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Plagues from the Permafrost: Will Thawing Ice Bring Back the Curse of the Mummy's Tomb?

By Dave Clark — May 22, 2018

Nearly a century ago, Lord Carnavon, who attended the opening of King Tut's Tomb, died shortly afterwards, in April 1923. At the time, the sensational media linked his death to supernatural causes activated by the curse of the mummy's tomb. More recently, this tale was rationalized by suggesting that his death was due to ancient disease causing microbes, lurking in the tomb, rather than supernatural influences.

Modern technology has been used to examine mummies to attempt to diagnose any infections that they had, which might have been the cause of death. Mummies and other reasonably well-preserved corpses have indeed yielded signs of infection. In some cases, DNA from ancient corpses has been sequenced and revealed the identity of the infectious agents responsible.

For example, DNA sequences characteristic of leprosy, tuberculosis, bubonic plague, and cholera have been detected. Medieval burials in Europe have provided DNA from leprosy and bubonic plague, for example. Admittedly, these remains are nowhere near as old as Egyptian mummies, but they did reveal that although the bacteria were still clearly recognizable, they have indeed changed significantly over the centuries. So far, the bacteria responsible for these diseases have not been successfully cultured from such sources.

The modern equivalent of the Curse of the Mummy's Tomb is the claim that virulent germs released from melting ice might cause a devastating epidemic. Emergence of infections from the permafrost is especially worrisome as this layer contains a great deal of organic matter plus the corpses of many ancient animals and humans.

As permafrost melts, corpses of animals and humans long frozen and buried are being exposed. After emerging, they begin to decompose and, it has been suggested, may release the infectious agents that killed them centuries or even millennia ago.

How realistic is this scenario? First, let's dispose of Carnavon and Tut. Despite media reports, there never was any curse found inscribed in the tomb to start with. As for Carnavon, he was already seriously ill and in any case, died four months after visiting the tomb of an infected insect bite. Hardly an immediate cause of death.

The permafrost is much bigger than a mummy's tomb. It is a vast area with many thousands of frozen corpses, including mammoths, reindeer, rodents, and humans. Indeed, human burials are often shallow as the permafrost is so hard that digging graves is difficult – although, whether the local shamans had applied curses to the bodies is unknown!

There have been a couple of genuine examples where disease has definitely been released by

thawing corpses. Perhaps the most serious was a recent outbreak of anthrax in Siberia. Reindeer in the Yamal peninsula last suffered from anthrax in 1941. And then in the summer of 2016, an anthrax epidemic emerged and spread through the local reindeer herds. About 70 people caught the disease and a boy and his grandmother died. The reemergence was blamed on anthrax surviving in a frozen reindeer carcass that recently thawed during an unusually warm summer.

Of course, anthrax is not an extinct disease and is endemic today in parts of Africa. Nonetheless it was missing from Siberia for 75 years. Anthrax forms very tough spores that persist in soil for many years, so it is much more likely to survive for a long period than most infections.

A variety of viruses and bacteria have supposedly been revived from ancient samples dating back anywhere from thousands to millions of years. One major problem with claims of ancient revival is contamination with modern microbes. Another issue is that DNA molecules break down over long time periods and even if a spore or virus particle survived intact, the genes inside would be unlikely to remain undamaged.

In practice, when careful work has been done, it seems probable that bacteria and viruses from several thousand years ago have indeed been “revived”. However, claims of million-year survival are dubious and mostly based on indirect evidence rather than direct isolation and culture. Analysis of million-year-old samples of ice shows that the DNA has mostly been degraded to fragments of several thousand base pairs – much shorter than the millions of base pairs found in typical bacterial genomes.

A fascinating recent example is the isolation of some giant viruses from 30,000-year-old permafrost. The frozen viruses were still able to infect amoebas after thawing out. So they were still functional. These viruses are unusually large and infect amoebas rather than humans or other large animals. Nonetheless, this suggests the possibility that viruses from thousands of years ago could still be capable of infecting us.

The Spanish influenza pandemic of 1918 was the worst outbreak of influenza on record. It is estimated to have infected perhaps 25-30% of the world population and killed around 40 million. Frozen lung tissue from victims buried in permafrost has been used to extract the 1918 version of the flu virus. However, no intact functional viruses were obtained, rather just RNA fragments of the viral genome. Combining data from these fragments allowed reconstruction of the 1918 flu genome. Testing of reconstructed viruses in animals did confirm that this variant of flu was more virulent than most. Nonetheless, no frozen historical samples allowed direct resurrection of a functional virus.

Many viruses, including flu, Ebola, yellow fever, Zika, measles, and many others that cause human disease carry their genes as RNA rather than the related DNA. RNA is more reactive, and the advantage to RNA viruses is that they can mutate ultra rapidly to escape recognition by the immune system. This explains the need for a new flu vaccine every year. However, the flip side is that RNA decays much faster. Thus, from a resurrection perspective, it means that RNA viruses are unlikely to survive intact even a century or two.

Overall then, the threat of a virulent epidemic emerging from the permafrost is conceivable, but extremely unlikely. Most novel diseases are likely to emerge from present day animal populations

as humans intrude into their habitats, as already seen with Ebola, SARS, and many others.
