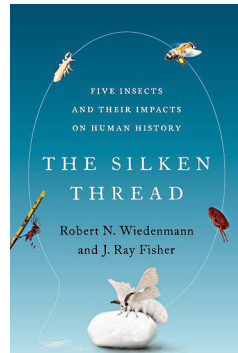


## ENTOMOLOGY

**The Silken Thread: Five Insects and their Impacts on Human History**

By Robert N. Wiedenmann and J. Ray Fisher. 2021. Oxford University Press. 268 pages and 54 figures, 43.95 CAD, Hardcover, 26.99 CAD, E-book.

How do you choose five insects, out of an estimated five million insect species in the world, to write a book about? While other authors might have balked at the challenge, Wiedenmann and Fisher felt that there were five species that shaped human history, linked together by the Silk Roads (either directly through trade routes and diseases, or through indirect paths) ... thus the main part of the title, *The Silken Thread*. While common usage refers to the Silk Road, it is really plural, as these were a vast web of trade routes, on land and sea, used for more than 1500 years, extending from Turkey to eastern China and into Greece, Italy, northern Europe, Russia, India, and North Africa. The species the authors chose were Domestic Silk Moth (*Bombyx mori*), Oriental Rat Flea (*Xenopsylla cheopis*), Body Louse (*Pediculus humanus humanus*), Yellow Fever Mosquito (*Aedes aegypti*), and Western Honey Bee (*Apis mellifera*).



Wiedenmann and Fisher divide the book into five sections—one for each species—with each section comprised of one to four chapters. Then there is a final concluding section linking the ‘silken threads’ together. Each section starts with a timeline related to events in that section. There are 54 figures, footnotes following some chapters, a bibliography by section, and an index. I noticed errors in the first three figures of Chapter 9: photos and captions were mixed up; one photo was used twice; and one photo was missing. This was in the e-book, and I don’t know if the hard copy has the same problems. This is one of the few non-fiction e-books that I have read, and I would have preferred it in hard copy, where I could have flipped back and forth more easily to check on some historical

fact or attach a sticky note ... perhaps this just shows my ignorance of such features in e-books! At times the authors’ writing is like a ‘faux’ mystery, setting up false themes or scenarios as to how or why certain events happened, then debunking each—I found this to be irritating after a while.

Domestication of Wild Silk Moth (*Bombyx mandarina*) began in about 7000 before current era (BCE i.e., before Christ) in northern China, and it has produced a species that is now unable to fly and is totally reliant on humans to reproduce effectively. Moth pupae secrete proteins for their cocoons, and this creates silk fibre, a textile with many amazing properties: high tensile strength but soft; hypoallergenic; moisture facilitating; lustrous; and impervious to growth of damaging fungi, bacteria, and clothes moths. Silk has always been a luxury product, at one time only worn by the emperor and his family, its demanding production a closely guarded secret. It has been used for clothing, as a surface for painting, as a measure of currency, and even exchanged for military aid. The trade routes used to transport silk were opened by the Han Dynasty in China around 130 BCE and became known as the Silk Roads.

All fleas are obligate parasites of mammals and birds, and Oriental Rat Flea is no exception. It hitched its fortunes to Brown Rats (*Rattus norvegicus*) and Black Rats (*Rattus rattus*), which hitched their fortunes to humans. These fleas carry the bacterium *Yersinia pestis* that causes the plague, of which there are three forms—one is the famous bubonic plague. There have been three major plague pandemics: the first, in the year 540 concentrated around Egypt and the Mediterranean; in 1331, the second originated in Mongolia and moved to Europe (becoming the Black Death); and, in 1855, the third plague pandemic erupted in China, Hong Kong, and India and spread to the rest of the world.

While fleas started the slow spread of the plague,

Body Louse continued the rapid spread through Europe, where about 25 million people (one third of the estimated population at the time) died during the Black Death; a similar number died in Asia and Africa. Body lice live in clothing but feed on our bodies. We scratch the itchy bites and the lice faeces (frass) are rubbed into the bite or scratch wound ... transmitting the typhus-carrying bacterium *Rickettsia prowazekii*. The first typhus epidemic may have been in 430 BCE in Greece; it also killed many of the Irish fleeing the potato famine in the late 1840s. But the highest casualties came during World War I, when typhus killed some 2.5 million Russian soldiers and civilians, and another 5 million in the five years following the end of the war.

Yellow Fever Mosquito is native to Madagascar and nearby islands off the southeast coast of Africa. It was eventually transferred to the Western Hemisphere through the transatlantic slave trade, first to Brazil, then throughout the Americas. These mosquitoes carry the yellow fever virus (a flavivirus, the family that includes dengue, Zika, chikungunya, West Nile, and Japanese encephalitis) and transmit it to humans. Of infected adults, 50–75% die because there is no cure, only palliative care. In the last half of the 19th century, yellow fever had a huge impact in the southern USA, shutting down railways and severely disrupting trade as people fled the population centres. It also affected the building of the Panama Canal (started in 1880, but completed between 1904 and 1914), killing thousands of workers, until a major campaign to eradicate mosquitos was undertaken. A yellow fever vaccine was developed in 1937.

The last of the five insects explored in *The Silken Thread* is Western Honey Bee. Ninety percent of our food is produced from 100 crops, and 70 of these are pollinated by bees, mostly honeybees. Keeping bees in hives had occurred by at least 4500 BCE in Egypt, and Europeans brought honeybees to North America in 1622 to pollinate the crops they brought with them. Wiedenmann and Fisher include a discussion of the honeybee's history as well as its current challenges, such as crowding in commercial hives that raises the risk of disease, infection, and parasites. Honeybees are also hit hard by land cover changes and insecticides, but they, in turn, are often associated with declines of native solitary bees through competition for nectar.

Wiedenmann and Fisher cover a lot of human history from the last 2500 years or so, all through the lens of these five insects (a single timeline linking all of the events would have been helpful). The sections on each of the insects could easily be expanded into separate books, which would allow for more detail on their natural history and associated human history. However, by weaving them together, the authors successfully make their case that, “The Silk Roads advanced science, mathematics, literature, art, languages, and religions, and became a singular force that shaped the diversity of societies and cultures across the continent and beyond” (p. 41). These impacts are still felt today, albeit in different forms. It will probably take more than one read of this book to absorb all of the connections.

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