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From Spark and Flame: a Study of the Origins of Gunpowder Firearms

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Sun Tzu said, “In order to carry out an attack, we must have means available. The material for raising fire should always be kept in readiness.”¹ Throughout history, nothing has been able to harness and effectively employ the destructive power of fire quite like gunpowder. Originating in the Medieval period, the use of gunpowder in weaponry has taken on many forms, from fireworks to incendiary devices to modern guns and all the variations thereof.

Most scholars agree that this powerful substance was originally created and used first in China. On the note of gunpowder’s journey west, however, there is disagreement. Some scholars believe the linear invention theory, that gunpowder was invented in China around the ninth century AD, where it was traded or captured through the Mongolian Empire, to the Islamic states, and on to Europe, where it was developed into modern-day field artillery. Others believe the independent invention theory, that each nation developed gunpowder through their own alchemical studies by the multitude of medieval Chinese alchemists in the East, Ibn Al-Baytar and his successors in the Middle East, and Marcus Greaceus and Friar Roger Bacon in the West. Because of the presence of precursors to guns in both technological use and nomenclature, and the similarities of the late advancements of the East and the early advancements of the West, the strongest theory is the linear invention theory.²

Most definitions of gunpowder firearms differ slightly. While gunpowder was a means to throw a projectile at high speed, it was also used as a weapon on its own as an incendiary.³ Later versions of Greek Fire, the extremely effective incendiary from the Greek islands, contained

¹ Sun Tzu, *Art of War*, (Monee, IL: Filiquarian Publishing LLC, 2021), XII-2.

² A. Rahman Zaky, “Gunpowder and Arab Firearms in the Middle Ages,” *Gladius*, VI, (DEC 1967), 47; J. R. Partington, *A History of Greek Fire and Gunpowder*, (Baltimore: The John Hopkins University Press), 1999, 22; Tonio Andrade, *The Gunpowder Age: China, Military Innovation, and the Rise of the West in World History*, (Princeton: Princeton University Press), 2016, 31; and Robert Holmes, “Medieval Europe’s First Firearms,” *Medieval Warfare*, Vol. 5, No. 5, (NOV/DEC 2015), 49.

³ Ling, Wang, “On the Invention and Use of Gunpowder and Firearms in China,” *Isis*, Vol. 37, No. ¾. (Jul., 1947), 167.

gunpowder.⁴ Thus, some sources include petroleum-based and alcohol-based weapons in the arguments of the invention of gunpowder firearms. While these are weapons that utilize fire, they do not contain gunpowder and are considered outliers to modern guns.

The most accurate identifier for early gunpowder is the presence of the primary element, saltpeter, or Potassium Nitrate, which is sometimes called niter, or Chinese Snow. Black powder, the original form of gunpowder, is the combination of saltpeter, sulfur, and charcoal in a ratio of around 6:1:2 respectively. Civilizations in the early Medieval Period experimented with different ratios or recipes, eventually settling on one similar to the aforementioned, presented in the *Liber Igneum* by Marcus Greaceus in the late thirteenth century.⁵ While the definitions of gunpowder can be simplified to the presence of a single element, the facts surrounding the invention and diffusion of this weapon are not as simple.

Three areas of interest emerge when studying the trade and diffusion of this invention. The first area of interest lies in the far East, including China, India, and the Mongol territories of Tibet, Eastern Siberia, and as far West as modern-day Afghanistan. The scholar Wang Ling places the earliest dates of the discovery of saltpeter at 85AD, citing Robert Norton, and a book titled *Pao P'u Tzu* from the late third century which mentions the use of saltpeter in Taoist alchemy, though this information is not corroborated by other scholars.⁶ What is corroborated is the repeated practical use of saltpeter and precursors to gunpowder by the ninth century AD as a medicine and light explosive. The *Wu Jing Zong Yao*, a Chinese alchemical book, marks the date for the invention of a gunpowder recipe around 1044 AD.⁷ Wang Ling describes the nature of this document saying, “The publication was meant to serve military purposes, and not only

⁴ Partington, *Greek Fire*, 49.

⁵ Partington, *Greek Fire*, 49.

⁶ Ling, “Use of Gunpowder,” 161.

⁷ Ling, “Use of Gunpowder,” 162; Andrade, *Gunpowder Age*, 2; and Joseph Needham, “The Guns of Kaifeng-Fu: China’s Development of Man’s First Chemical Explosive,” *The Creighton Century, 1207–2007*, (London: University of London Press), 2009, 160.

points out a detailed and perfected method for preparing and keeping gunpowder, but also explains its use for different kinds of arms.”⁸

In the Far East, gunpowder firearms such as fire arrows, Fire Lances, and fire bombs were used against the raiding Mongolian horsemen in the North. The most developed weapons were used as incendiaries, using gunpowder to quickly start fires rather than utilizing explosive power to throw shrapnel or projectiles. Seeing the notable destructive power these weapons had on the raiders, the Mongols took some of the firearms and manufactured their own versions of each weapon. It was not long before these new weapons were employed by the Mongols in various sieges such as Genghis Khan’s siege of the Jin capital of Kaifeng in 1232.⁹ After the Mongols began to use gunpowder firearms, nations like India took and utilized the technology for themselves in roughly the same manner.¹⁰ In this way, the Mongols were the driving force of linear travel, at least in the Far East.

The second area of interest is the Middle East and a large portion of the Balkans. This includes the area around modern-day Iran, Syria, through Egypt and Turkey, and includes parts of Greece, Serbia, Romania, and Bulgaria. This area was dominated by the Byzantines and Islamic nations during this time. The first document noting the invention of gunpowder in this area comes from the Aldusian Ibn al-Baytar who calls it “Chinese Snow.”¹¹ Despite the disagreement on how the technology arrived in the Middle East, the trend of Westward movement continued. The Turks quickly developed their own form of gunpowder weapon and used it against the Byzantines with great success. The Byzantines then captured the technology

⁸ Ling, “Use of Gunpowder,” 162.

⁹ Andrade, *Gunpowder Age*, 45; and Kate Raphael, “Mongol Siege Warfare on the Banks of the Euphrates and the Question of Gunpowder (1260-1312),” *Journal of the Royal Asiatic Society*, Vol. 19, No. 3, (Jul 2009), 360.

¹⁰ Iqtidar Alam Khan, “The Role of the Mongols in the Introduction of Gunpowder and Firearms in India,” *Proceedings of the Indian History Congress*, Vol. 55, (1994), 199.

¹¹ “Setting the Record Straight: The Miracle of Islamic Science.” Excerpted from: Appendix B of *The Miracle of Islamic Science* by Dr. K Ajram.

and used it for themselves, albeit to a much lesser degree.¹² For the Middle East, the linear travel theory took on the form of warfare rather than physical travel.

The final area of interest is Western and Central Europe. This area includes modern-day Spain, France, Germany, England, Austria, Hungary, and was dominated by the Germans and English. Feudalism was developed at this point, which aided in the diffusion of technology in Europe. The local lords were constantly trading or warring in order to gain the upper hand. The use of experimental gunpowder was quite common for these nations.

The Europeans used gunpowder cannons in warfare by 1326 AD, but how the technology came to the area is still in contention. One point of view claims that Europe developed the technology independently through the alchemical works of Marcus Greaceus and Friar Roger Bacon. Another claims that, like the Turks and Mongols, the nations saw gunpowder used by their neighbors to the East and took it for themselves through trade or warfare. Many who subscribe to the latter discuss whether the technology came from the Mongols, traveling through modern-day Ukraine, or the Turks, likely being looted during the Crusades. Regardless, the technology was given a new recipe by Friar Roger Bacon and used in warfare no later than 1326 AD as proven by a preserved image of a soldier using a cannon. From there, the Europeans continued to develop cannons and other types of field artillery that were used with great success against neighboring forts and castles.¹³

Each of these areas of interest make a claim that they developed the technology first, or at least without the help of neighboring nations. This is not unsurprising when recognizing that this is a nationalistic conversation. Scholars who have pride in their nation want to prove it unique, special, or otherwise great. Each area of interest developed their own form of gun after the

¹² Partington, *Greek Fire*, 22; Raphael, "Mongol Siege Warfare," 360; and Zaky, "Arab Firearms," 47.

¹³ Andrade, *Gunpowder Age*, 90; and Kelly DeVries, "Gunpowder Weaponry and the Rise of the Early Modern State," *War in History*, Vol 5, No. 2, (Apr 1998), 130.

technology came to them, which gives an opening to say that each area developed the technology independently.¹⁴

The first point of set of evidence supporting the linear invention theory is nomenclature. The original word for gunpowder comes from Chinese texts which call it “fire medicine,” denoting the original use for the invention. Early into gunpowder’s use as a weapon, it was still referred to as medicine.¹⁵ This carried over to the Islamic nations, where gunpowder was known as Chinese Medicine or Chinese Snow until later when it was given the name Barud was used to classify its modern use.¹⁶ There is no such preceding term for Europe. Early forms of European gunpowder are either unnamed or referred to directly as gunpowder. This enforces the idea that the Europeans had no use for the substance other than as a gun-style weapon, unlike the other two groups mentioned. That being said, the real evidence against independent invention comes from the interconnectivity of the world at this time.

The argument of Turkish origin shows this most clearly. The first mention of gunpowder in the Middle East comes from a manuscript by the botanist Ibn Al-Baytar, who refers to it as Chinese Snow early in the thirteenth century. While it was originally used as a medicine, similarly to China, it was not long before it was developed into a weapon. There is no evidence that the development of the medicine or the weapon is independent.¹⁷ In addition, the use of gunpowder by the Mongols in sieges against the Middle East, specifically the invasion of Syria in 1259, promotes the idea that the Turks captured the invention from the Mongols or Chinese rather than developing it on their own.¹⁸ The scholar A. Rahman Zaky goes further to make the

¹⁴ “Setting the Record Straight.”

¹⁵ Ling, “Use of Gunpowder,” 162; and Andrade, *Gunpowder Age*, 30.

¹⁶ Zaky, “Arab Firearms,” 47.

¹⁷ Zaky, “Arab Firearms,” 47.

¹⁸ Raphael, “Mongol Siege Warfare,” 356.

claim, “The Arabs, thanks to their communication with China since the tenth century and before, were not long before they learnt the art of making gunpowder . . .”¹⁹

The much more confusing claim comes from Europe. Europe had two major alchemists who advanced the study of gunpowder. Marcus Greaceus, or whoever used that name as a pseudonym, gave a recipe for Greek Fire that contained saltpeter, thus fulfilling the conditions of the initial research question around the same time as gunpowder was being discovered in China. The issue is that the use of gunpowder in Greek Fire did not advance beyond additives and elements of Greek fire are not seen in later advancements of gunpowder firearms.²⁰ The advancement and development of gunpowder would come from Friar Roger Bacon. Based on Bacon’s recipe given in the late thirteenth century, Europe would quickly develop cannons of every size.

The truly unique development to Europe, which some scholars point to as evidence of independent invention, is the idea of anti-structure firearms. The nations to the East used gunpowder weapons against enemy soldiers because of the way structures were built in those areas. It was faster, easier, and more efficient to burn the people inside the structures or meet them outside than to raze the building entirely. A notable example of this is the comparison of castle walls between the Europeans and Chinese. The Europeans built large vertical structures that could easily repel an invasion of foot soldiers, even if they brought their ladders, siege towers, or battering rams. These large stone structures effectively repelled attacks from footsoldiers, but they would prove ineffective against the overwhelming power of a large cannon. The Chinese, however, had castles much larger in land area but much lower in height. These castles were close to the ground and often built into the surrounding earth. They had sectioned

¹⁹ Zaky, “Arab Firearms,” 45.

²⁰ Partington, *Greek Fire*, 49.

designs that forced attackers to breach multiple doors, and their walls, being dug into the ground, could resist almost any form of attack, including an attack by a large cannon. After the development of the cannon, Europe's castle walls would look very much like China's, but it would take some time for this to take place. By then, the advancement of the cannon had already made itself a mainstay in European warfare.

What is much more vital to the argument of independent invention is the existence of predecessors to a gun. While there were successful experiments with gunpowder attached to arrows and even livestock, the first unique gunpowder firearm is recognized as the Chinese Fire Lance. Early versions of this weapon were a single-use pole with gunpowder propellant attached to the end. The package of gunpowder had a fuse that was lit and ignited the whole package, which threw fire in the direction the pole was pointed. Advancements to the Fire Lance added an early form of ammunition, where the package of gunpowder could be taken out and the pole was reused, thus making the use of the Fire Lance more practical. Later, the Fire Lance added metal balls and other bits of shrapnel to the end of the gunpowder package. This is the first gun, an incendiary pole that threw shrapnel in addition to flame, somewhat akin to a modern buckshot shotgun.²¹

This kind of progression did not occur in the Islamic nations, which further weakens the argument of independent invention. It is, however, present in Europe from certain points of view pertaining to Greek Fire. The issue with this is the broken lineage of Greek Fire. The recipe has been lost and remade from scratch a multitude of times. The most documentation comes from the version of Greek Fire used by the Byzantine Empire, which is similar but not identical to the original version. In addition, if Greek Fire could be counted as a definite precursor to what the

²¹ Stephen G. Haw, "The Mongol Empire — the First 'Gunpowder Empire'?" *Journal of the Royal Asiatic Society*, Third Series, Vol. 23, No. 3, (Jul 2013), 442, 444.

Europeans would develop, there should be elements of that technology in those firearms. Greek fire, or any other forms of that technology, is not seen in the advancement of gunpowder firearms.²²

The early advancement of firearms in Europe is a weapon very much like the Fire Lance, though instead of throwing flame or shrapnel, this weapon fired a single shot. The technology for cannons would be developed as the needs for larger projectiles arose, but until that time, the Chinese Fire Lance and the European Handgonne were too similar to ignore. The technologies were even used in the same anti-personnel roles.²³

Although each nation that gained gunpowder technology developed a way to make the technology unique to them, the idea that it rose independently in each nation is mistaken. The arguments for a linear westward path are supported by linguistics, surrounding technological advancements, and the similarities between the different nations' weapons. The arguments for independent invention, pointing to the independent alchemical studies of the time, hold very little ground. So, the journey of gunpowder weapons is akin to the journey of the sun, rising in the east and traveling west.

²² Partington, *Greek Fire*, 49.

²³ Andrade, *Gunpowder Age*, 96; and Holmes, "Europe's First Firearms," 50.

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