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Introduction by Jacob Darwin Hamblin, Oregon State University

This inaugural roundtable for H-Environment centers upon one of the key concepts that students and scholars of environmental history confront: environmental determinism. Many found their way to the field after reading Alfred W. Crosby's 1972 *The Columbian Exchange*, which brought plants, animals, and diseases out of the footnotes and into a prominent place in the grand sweep of history. In that book, Europeans gained syphilis from North America while Native Americans gained smallpox. Europeans gained tomatoes and chocolate, while Native Americans gained large beasts of burden. Some of these ideas Crosby later disavowed (particularly his emphasis on syphilis). However, most of the book, especially its overall premise, has stood the test of time for several decades. It was a kind of approach to history that emphasized how biological entities had lives of their own, often determining outcomes in human history beyond the usual political, social, and economic explanations. Younger scholars may have encountered this perspective more recently, due to high-profile books emphasizing the importance of geography and climate in the development of societies, as with the Pulitzer Prize-winning book *Guns, Germs and Steel* by Jared Diamond.¹

For J. R. McNeill, the key influence clearly was Crosby. As he wrote in a forward to the 2003 edition of *The Columbian Exchange*, "My first encounter with the book came on a rainy afternoon in 1982 when I picked it off of a shoulder-high shelf in an office I temporarily occupied. I read it in one gulp, neglecting the possibility of supper. Only rarely can I recall precisely the circumstances in which I read a book long ago, but *The Columbian Exchange*, and the sense of excitement it provoked in me, etched itself into my memory."² We can also see influence upon McNeill by a later book by Crosby, *Ecological Imperialism*, which emphasized the myriad ways in which biological exchanges could be asymmetrical, benefiting some while crippling others.³ McNeill has applied this approach toward answering one of the tough problems of colonial and Caribbean history: why were powerful Atlantic powers unable to dislodge the waning Spanish empire in the Caribbean during the seventeenth and eighteenth centuries, despite numerous costly efforts to do so?

The result is *Mosquito Empires*, a book that spans nearly three centuries and the histories of many peoples, nations, and empires in the American tropical world. As the title suggests, it places considerable responsibility for the course of events upon mosquitoes, those formidable vectors of yellow fever and malaria. McNeill's focus is on differential resistance—an inequality in disease susceptibility that killed off some humans while others soldiered on unperturbed. It not only reinforced the status

¹ Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New York: W. W. Norton, 1997).

² J. R. McNeill, "Forward," in Alfred W. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492* (Westport, Conn.: Praeger, 2003), xi-xvi. Quote on p. xii.

³ Alfred W. Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900-1900* (Cambridge: Cambridge University Press, 1986).

quo before the late eighteenth century, disallowing serious imperial reconfigurations, but also strengthened independence movements from the 1770s onward.

I approached Lisa Brady to comment upon *Mosquito Empires* because she has demonstrated a keen interest in the intersections between war and the environment. Her article “The Wilderness of War” explained the relationship between nature and strategy in ways beyond the usual determinants of the battlefield such as terrain and weather. Instead she argued that nature, physically and conceptually, assumed an active role in warfare, particularly in the American Civil War. Like McNeill, she highlighted not simply the constraints of the environmental factors upon conflict, but their psychological importance, as when General Sherman’s march to the sea laid waste to what she called “the ecological foundation of the Confederacy.”⁴ In her review of McNeill she applies this expertise in Civil War history to assess the impact of differential immunity in the “Greater Caribbean,” which includes the American South.

Stuart McCook has written extensively about the process of nation-building in the Spanish Caribbean during the same period that McNeill investigates. For McCook, the key story has been the development what he called “creole science,” a cooperative relationship between scientists and agricultural elites as they attempted to maintain agricultural, export-based economies. McCook has made clear that the ability to exert power in the Caribbean has often depended upon the ability to understand nature and the desire to control it.⁵

Richard Tucker’s work also has honed in on the tropical world, though not limited to the Caribbean. His work has educated numerous scholars—and more of my own undergraduates than I can count—on the disturbing effects of viewing nature as a commodity in a global capitalist economy. Whereas McNeill emphasizes the ability of empires, governments and armies to dig in for the long term, Tucker has written about the dislocations of power in the region due to corporations and expanding markets.⁶

Paul Sutter’s work has ranged quite broadly, from cars and the twentieth-century wilderness movement to the history of American imperialism in the tropics. Like McNeill, he has devoted considerable attention to the significance of insects and disease vectors in the projection of power in the Caribbean. A recent article in *Isis*, the recipient of the Alice Hamilton Prize (of the American Society for Environmental History), explores the role of entomological workers in combating yellow fever and

⁴ Lisa M. Brady, “The Wilderness of War: Nature and Strategy in the American Civil War,” *Environmental History* 10:3 (2005), 441-427.

⁵ Stuart McCook, *States of Nature: Science, Agriculture, and Environment in the Spanish Caribbean, 1760-1940* (Austin: University of Texas Press, 2002).

⁶ Richard P. Tucker, *Insatiable Appetite: The United States and the Ecological Degradation of the Tropical World*, Concise revised edition (Lanham: Rowman and Littlefield, 2007).

malaria in the Panama Canal Zone. Sutter wrote that scientists were not just attempting to control nature, but that the threat from nature was a direct result of American practices in the Zone.⁷ This perspective is shared by McNeill, who makes clear in *Mosquito Empires* that imperialism itself, particularly the transformation of landscapes to support agriculture for export, created ideal environments for mosquitoes and the diseases they carried.

Before turning to the comments and response, I wish to thank all five contributors to this roundtable for their thoughtful comments. Their willingness to raise issues for scholarly discussion and debate will undoubtedly aid in creating fruitful dialogue about the shifts in power and ecological relationships during this long and tumultuous period.

⁷ Paul S. Sutter, "Nature's Agents or Agents of Empire? Entomological Workers and Environmental Change during the Construction of the Panama Canal," *Isis* 98:4 (2007), 724-753.

Review by Lisa M. Brady, Boise State University

The story of the various European powers' struggle for domination of the Americas is a familiar one: Beginning in the fifteenth century and culminating in the nineteenth, the contest to control the wealth of the New World involved political machinations, military clashes, and settlement schemes. Territorial claims in the Americas brought with them material wealth and increased political power in Europe. This was especially true with the advent of plantation agriculture in the seventeenth century, which promised a more sustainable source of wealth as opportunities to extract gold and silver declined. The colonial holdings were secured through military might, both on land and at sea, and by careful diplomatic negotiations. All of this eventually was undermined by the Enlightenment, with its radical notions of individual liberty and its calls for democracy. Enlightenment ideas were especially powerful in the Americas, where they contributed to a rash of independence movements in the late-eighteenth and early-nineteenth centuries. By the mid-1800s Europe's hold on the New World had weakened considerably and was broken completely as the twentieth century dawned.

J.R. McNeill tells an innovative and much more compelling version of this history in his new book, *Mosquito Empires*. Without ignoring or discounting the influences of diplomacy and intellectual developments, McNeill reveals another, equally important element in the transformation of the American colonies from resource outposts to independent nations: ecology. Equating the reciprocal relationship between geopolitics and ecology to "a cotillion of co-evolution" (7), McNeill effortlessly guides his readers through the intricate steps that ultimately became the dance of death for European imperialism in the Americas.

Mosquito Empires transcends political boundaries to provide a truly ecological view of history. By focusing on what he calls the Greater Caribbean, the "plantation zones" of "the Atlantic coastal regions of South, Central, and North America, as well as the Caribbean islands themselves," McNeill demonstrates that ecological forces supersede the arbitrary divisions humans impose on the physical world (2). Furthermore, McNeill compellingly argues that ecology can trump imperial power and that monkeys, mosquitoes, and microbes can shape the destinies of men.

I use the term men, as opposed to humans, intentionally here because women seem to have little to do with the story. The human actors are, with rare exception, male and the few women who appear do so only in connection to men (only Josephine and Pauline Bonaparte rank mention by name in the index and discussion of women in general can be found on a scant eight pages). In a book focused on military and political strategy in the seventeenth through early-twentieth centuries, however, this is neither unexpected nor a major detraction because at that time and in that context, men were by and large the primary agents. Unless, that is, we turn our attention away from *Homo sapiens* and notice a small but powerful female force,

“those tiny amazons, the female *Aedes aegypti* and *Anopheles quadrimaculatus*,” which McNeill argues “underpinned the geopolitical order in the Americas until the 1770s, after which they undermined it, ushering in a new era of independent states” (5). The irony is not lost on McNeill, of course, and he at times seems to revel in it, claiming at one point that the “tiny female *A. quadrimaculatus* stands tall among the founding mothers of the United States” (234). While some might quail at equating a mosquito with the likes of Abigail Adams, McNeill has no such compunction. His book is the better for it. As with all his work, McNeill blends impeccable scholarship with an engaging, often witty, style that makes for genuinely fascinating reading.

Quite simply, McNeill’s argument is that “quests for wealth and power changed ecologies in the Greater Caribbean” and that those “ecological changes in turn shaped the fortunes of empire, war, and revolution in the years between 1620 and 1914” (2). Key to this argument is the development of “differential immunities,” first enjoyed by the Spanish with regard to their European rivals, and later by independence-minded Americans who exploited the advantage to overthrow European domination. By modifying American ecologies through the co-introduction of plantation agriculture and African slavery – and, thus, the importation of the yellow fever virus and malaria plasmodium – the imperial powers sowed the seeds for their own demise.

The role of differential immunity was especially important during large-scale armed conflicts. McNeill’s argument, though without explicitly attempting to, provides excellent insight into Carl von Clausewitz’s notion of friction. Clausewitz suggested in his military treatise *On War* that even the best laid strategies cannot anticipate every influencing factor and, therefore, unintended and unpredictable developments often determine the outcome of military affairs.⁸ In other words, much in war is a factor of chance. Many of the conflicts McNeill examines in his book demonstrate the principle of friction, but one in particular illustrates it best. In his discussion of the British siege of Havana in 1762, McNeill discussed the Spanish hope that yellow fever would assist in the defense of the city. This initially held true. However, an unusually dry June and July – prime yellow fever season – mitigated somewhat the ravages of the epidemic and spared the British from absolute devastation. Additionally, the British had expected North American reinforcements in May, but these fresh troops did not arrive until late July, providing the necessary healthy troops to continue the siege long enough to force the city’s surrender. Had the American troops arrived as planned, they would have suffered equally with the British; had they arrived any later, the Habañeros would have withstood the siege long enough to force the British, weakened by yellow fever, to withdraw. Additionally, had the rainy season been more reliable, the yellow fever epidemic likely would have been much worse. These factors, unforeseen and impossible to control, enabled the British to take a city that was well fortified and usually protected by differential immunity (178-83). Their victory was pyrrhic, however, as

⁸ Carl von Clausewitz, *On War*, indexed edition, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 119-21.

the British soldiers continued to succumb to the disease and could not press their advantage against the Spanish elsewhere. By the end of the Seven Years' War, Havana was back in the hands of the Spanish, thanks in part to chance (friction) and in part to differential immunity.

Differential immunity had a more decisive and permanent effect in another conflict forty years later. In Haiti's revolution, a shift in understandings of yellow fever went hand in hand with changes in military strategy. According to McNeill, "Toussaint understood better than anyone that yellow fever was the supreme weapon of the weak and conducted his wars accordingly" (262). The outcome in this instance was what the revolutionaries hoped for: yellow fever, and to a lesser extent malaria, disproportionately affected the French troops sent to quell the rebellion. "Given that yellow fever and malaria, by making (disease-resistant) African labor especially attractive to Caribbean and Brazilian planters, it is altogether fitting" McNeill suggests, "that these two infections should have helped world history's largest slave revolt succeed. The virus and plasmodium initially promoted African slavery in the Americas, then helped destroy it" (264).

These are just two of the dozens of examples McNeill provides to illustrate the crucial role yellow fever, and to a lesser extent malaria, played in the violent history of the Greater Caribbean. Throughout the book, McNeill uses a wide range of primary sources, though he admits that there are problems with them in terms of accurately and definitively identifying the diseases they described. McNeill shores up this somewhat shaky foundation through deductive reasoning and sound medical and epidemiological science. If there is a weakness in this line of argument, it is in the somewhat sketchy treatment of monkeys in the transmission chain. Here, too, McNeill acknowledges the limitations of his sources, conceding the "uncertainties of historical monkey ecology" (50), but nonetheless I had trouble making the leap of faith required to accept their place in the story. Furthermore, one might question whether myriad diseases helped yellow fever and malaria on their killing ways. Regardless of whether they had co-conspirators, McNeill nevertheless clearly shows that those two diseases did in fact play a significant role in the politics of empire in the Americas – no small feat indeed.

I do have another small quibble, however: McNeill dismisses yellow fever and malaria as minor factors in the American Civil War. While they may not have killed as many as typhus and other "crowd" or "filth" diseases, malaria and yellow fever both influenced strategic and operational decisions in the war, as Andrew McIlwaine Bell shows in his book *Mosquito Soldiers*.⁹ Death is not the only way diseases can affect the outcome, or even the waging of war. Battle plans, operations, and other decisions often take disease environments into account – McNeill clearly shows this throughout his study. Why, then, discount it in the context of the Civil War? That conflict does not fit into McNeill's corollary argument regarding the underpinning of

⁹ Andrew McIlwaine Bell, *Mosquito Soldiers: Malaria, Yellow Fever, and the Course of the American Civil War* (Baton Rouge: Louisiana State University Press, 2010).

colonial geopolitics in the region (though some may like to see the war as an imperial one), but the Civil War is an excellent example of the roles disease and disease ecologies play in shaping and guiding elements of warfare. This was a missed opportunity to bring that point home.

These minor issues aside, McNeill has produced an excellent book, one that makes a brilliant contribution to the growing literature on war and environment. It is thoroughly researched, engagingly written, and persuasively argued. Begun accidentally during his dissertation research in Seville in 1979, McNeill notes in his Preface that “Few books can have had a longer gestation period than this one” (xv). It was well worth the wait.

Review by Stuart McCook, University of Guelph

Mosquito Empires is a history of the interactions between epidemic diseases and politics in the New World, but it is also much more than that. Although its nominal focus is on yellow fever and malaria, it can also be read as a sequel to some of Alfred Crosby's pioneering studies in classics such as *The Columbian Exchange* and *Ecological Imperialism*. Where Crosby's works focus heavily on the early phases of transatlantic exchanges, in the sixteenth and seventeenth centuries, *Mosquito Empires* brings the story of these exchanges from the seventeenth up to the early twentieth centuries. It seeks to explore the environmental dimensions of politics in the "Greater Caribbean" (from the southern United States to northern South America) through a history of yellow fever and malaria. Its scope is ambitious and broad; this is an environmental history of European imperialism and colonial nationalism in the New World. The period it covers has been comparatively neglected in many environmental histories of the Americas; this 'middle period' has not received the same scholarly attention as the conquest era (roughly 1500-1650, covered by authors such as Crosby and others), or as the twentieth century. But this is more than simply a chronological extension of Crosby's argument; McNeill shows compellingly that environmental relations between the Old World and the New underwent a fundamental transformation in this period. After the mid-seventeenth century, the epidemiological advantage shifted from the colonizers from the Old World, to the local residents in the New World.

Mosquito Empires also differs from these earlier works in its close attention to the connections between environment and power. In the first section, McNeill describes the ecological transformations of the Greater Caribbean from the seventeenth to the nineteenth centuries. The "Greater Caribbean" here is a useful construct encompassing the Atlantic coastal regions of the Americas, from Surinam to the Chesapeake. He defines Greater Caribbean by geography (primarily coastal lowlands), by economics (the plantation), and ultimately by diseases such as yellow fever and malaria. There is a compelling unity to this area, and one that crosses the imperial and national boundaries that often mark the intellectual boundaries of traditional historical scholarship.

At first, fevers such as malaria and yellow fever did not significantly inhibit the European settlement of the New World. But these 'imported fevers' gradually took root in the seventeenth century, with the introduction of the yellow fever and malaria pathogens, and their respective insect vectors: *Aedes aegypti* and varieties of *Anopheles*. Their success involved something more complex than the virgin soil epidemics of the sixteenth and early seventeenth centuries, in which introduced pathogens flourished on large populations of susceptible human hosts. Many of these early epidemics could be transmitted directly from person to person. By contrast, malaria and yellow fever are both zoonotic diseases transmitted by insects. Both diseases can infect both humans and animals (and in fact often prefer their

animal hosts to humans). These imported fevers gained a foothold in the Greater Caribbean because the colonizing powers had *created* 'creole ecologies' – particularly sugar plantations – that also unintentionally allowed malaria and yellow fever, and their insect vectors could flourish. The epidemics also found a home in the region's port cities, where there was standing water in which the mosquito vectors could breed, and where there was constant influx of non-immune hosts who could sustain the epidemic. To distill McNeill's argument to its essentials, the human populations resident in the Greater Caribbean gradually developed at least partial immunities to these epidemic diseases, usually through exposure as children. After the sugar boom of the mid-seventeenth century, people born and raised in the Greater Caribbean, like those in West and West-Central Africa, enjoyed a much greater immunity to these diseases than did people who had been born and raised outside these zones of exposure. This differential immunity was to shape the geopolitics of the Greater Caribbean in the eighteenth and nineteenth centuries.

Once yellow fever and malaria were established in the Greater Caribbean, it became increasingly difficult for other European powers to establish a foothold in the region. In a series of elegant case studies, McNeill shows how – in the seventeenth century – yellow fever presented a significant (although not always insuperable) obstacle to Dutch settlements in Brazil, English settlement in Jamaica, and the Scots at Darien. He points out that the British conquest of Jamaica was the last time that one European power took a large Caribbean possession from another European power until the British took Trinidad more than a century later, and in this case the British succeeded largely because the island was lightly held. But even the victorious British troops suffered heavy losses from fevers, most likely malaria. French settlers encountered similar problems at French Guyana in the eighteenth century. Yellow fever also acted as an ally to the Spanish empire; yellow fever epidemics helped break the British sieges of Cartagena in 1741, when the yellow fever cost the British force some 6,000 of its 9,000 members, and turned the conquest of Havana into a pyrrhic victory. "Fortifications and yellow fever," concludes McNeill, "helped keep the Spanish empire Spanish" (188).

In the late eighteenth and early nineteenth centuries, the geopolitical importance of mosquitoes and fevers changed (although the disease patterns did not). The disease ecologies of the Greater Caribbean helped favor the independence of New World colonies from their European metropolises. In the United States, for example "malaria and smallpox were systematically partisan because of differential immunities" (200). Outbreaks of malaria made it difficult for Cornwallis to decisively defeat rebel forces in the southern colonies in 1780-1, or to resist the siege at Yorktown. McNeill shows just how finely balanced the two sides were in most other respects, and how the battles could have easily gone the other way. But the British troops were placed at a significant and consistent disadvantage since so many of them were disabled by fevers, particularly malaria. Yellow fever also favoured the independence movements in St. Domingue (Haiti), New Granada (Colombia, Venezuela, and Ecuador), and later in Cuba. McNeill gives a particularly nuanced account of the role of yellow fever in Haitian independence, arguing that

the differential immunity from yellow fever was a “weapon of the weak” (262) that Toussaint L’Ouverture and other Haitian independence leaders deliberately and effectively incorporated into their resistance strategies. Rather than engaging imperial troops on the battlefield, they could wage guerrilla warfare and allow the diseases to wreak havoc on their opponents. Across the Greater Caribbean, local rebel populations enjoyed a much greater resistance to yellow fever than did the imperial armies sent from overseas; the tremendous mortality among imperial soldiers gave a decisive advantage to the rebels.

The geopolitical impact of yellow fever diminished significantly in the closing years of the nineteenth century, as doctors identified the insect vector that carried yellow fever. Once the vector had been identified, they quickly developed effective means of containing yellow fever and (in many places) eradicating it altogether. *Mosquito Empires* is a compelling model of how to write an environmental history of geopolitics, without falling into the trap of environmental determinism. According to McNeill, yellow fever and malaria “did not determine the outcomes of struggles for power, but they governed the probabilities of success and failure in military expeditions and settlement schemes” (2). Throughout the book, McNeill is always careful to weigh the impact of these epidemics against the other factors that contributed to particular geopolitical successes or failures, and to give each factor its due. I worry that some readers of *Mosquito Empires* will miss the significant nuances of McNeill’s arguments, much the way that they have done with Crosby’s work on virgin soil epidemics (see Jones 2003).¹⁰

It would be churlish to expect a book so sweeping and thorough to cover more territory than it already does. Still, it is also worth considering the moments in the history of the Greater Caribbean where the *absence* of these fevers or the *absence* of differential immunity also shaped geopolitical outcomes. After the mid-seventeenth century, the absence (or low incidence) of yellow fever and malaria in some parts of the Greater Caribbean was also a human construct. For example, the abolition of slavery and the slave trade in the British and later French empires in the early nineteenth century gradually stopped the flow of people from Africa to the region’s remaining British and French colonies – especially the island colonies. Their stagnating sugar economies likewise reduced the flow of susceptible European migrants. So it became more difficult for yellow fever, in particular, to flourish in the West Indies. The declining importance of yellow fever on these islands – Jamaica, Trinidad, Guadeloupe, Martinique and the Leeward Islands may, in turn, help explain why some of them remained colonies of Britain and France until the twentieth century, and why some continue in colonial roles to the present. Of course, disease alone is not a sufficient explanation for this -- it is also unlikely that the inhabitants of these small islands could have mounted a credible military threat to the imperial powers in the same way as did their counterparts in Cuba, Haiti, and on the mainland. But surely the absence of disease was a factor, since it reduced the human cost of maintaining these colonies. Similarly, the lack of differential

¹⁰ See D. S. Jones, “Virgin Soils Revisited,” *William and Mary Quarterly* 60:4 (2003), 703-742.

immunity decisively shaped the history of the Dominican Republic in the nineteenth century. McNeill rightly devotes considerable attention to the history of Haiti / St. Domingue, but the other half of Hispaniola (which became the Dominican Republic) remains shadowy here. To extrapolate McNeill's argument, the Haitian conquest of eastern Hispaniola in 1822 was possible in part because there was no significant differential immunity between the populations on either side of the island. In a single sentence, McNeill notes that yellow fever and malaria impeded Spanish attempts to re-conquer it in the early 1860s (295). The point is that the *absence* of these epidemic fevers or the *absence* of differential immunity could have just as much geopolitical significance as their presence.

The blurbs on the book cover stress the main aspect of McNeill's argument – the role of epidemics in shaping geopolitics. But these blurbs and, I fear, many reviews will overlook the book's critical secondary argument. Specifically, McNeill not only shows how disease shaped geopolitics; he also shows how geopolitics shaped disease. Malaria and yellow fever were, of course, 'natural' phenomena that were not the result of deliberate planning by anyone. Nonetheless, their presence in the Greater Caribbean was shaped and sustained by geopolitical processes – by European conquest, colonization, and trade. The diseases and their insect vectors were introduced (accidentally, and probably repeatedly) to the New World on ships from the Old World. Once in the New World, they prospered in landscapes that had been transformed to suit imperial ends. And they received a steady supply of susceptible hosts, courtesy of geopolitical forces that brought non-immune people into the Greater Caribbean (slavery, indentured servitude, troop movements, and even – occasionally – voluntary migration). As McNeill observes, these epidemics were not random, and even some contemporary observers recognized the connections between the arrival of non-immune people and the outbreaks of disease. By the nineteenth century, people were more deliberately engaged in shaping their relationship with the insects and the pathogens. They developed effective shipboard quarantines, and by the early twentieth century began campaigns to alter their environments so as to limit the populations of insect vectors. The eradication campaigns were, to a large extent, the product of US colonialism and neocolonialism in the Greater Caribbean. The yellow fever and malaria epidemics were both imperial constructs, albeit accidental ones. In short, the relationship between epidemics and geopolitics flowed *both* ways.

McNeill writes in an informal yet effective style; in many places *Mosquito Empires* reads like the transcript of an engaging and thoughtful lecture. He recounts his case studies in rich detail, from a variety of perspectives. For example, the British siege of Cartagena is recounted using the voices both of Spanish and British sources. He paints lucid pictures of battles and sieges, and the broader conditions of landscape and weather that shaped the patterns of disease. As a counterbalance to the book's somber subject, McNeill's language is always vivid and graceful, and often gently humorous. McNeill also explicitly identifies the parts of his argument where he is speculative and tentative. This intellectual openness makes *Mosquito Empires* particularly useful as a classroom text; it invites students (and indeed all readers) to

consider how historical evidence is weighed and how historical arguments are constructed. *Mosquito Empires* is an exemplary study of the complex relationships between the natural world and political power.

Review by Richard P. Tucker, University of Michigan

Some years ago I strolled through a British colonial cemetery in Mussoorie, in the outer hills of the Himalayas, one of the “hill stations” where colonial officers, both civilian and military, spent the season of most intense heat and rain, away from disease and discomfort in the plains below. The cemetery, still maintained by an association of ex-colonials, was filled with a startling proportion of young military officers. I learned later of a privately published book by a leading association member, entitled, *Three Monsoons*. The title reflected the then well-known saying, “If you survive three monsoons in India, you can reasonably hope to retire home in comfort.” John McNeill’s new book, though it focuses on a region of European empires half a world away, provides compelling new perspective on the epidemiological and emotional life of that expatriate community.

The boldness and originality of *Mosquito Empires* are of a particular character. As long as there have been military historians, they have described diseases in armies and navies, often acknowledging it as a major adversary for strategists to take into account. But military historians have rarely viewed this in the broader interpretive context of environmental history, in terms of its central role in processes of ecological change. Conversely, environmental historians, who began to develop a wide-ranging discussion of the role of war and militarization as a central dimension of human history only about a decade ago, have not usually included disease among their themes. The essential bridge disciplines of disease history and demographic history are only beginning to be integrated into an emerging synthesis. McNeill’s work indicates why this synthesis has been having a difficult gestation. He faced the task of integrating the vast literature on the European expansion into the tropics, with the very different technical field of epidemiology and disease ecology. Then he had to find a single, consistent language that would rhetorically integrate these disparate subjects into a narrative comprehensible to readers less well grounded in the range and complexity of the subject. His success in finding an effective voice is one of the book’s major achievements.

This study has emerged in tandem with three other recent studies: James Webb, *Humanity’s Burden: A Global History of Malaria* (Cambridge University Press, 2009), Paul Sutter’s studies of the conquest of malaria and yellow fever in the twentieth century Caribbean, and also Sonia Shah, *The Fever: How Malaria Has Ruled Humankind for 500,000 Years* (Farrar, Straus and Giroux, 2010) a more popular but yet substantial history. Webb’s survey provides a global historical context (and a regional setting in chapter 3) for *Mosquito Empires*. In turn, McNeill is more inclusive for the trans-Atlantic region. None of the other studies centers on the interactions between tropical disease and military operations.

Demographic historians have also contributed to making the new synthesis possible. One major contribution has been Philip Curtin’s writings, especially *Disease and Empire: The Health of European Troops in the Conquest of Africa*

(Cambridge University Press, 1998) and *Death by Migration: Europe's Encounter with the Tropical World in the Nineteenth Century* (Cambridge University Press, 1989). As with much of Curtin's work over the years, his scope stopped at the fringes of environmental history. It has been indispensable to a younger generation of environmental historians, but it leaves the next step for his protégés' work on the tropical world.

In the context of the New World tropics' history, the central theme of *Mosquito Empires* is startling, for it presents in effect chapter two of colonial control. Far better recognized is chapter one, the demographic disasters that indigenous Americans suffered from the introduction of European diseases after 1492. An earlier volume in the Cambridge University Press series "New Approaches to the Americas" pursues that discussion. Noble David Cook's *Born to Die: Disease and New World Conquest, 1492-1650* (1998) addresses the "Black Legend" debate familiar ever since the late sixteenth century: was the onslaught of epidemics largely the result of Iberian policy in the American tropics (as north Europeans sententiously argued), or was it the responsibility of all European forces as they pursued conquest, in temperate as well as tropical zones? McNeill's thesis embodies the enormous irony that the introduced Old World diseases, malaria and yellow fever, became co-domesticated with both indigenous and Creole populations, which led them to resist a new round of conquest from northern Europe for many years.

When it is written, chapter three of this long history will move us beyond 1914, addressing the role of epidemic disease (of both warriors and civilians, and both humans and livestock) in the twentieth century's global and regional wars. There is still much to be done, to achieve a lucid and widely accessible global perspective on the mass conflicts of the most recent century. A major contribution to this effort is Judith Bennett's recent *Natives and Exotics: World War II and the Environment in the Southern Pacific* (University of Hawaii Press, 2009), which surveys the struggles of each combatant's military to control malaria and dengue, as well as a range of other diseases, in the struggle for control and victory.

Unlike the demographic disasters in the Americas and Oceania that accompanied early contact with the Eurasian gene pool, mass conflict in Eurasia and Africa never resulted in such devastating loss of human populations. But several diseases associated with mass concentrations of humans and livestock helped shape military campaigns. Historians of war and environment will do well to study the writings of military strategists, which are a storehouse of information. Military movements in the Mediterranean and Middle East alone are major examples of the strategic role of epidemics in wartime. Marcus Hall's study of the struggle to control malaria in Italy and the Mediterranean takes us back to the setting of one of John McNeill's previous books. The tropical and monsoon belt of Africa and Asia invites similar study.

The historiography of mass migrations is richly detailed, but migration historians have not often encompassed ecological change in their studies. There is a major opportunity here for merging two largely separate discourses; epidemic disease and

social upheaval are two key elements. Studies of the mass migrations of refugee populations hint at an additional dimension of the interactions among war, disease and environment. These studies will need to be considered carefully by historians of war and environment. Environmental perspectives will in turn reinforce our understanding of the work of the United Nations High Commission for Refugees and several international non-governmental organizations.

I must also point – and not just in passing – to McNeill’s use of humor in writing about a subject that has usually been treated as melodramatic, tragic, or technical. His startling metaphors and similes, usually ironic or dark, startle the reader. Two examples, taken from many, illustrate the point. On p. 234: “The tiny female *An. Quadrimaculatus* stands tall among the founding mothers of the United States.” And on p. 188: “At Havana, British soldiers had the satisfaction of dying from yellow fever as victors.” These images are audacious but not frivolous, for they highlight important analytical points.

In this way, and in the clarity of the exposition, McNeill presents his case in a manner that will be accessible to a wide range of academic specialists, as indicated in the admiring review in the *Times Literary Supplement* of July 10, 2010, by trans-Atlantic historian Gabriel Paquette. The book is also proving to be accessible for readers outside academic life. Retired military officers who can never forget World War II in the Pacific or the Korean War tell me that their rekindled memories take on a new dimension of meaning. And I have given *Mosquito Empires* to two non-academic friends who have spent many years in the American and Pacific tropics, with no fear that they would consider me either quirky or esoteric. They report that reading the book has given them a fresh integrative perspective on the context of their own lives. Any academic historian would appreciate that validation.

Review by Paul S. Sutter, University of Colorado

Let me begin by thanking Jacob Hamblin for providing a forum such as this, and for inviting me to comment on John McNeill's important new book. As I see it, this forum allows me to approach the book somewhat differently than I might if I was reviewing it for an academic journal. In particular, I will take the liberty of spending only a modest amount of time rehearsing the book's major arguments, summarizing its details, and praising its many virtues. Instead, presuming that the purpose of this forum is to provoke discussion, I want to raise several broad questions about McNeill's methodology and approach in relation to the field of environmental history. Having the opportunity to hear the author's responses to these questions will be one of the luxuries of this particular format.

In his sweeping new study, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620-1914*, the eminent environmental historian John McNeill argues that we cannot understand three centuries of geopolitical history in what he calls "the Greater Caribbean" without appreciating the central role that disease played – specifically yellow fever and, to a lesser extent, malaria – in shaping and constraining the outcomes of settlement, economic development, and, particularly, warfare. McNeill makes several important sub-arguments to support this broad claim. First, he compellingly suggests that, far from being mere adjuncts of the tropics, yellow fever and malaria were the products of a "Creole ecology" in the Greater Caribbean that was built upon European and African exchanges, the environmental transformations that came with the sugar plantation economy, and growing trade through port cities. Human activities, in other words, brought these diseases to the Caribbean and created conditions under which they thrived. Second, he demonstrates that the prevalence of these diseases in the Greater Caribbean, when combined with the physiological dynamics of differential immunity, resulted in a two-phase geopolitical trajectory for the region. From the middle of the seventeenth century to the late eighteenth century, yellow fever and malaria assisted the Spanish in maintaining an empire that was otherwise minimally fortified and open to military challenge by other European imperial powers. Then, from the late eighteenth century well into the nineteenth, and from North America's southern colonies to Haiti and Surinam, the presence of these diseases abetted the age of revolution by granting a critical advantage to locals with enhanced immunities in their battles against outside military forces less well-equipped from an epidemiological perspective. McNeill ends his story in the early 20th century, when the discoveries of the mosquito vectors for these diseases dramatically improved the efficacy of sanitary interventions and thus ended the geopolitical influence of their ravages (though these discoveries also ushered in a novel geopolitical arrangement, beyond the scope of the book, in which disease control justified a new series of interventions in the Greater Caribbean by an increasingly powerful U.S. state and its non-governmental adjuncts such as the Rockefeller Foundation). *Mosquito Empires'* argument about the sweeping influence of these

diseases on the history of the region is, to this reader at least, convincing and impressive.

Mosquito Empires is a book firmly committed to one of environmental history's foundational claims: that we cannot fully understand certain aspects of the human past without appreciating the role that non-human nature has played in shaping them. Indeed, *Mosquito Empires* is an insistent example of how and why nature has mattered to human affairs. As such, I think it's appropriate to see *Mosquito Empires* as a model for doing environmental history in the tradition of such distinguished scholars as Alfred Crosby, whose *Ecological Imperialism* demonstrated the ways in which disease and other ecological factors aided and abetted European expansion into temperate regions of the Americas, Australasia, and southern Africa; and Philip Curtin, who adapted and reworked many of Crosby's meta-themes to examine how and why Europeans failed in their efforts to settle Africa and how the forced migration of Africans throughout the neo-tropics resulted in tropical ecological exchanges that Crosby largely neglected. Like the work of these scholars, McNeill's book is expansive, ambitious, and erudite. Moreover, beyond building an argument of impressive spatial and temporal scale, his is also a project rooted in far-flung archival research as well as extensive reading in secondary literatures in multiple languages. In short, there are few environmental historians working today who could have pulled off such a study. For all these reasons, and several others, *Mosquito Empires* is a remarkable achievement and entirely worthy of the attention this forum is giving it.

But praise, no matter how justified, is rarely a useful catalyst for conversation, and so I want to turn now to several observations and questions about causation and narration – about how environmental historians understand and animate the environment as a force for change over time – that lingered with me after reading *Mosquito Empires*. These are issues that I believe are critical to the future of environmental history as a discipline, and to how we as a disciplinary community argue for its larger historical importance.

First, while I found *Mosquito Empires* to be superbly reasoned and deeply informed in its discussions of the details of how and why yellow fever and malaria were such powerful shaping forces in the Greater Caribbean from 1650-1900, anyone closely following McNeill's arguments will be struck by how much speculation is built into his analysis. The speculation is not so much at the level of the broad argument; there is plenty of data to suggest that these diseases killed extensively and did so with a discrimination that was of geopolitical import. Rather, the speculation is mostly in the secondary mechanics of how these diseases worked in particular places, and it usually occurs where incomplete archival records intersect with McNeill's reconstruction, from a modern scientific perspective, of how these diseases likely worked. So I am left to wonder, what does it mean to build an argument on so much causal supposition, and what are the pitfalls of doing so? I should say that I wonder this in part because I am in the midst of a project – an environmental and public health history of the construction of the Panama Canal –

that will involve a similar set of speculative assumptions, though I will have the advantage of studying a group of historical actors with a much clearer sense of the ecology of these diseases.

I want to be clear that such speculation is both necessary and unavoidable if one's goal is a reconstruction of the sort McNeill attempts here, and McNeill is usually quite candid about the speculative nature of his efforts. Nonetheless, it seems to me that certain speculations enter the argument in too forceful or convenient a way, and they sometimes combine to build towards general conclusions in which the speculative caveats fade. One small example is McNeill's logical suggestion that ENSO (El Niño/Southern Oscillation) events may have added gravity to particular disease outbreaks, an argument based upon scientific studies that have shown that ENSO weather patterns can create improved breeding conditions for vector mosquitoes. My concern here is not so much with the logic of the supposition as with its selective application. When certain disease outbreaks combined with ENSO events, McNeill inserts ENSO as a potential exacerbator (and in at least one case he speculates that the *absence* of an ENSO event might have made an outbreak milder). Does it make sense that this might have been the case? Sure. Do we really know with any certainty, given the complex, multi-causal nature of disease etiology? No. Was there much more that McNeill could have done to fortify this connection? In this case, the answer is "perhaps." The argument for causal significance might have been enhanced by completing a thorough correlation of known disease outbreaks with known ENSO events over the centuries under consideration to see what kinds of relationships emerge. Such a study would not have provided proof of ENSO's influence, but it would have made stronger what is currently an argument from coincidence. I could make similar comments about other speculative arguments that work with a similar causal logic: the influence of livestock on malarial outbreaks, for instance, or whether possible primate reservoirs mattered to particular yellow fever outbreaks, or even the issue of differential immunity, which is at the heart of the book's argument. In the latter case, I should say that McNeill provides as good a discussion of the details of how and why immunity emerges to both malaria and yellow fever as I have seen in the historical literature, but his application of the principle to particular circumstances still strikes me as speculative. In the case of the American Revolution, for instance, McNeill argues that the presumed experience with and thus acquired resistance to malaria among troops from the southern colonies gave them a decisive advantage against British troops from outside the region – an argument built upon data that show that British troops suffered in greater numbers from diseases, including presumably high rates of malaria, than did colonial forces. But do we definitively know that differential immunity was the most significant force at work here? Might there have been other factors that could have contributed to differential morbidity and mortality? It's ultimately hard to know. Again, while there may be particular places where I would take issue with McNeill's specific logic, my concerns and questions are of a larger order: what does it mean to build the details of an argument on considerable speculation, no matter how well reasoned it is, and can a historian attempting such an analysis avoid the temptations of convenience and self-service? These are, it

seems to me, questions of particular import for environmental historians, and to how other historians receive environmental history.

This leads me to a second concern, what I will call the problem of argument by synecdoche. In *Mosquito Empires*, it is, as the title indicates, the mosquito that often comes to embody and stand in for the complex ecology and epidemiology of malaria and yellow fever. In this case, the question the book left me with was, what does it mean to privilege a part of a complex causal process? Let me explain. If one were to ask what causes disease in a particular place at a particular time, the answers would be many and interlocking. In the simplest and most reductive sense, a virus and a parasite are the specific causes of yellow fever and malaria respectively. But for these diseases to spread, their vectors must be present, so mosquitoes are obviously critical. So are human bodies of a particular sort, and sometimes other mammalian bodies. There are also factors such as climate (temperature, rainfall, etc.), geography, topography, and environmental conditions that play important causal roles. One might add to these social conditions such as poverty or malnutrition or poor housing or particular relations of labor or a particular historical stage of urban infrastructural development. One might even add cultural explanations that differentiate patterns of disease in places where environmental and social conditions were similar. In other words, the “causes” of these diseases are many and they span the nature-culture divide. McNeill is well aware of this, and any close reading of *Mosquito Empires* will make that clear. Indeed, the book is at its best in its detailed reconstructions of the creole ecology of these diseases. And yet, sometimes for narrative simplicity and sometimes for rhetorical force, McNeill offers decidedly reductive conclusions that usually implicate mosquitoes as the critical natural agents. To give but one example, McNeill ends Chapter 6 (“Lord Cornwallis vs. *Anopheles Quadrimaculatus*, 1780-1781”), a chapter that argues that malaria played a decisive role in the southern military campaigns that ended the American Revolution, by concluding: “The tiny female *An. Quadrimaculatus* stands tall among the founding mothers of the United States,” (233-4). Why isolate the mosquito as the singular cause in this summary? Why not the malaria parasites? Why not the immune systems that allegedly made certain soldiers better capable of handling biting mosquitoes and the parasites they spread? Why not blame swamps or climate or methods of water collection or other material environmental factors that contributed to mosquito breeding? My point here is not that McNeill misses the importance of these other forces, for he decidedly does not. Rather, my point is that violence is done to the argument when that causal complexity is reduced to a single natural agent. And that violence, I believe, is at the heart of what many who are disposed to be critical of environmental history often fix upon and call determinism. John McNeill is far too good and careful an historian to be a determinist; indeed, he addresses the issue and anticipates the charge in the text. But I am fairly certain that he will be accused of being one by certain readers (and perhaps was challenged on this point in peer review?) as a result of reductive summaries like these. They certainly provide narrative punch, but I wonder if such reductiveness serves the cause of environmental history.

One reason, I think, that McNeill moves towards summaries such as these is that he is a dedicated materialist when it comes to environmental causation. The mosquito works nicely as a stand in not only for disease and all of the factors that cause it, then, but also for the material non-human environment as a neglected force in history. To a degree, I share that commitment to materialism. Indeed, in my less tolerant moments I am inclined to think that environmental history, by definition, must deal with material causes first and foremost. But I also think it's worth noting the ways in which the general materialism of *Mosquito Empires* runs against the grain of some of the best recent work in the environmental history of health and disease – Gregg Mitman's *Breathing Space*, Linda Nash's *Inescapable Ecologies*, and Conevery Bolton Valenčius's *The Health of the Country* in particular.¹¹ To an extent, we might just chalk up these differences to the fact that these historians are asking different questions. Where McNeill is primarily interested in disease as a material cause of certain broad geopolitical outcomes, these histories are more focused on questions about the cultural construction of disease, how diseases and public health efforts shaped and responded to social and economic inequalities, and how sufferers experienced their maladies and thus knew nature through disease and health. *Mosquito Empires*, on the other hand, seeks to distill the environmental dimension from a larger field of causation rather than to infuse environment as a category of analysis into that larger causal field. As a result, the argument can be a bit reductive and monocausal precisely because it sets out to elevate one particular set of causes above others. Or, to put it another way, McNeill's very question – how did the ecology of yellow fever and malaria shape the geopolitics of the Greater Caribbean? – is aimed at generating a distinct environmental causation. And the one he produces is superb. But I wonder what his environmental analysis might have looked like if he had asked questions less focused on isolating environmental explanation, questions that required that environmental analysis be more fully integrated with other causal factors. Rather than asking, for instance, how disease proved crucial to the success of the Haitian Revolution, to cite one of his most compelling examples, what if McNeill had asked, simply, how do we explain the outcome of the Haitian Revolution? McNeill's book convinces us that we cannot answer that latter question without taking into account disease ecology, but it doesn't show us how to fully integrate disease ecology with the many other factors that shaped that outcome. And it leads me to wonder whether environmental histories that emphasize environmental causation at the expense of other factors – often with the expressed logic that plenty of people have already explained the political or social or economic aspects of this or that topic – ultimately make the case for the importance of environmental history at the expense of both balkanizing it and making it seem too deterministic.

¹¹ Gregg Mitman, *Breathing Space: How Allergies Shape our Lives and Landscapes* (New Haven: Yale University Press, 2007); Linda Nash, *Inescapable Ecologies: a History of Environment, Disease, and Knowledge* (Berkeley: University of California Press, 2006); Conevery Bolton Valenčius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2002).

To an extent, McNeill already answered many of the questions raised here, in a brief section at the beginning of the book in which he discusses some of the limitations of his argument. It is worth quoting at length. "This, then," he writes of *Mosquito Empires*:

is not quite an essay in mosquito determinism, or even environmental determinism, although at times it will seem just that. In trying to highlight what is novel in this argument, I will, as authors often do, underplay other considerations. I will make my case in bold and bald terms, and not repeat endlessly the relevant caveats and qualifications. Passages taken on their own will seem far too deterministic for some readers, with a simplistic sense of cause and effect. . . But, I hope, the book taken as a whole will seem to provide a blended perspective that emphasizes the mutual and reciprocal impacts of geopolitics and ecology. Each guided the other in an ongoing process, a cotillion of co-evolution. (6-7)

Fair enough. But I also wonder whether McNeill could have written this book in a way that avoided the need for such an apologia. Maybe not. The caveats and complexities may well have overwhelmed the ambitions of this sweeping history. But one result, it seems to me, is that this will be a history that will command the attention of future scholars in elucidating the details of the various cases that McNeill discusses in broad terms. Moreover, I am not really sure that he has consistently produced the "blended perspective" that he hopes for, of sufficiently fills out all that exists in the gap between geopolitics and ecology, though again that might have made for a denser and less compelling narrative. There are certainly many points at which his argument elegantly takes account of multiple layers of causation, but the very questions guiding the study, and the scale at which the analysis operates, mean that the conclusions often do seem both bold and bald. And perhaps that's the point. Ultimately, *Mosquito Empires*, in its breadth and ambition as well as its boldness and baldness, is a book that deserves the attention and admiration of scholars, a book whose true legacy will be the conversations that it provokes and the productive questions that flow there from.

Author's Response by J. R. McNeill, Georgetown University

First things first: I am deeply grateful to all concerned for the opportunity to engage with thoughtful commentary on my book *Mosquito Empires*. I am doubly grateful to professors Brady, McCook, Sutter and Tucker for the many kind words in their assessments of the book. But as Paul Sutter notes, kind words, welcome as they are, rarely give rise to fruitful exchanges. In the paragraphs that follow, I will address some of the issues raised and criticisms offered as best I can.

McCook notes that *Mosquito Empires* is concerned with episodes in which differential immunity (or resistance) shaped political events, but does not go into episodes in which the absence of yellow fever or malaria, or the absence of differential resistance, affected the outcomes of wars or revolutions. When I first read his remarks on this head, my reflexive reaction was along the lines of: "Of course, that's because I was pointing out the remarkable rather than the mundane. If a hurricane changes the political balance before an election in Jamaica, or a snowstorm does the same in Chicago, that is worth drawing attention to, but if there is no hurricane or snowstorm, why should anyone bring that up?"

But my second reaction might be more interesting. McCook explains that with the end of the slave trade (a gradual process extending roughly from 1807 to 1850) the opportunity for re-introduction of *Aedes aegypti* and of yellow fever virus directly from West and West-central Africa narrowed sharply. The decline of sugar plantations (outside of Cuba) after about 1830 diminished *A. aegypti* breeding habitat. So, reasons McCook, the scope for yellow fever in the West Indies became more restricted, at least outside of Cuba where the sugar economy thrived throughout the nineteenth century. This is plausible, if as Paul Sutter might note, speculative. Of course there were several yellow fever outbreaks after 1830, but indeed they seem to have been fewer and smaller than those in the eighteenth century. But the place where this dynamic was surely most strongly at work was in the United States. That is because *A. aegypti* could not overwinter north of Florida and had to be re-introduced every summer from somewhere warm, presumably either tropical Africa or the West Indies. With the abolition of the slave trade to the U.S. in 1808, one avenue for *A. aegypti* to North America disappeared almost completely. With the decline of Caribbean sugar production outside of Cuba, routes between the U.S. Atlantic seaboard and the West Indies were perhaps less often used, and the main remaining pathway for re-introduction lay between Cuba and the Gulf of Mexico ports, notably New Orleans. All this might help explain why yellow fever stopped attacking Philadelphia, New York, and Baltimore after the early 19th century, and became less of a menace in Savannah and Charleston, but kept hammering New Orleans. I wish I had thought of this subject before I finished the book, because it bears investigation. I should have asked McCook to read the manuscript!

Brady notes that women scarcely figure in the stories told in *Mosquito Empires*. This is entirely accurate. I was fully aware of it when writing the book, and on the alert for ways to change it. But, for reasons Brady offers, I found no way to avoid a male-dominated narrative (mosquitoes aside). In early modern European warfare, women routinely marched and camped with armies in the field, tended the sick and wounded, cooked, washed, and sewed, and no doubt much else besides. John Lynn has summarized the slender available evidence.¹² But women were much less likely to be involved with expeditionary forces sent across oceans, or with militias raised in colonial outposts. So, at least as far as the surviving documentation indicates, women were scarcely present in the military events described in my book. In the settlement efforts, at Darien and at Kourou, women were involved, and whenever I found evidence of that I mentioned it. The only real discussion of women as women in the book concerns the belief, widely held in the 17th and 18th century, that women were less vulnerable to yellow fever than were men. This is almost certainly untrue, an illusion produced by differential risk of exposure to mosquito and virus. The other discussions, or mentions, concern for example African-American healers who just happened to be female. So I thought about this matter, struggled with it, but found no sensible way to feature women more prominently. Besides the two Bonapartes whom Brady notes, the index includes two other women, slaves named Cuba Cornwallis and Joanna respectively. But Brady's point stands nonetheless.

Brady also raises the issue of the U.S. Civil War, a matter on which she has considerable expertise and which I deal with only on pp. 292-94. My claim is that yellow fever and malaria had only a minor impact on that war and no impact on its outcome. I had had some exchanges with Andrew Bell during the writing of my book, although his own came out too late for me to cite it. I think that fear of yellow fever and malaria did affect the strategic planning of the Union forces in the Civil War, but not the result of the war. Together they accounted for under 2% of disease deaths in the Union Army (health records for the Confederate Army did not survive). So the role of these diseases in the Civil War was rather different from what I claim was the pattern in the West Indies, where they routinely killed most of the men who died on campaign. Many soldiers fell ill with malaria, it is true, and death is not the only way in which disease can be important. But unless I could argue that malaria hamstrung the Confederacy contributing non-trivially to its defeat, which in the first instance is probably not true and in the second would require documentation that does not exist, the Civil War seems to me a case apart. For reasons explained in the book, yellow fever and malaria did not wreak nearly the havoc they normally did in the West Indies wars. They form an interesting aspect of the Civil War, well presented in Bell's book, but I still think a case apart because other matters governed the outcome of that contest.

Brady also found herself unable to make the leap of faith involved to believe that monkeys had a place in the story of disease and war in the West Indies. This is

¹² John Lynn, *Women, Armies, and Warfare in Early Modern Europe* (New York: Cambridge University Press, 2008).

perhaps an example of the more general point that Sutter raises, that of the proportion of speculation in my book. As regards monkeys, I did indeed speculate that they might have served as a reservoir of yellow fever virus explaining its frequent irruption in areas far from its typical urban foci. They apparently do so in Amazonia today. But if they did so in the past, neither I nor anyone else knows for sure. My book is indeed full of speculations of this sort. Again, I was aware of this while writing, and tried to identify my speculations as just that in the text. But, as Sutter suggests, this is a wider issue for environmental history.

A big part of the reason for that, I think, is that soils, snakes, and sulfur dioxide do not leave memoirs and memoranda. They scarcely show up in archives. Historians who confine themselves to a version of the past that is reliably documented must say little if anything about them. As for viruses and plasmodia, they left even fewer traces because before 1890s nobody was aware they existed. But exist they did.

The issue of documentation is a general one for history but especially interesting for environmental history. At root, the issue is a question of what is the proper ambition for historians. Is it to offer the most plausible vision of the past, or to offer a reliably documented vision of the past? The former necessarily requires speculation, and could therefore easily be misleading. The latter avoids speculation, but must leave large blanks. What can historians say about sub-Saharan Africa before 1800 that is reliably documented? What can they say about the lives of Indian peasants or Chinese women before 1500? Very little indeed.

As a professional discipline, history emerged in a time and place that made the notion of reliable documentation a realistic ambition. In 19th-century Germany, as long as history was understood to concern the affairs of European states, historians could aspire to careful documentation and could discipline themselves to avoid saying things they could not document. But, as history evolved so as to include the study of times and places without textual records (most times and places, as it happens), and to include the study of people who left no textual traces, this evidentiary standard became a suffocating constraint. Those who still accepted it were tempted to say, as the Regius Professor of Modern History did in the early 1960s, that Africa has no history. Even within regions with long traditions of surviving documentation, say northeastern China or southern Europe, only tiny parts of human experience were seen as worthy to be committed to paper (or clay tablet, papyrus, etc.), and only random subsets of that paper survived centuries of fire, flood, decay, and paper recycling. So historians find themselves tempted by speculation, while at the same time heirs to a disciplinary culture that either disallows it or at least cautions against it. And, as I said above, the problem of evidentiary standards grows more acute if historians elect to take into account the non-human world.

This issue was one I was fully aware of before writing *Mosquito Empires*. My approach is to take heart from the behavior of astrophysicists. Almost all of them believe in something they call 'dark matter,' although they cannot see it. Indeed

they think most of the matter in the Universe, about 80%, is invisible to them. But they are sure dark matter is there, because something is exerting gravitational pull on many objects they can see, and certain observed phenomena, such as the rotational speeds of galaxies, are inexplicable without dark matter. As I see it, history is packed with the equivalent of dark matter. Historians could choose to ignore it, on the grounds that they cannot see it in the surviving documents. But then they could not explain most of what they can see in human history. Thus I find myself among those historians who chafe at the constraint of reliable documentation, and unabashedly engage in speculation, in hopes of presenting a maximally plausible vision of the past.

Sutter also finds a certain “reductiveness” in my prose, a habit of using mosquitoes to stand for a complex configurations of conditions and connections that underlie epidemics. This was something I did not do fully intentionally or consciously. I had not noticed it until Sutter pointed it out. But it appears frequently in the introductions and conclusions to chapters and sub-chapters, and in the title of the book as well as the title of Chapter 6.

As I reflect upon it, I suspect all I intended was brevity and simplicity. I esteem those qualities in general, and when I write books I try hard to achieve brevity and simplicity in hopes of expanding my audience. Two inspirations guide me. The first is my mother, who read most of what I published until soon before her death in 2006. She had a college education and a fine command of English, but no intellectual pretensions. She never voluntarily read anything more challenging than murder mysteries. I want to write my books in a language that she could understand and perhaps enjoy, even if she is no longer around to do so. But I think there are many people like her, or like Richard Tucker’s ‘non-academic’ friends. The second inspiration is the New Zealand physicist, Sir Ernest Rutherford (1871-1937), who allegedly said that all good physics could be explained to a barmaid. We might prefer the term ‘server’ or ‘barista’ nowadays of course. But I admire his point nonetheless: with enough effort, it should be possible to present the essence of complex matters simply and briefly enough to win the attention of people who would grow impatient with baroque language (or postmodern dialect) and full respect for social and ecological complexities at every turn. That is what I believe I was hoping to achieve when conscripting mosquitoes as stand-ins for complex configurations.

There is probably another, related, reason behind my frequent resort to “reductiveness.” In (pale) imitation of Alfred Crosby, I have a weakness for attempting phrases or sentences that might be memorable or provocative. So, for example, the one about tiny anopheles mosquitoes standing tall among founding mothers of the American republic, which seems to have caught the attention of three readers for three different reasons, also represents a temptation I succumbed to in this hope.

This “reductiveness” is not, as far as I can tell, the reason I wrote an introduction that tackles the issue of environmental determinism. Nor was that introduction a response to peer review. I wrote that because environmental determinism is a charge that dogs some environmental history (and some other scholarship as well). I leveled that accusation myself against Jared Diamond’s *Guns, Germs, and Steel* at about the same time I was getting underway with *Mosquito Empires*. And in those days Richard Grove good-naturedly accused me of mosquito determinism whenever I accused him of El Niño determinism. So the issue of environmental determinism was in the forefront of my mind as I worked on the book, and a dozen or more audiences for talks I gave on the book kept it there. It is a serious and justified objection in many cases, and so I wanted to explain my position on it at the outset. And I was aware that if I did so, I could streamline the book and avoid repeating the cautions and caveats throughout.

The risk I chose, then, is the one Sutter points to: that some readers will lose sight of that introduction, will lose sight of the treatments of social and ecological complexity within the chapters, and read the shorthand usages of “mosquitoes” as overly deterministic. To avoid the risk I might have fleshed out each passage with appropriate caveats and complexities – at the risk of losing the attention of my mother and her ilk. Or I might have written a different book, perhaps confining myself to the Haitian Revolution or the siege of Cartagena, and explored the full range of causation, balancing disease and environment with everything else. That would have come at a cost, however, as it would not lay out the patterns, the systematic partisan impact of yellow fever and malaria across a broad space and over three centuries. As in most of life, in writing books there are tradeoffs.

Sutter also notes that *Mosquito Empires* ‘runs against the grain’ of much good recent work in the realm of the environmental history of health and disease. This too was something I recognized from the outset. In my younger day, I would have worried more about it. At many of the talks I gave, especially those that had the word ‘disease’ in the title, audiences wanted me to address the social or cultural construction of disease, or perhaps of yellow fever or malaria specifically. Work along those lines would surely be rewarding, but I felt no urge to conform to expectations. I am content to let others do it, and write only what I want to write. This is a liberty that comes with age, growing cussedness, and tenure.

I felt more unease at another nonconformity in the book. When discussing European medicine’s ineffective approaches to yellow fever and malaria, I did not keep company with the historians of medicine who scrupulously sympathize with the limitations with which medical thinkers contended in past centuries. Instead, I included some of the wackier (by today’s standards) ideas and treatments which seemed to me amusing. I did not mock medicine and doctors (Molière and Smollett cornered that market long ago), but wrote of them with irony and bemusement – against the grain of serious history of medicine. Intellectually, I have to side with the historians of medicine against myself. But I chose, consciously, to succumb to this temptation as well. I note, with additional unease, that I would probably not

have done so had it been African or Amerindian healers, rather than European doctors, blistering patients' scalps with cauterizing irons and administering horse-dung posset.

In his commentary, Richard Tucker notes my resort to irony. *Mosquito Empires* as a whole is built on ironies. The irony that African diseases brought to the West Indies in (mainly) African bodies, combined with Africans' resistance, acquired or inherited, to these diseases radically improved the odds that Africans would be sought as slaves for West Indian plantations. The irony that the more people who migrated to the West Indies, the more dangerous its disease environment became. The irony that the larger a military expedition was, the greater the odds it would be destroyed by disease. The irony that the most socially and militarily powerful people in the West Indies were the weakest in the face of yellow fever and malaria.

The ancient Greeks thought that the gods amused themselves toying with our hopes, ambitions, and vanities. As a resident of Washington DC, I am daily reminded of the myriad ways in which circumstances (not, as far I can tell, Zeus and his ilk) conspire to foil human ambitions, the ways in which the forces of cosmic irony undermine our projects and overwhelm our conceits. Perhaps because I spend so many of my waking hours at a university unusually dedicated to the detailed scrutiny of the policies and intentions of the great powers of the day, I find myself unusually attracted to situational irony and unintended consequences in human affairs.

Lastly I wish to set the record straight with respect to Prof. Brady's comment that I "effortlessly" guide my readers through the relationships between geopolitics and ecology. I wish it had been effortless, but that is not at all the way I remember it!

About the Contributors

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