

# Black and yellow

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J. R. McNeill

MOSQUITO EMPIRES

Ecology and war in the greater Caribbean,  
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The annals of empire are saturated with the exploits of soldiers and politicians. Only rarely have historians given due weight to the role of the environment in shaping events. In his original and largely persuasive book, J. R. McNeill seeks to recover the "mutual and reciprocal impacts of geopolitics and ecology", and thus to view afresh the rise and fall of empires in the Atlantic world. McNeill demonstrates that mosquitoes, the vectors for the Yellow fever and malaria viruses, indelibly marked the political and military history of the greater Caribbean between 1640 and 1914. Far from being a work of environmental determinism, *Mosquito Empires* suggests that insects and the viruses they carry functioned as "inadvertent historical actors".

Neither Yellow fever nor its vector, the female of the *Aedes Aegypti* species of mosquito, is native to the Americas. They originate in East or Central Africa. Their appearance and proliferation in the Caribbean form part of the broader Columbian exchange that knit the New World to Europe and Africa in the early modern period. Brought from Africa on slave ships, these mosquitoes flourished in landscapes undergoing rapid environmental change. The rise of sugar plantations resulted in deforestation and soil erosion, providing mosquitoes with ideal breeding and feeding conditions. Then as now, the transformation of the environment disrupted existing ecosystems. The ensuing unstable situation, which McNeill terms "ecole ecology" for its "motley assemblage of indigenous and invasive species", produced unintended consequences for human societies which had sought to harness the resources of nature for their own ends.

How did mosquito-borne viruses affect the geopolitics of the Caribbean for almost three centuries? The key to McNeill's argument is the idea of differential immunity (or differential resistance in the case of malaria). Yellow fever confers full immunity on survivors, whereas it is possible to build up resistance to malaria through multiple exposures to it. Many Africans bound for slavery in the Caribbean came from regions where Yellow fever was endemic, and would have earned immunity through childhood exposure to the virus. Those born in the New World who survived Yellow fever in childhood, when its effects were less virulent, also became immune.

Differential immunity was crucial, because newcomers to the Caribbean who lacked immunity were soon exposed to the scourge of illness, whereas those who lived there from birth, or hailed from regions where it was endemic, were largely spared. The incursion of large groups of non-immune people, whether soldiers or settlers, could, and frequently did, spark epidemics, for the virus could "commandeer countless human cells for an orgy of mass replication", all but wiping out the non-immune population. The bark from the Andean Cinchona tree, also known as "Jesuit Bark", offered some protection against malaria owing to the ability of its alkaloids, commonly called Quinine, to kill certain types of malarial plasmodia in human red blood cells. But there was no prophylactic or cure for Yellow fever, the more lethal of the two diseases, with its signature symptoms of jaundice and black vomit. Yellow fever, which primarily affected cities or other areas with high population densities, plays

the most dramatic role in McNeill's narrative.

The changes wrought by the slave trade, the plantation system, and the burgeoning population of the Caribbean combined to set the ecological stage for the mosquito's repeated intervention in inter-imperial conflicts from the late seventeenth century, when Yellow fever became endemic to the region. The net effect was to frustrate English and French efforts, whether through military conquest or settlement of unpopulated frontier zones, to unseat Spain as the pre-eminent power. As McNeill puts it, Spain's "hold on the region was inexpensively buttressed by mosquitoes and microbes". Many of these historical episodes are scarcely known today, but the ghastly scale of human suffering horrified contemporaries. At the very end of the

eighteenth-century warfare. From their island footholds, the British sought to seize the trade, production and territory of Spanish America. It was for this irresistible target that the perils of Yellow fever would be braved, often with deadly consequences for non-immune British soldiers and sailors. In 1741, Admiral Vernon led a force of 29,000 in an amphibious siege of Cartagena, in modern Colombia, and Santiago, in eastern Cuba. Of these men, 22,000 were dead within a year, a mere 1,000 of whom were battlefield casualties. Mosquitoes claimed the rest. This alarming figure is usefully compared to conflicts in the War of Austrian Succession (1740-48), in which a mere 8 per cent of the British army died from disease and wounds combined. Yet in the Caribbean, as one contemporary ruefully noted, "the Climate soon wages a more destructive war, than the Enemy".

Lessons from these epidemiological debacles were learned slowly, if at all. In 1762, the Earl of Albemarle successfully laid siege to Havana, an impressive feat given that city's formidable fortifications. But the conquerors tarried too long into the rainy season and were soon besieged by Yellow fever. About 10,000 men died in securing Havana for Britain, with only 700 deaths arising from combat. This figure dwarfs the British army's

British troops at a major disadvantage, limiting their ability to hold territory and operate in the humid, mosquito-infested summer months. Only about 5 per cent of Washington's troops were ill at the battle of Yorktown while between a quarter and a half of Lord Cornwallis's surrendering force was infirm.

Both British and French forces were decimated by Yellow fever and malaria in their respective efforts to conquer St Domingue, modern Haiti, during the French Revolutionary wars. It is estimated that between 50,000 and 70,000 British soldiers and sailors died in Caribbean warfare in the 1790s, the lion's share from disease. French forces fared little better. By 1802, an estimated 50,000 had perished, perhaps three-quarters of them from disease. The Spanish Empire's dissolution, too, was facilitated by the differential immunity between the South American rebels and the Spanish troops sent to suppress them. Of the 16,000 troops serving in Ferdinand VII's armies of reconquest, perhaps 90 per cent died, primarily from tropical diseases.

The epidemics that debilitated European military forces in the age of revolutions also greatly affected subsequent invaders in the greater Caribbean. Though they remained entirely unaware of the fact that the vector of Yellow fever and malaria was the mosquito, they did notice that higher elevations were spared epidemics and began to strategize accordingly. Part of the American army's success in its invasion of Mexico in the 1840s may be attributed to accounting for this insight in its war planning, moving away from the low-lying coastal regions before the mosquitoes could swarm. Still, the demands of war sometimes trumped the dictates of prudence or quasi-scientific intuition. In the late nineteenth-century War of Cuban Independence, the Spanish army lost 3,100 troops in battle and 41,000 to disease, including 17,000 to Yellow fever.

This state of affairs would soon change. As late as 1880, the notion that an insect could carry a disease remained strange to many. Yet by 1900, the mosquito was identified as Yellow fever's vector. This identification was made by the US Army's Yellow Fever Commission, headed by Walter Reed, during the American occupation of Cuba. Though the hypothesis was still unfashionable – the *Washington Post* dismissed it as "silly and nonsensical rigamarole" in 1900 – Reed and his team of doctors convinced government policymakers to embark on an anti-mosquito crusade. By 1902, Havana was free of Yellow fever. These tactics were employed with equal effect at another great site of US imperial activity, the Panama Canal, and subsequently promoted by public health missionaries throughout the Yellow fever zone. By the 1930s, a safe vaccine was developed and by the 1950s, Yellow Fever had ceased to be a global scourge. The reign of the mosquito had not ended, but the size of its kingdom had been reduced.

Drawing on an enormous documentary source base, culled from many archives and texts in several languages, and ranging effortlessly across military history and medical science, J. R. McNeill's book is a major achievement. Henceforth, histories of empire, warfare, and international relations that neglect the environmental context of the events they recount will be seriously deficient.



"Yellow Fever, CUBA, c1900.

'Conquerors of Yellow Fever.' Cuban physician Dr. Carlos Finlay (left, in civilian clothes), US Army surgeon Dr. Walter Reed (center), and his doctor for the disease at Dar es Salaam in 1900, Dr. James Carroll (right), who first identified the mosquito as the vector for yellow fever in Cuba after the Spanish-American War. On his return to Havana in 1901, he was ordered to return to Cuba by British troops in the aftermath of the Spanish-American War.

As well as settlement schemes, Yellow fever and malaria shaped the contours of

at the conclusion of the war in 1763. Yellow fever, and to a lesser extent malaria, ensured that the Spanish Empire stayed Spanish. Yet these diseases also played a role in the overthrow of the empires of Spain, France and Britain in the New World. McNeill argues that the British army was hampered by its greater susceptibility to malaria during the American Revolution, particularly in the southern colonies. Differential resistance put