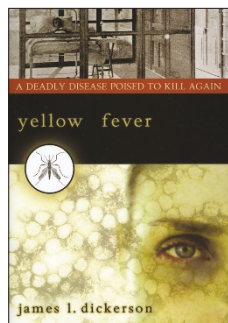


## Specter of a serial killer



### Yellow Fever: A Deadly Disease Poised to Kill Again

James L. Dickerson

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Reviewed by Lyle R Petersen

Yellow fever was a scourge for 250 years after its introduction to the New World, likely by Dutch slave ships, in the 1640s. Outbreaks causing considerable mortality occurred from Buenos Aires to New England, affecting nearly every major United States port between New Hampshire and Texas by the onset of the nineteenth century. The accompanying fear, economic disruption and social upheaval altered the course of history. Experiments conducted by Walter Reed and colleagues in Cuba in 1900 and 1901 proved the disease's mosquito-borne origin, and, within one year, in one of public health's greatest triumphs, William Gorgas eliminated yellow fever from Havana. A subsequent effort led by the Rockefeller Foundation nearly eliminated the principal vector of urban yellow fever, *Aedes aegypti*, from the Americas, with the last large outbreak recorded in 1954.

Can yellow fever once again threaten the United States? In *Yellow Fever: A Deadly Disease Poised to Kill Again*, James Dickerson provides historical perspective by describing the eighteenth and nineteenth century yellow fever outbreaks in Philadelphia, New Orleans, Memphis and Mississippi, as well as the events that led to the discovery that the disease was spread by the *Aedes aegypti* mosquito. In the book's final chapters, Dickerson argues that bioterrorism, climate change and globalization create an environment that renews the threat of yellow fever.

Although this book provides few new historical insights regarding the American experience with yellow fever, the sequential description of four outbreaks reveals their striking similarities despite a temporal separation of nearly 100 years. Particularly noteworthy were delays in public notification because of misdiagnosis or fear of a negative impact on business, inability of the medical establishment to meet the demand for care, difficulty transporting and burying large numbers of bodies, considerable disruptions to government, fleeing populations, difficulties of establishing and maintaining quarantines, and staggering economic loss. These same issues concern those involved with contemporary planning for bioterrorism and pandemics, and it is sobering to contemplate the medical and social consequences of a modern calamity that can kill 10 to 30 percent of the population, as occurred during those yellow fever outbreaks.

Unfortunately, the similarities of the four outbreaks that Dickerson describes makes for redundant reading. The subsequent, interesting chapter

on the discovery that mosquitoes transmit yellow fever provides welcome relief, albeit tempered by detracting factual errors (such as mis-stating the size of the Louisiana Purchase by three orders of magnitude) and unnecessary and incorrect commentary (such as the statement that the Spanish-American, Vietnam and Iraq Wars were fought for the benefit of American corporations).

Dickerson turns next to the potential risk of a return of yellow fever to the United States. After speculating that the historical links of the yellow fever virus with America would make it a symbolic agent of choice for Islamic bioterrorists, he presents a scenario whereby said terrorists might import the virus in infected eggs or mosquitoes and then release the mosquitoes or spray infectious aerosols at outdoor venues. To prevent these attacks, Dickerson recommends curtailing egg imports and installing virus-sensitive testing equipment at airports. One obvious problem with this scenario is the fact that, aside from vaccine production, yellow fever virus is now grown in cell culture, which negates the need to 'cultivate' the virus in enzootic locations or to use eggs or mosquitoes as a means of importation. In addition, the virus is not particularly infectious via the aerosol route and is unstable in the environment. Producing quantities of infected mosquitoes would require considerable infrastructure, and pesticides could quickly eliminate the mosquitoes after release.

Dickerson then argues that global warming increases the threat of yellow fever by expanding the distribution of the tropical *Aedes aegypti* mosquito. The recent reinfestation of *Aedes aegypti* in tropical America, including parts of the southern United States, reflects an ineffective control effort rather than global warming. This reinfestation has produced massive epidemics of dengue, a related flavivirus that also utilizes *Aedes aegypti* as its main urban vector, yet urban yellow fever has not returned. Clearly, other critically important factors influence urban yellow fever transmission besides the presence of competent vectors. Global warming is also unlikely to establish a sylvatic enzootic cycle in North America without monkeys, the principal hosts. Dickerson also makes an unfortunate comparison with St. Louis encephalitis virus, a related flavivirus, but one that uses different vectors and different principal hosts. He states that St. Louis encephalitis reached record levels in the 1990s, the hottest years of that century. St. Louis encephalitis actually reached record levels in the mid-1970s, at a time when temperatures were relatively normal.

In the final chapter, Dickerson argues that yellow fever will remain a risk to travelers and residents in endemic areas. This has been known since the 1930s when, after discovering that the virus could be maintained in sylvatic, enzootic transmission cycles involving monkeys and tree-hole breeding *Haemagogus* mosquitoes, Rockefeller investigators concluded that disease eradication was impossible. Dickerson correctly states that more people will be at risk for yellow fever as travel to endemic regions increases, and he appropriately ends the book with advice regarding self-protection measures for yellow fever. In his final recommendation, he advises special attention to the threat of *Haemagogus* mosquito bites, particularly between dusk and dawn. However, as with much of this book, this advice is flawed: both *Aedes aegypti* and *Haemagogus* mosquitoes are primarily daytime feeders.

Overall, the book provides a few interesting historical tidbits, but, given the number of factual errors and flaws, Dickerson fails to persuade that yellow fever really is 'poised to kill again'.

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