A

s children, many of us will have read how the Hebrew people living in Egypt were suffering under the cruel rule of the Pharaoh. Moses asked the Pharaoh to let them return to their homelands in Canaan, but he refused. As a consequence, 10 plagues were inflicted on the Egyptians in a divine demonstration of power and displeasure designed to persuade the Pharaoh to reverse his decision. But were the plagues historical events or, as some historians have suggested, simply passed-down accounts of several natural disasters? Some scholars concede that from an historical standpoint, the first nine plagues resemble natural events and while some are disconnected, others appear to be part of a chain reaction with set patterns and a rapid succession. The Egyptians were renowned for recording every event, whether temporal or religious in nature, but there are few references to plagues in ancient Egyptian literature. What if the plagues, however, involved villages and the countryside around Goshen, these might not have been referred to the royal court for insertion in official chronicles.

Recording history
When did the plagues occur and who was the tyrannical Pharaoh? The Greek historian Herodotus put the dates around 1570-1550 BC when Egypt was under the rule of the Hyksos (an Asiatic tribe), but there was no Pharaoh, until Ahmose I (1550-1525 BC) raised rebellion and overthrew the invaders. During this time apocalyptic rainstorms, devastated much of Egypt, and were described on the Tempest Stela of Ahmose I, these have been attributed to short-term climatic changes caused by the Thera volcanic eruption on the island of Santorini around 1630 BC (although it has also been suggested that the storm reference is merely a metaphor for the chaos caused during the war). Trevisanato (in his 2005 book The Plagues of Egypt: Archaeology, History, and Science Look at the Bible), suggested this eruption was also the trigger event for the plagues. There are indications that the environmental effects of this...
eruption were felt around the globe – some scholars have also linked this eruption to the legend of Atlantis. Trevisanato believes that volcanic ash tainted the Nile causing it to become acidic and sediments found at the bottom of lakes along the Nile Delta seem to suggest that there was deposit of volcanic ash sometime during the Middle Bronze Age, which would be in line with the eruption on the Greek island of Santorini (Thera, Thira), thought by some to be the location of Atlantis. Date: 1996

This was the basis of the 1950s naturalistic theory by Greta Hult, who proposed that certain algae in particular, Haematococcus pluvialis, were able to flourish in the warm, slow moving water. When the algae died off, concentrated algal blooms can also disperse toxins in the air, causing breathing problems for people. More importantly, a bloom in the water would have killed the fish, allowing amphibians to breed unchecked, as fish eat their eggs. Studies have also shown that tadpoles, when stressed because of a change in their environment, quickly develop into frogs. The toxic water would have caused the amphibians to leave and swarm over the land in overwhelming numbers. The amphibians would have stayed away from the deadly river and many would have died, leading to the third plague – lice (this could mean lice, fleas or gnats, based on the Hebrew word kinnim). If toxic algal led to the first plague and dead frogs followed, it is not surprising that a swarm of insects would also follow.

The plagues continue

The lack of frogs in the river would have let insect populations normally kept in check by the frogs, increase massively. The rotting corpses of fish and frogs would have attracted significantly more insects to the areas near the Nile. If so, an infestation with certain insects could have set the stage for the later plagues. Scientists have theorised that the sickness that killed the beasts of the field for Egyptians in later plagues might have been Blue tongue or African horse sickness (AHS), these are OBviruses, of the Reoviridae family, both of which can be spread by insects of the Culicidae species. Matt and Malloy argued that the fourth plague represent a swarm of flies, such as the stable fly (Stomoxys calcitrans). Studies have shown that cattle heavily infected with stable flies can become anaemic and have lower milk yields. The stable fly also bites humans and could have led to the boils that occurred as part of the sixth plague. Inryptoependyris can also cause the species is a carrier of trypanosomid parasites including Trypanosoma evansi and Trypanosoma brucei. There would have also been an increase in the common house fly (Musca domestica), which belongs to a group of flies often referred to as “flies of pestilence”. The house fly has been in existence since the origin of human life, is well adapted to life in human habitations and acts as a potential vector of diseases. A recent study found that over 100 pathogens including bacteria such as E. coli and S. aureus, viruses, fungi and parasites have been associated with this prolific insect, so it is not surprising that people would have been suffering from increased illnesses. Could the boils have been caused by other means?

The fifth plague, which killed off the Egyptian livestock, has similarities of rinderpest, a member of the genus **Reoviridae** family, both of which can be spread by insects of the Culicidae species. **Culicoides** species.
Morbillivirus, a member of the Paramyxoviridae family. This causes high fever, diarrhoea and ulcers in the mouths and noses. Rinderpest is spread between animals by direct contact and possibly aerosol over limited distances. The virus can be spread via secretions from the eyes, nose, or mouth, and the faeces, urine, blood, milk, or reproductive fluids of infected animals.

Then, around 1600 BC, the plume of another Santorini eruption may have been responsible for the seventh, eighth and ninth plagues – the fiery hail, the locusts and the days of darkness. According to the archaeologist Charles Pellegrino, the Santorini eruptions would have been comparable with the Mount St Helens eruption of 1980 and this volcanic plume coupled with high velocity dust storms could have rained down in Egypt, thereby turning days into nights and causing weather anomalies with increased precipitations and higher humidity. It is possible that when the volcanic ash mixed with thunderstorms above Egypt, it led to dramatic hailstorms. This could have created the conditions which caused the infamous desert locust (Schistocerca gregaria) to change from the solitary to the more gregarious form, not only are they more sociable they change in appearance, becoming stronger, darker in colour and more mobile. They can swarm over long distances and, according to the United Nations Food and Agricultural Organization, when they get hungry, a one-tonne horde of locusts can eat the same amount of food in one day as 2,500 humans. Such a pestilence would devour all the remaining plants that the hail did not destroy.

Archaeologists have always believed that the last plague, the death of the firstborn male, was caused by wheat infected with a fungus. But this seems unlikely, since infants died also and they would probably not have been eating grain. Also, why were some children spared? There is a similar historical precedent where ergot fungus (Claviceps purpurea), infected rye grain, and is believed to have precipitated the Salem witch trials in the winter of 1692 where it may have been the cause for the hallucinations, trances, seizures, and violent behaviours that were the supposed signs of being a witch. Although ergot did not cause death in the settlers, it is unclear why it affected some people and not others. A similar fungus could have infected the Egyptian grain.

**Conclusions**

Were the plagues an ecological domino effect or divine intervention? It is very easy to dismiss the plagues as a fable when confronted with natural events such as volcanic eruptions, thunder, and desert sandstorms driving locusts into Egypt. But there are many problems with trying to analyse historical events from contemporary records. Often it is difficult to work out where or when they happened. In this instance, the period for the plagues of Egypt is sometime between the years 1570 and 1440 BC, depending on who was writing about them. Eusebius Pamphili (263-339 AD), the first Church historian, believed the specific date to be 1446 BC. And yes, there were the Thera volcanic eruptions in around 1630-1600 BC, one of which is described as the largest on record, but it was 1,050 kilometres (650 miles) away from the northwest part of Egypt. And the eruption was many years before the Exodus took place; the eruption would only have caused some of the plagues, if one or other of the dates is wrong. I am not a theologian and rely on empirical evidence to make decisions, but occasionally there is a question where you ask: “What if?”

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