

Scientists are like detectives, piecing together clues to explain how things occur in nature. Scientists can also take clues from historical texts to pinpoint precisely when events occurred in the past. The battle of Marathon in Greece is one event that has perplexed scientists for years.

A marathon is an endurance footrace that re-creates the experience of a messenger in 490 BC. The messenger ran 26 miles from a battlefield on the plains of Marathon back to Athens to bring the Greeks news of victory over the Persian army. According to historical texts, the messenger delivered the good news and then immediately collapsed and died. The conclusion of the story has troubled historians, scientists, and athletes for years. Why would an experienced runner die after running 26 miles? Researchers at Texas State University decided to re-examine this legend in light of modern-day science.

How Science Explains History

Historians turned to historic text to understand when the battle of Marathon took place. One key piece of information jumped out at the researchers. The Athenians requested help from the nearby Spartans. However, the Spartans could not send troops until after the religious festival of Karneia, which would occur 6 days later with the next new moon.

Most historians describe the events of Marathon in terms of the Athenian calendar. Using this method, historians have placed the date of this epic battle on September 12. The researchers used the astronomical clue in the story to re-create events and determine the date of this legendary event. The research team from Texas believed that dating this



This map identifies the location of Athens. The plains of Marathon are located in the southern portion of the modern central Greek province (shown in purple).



A new moon occurs when the face of the Moon visible from Earth is not illuminated by the Sun's rays.

event based on the Athenian calendar was flawed. Instead, these researchers focused exclusively on the Spartan calendar, which was not the same as the Athenian calendar.

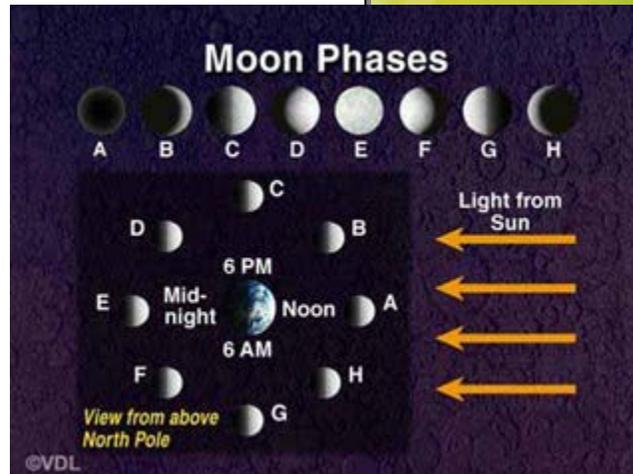
The Role of the Moon

The detective work began by interpreting the phases of the Moon. The Moon orbits Earth in approximately 27 days. As the Moon orbits Earth, the Sun illuminates different areas of the Moon's surface. The differences in illumination are referred to as the phases of the Moon. There are eight phases of the Moon. The Moon undergoes these phases every 29 days.

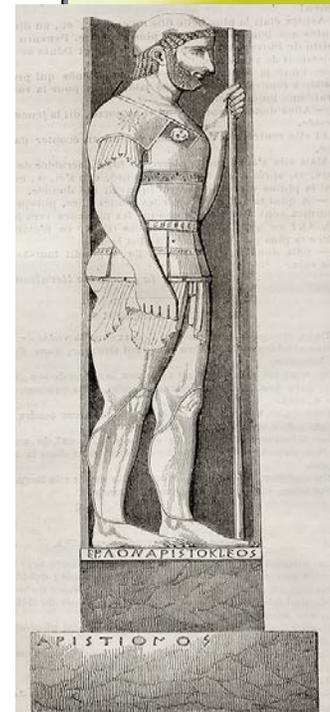
The first phase, or the new moon, is the side of the moon facing the Earth that is not illuminated. The illumination gradually increases through the three phases—waxing crescent, first quarter, and waxing gibbous. The full moon describes the face of the moon that is completely illuminated. As the moon continues in its orbit, the illumination gradually decreases. The remaining phases include waning gibbous, third quarter, and waning crescent, returning to the new moon.

The research team began with the religious ceremony cited in the historical text. This event provided a precise mark on the Spartan calendar. The team then used the reference to the new moon, which occurred 6 days after the festival. The scientists used this event to discover the lunar cycle. According to the Spartan calendar, the first new moon occurred during the autumn equinox. With this information, the research team revised its knowledge about the battle of Marathon. The researchers believe this battle occurred on August 12, 490 BC rather than September 12, 490 BC.

Since the battle occurred 1 month earlier, the environmental conditions would have been different. A typical Greek summer has temperatures around 91° F. The temperature can reach as high as 102° F—more oppressive than September's temperature of 83° F. Even a trained athlete who is exposed to more extreme



The phases of the Moon illustrate the Sun's illumination of the face of the Moon.



Artists have re-created the battle of Marathon through paintings and sculpture.

temperatures can experience heatstroke or exhaustion. The slight change in timing could explain the dramatic conclusion to the epic story. Researchers, however, remain doubtful about the conclusion of the story. Most versions of the battle were written than 500 years after the event. One cannot disagree that the messenger's collapse offers a dramatic ending to this amazing story.