to the United States for burial in Arlington National Cemetery.

Disease and the Canal



A yellow fever patient convalesces in a quarantine chamber in 1905. Photo from canalmuseum.com.

Yellow Fever

Yellow Fever is an acute viral disease transmitted by infected mosquitos. Evolving in Africa, it was carried across the Atlantic Ocean by European ships in the 1600s, and quickly spread throughout the Americas. Most cases of yellow fever are mild. Early symptoms of the disease include headache and fever, muscle pains, backache, and nausea or vomiting. These early symptoms usually fade after three or four days, leaving the victims immune to the disease for the rest of their lives.

In approximately one case out of every five, the victim will enter a second toxic phase of the disease. Within twenty-four hours of the initial remission, the victim develops a case of jaundice (the "yellow"in yellow fever), along with high fever, abdominal pain, vomiting, and in some cases bleeding from the mouth, nose, eyes, or stomach. Half of the patients who enter the toxic phase die within 10 to 14 days, the rest recover without significant organ damage.

Malaria

Malaria is another mosquito-borne illness found in tropical and sub-tropical regions, cause by a parasitic protozoa rather than a virus. Early symptoms of malaria resemble the flu: headache, aches and pains, and vomiting. The classic symptom of the disease is the recurrent cycle of chills, fever, and sweating which repeat on a cycle of two or three days. Unlike yellow fever, surviving a bout of malaria does not confer immunity to the diesase -- instead many malaria victims suffer the disease time and again.

Gorgas' fight with "Yellow Jack"

At the time of the Canal's construction, the idea of the mosquito as a carrier for infectious disease was not accepted as popular belief. Instead, many believed that yellow fever and malaria were caused by bad air or soil, the "miasma theory" of disease that the hot, humid conditions of Panama (so perfect for mosquitoes) seemed to support. Given this popular misconception, Gorgas had difficulty promoting the mosquito eradication methods that had worked for him in Cuba: adding screens on houses, spraying standing water in puddles and ditches with kerosene, and fumigating and cleaning houses and buildings.

Success in Cuba aside, many members of the Isthmian Canal Commission refused to believe that mosquitoes were the culprit rather than "miasmas" or bad air, and Gorgas faced official restrictions placed on him by fellow members of the commission, refusal by the first head of the sanitary commission, John Findley Wallace, to authorize necessary supplies, and resistance by government officials to enforce suggested sanitary regulations.

A worker sanitizes a field with a mosquito oiler. Photo from the Library of Congress.

Gorgas and Sanitation at the Canal Zone

The Isthmian Canal Commission with Gorgas (third from left).
Photo from Digital Library of the Caribbean (dLOC), http://www.dloc.com.

The American Medical Association sent a surgeon to investigate conditions in Panama in 1905, the year after Gorgas arrived in Panama. The report condemned the commission, while praising Gorgas' efforts. On receiving the report, President Theodore Roosevelt decided to replace all members of the committee, including Gorgas, but Alexander Lambert, Roosevelt's personal physician, counseled otherwise: "You are facing one of the greatest decisions of your career," he said. "If you fall back on the old methods you will fail, just as the French failed. If you back Gorgas you will get your canal."

Roosevelt took that advice, granting Gorgas autonomy from the commission and funding. Gorgas then unleased one of the most extensive sanitary campaigns in history: in 1905, more than 4,000 people worked for Gorgas on his "mosquito brigades" in what would become a yearlong effort to prevent the insects from reproducing. A legion of fumigators armed with cleaning agents, insecticide powder, and wire mesh for screening windows and doors, visited every house in Panama repeatedly; drains and cesspools were prayed with kerosene; pools of standing water were drained or filled in. Gorgas' army of sanitation workers used 120 tons of pyrethrum powder, 300 tons of sulfur, 600,000 gallons of oil, 3,000 garbage cans, 4000 buckets, 1,000 brooms and 1,200 fumigation pots… and by August of 1906, the number of yellow fever cases had fallen by half. In September, 1906, only seven new cases appeared… and on November 11, 1906, the last death from yellow fever in the Canal Zone was recorded.

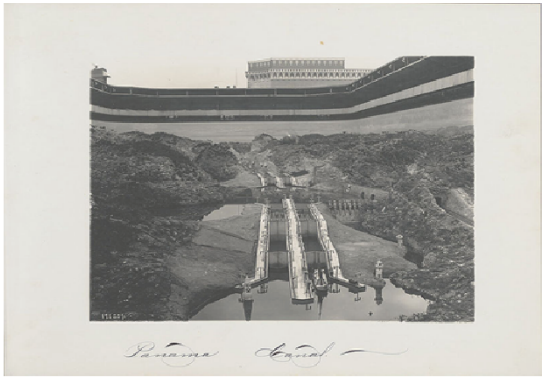
Malaria would take longer to control, but death rates from that disease would drop to less than one percent by January of 1910.

The eradication of yellow fever and malaria by controlling the mosquito population in the Canal Zone changed medicine dramatically: the promotion of the germ theory of disease over the miasma theory is perhaps the most important outcome of Gorgas' work there.

William Gorgas at the canal zone.
Photo from The Gorgas Family Collection, UA Museums

The Panama-Pacific International Exposition

The Panama-Pacific International Exposition took place in Sanfrancisco, California in 1915 to celebrate the United States technological achievements and specifically the opening of the Panama Canal. It also commemorated the 400th anniversary of the discovery of the Pacific by the explorer Balboa. Thirty-one nations and many U.S. states contributed to the Exposition, which filled the Presidio and Marina District with temporary buildings connected by over forty-seven miles of walkways. The structures, though temporary, were designed to impress: the Palace of Machinery, the largest structure in the world at the time, was the first building to have a plane fly through it. The Horticulture Palace had a glass dome larger than that of St. Peter's Basilica in Rome, and the forty-story Tower of Jewels held 102,000 pieces of multicolored cut glass which were illuminated by electric lights after dark. There was a replica of the Greek Parthenon, and a working large-scale model of the Panama Canal itself. It was said that it would take an individual years to visit all these iconic attractions.



The life size replica of the Panama Canal was one of the most popular attractions at the Panama-Pacific International Exposition.
Photo from Charles C. Moore Albums of Panama Pacific International Exposition Views

The Exposition was an ambitious endeavor after the earthquake of 1906 destroyed much of San Francisco and its infrastructure. However, the Fair served to boost San Francisco's economy, and foster trade between the United States and other countries. Today, San Francisco's Palace of Fine Arts, which was saved from demolition and restored in 1964, is the only one of the Exposition's monumental structures still standing in its original location.

The Italian Towers and Festival Hall illuminated at night.
Photo from Jessie Brown Cook Scrapbooks, Documenting San Fancisco History and Law Enfocement, UC Berkley, Bancroft Library