

Frequently times history is thought of as a kind of endless story developed by both great and terrifying human leaders. What a big role nature plays in this story is the unthinkable part.

In current years, it was started by scientists to be taken care of in climate records hidden in nature inside tree rings, glaciers, caves, and even human remains. Historians, who now comprehend much better how our globe looked and felt in the past, are unwanted beneficiaries of this knowledge.

By the look of things, the rise and fall of the Roman Empire matched with a particularly fateful splinter in our planet's climate history - for better and worse. We cannot attribute Rome's fall or achievement solely to nature. But by us, it cannot be also ignored the role that nature plays. As can be seen in this summary, Roman history is inseparable from environmental history.

Chapter 1 - What provided to the welfare of the Roman Empire was a non-generic favorable climate.

Even as this empire was growing, life in the Roman Empire was tough. Baby mortality rates were high. Generally, 25 years was defined as the average life expectancy. Due to there being no motor vehicles or telecommunications devices, trips and communication were implausibly slow.

Despite these restrictions, what was achieved by the Romans was the establishment of a unified empire stretching into Western Europe, North Africa, and Western Asia. As the empire and its cities expanded and the population exploded, the Romans had to extract more resources from the surrounding environment. Yet it was not faced with the main nutrition shortage caused by them and nor were they hopelessly forced to grow hard or difficult soils.

Why is that? Those who were partly lucky were The Romans: according to the globe's climate history, the term they lived in was especially hospitable.

In the 2nd century AD, the Roman Empire slowed its expansion and maintained extensive peace in its vast territory. For the most part, conditions were very good: economic efficiency was high, there was enough food for everyone, and wages were rising for even the most unskilled workers.

It was Rome's expansion and improvement connected to a climate regime described as the Roman Climate Optimum, or RCO. With a stable, hot, and humid climate, RCO began in the last two centuries BC and dates back to the first two centuries AD.

During the RCO, the sun heated the earth more than normal - which period owned temperatures higher than in the past 150 years of our period was 1st century AD. At the same time, volcanic activity was almost nonexistent. This meant that the era did not see any of the low temperatures caused by volcanic ash blocking the sun.

What was a great blessing for the Roman Empire, was these circumstances. Thanks to the hot and humid climate, wheat and olives could be grown by farmers in the mountains where

a region they can never grow today! It was North Africa that was highly productive, supplying grain to large parts of the empire. However, today this region is more significant than a grain exporter.

Thanks to climatic circumstances, it helped Rome grow. However, this welfare came at a price: The Roman Empire's multitude of trade routes and high connections created the magnificent breeding ground for infectious illness.

Chapter 2 - What was always part of Roman vita was illness and sickness.

Worldwide, populations vary widely in their average size. Why so? Well, nutrition is an essential contributing factor.

By the modern period, it is seen many countries go through a tremendous growth spurt, thanks to economic growth and the resulting nutritional support. Let's take the Dutch, whose males averaged 164.5 centimeters in 1850. Also, nowadays their height is approximately 20 centimeters taller on average.

As for the Romans? By any measure, they were short, with males averaging 164 centimeters tall and females 152 centimeters. Both pre-and post-Roman the heights of Italians were taller than the Romans themselves. Still, the diets of the Romans were usually good, with even those on the lower rungs of the social ladder consuming animal and marine protein that increase height. This suggested that their small length was likely caused by illness, not malnutrition.

The same conditions that assisted the Roman Empire to flourish also permitted bacteria and viruses to spread without hindrance. What was densely collected and well connected through roads and marine trade routes so that disorders could simply move from one population to another were the towns.

Not only were infectious illnesses spreading rapidly throughout the empire, but Rome's cities were also terribly smudgy. For this reason, they became great Petri dishes for intestinal parasites. Thanks to aqueducts, clean water in and out of cities was frequently brought. This process not only provided drinking and bathing water but also assisted clean the sewage systems of cities. However, waste disposal left much to be desired; For the reason that household toilets were generally not connected to public sewer lines, by most Romans, it was still used room pots or open-pit toilets. Human excrement has also been sold to farmers as a valuable fertilizer. The thing that meant that the Romans were possibly surrounded by parasites like roundworms and tapeworms was all this exposure to human feces.

The seasonal death pattern in the Roman Empire gives us some clues when it comes to other great killers of the time.

The deadliest time of the year was defined as from late summer to early autumn by whole Romans - the time when the food-borne stomach and intestinal disorders such as typhoid and dysentery developed. Especially for older human beings, winter has been the deadliest because older bodies are most sensitive to respiratory infections.

The Romans were never really well. However, things were much worse than usual when a fresh illness showed up on the scene that would devastate the society: Antonine Plague.

Chapter 3 - It was the Antonine Plague that stimulated an economic crisis in the Roman Empire.

Mosquitoes' favorite environment is perhaps a swamp, a large bulk of water full of tall grass. And it just appears that the city in the metropolis of the large Roman Empire was built on this kind of wetland.

Not only was Rome circled by swamps, but the city itself was filled with water works such as decorative fountains, pools, and city gardens, which is the vast breeding area for mosquitoes.

Now, mosquitos are annoying. Worse than that, though, they carry a host of deadly diseases.

Presently, what is annoying is mosquitoes. Even worse, they bring a lot of deadly illnesses. For Rome, malaria was the biggest mosquito-borne killer. However, even this nutritional deficiency and fever-causing illness pale in comparison to the devastation caused by the Antonine Plague, an epidemiological event that brought the empire to its knees.

According to a Roman myth, what was shown during the Roman pillage in Seleucia, Mesopotamia was the Antonine Plague, when a soldier opened a chest inside the sacred temple of Apollo. It was said by them that inside the chest was a harmful vapor that came out and covered the empire.

Well sure, it is probably known by us that the illness we now know as smallpox, the plague, existed within the empire long before the so-called "toxic vapors" were shown up. It was held in the City of Rome in 166 AD and sustained its destruction for at least 8 years.

Thanks to Rome's organized healthcare system which involves simple nursing, the blow of the plague was probably softened. Yet its effects were devastating.

Although it is hard to determine the exact death toll from a plague that occurred not so long ago, the estimated death toll ranges from 2 percent to one-third of the population. It was the army that was especially severely affected by the illness, and it was stated by the emperor Marcus Aurelius that slaves, gladiators, and bandits should be quickly recruited to help renew the army ranks.

At the same time, in the late 160s AD, imperial silver mining, which allowed the Empire to continuously produce more coins, existed and it collapsed abruptly. An economic crisis has arisen. As the majority of the population was given out, its monetary worth decreased sharply, at the same time the request for land fell. Work power was scarce and what was significant was productivity losses.

After all, it was not the Antonine Plague that was a fatal blow for the Roman Empire. However, hence damaging the system, it caused less resistance to other future threats.

Chapter 4 - It was the third century when the Roman Empire experienced its first fall.

The city of Rome, AD 248. At first look, the city seems almost the same as a generation ago, at the height of its splendor. However, on closer inspection, items appear less rich, less wealthy, and commonly less durable than before.

To begin with, coins that were once solid silver and circulated the city are little more than metal wafers with a fine silver wash to cover them. Stone fortifications now surround the city and protect external forces. What only presents marks of an uprising is an obscure sect known as Christianity.

Rome is in the middle of its "initial fall". What lies in destructive aridity, a novel epidemic, and barbarian invasions are the roots of the crisis.

Let's go back four years. In AD 244, an aristocratic called Philip became Roman Emperor. In the beginning, although his reign made stability, it was not for long. Over the following few years, the empire was surrounded by both internal revolts and barbarian attacks along the Danube and in the East. Philip was killed in AD 248, and for the next two decades, by a usurper, it was tried to capture the throne one after another.

At the same time, while the days of the Rome Climate Optimum were closing, the climate regime identified as the Late Roman Transition was just starting. At this period, it caused a decrease in solar activity and began to cool. What has retreated after centuries of melting is glaciers in the Alps. A deep drought-hit North Africa and Palestine. Eventually, the weak or incomplete Nile floods deprived of the water and silt it required for grain production.

By the empire, it was being struggled - what it meant to be completely unprepared was to deal with another plague that began in AD 249 and lasted for 13 years: the Cyprus Plague. Those who claimed that the disease that could be caused by a filovirus similar to Ebola carried at least 5,000 souls a day was a testimony.

It was the Empire that broke up in 260 AD. Due to the silver content of the Roman currency, its value continued to decline, destabilizing it. As a result, the prices of the goods have fluctuated wildly.

What inspired the murder of the emperor Gallienus in AD 268; It was a combination of military loss, coin downsizing, and empire fragmentation. Fortunately, his successor II. The pieces were taken by Claudius. It was his reign that initiated a healing age that allowed the empire to flourish once more.

Chapter 5 - Although the Roman Empire was built again later the initial fall, it wasn't for long.

In the late third and fourth ages, who was still the most dominant nation in the globe was the Roman Empire.

A series of reforms happened throughout this term. By them, it involved those of the emperor Diocletian, who built the tetrarchy, giving four separate rulers the power to manage the sprawling empire. The army was reconstructed, and as currency stabilized too, permitting markets to revive.

Constantine who was the son of a military officer has arrived after Diocletian. By a controversial figure, Constantine, it was set up a second senate in the empire's eastern capital, Constantinople. In less than a century, the population of the city increased ten times, from 30,000 to 300,000 citizens. Despite the empire being in the midst of a new golden era, the peace wouldn't last permanently.

What emperor Constantine's reign brought to the empire was stability. These stable circumstances were mirrored in the environment. The climate was usually warm, rains were reliable, and by the empire, major disease events and volcanic activity was gotten rid of.

However, globally, things didn't seem quite as peachy. In especially, in the Eurasian steppe, which stretches from Central Europe into East Asia, major aridity was experienced. This caused food shortages and famine. Combined with growing political tensions, this caused a period of migration from Asia into the West.

The Huns that was known as a nomadic tribe was one group that migrated in the mid to late 300s. With the Huns' ferocity as warriors, along with their superior weaponry, the peoples living in the western part of the steppe, who were known as Goths, were defeated. In AD 376, the Huns' still kept migration and pushed higher than 100,000 Goths into the Roman Empire as refugees.

By the Romans, it wasn't behaved gently to the Gothic refugees. Because of Roman cruelty, which involved forcing parents to sell their children in exchange for dogs to eat, a Goth revolt was led. In a battle at Adrianople on August 9, AD 378, the worst military loss was seen in Roman history: it's expected that 20,000 men were killed. The army did not recuperate like before.

Soon, the western Roman Empire collapsed. It was observed in two waves. In 405, the first one started when a series of destabilizing Goth strikes resulted in the looting of Roman City. The second wave came when the Huns, directed by Attila, occupied Gaul, and Italy in 450 AD. By AD 476, while the Western Roman Empire had stopped to exist, yet the eastern Empire grew rich.

Chapter 6 - By the bubonic plague, it was struck the first of two deadly dashes to the Eastern Roman Empire.

In the fifth and sixth centuries, the place that was a global center was Constantinople, the eastern capital of the Roman Empire - a commercial center and big city where you can hear ten or more languages spoken in the streets at any given time. And sharing this distinct city with its human-beings' residents was a species known as the *Rattus rattus*: the black rodent.

These mice weren't only annoying insects, but also, they were home to a wild killer that is now called the Black Death or the bubonic plague.

What is the most well-known formation of bubonic plague in all past is The Medieval Black Death, which lasted about 500 years in the 14th and 15th centuries. However, its first presentation appeared in AD 541 when it reached the Egyptian coast and devastated the Roman Empire.

Which insect is a Southeast Asian native is black rats. However, by these rodents, traveling is loved, and by them, grains are loved too. That meant they were eager to hitchhike to Roman ships in the Red Sea and the Indian Ocean.

The source of the plague was not insects themselves. A bacterium called *Yersinia pestis* was the criminal. Most often, *Y. pestis* lives in a population of rodents, generally marmot or gerbil. It spreads like after these steps; when fleas receive blood from an infected rodent and send it to a population of mice. Because of the bacteria, it makes mice sick and depletes the fleas' food supplies, causing their population to decline. Then a human blood diet is changed as a last resort by the fleas.

What is an extremely deadly disease is bubonic plague, particularly in a globe without health care or antibiotic treatment. Before the plague, it was considered that the population of Constantinople was probably half a million. By primary sources, it is claimed that the death number in the city is 300,000, or 50 to 60 percent of the city's residents.

The plague that spread all over the empire began for two centuries from AD 541 to AD 749. Because of the cold climatic circumstances, the spread of the illness was encouraged perfectly, and it was excellent for delivering the last punch to an already stressful Roman Empire.

Chapter 7 - It was the Roman Empire that never survived the Late Antique Little Ice Period.

The black death was not the only fatal and apocalyptic situation that plagued the Roman Empire in the late and sixth centuries. In AD 535, a volcano erupted, ejecting clouds of ash and smoke. Because of its explosion, what is known as the year without a summer emerged. It was insisted by witnesses that the sun seldom shone and when it did its light was shadowy and blurry.

It was just one example of a wider chain of climate anomalies. In AD 540-541, another volcanic winter was seen. And the 530s and 540s AD were the coldest times of the era. In 536 AD, summer temperatures fell 2.5 degrees Celsius in Europe - a staggering figure.

What was comprehended as the Late Ancient Little Ice Period and, along with the bubonic plague was this climatic time, which assisted in advance the Roman Empire toward its last destruction?

The absence of summer in AD 536 meant a great crop scarcity. Luckily, thanks to seeing a bountiful harvest in the previous year, the grain warehouses were abundant, appropriate that the population within the empire emerged relatively unscathed by famine. However elsewhere, famines were seen in Ireland and China - proof of the around globe scale of climate change.

What the cold weather caused was also a huge demographic decay - now by as few as 10 to 20,000 individuals, it may have been termed Roman houses. All settlements seemed smaller. Those who spread to Spain, Gaul, and Italy were distinctive Gothic tribes. The wild started to grow again on the farmland that once fed the great western cities of the empire.

In the east, the army was strained from the devastating impacts of the plague. Its troops could not be paid for by the government, and therefore sufficient soldiers could not be recruited to protect the imperial lands. In 641, the city of Alexandria was captured by the armies of the neighboring Persian Empire. With the Persian triumph, grain shipments to Constantinople stopped completely.

In the next years, by the plague, life in Constantinople was stifled, and the person who presided over the empire's final failure in the early 640s was the emperor Heraclius. By the Arabs - Christian, Jewish, and Islamic -, the ancient jewels of the Roman Empire were captured in the east and south. Even though the city of Constantinople struggled, the Roman Empire well, and fell.

The Fate of Rome: Climate, Disease, and the End of an Empire by Kyle Harper Book Review

Thanks to present scientific research on natural climate records, more than ever have been learned about the environmental conditions in the wider Roman Empire. Although the Roman Climate Optimum coincided with the top of the empire's welfare, this naturally hot and rainy period ended in AD 150 and ushered in a period of climate instability with main plague events. What puts immense pressure on an empire that was already torn and stressed by war and invasion is The Late Antiquity Little Ice Age and the bubonic plague, and by the early 600s, almost all of its territories fell under the Arab caliphate.

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