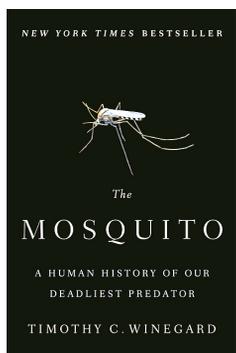


The Mosquito: A Human History of Our Deadliest Predator

By Timothy C. Winegard. 2019. Dutton imprint, Penguin Random House. 496 pages, 28.00 USD, Cloth.

For most people in North America any reference to mosquito means the dreaded hum which, if not eradicated with a quick slap, will translate into an itchy, red, annoying bump. So, should we believe Timothy Winegard's assertion in the title of his latest book that mosquitos truly are "Our Deadliest Predator"? The first chapter of the book



does dispel any skepticism with a quick rundown of animals most lethal to humans and mosquitos clearly dominate the top of the list, causing over two million deaths per year; the next "animal" perhaps surprisingly is ourselves, with humans causing 475 000 deaths per year. The numbers then drop off quickly to include animals such as snakes at 50 000, dogs 25 000, crocodiles 1000, and the much-feared shark at only about 10 deaths per year.

The mosquito is, of course, only the disease vector, the real cause of death being one (or more) of the 15 virus, worm, or protozoan pathogens delivered by its bite. Yellow fever is the most lethal of the viruses carried by mosquitos, that also include less virulent dengue, chikungunya, Mayaro, West Nile, Zika, and variants of encephalitis. Elephantiasis, debilitating and disfiguring but not lethal, is caused by a filarial worm. Malaria, which currently is responsible for the greatest number of deaths each year, is a protozoan.

So while Winegard's book quickly captured my interest by asserting the lethal capacity of mosquitos, it just as quickly lost my interest by embarking on a history of the world shaped not by human ambition and determination but by Winegard's assertions regarding the deadly influence of mosquitos. This would have been fine had the book made convincing arguments. In other words, for a natural history book to be enjoyable it must be plausible and supported by good evidence.

As a scientist reading Winegard's book, my inclination was to scrutinize what was being said and fact check the inferences being made. As the pages turned

and my skepticism grew my reading enjoyment declined, making it harder and harder to pick the book up to embark on another chapter. For example, this sweeping statement is made on page 38: "the symbolism associated with chrysanthemums in global culture has been directly prejudiced by the mosquito". Has it really? Can you make this statement when the flower is associated with death in countries with high historical rates of mosquito borne disease, while in other countries the flower symbolizes love, joy, and vitality? Almost as an aside the book also loosely links chrysanthemums, death, and global culture to the fact chrysanthemums are related to plants which produce pyrethrin, long recognized for its insecticidal properties. So, while it is true chrysanthemums signify different things in different cultures, there are no data to suggest that this is in any way linked to mosquito borne disease.

Had there been relatively few such stretches of the imagination I might have tolerated Winegard's musings, but my enjoyment of the book became overshadowed by an annoyance at far too many unsubstantiated conclusions of how mosquitos influenced human history. Following the reference to chrysanthemums, Winegard states, "Cloves, nutmeg, cinnamon, basil, and onions all soften malaria's symptoms [do they?], which may explain why, for millennia, people have added these notionally hollow flavorings to their diets" (p. 38). Could one not also conclude that the human palate simply enjoyed these flavours or that their medicinal uses are completely unrelated to mosquitos? On page 42 Winegard attributes the all-consuming global coffee culture and the fortunes of the likes of Starbucks to the stimulating properties of coffee which, he infers, may have been used medicinally against mosquitos based, presumably, on the fact that coffee originated in Ethiopia, a country with mosquito borne diseases.

Speculation escalates to a much larger scale as Winegard reviews the rise and fall of human empires, beginning with the dominance of Bantu tribes in Africa because they carry the recessive gene for sickle cell which is known to provide some protection from malaria. Many Africans continue to pass on this recessive trait, but millions of Africans also

still die from malaria. The fall of the Roman empire is attributed to a mosquito infested swamp, without exploring more thoughtful analyses, such as Thomas Homer-Dixon's in his book *The Upside of Down: Catastrophe, Creativity and the Renewal of Civilization* (Knopf Canada, 2006), which explains the fall in more complex terms of population growth, resource supply and demand, and governance. I could go on to include the continental conquering aspirations of Genghis Khan and his grandson Kublai Khan, both thwarted by mosquitos in their various campaigns to expand the Mongol empire in Europe and Southeast Asia, or the initiation of the slave trade and later its abolition, or simply why humans build homes on hilltops.

There is no doubt that mosquito-borne diseases are deadly—they are estimated to have reduced humanity by half over the millennia. And by highlighting the legacy of mosquito-borne disease, Winegard's book contributes to other recent books that consider

the interplay between humans' global pursuits and the spread of disease, such as the work of Jared Diamond in *Guns, Germs, and Steel* (Norton, 1999) and Charles C. Mann in *1491: New Revelations of the Americas Before Columbus* (Knopf, 2005). Given the current COVID-19 pandemic, reading a history book with a focus on disease does make you re-evaluate the potential influence of less obvious, hidden, and simply unknown factors that underpin history. Thus Winegard's book is timely. In 2020 humans instigated a novel, rapid, and widespread disease outbreak that is changing human history in ways that we can not yet know, from small things like learning how to make your own bread to big things like the rise of the home office with all the social, environmental, and economic impacts of this.

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