

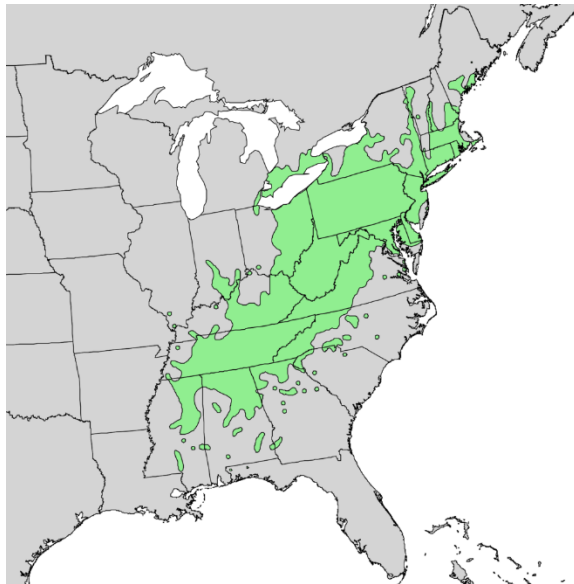
# STANDARD DEVIATIONS: Chinese Pathogen Kills Billions!

Greetings,

Hope you had a happy holiday. While Jack Frost may have been nipping at your nose, it's unlikely that any chestnuts were roasting.

The American chestnut is functionally [extinct](#).

At the start of the 20th century, there were over 4 **billion** American Chestnut trees across a huge swath of the nation.



{Natural American Chestnut distribution.}

Around 1904, imported **Chinese** chestnuts trees brought a new fungal parasite, the Asian bark fungus, *Cryphonectria parasitica*. The fungus enters through insect wounds and any fissure in the bark. It infests the cambium layer (the vascular system) where the mycelial cells fan out under the bark. Hyphae produce plant toxins that alter the pH from a normal of 5.5 to  $<3$ , which is toxic to the plant cell. The infection eventually expands around the trunk cutting off any flow of water or nutrients.

In just 4 decades the blight effectively destroyed the American chestnut population.

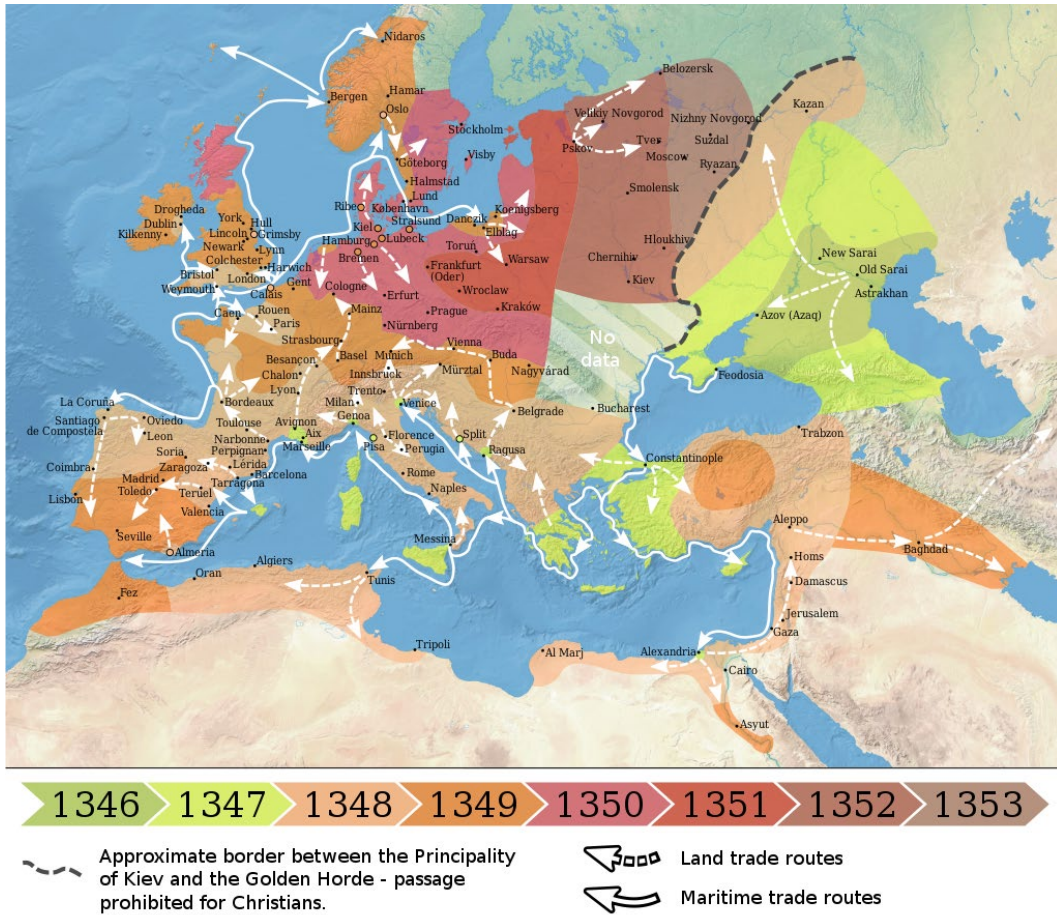
The Chinese chestnut (smaller) evolved with the fungus and has some resistance. Rescue efforts are aimed at hybrids of the American and Chinese plants but have not produced a reliable



survivor. The fungus does not kill the root system and shoots do form, but never reach a sexual maturity.

*But this newsletter isn't about a fungus.*

The most fatal pandemic in human history probably **originated in China**. Genetic sleuths believe that the *Yersinia pestis* epidemics across Europe and Asia going back to the 1300's originated in the Mongol Empire of Western China and migrated along the Silk Road or was carried along in Chinese merchant ships. Plague has killed hundreds of millions of people.



The havoc of this bacterial infestation decimated the European and Asian populations through pandemic spread. And plague is still endemic in many places around the globe.







{The Triumph of Death, Peter Bruegel 1562.}

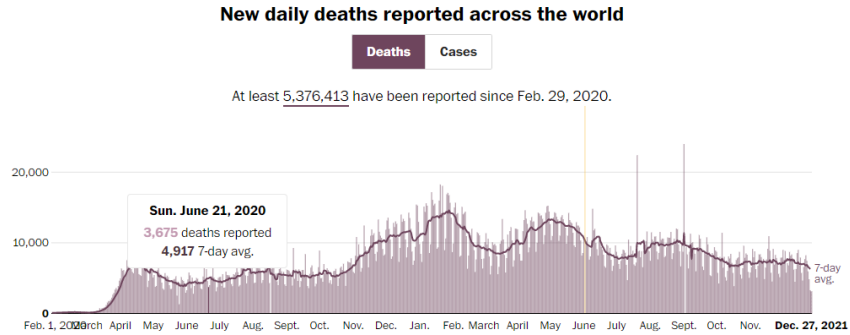
*But this newsletter isn't about a bacterium.*

In December of 2019 a [coronavirus](#) was first observed in China that has become the global pandemic of SARS-CoV2, or COVID. Even with vaccines being discovered, developed, and distributed in an unprecedented record time, the pandemic rages on.

The COVID-19 pandemic is among the deadliest infectious diseases to have emerged in recent history. Virologic, epidemiologic, veterinary, and ecologic data establishes that the new virus, SARS-CoV-2, evolved directly or indirectly from a  $\beta$ -coronavirus in the sarbecovirus (SARS-like virus) group that naturally infect bats and pangolins in Asia and Southeast Asia.

The latest virus mutation, Omicron, has the potential to rapidly infect and kill millions even with the protective strategies available. The end of this pandemic is nowhere in sight.





{Daily average = 6,410 deaths, 12/27/21. WaPo data.}

In just a little over two years the pandemic has killed over 5 million worldwide, with around 300 million cases reported.

*But this newsletter isn't about a virus.*

### **It's not even about China!**

It's about risk.

Where we run into trouble is when a pathogen is able to take advantage of our naivete. The American chestnut, the Dodo, and the North American bison have been wiped out by things they did not see coming. The same phenomenon happens to us with germs. Our lack of resistance or understanding allows catastrophe to occur.

Pathogens are not inherently evil, they're just opportunistic. We're **all** simply looking for an easy path to health and success and we rarely care about who or what we step on to get there. Why should pathogens be seen differently?

The only real advantage we have in fighting pathogens is our intellect and awareness of risk. By anticipating that risk exists and understanding that we can control our exposure to risk, we can mitigate the damages. When we ignore the warnings or fail to prepare then we suffer a consequence.

Scientists have warned for decades that pathogens (SARS, Ebola, Measles, Avian influenza, etc.) are poised to emerge again and again, identified risk factors, and argued for enhanced pandemic prevention and control efforts. With this kind of forecasting, it's hard to understand why we never seem to learn.

My newsletter has been about risk, risk awareness and the value of biosafety. I've tried over two hundred ways of shouting to get a message about risk out to people. The newsletter is going away; risk isn't.

Have a great week and be safe,

Bryan

