This entertaining book chronicles the impact of mosquito borne disease, principally malaria, throughout history. It traces the impact from the age of the dinosaurs to the current day. Winegard is a historian, not a biologist, he provides his own disclaimer (p30) to this effect, and this shows. The mosquito is portrayed in colourful language as a rampaging human foe, with the ability to truncate thousands of years of evolution into less than a 100-years. Unfortunately, this evolutionary power is illusory, the isolated populations of Culex mosquitoes in the London Underground he cites are sub-species of their above ground cousins and demonstrate how imprecise estimates of separation time using classical genetic methods become when comparing populations that have severe genetic drift and are subject to strong selection pressures. A point made in the primary paper1.

The impact that mosquito borne diseases have had on the human genome, selecting traits such as sickle cell and Duffy negativity are well summarised alongside the increase in consumption of various plants likely to reduce malaria.

The majority of the book covers the mosquito’s impact on the rise and fall of empires. Alexander the Great, pulled back from his Indian campaign due to his armies being decimated by malaria, and later may have died from malaria, The Pontine Marshes initially protecting Rome from the attentions of Hanibal at the end of the second Punic war, but malaria spread with the Roman legions and Rome had major annual summer epidemics of malaria. As a result Romans prayed to the fever goddess Febris and Rome was described as a death trap with a fever puffing subterranean Dragon. Walpole talked about the summer being plagued with malaria in the city in 1740, introducing malaria to the English language (prior to this it was referred to as ague).

The historical journey continues with Ghengis Khan, with Winegard documenting the impact of malaria during his Eastern European campaign, with the wet spring in 1241 increasing malaria and decimating his army in the Hungarian plains. He speculates that Ghengis Khan may have died through ‘a weakening of his immune system due to chronic malaria’, but the evidence base for this is minimal with many speculative causes of death and no actual evidence of how he died and where he is buried. Malaria did however play a role when his grandson Kublai Khan campaigned in the Holy land, southern china and Vietnam and may have contributed to the eventual fall of the Khmer civilisation.

As we move to the mid-1600s and the Colombian exchange the narrative flows through into the slave trade and the role of mosquitoes in stopping Europeans colonising central Africa. Another historical figure Sir Francis Drake is added to malarias victims ‘as in 1596 he is said to have ‘succumbed to malaria and dysentery and was buried at sea.’ Old English texts dating back to 1599 state that he died from flux, i.e. dysentery with no mention of malaria. In the remainder of the book the factual inaccuracies around the mosquito and her biology increase. While Aedes mosquitoes, yellow fever viruses and malaria parasites were transferred from West Africa to the Americas, the Anopheles transmitting malaria were not. There is also no evidence that the imported Aedes ‘thrived in its superiority to domestic species’, it was just assimilated into the mosquito fauna already in the Americas. New and Old World Anopheles are distinct to this day and indeed, in the few accidental introductions of Anopheles gambiae that have occurred outside Africa, for example in Brazil in the 1930s these were rapidly recognised and the invading species eradicated2.

DDT and the drug chloroquine are given centre stage, reducing mortality from malaria in the second world war and subsequently becoming the bedrock of the WHO malaria eradication efforts of the 1960s. While eradication was possible on the geographical fringes of malaria transmission, it soon became apparent that it was not possible with DDT and chloroquine alone in the African heartlands. Readers of this book might surmise that efforts to control malaria then stopped for decades – in part true for Africa, but not for the rest of the world. We are told that ‘DDT operates by scrambling the proteins and plasma of sodium ion channels and neurotransmitters’ a garbled and inaccurate representation of its true mode of action. The impression is given that mosquito borne disease control was restarted when West Nile virus invaded New York, airbrushing out decades of rapidly evolving and effective malaria and arbovirus control. Over this period new generations of insecticide replaced DDT and indoor residual spraying of insecticide was joined by pyrethroid impregnated bednets which have saved many millions of lives globally.

The book concludes with the modern technology that is now under development to reduce malaria transmission, including Crispr-Cas genome modification of the mosquito and deployment of a malaria vaccine. Winegard speculates that we might using these new technologies to eliminate the mosquito itself. While new technologies are indeed being developed and tested their focus is to reduce the ability of the mosquito to transmit the parasite not to eliminate the mosquito, as it is the army of parasites and viruses that the mosquito passes from one human to another, or from animals to humans that are the real foe, not the mosquito herself.

Readers of this book should enjoy the rapid journey through many of humanities major population movements, accompanying campaigns and wars alongside many familiar figures, but the direct involvement of mosquito borne disease in the death of many of these should be questioned. For those wanting an authoritative work on Mosquitoes this should not be used as a primary reference.

References.

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2. Killeen GF, Fillinger, U. Kiche, I. Gouagna, LC and Knols BG. Eradication of Anopheles gambiae from Brazil: lessons for malaria control in Africa? Lancet Infectious Diseases 10, 618 – 627.

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