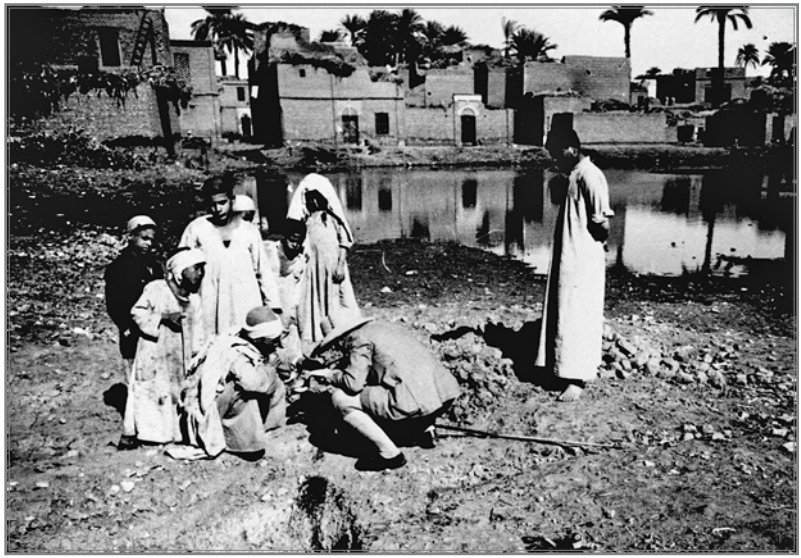
M

is for

MOSQUITO



Because it can implant viruses and parasites into the bloodstream of a mammal, the mosquito has been one of the great concerns of empires large and small. In the colonization of the Americas, yellow fever epidemics spread by *Aedes* mosquitoes were recurring impediments to Spanish, British, French, and Dutch settlers' control of land and resources. Although Indigenous peoples were often threatened by other diseases spread by colonial settlement, there are repeated instances in which Native peoples and enslaved Africans took advantage of immunity to yellow fever in order to challenge colonial rule. The most notable example is the series of military victories against Napoleon's disease-stricken armies during the Haitian revolution, the first successful slave revolution in the Americas.

For British officials, control of mosquitoes and other disease-transmitting insects became a significant environmental target by the late nineteenth century. Insect control was increasingly viewed as necessary for expanding colonial development of agricultural and urban land. It was also significant in the inter-imperial struggles for control of populations and trade routes in Asia, Africa, and the Americas. Recur-

A health worker searches for anopheles mosquitos in Egypt, 1943.
Source: https://profiles.nlm.nih.gov/ps/retrieve/ResourceMetadata/VVBBFN.

ring disease outbreaks spanned the British Empire in the nineteenth century—including the great pandemics of "Asiatic" cholera crossing between India, the Middle East, and Europe. These outbreaks were one cause of concern that generated new investments in British colonial health institutions. As physicians and medical researchers learned more about the health effects of mosquito-transmitted diseases in the late 1800s, these insects increasingly were seen as tiny, mobile threats to a British sovereignty that vested rights in the property-owning, self-reliant male settler. British notions of the colonial right to Native-occupied land relied on the ability of settlers to geographically divide land and cultivate it using sedentary agriculture. Therefore, the ability to control migratory animal species and contain their threats to white control of property became significant to British colonial ideology and institutions. Tropical medicine emerged as a specialty, and the London School of Hygiene and Tropical Medicine was established in 1899. Public health officials in England developed institutions that devoted significant financial resources and personnel to controlling the cross-border transmission of parasites and viruses via mosquitoes. At the same time, British and U.S. health officials began to collaborate in developing new forms of insect eradication, as the U.S. expanded its overseas possessions in the Caribbean and the Pacific. By the first decade of the 1900s, tropical medicine was becoming an inter-imperial enterprise, with British, French, German, and American medical researchers collaborating across borders.

In the process, British and U.S. public health officials developed invasive strategies for mosquito control. In 1942, as British forces battled Nazi soldiers invading Egypt in the northern city of Al-Alamein, *Anopheles* mosquitoes traveled north from Sudan for the first time on record, carrying the *plasmodium* parasite that causes malaria. As they moved up the Nile River, aided by the construction of new dams and increased wartime shipping, the mosquitoes spread disease among a colonized population already facing the depredations of famine and war at the end of Britain's formal rule. From 1942 to 1944, 750,000 people contracted malaria, leading to the death of approximately 135,000 Egyptians.

The Egyptian malaria epidemic demonstrates how mosquito movements and behaviors are affected by the impacts of colonial land use on water and agriculture, the concentration of human settlements, the expansion of transit, and the basic health conditions of a given population. Mosquitoes were not always understood as the vectors of these

diseases. Earlier in the nineteenth century, diseases like malaria were viewed as the results of filth. In England, the "miasma" of airborne dirt was often attributed to the condition of urban workers or rural peasants. But by the end of the 1800s, diseases such as yellow fever, filariasis, and malaria—which we now know are mosquito-borne—were increasingly seen as products of racial differences in personal hygiene. They were represented in racist terms by colonial officials and print media, who depicted these maladies as particular to the tropics: outcomes of poor hygiene, "backward" cultural practices, and unfamiliar climates and environments. What was often lost in such colonial discourses on disease was the simple fact that diseases viewed as "tropical" were often endemic within Europe and North America as well. Before it was known that malaria was transmitted by mosquitoes, famous works of literature, such as Charles Dickens' 1861 novel *Great Expectations*, suggested that malaria was a persistent concern within the British Isles. Dickens' character Pip was stricken with the malarial "ague," attributed to his rural location and his residence near the marshes of Kent.

But it was in the colonies that doctors discovered that mosquitoes were the transmission source of malaria from bodies of water to humans. Beginning in the 1880s, doctors working in colonial hospitals made advances in understanding the cause of malaria. In 1880, at a French-run military hospital in Algeria, Charles Laveran described the parasite that causes malaria. Soon after, researchers working in current or former colonies suggested that malaria and other parasitic diseases were mosquito-borne. These doctors included Carlos Finlay, Cuba; Ronald Ross, India; Josiah Nott, the Gulf coast of the United States; and Patrick Manson, China. Based on these findings, U.S. officials including William Gorgas, Walter Reed, and Fred Soper worked with the U.S. military and the Rockefeller Foundation, spearheading efforts to control mosquito-borne diseases around the world—most famously in the U.S. project to build the Panama Canal. By midcentury, mosquitoes were depicted as wartime enemies in health propaganda that compared Black, Asian, and Latino populations to mosquitoes.

By World War II, when *Anopheles* mosquitoes brought the malaria epidemic to colonial Egypt, malaria was one of the most significant factors in the outcome of military deployments across the world. The treatment for malaria at the time was quinine; Japan controlled much of the world's supply through its occupation of Indonesia. In this context, Reed undertook efforts to develop antimalarial drugs, while Soper

carried out invasive chemical efforts to eradicate mosquitoes in Brazil and Egypt. Working with the Brazilian dictator Getúlio Vargas and the British colonial government in Egypt, Soper successfully advocated a three-pronged strategy to exterminate mosquitoes: use teams of eradicators to find, drain, and cover standing water with petroleum-derived chemicals to prevent breeding; control migration; and use DDT to treat humans and prevent mosquito bites. These strategies were invasive and relied on a strong state authority to impose control on often skeptical populations. Even then, they had to be adapted to local custom. This made DDT particularly useful, as it could be used on individuals without requiring clothing removal. This was important for ensuring its adoption in places where it was customary for women to maintain modest dress and to wear head coverings.

Control of epidemic malaria in Egypt required a large-scale deployment of health officials to identify, test, and chemically treat standing water sources to prevent *Anopheles* reproduction. Colonial public health involved training local populations in new forms of spatial surveillance, treating water sources as sites of risk. In carrying out such labor, public health officials were not neutral. They were engaged in practices of emergency intervention that intensified colonial surveillance of space and visually reproduced public divisions between British and Egyptian.

Despite the efforts of Soper, who was dubbed the "malaria dictator" in Brazil, colonial warfare against mosquitoes had limited success and high costs. After his departure in 1939, epidemic malaria continued in Brazil, as ecological and social conditions continued to bring populations in contact with open water and mosquitoes. Health officials succeeded in battling mosquitoes in Egypt in 1944, but once they tried to transport this result to other locations, it failed for a number of reasons. Chemical use had high costs for humans and the environment, *Anopheles* mosquitoes were present in higher numbers in other areas of malarial outbreak, and invasive eradication measures only work for a limited time period.

Soper's environmental warfare against mosquitoes reflects ways of thinking that divide humans from nature and society from environment. Such human-centered colonial thinking misses the complexity of bodies and ecologies that our contact with animals reveals. For example, mosquitoes have much to teach us about the smell sense. Scientists have identified a number of genetic smell receptors in the *Anopheles gambiae* mosquito that are attuned to chemical components of human sweat. Although not all mosquitoes bite humans to feed on our blood,

those that do engage in a kind of airborne dance to identify and pursue us as their food of choice. Mosquitoes are less likely to spot a human by the visual identifiers we use—body shape, skin color, upright stance—than by the odors we emit. When walking along an urban path that crosses a creek-bed or sitting near a lake at sunset, human bodies emit chemical traces into the atmosphere—lactic acid, carbon, beads of sweat—catching the attention of mosquitoes that breed around water. Hovering in a cross-pattern while navigating gravity and wind turbulence, mosquitoes use antennae to identify the smell. They then estimate direction and speed of the scent trails that will lead them to the surface of our skin. From the vantage point of the mosquito, the human most likely appears more like a ghost than a body: a collection of gaseous plumes that linger and expand, coalescing in a hazy outline around the edges of the skin.

Millions of mosquito bites take place around the world every day. The bug barely catches our attention as we brush it from our faces, arms, or legs. Yet these moments of contact reflect a bigger story about the inherent weakness of a strategy that attempts to manage the colonized environment by viewing nature as an enemy—one that needs to be controlled by science, technology, and bureaucracy. The racist ideas that were used to justify British and U.S. colonization suggested that malaria outbreaks in India, Algeria, Egypt, Panama, and Brazil were the result of underdevelopment and poor hygiene. But the truth is that Euro-American development projects disrupted natural defenses against disease. Colonialism was the source of, rather than the solution to, malaria epidemics. When dams prevent rivers from fertilizing crops, they increase standing pools of water and the need for irrigation and fertilizer. When chemicals are used to control disease, they require dependency on the colonial industries that manufacture and ship chemicals. When doctors advertise that mosquitoes spread malaria, they encourage people to think of humans and nature as divided and at war. Colonialism undermined itself by ravaging the very nature that it sought to appropriate for profit. Mosquito-borne diseases today—from malaria to dengue fever to Zika virus—continue to dominate public health agendas, which suggests that mosquitoes remain effective travelers on the colonial routes of settlement and trade. Settlers were never able to dominate the environments they stole from Indigenous inhabitants. Today, medical researchers and health nonprofits continue to spend large sums of money on drugs, mosquito nets, and chemical repellents to oppose mosquitoes' evolutionary ability to smell, track, and

bite human beings. The lesson, perhaps, is that mosquitoes are not our mortal enemies; they are products of the ecologies we create through forms of development that separate nature from culture, humans from the environment.

Suggestions for Further Reading

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M is also for . . .

Macaque
Mongoose
Mule