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Introduction

Why was it the Europeans who perfected firearms when it was the Chinese who invented them?

Boiled down to a single sentence, that is the question this book tries to answer. There was once a great deal of confusion and controversy surrounding the invention of firearms, but it is now generally accepted that firearms originated in China. Although there is no solid evidence for firearms in Europe before the 1300s, archeologists have discovered a gun in Manchuria dating from the 1200s, and an historian has identified a sculpture in Sichuan dating from the 1100s that appears to represent a figure with a firearm. Since all the other evidence also points to Chinese origins, it is safe to conclude that this was in fact the case.[1]

The earliest known formula for gunpowder can be found in a Chinese work dating probably from the 800s. The Chinese wasted little time in applying it to warfare, and they produced a variety of gunpowder weapons, including flamethrowers, rockets, bombs, and mines, before inventing firearms. "Firearms" (or "guns") for purposes of this book means gunpowder weapons that use the explosive force of the gunpowder to propel a projectile from a tube: cannons, muskets, and pistols are typical examples. Although there were many kinds of gunpowder weapons other than firearms, none ever rivaled firearms in importance.

Firearms remained in use in China throughout the following centuries. Meanwhile, gunpowder and firearms spread elsewhere very quickly. Gunpowder seems to have been widely known by the 1200s. The Europeans certainly had firearms by the first half of the 1300s. The Arabs obtained firearms in the 1300s too, and the Turks, Iranians, and Indians all got them no later than the 1400s, in each case directly or indirectly from the Europeans. The Koreans adopted firearms from the Chinese in the 1300s, but the Japanese did not acquire them until the 1500s, and then from the

Portuguese rather than from the Chinese. Firearms were known to other peoples, but few others manufactured them until fairly recent times.

Although firearms spread very far very quickly, three areas stand out for their success at producing and deploying firearms. Europe, of course, was one. The Ottoman empire was the second, although it might also be counted as a European power, geographically if not culturally. Japan was the third. The Japanese eagerly adopted firearms in the 1500s, even though they found no further use for them after Japan's unification in the 1600s.

When the Chinese came into contact with foreign firearms in the 1500s, they found those firearms to be far superior to their own – not only European firearms, in fact, but also Ottoman ones, and eventually even Japanese ones. One Chinese military manual, published in 1644, compared Chinese firearms to European and Ottoman muskets in the following terms:

> Firearms have been in use since the beginning of the dynasty, and field armies in battle formation have found them convenient and useful to carry along. . . . Since muskets have been transmitted to China, these weapons have lost their effectiveness. . . . In battle formation, aside from various cannon such as the three "generals," the breech-loading swivel gun, and the "hundred-league thunder," nothing has more range or power than the Ottoman musket. The next best is the European one.[2]

If the Europeans had been the only people to use firearms effectively, one might suspect that some unique aspect of European culture was responsible, but the Ottoman and Japanese experience complicates any speculation along these lines. It is not enough to identify some trait that was unique to Europe. There also has to be something that set Turkey apart from closely related societies in Egypt and Iran. There also has to be something that set Japan apart from closely related societies in Korea and China. Finally, these distinctions have to be linked to firearms in a way that could plausibly account for their use or neglect.

Once the question is posed, it becomes impossible to confine the answer to Europe and China alone. Europe was not the only latecomer, nor was it the only region where firearms were used effectively. Any answer to the question has to account not just for Europe and China but for the rest of the world as well.

So why was it the Europeans who perfected firearms when it was the Chinese who invented them?

As a preliminary matter, it should be clear that one prerequisite for firearms development was a certain level of technological sophistication, particularly in chemistry and metallurgy. It is no simple matter to make gunpowder pure enough to ignite and explode or gun barrels strong enough

to withstand and direct that force. There were four regions of the world during these centuries that possessed the necessary technology for these purposes: Europe, the Middle East, India, and East Asia. Although not every area within these four regions boasted an equally high level of technology, each region did contain areas that did.[3]

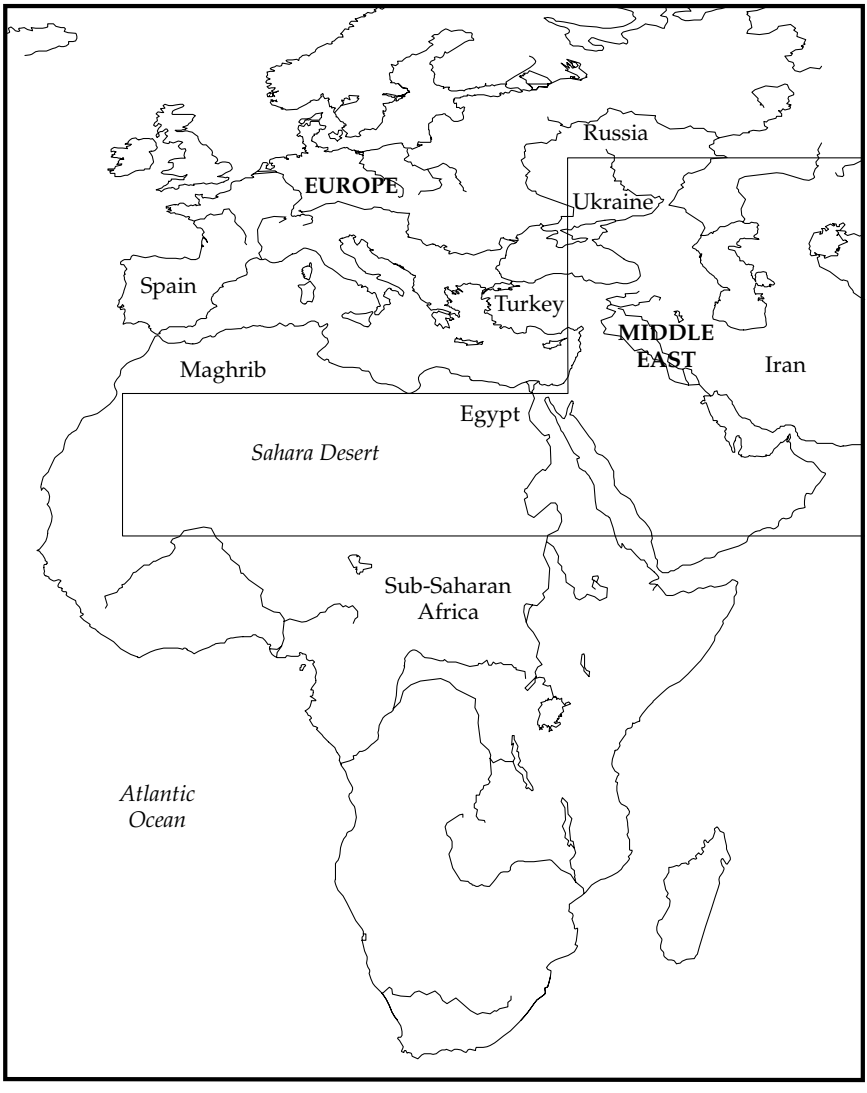
It is often assumed that European technology was generally superior to that of the rest of the world. Although true enough for recent centuries, this assumption does not hold for the centuries when Europeans were actually gaining their superiority in firearms technology. The further back the assumption is pushed, the harder it is to reconcile with what we now know about the origins of firearms. If the Europeans had such a clear-cut technological superiority, why was it the Chinese who invented firearms in the first place? Technology may explain why the Europeans kept their lead, but not how they gained it.

Among those who recognize that Europe started behind and had to catch up, the most popular explanation seems to be political fragmentation. European powers were engaged in a continuous life-or-death struggle with each other, and this struggle impelled them to seek the best possible military technology. Unfortunately for this explanation, all the other areas that possessed similar levels of technology were also involved in more or less constant warfare, the principal exception being Japan after 1615. Although this does explain why the Japanese neglected firearms after 1615, it says nothing about other areas.[4]

The argument in this book picks up where the political fragmentation argument leaves off. Although nearly all the areas with the requisite technology experienced almost continual warfare during this period, that does not mean they all would have found firearms equally useful in those struggles. In particular, those areas that were most concerned with defending themselves against steppe and desert nomads had the least use for firearms. Early firearms were ineffective against steppe and desert nomads.

Of all the technologically advanced areas of the world, only western Europe and Japan did not face any threat from steppe or desert nomads, and it was those two areas where firearms developed most rapidly. Russia and the Ottoman empire faced this kind of threat on their eastern borders, though not on their western borders, and their development of firearms was slower. The Middle East, India, and China were preoccupied with the threat from the steppe or desert and tended to neglect firearms.[5]

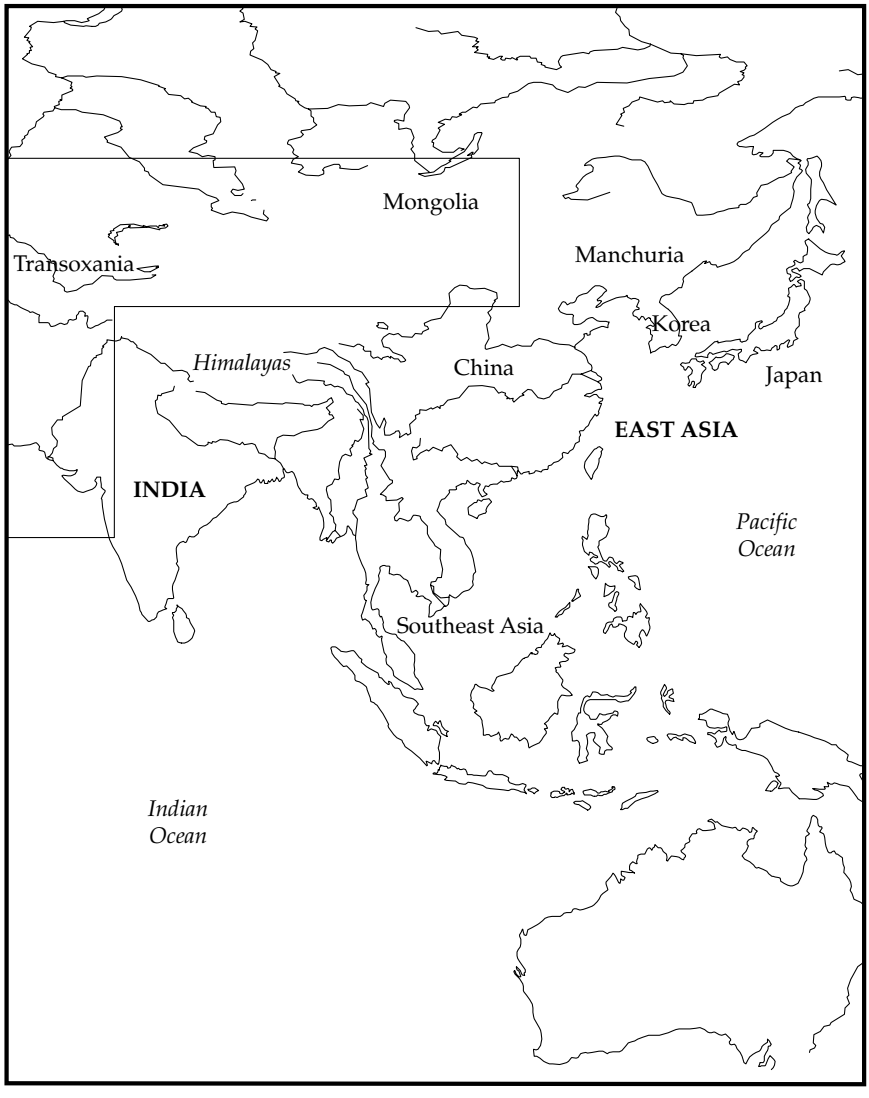
It is easy to speak of Europe "starting behind" and "taking the lead," as if there were a worldwide race to develop firearms. However, there was no arms race either between the Europeans and the Chinese, or between the Indians and the Japanese. Neighbors like the Habsburgs and the Ottomans or the



Map 1. "The Oikoumene" consists of the four regions marked in bold type – Europe, the Middle East, India, and East Asia – which possessed advanced technology at the time when firearms were invented. "The Arid Zone" is the outlined area – from Mongolia in the northeast to the Sahara Desert in the southwest – where there was generally too little rainfall to support agriculture.

Chinese and the Mongols each had their own separate rivalry, but the latter was not a race to get more and better firearms. Most places in the world had lost the firearms race long before they ever knew there was one.

Of course, no simple answer can account for all the complexity and variety in the historical record. Nor does there have to be one answer that will



Map 1. (*continued*)

account for everything, because similar effects can have different causes.[6] However, the ineffectiveness of firearms against steppe and desert nomads goes a long way toward explaining why some areas of the world had more success than others in applying firearms technology. This book shows just how far this one argument brings us and what else is necessary to get us the rest of the way there.

The next section (The Oikoumene) deals with the issue of technology. The rest of this chapter discusses the interaction between nomads and their

neighbors: how nomads lived on the steppe (The Steppe) and in the desert (The Desert); why the nomads of the steppe and the desert were not conquered by their richer and more populous neighbors (Logistics); and why people chose to fight nomads by some means (Cavalry) rather than by others (Firearms).

The other chapters of the book then trace the history of firearms as they spread around the world: starting where firearms were invented in China (Chapter 2), following them west as they were introduced in Europe (Chapter 3), and then tracking European firearms east again through Turkey and Egypt (Chapter 4) and Iran and India (Chapter 5) all the way back to China (Chapter 6) and beyond to Korea and Japan (Chapter 7). The conclusion (Chapter 8) takes the story up to the present day.

The Oikoumene

Certainly up to the year 1700 and even well after that, nearly all firearms were produced by inhabitants of four regions: Europe, the Middle East, India, and East Asia. These four regions formed a roughly crescent-shaped band from England to Japan (see map 1) that is sometimes known as "the Oikoumene," from the Greek for "the inhabited quarter."[7]

The Oikoumene was characterized by cities that were supported by the agricultural and pastoral surplus of the countryside. None of these regions was industrialized before 1700, and industry was responsible for only a small part of the economic output, but that industrial output set them apart from areas outside the Oikoumene, even though most of the inhabitants lived on farms and produced food. Not yet industrial but not simply agricultural, these civilizations might be referred to as "agrarianate."[8]

Large, dense populations were able to support specialists in writing and keeping records and accounts, which led to civilization in the sense of common literary traditions. In this sense there were perhaps four major civilizations in the Oikoumene when firearms were invented: Latin, Arabic, Sanskrit, and Chinese. That is to say, there were four established literary traditions that connected large numbers of people together and allowed the literate persons among them to exchange ideas across time and distance.

It is not entirely coincidental that we also find four major religions in the Oikoumene in this period: Christianity, Islam, Hinduism, and Buddhism. Each of these religions was linked to one of the literate traditions, although each one in its own way: Latin and Chinese had classical literatures that predated Christianity and Buddhism, for example, whereas Arabic and Sanskrit literature grew from the Qur'an and the Vedas. Except perhaps in China, religion probably shaped cultural identity more than did the associated literate tradition.

Speaking still in very general terms, it is also possible to identify each civilization and religion with one region of the Oikoumene in the 1100s. Europe was home to Latin and Christianity, as India was to Sanskrit and Hinduism – these regions are easy to label. The territory covered by Arabic and Islam was the most diverse, but its historical core was the land between the Nile and the Oxus Rivers, usually known as the Middle East. The territory covered by Chinese and Buddhism, including not only China but also Korea, Japan, and northern Vietnam, is generally known as East Asia.[9]

These were the four regions of the world in the 1100s with the technology needed for the production of firearms.

Comparisons of technology between areas within the Oikoumene are more controversial. Theoretical science in the 1100s was probably more highly developed in Arabic civilization than anywhere else, as Arabic civilization drew upon and built upon both Greek and Indian science. Be that as it may, the marriage of science and technology so characteristic of the world today was a much later phenomenon. At least through the 1700s, if not later, technology advanced principally by trial and error, without much in the way of theoretical underpinnings.[10]

If Arabic civilization excelled in science, Chinese civilization excelled in mechanical technology. To the Muslims, who were in the best position to judge, the Greeks and the Indians were known for their philosophy, but the Chinese were famous for their artistry and their artisanry.[11] The Armenian monk Hetoum, writing just two decades before the first record of firearms in Europe, had the following to say about Chinese technology:

> And for very treuth, out of this realm of Cathay are brought many strange and meruelous thynges of subtyll labour and art ingenyous, wherby this peple well seme to be the moste subtell and inuentife of the world in arte and laboure of handes.[12]

To take the broadest possible view of things, it is safe to say that Europe lagged behind the other three civilizations in the Oikoumene in the year 1000 and had passed them all by the year 1800. The question of when exactly Europe did overtake each of the other three civilizations is highly contentious.[13] Without necessarily committing to a definite position on that issue, it is safe to say that the development of firearms was not determined by any general technological superiority on the part of Europe.

Very few people believe that Europeans possessed superior technology in the 1300s or 1400s, even those who believe that the roots of the Industrial Revolution can be traced back to those times. However, those two centuries are the most relevant time frame for the question at hand. European firearms already were quite clearly superior to those in any other part of the world, aside from the Ottoman empire, by the early 1500s (firearms not being

introduced to Japan until 1542). Whatever happened had already happened by then.

What makes firearms so significant in the history of technology is not that they were symptomatic of some general European superiority, but rather that they were one of the very first items of technology in which Europeans did excel. Although Europe made tremendous progress in the 1300s and 1400s, very little of it represented anything that was unknown elsewhere. Europe was gaining ground on other regions, but it had not yet taken the lead. Optics (i.e., eyeglasses) and horology (i.e., clocks) are the two fields aside from gunnery where they were legitimately at the forefront in practical technology of universal application. This is all the more reason for giving close attention to firearms.[14]

Whatever the relative accomplishments of regions within the Oikoumene, they all enjoyed immense advantages over lands outside of it. At any given time after the rise of urban civilizations, some three fourths of the world's population resided within that arc from Europe through the Middle East and from India to East Asia. New ideas spread far more quickly within the Oikoumene than outside of it, firearms being a case in point. Isolated populations tend to be technologically backward precisely because they cannot benefit from other peoples' ideas. This disparity is highlighted in the initial contacts between peoples from inside and outside the Oikoumene – between Spaniards and Aztecs, for example.[15]

Sub-Saharan Africa lagged behind the Oikoumene in the necessary technology and perhaps in industrial organization as well. North and South America were even more isolated, and their metallurgical and chemical expertise was negligible, whatever their other accomplishments. The same goes for places like Australia and New Zealand. Even though some natives of these regions learned to use firearms effectively, they remained dependent on external sources of firearms and gunpowder.

Nevertheless, the development of firearms was a global phenomenon. It involved more than just the people of the Oikoumene. Even if the populations of Africa and the Americas did not produce firearms, they helped shape how firearms were used. This is all the more true for the nomads of the steppes and deserts bordering the Oikoumene.

The Steppe

Cutting through the middle of the Oikoumene is "the Arid Zone," stretching from the steppes of Mongolia to the deserts of North Africa.[16] The Arid Zone is shaped like a big backward Z (see map 1). From Mongolia, it extends west to the Ukraine, southeast into India, and west again all the way across North

Africa to the Atlantic Ocean. The northern half of the Arid Zone is largely steppe, an enormous expanse of rolling grassland broken up by a few large rivers and mountain ranges. The southern half is largely desert, including the largest desert of all, the Sahara. Both halves were inhabited by nomads.

When firearms were invented in the 1100s, none of the civilizations of the Oikoumene boasted stable unified empires. Latin Christendom never reunited after the fall of the Western Roman Empire. The Eastern Roman Empire had lost most of its territory, and Constantinople would be sacked by the Fourth Crusade in 1204. The Abbasid Caliphate had disintegrated into rival dynasties, with the caliph ruling little more than the city of Baghdad, if that. The Hindu kingdoms of northern India were worn down by two centuries of Turkish invaders, who would establish the Delhi sultanate in 1206. The Song dynasty lost north China to the Jurchens and was locked in a stalemate with them for the rest of the century. Japan was beginning its long slide from centralized aristocratic rule to decentralized warrior rule to all-out civil war.

By contrast, the nomads would reach the height of their power in the 1200s. The tribes of the steppe to the north of China were united in 1206 by a man named Temüjin, the son of a minor chieftain of the Mongol tribe. He took the title Chinggis Khan, popularly though inaccurately rendered as Genghis Khan. Chinggis Khan spent the remaining two decades of his life extending Mongol power in every direction, and his sons and grandsons continued his legacy. When Chinggis Khan's grandson Möngke became *khaghan* (emperor) in 1250, he inherited an empire that extended from north China and Korea across the steppe to Russia, and over the following decade he sent armies to the Middle East and south China.[17]

Although the Mongol empire itself failed to maintain centralized control past 1260, four branches of the family established successor *khanates* (kingdoms) that ruled over China, Transoxania, Iran, and Russia. Other areas within the Oikoumene like Turkey, Egypt, and northern India were ruled by Turkish dynasties of nomadic origin whose military power also rested on mounted archery. Except for western Europe (at the far western end), southern India (at the far southern end), and Japan (at the far eastern end), most of the Oikoumene came under the rule of nomads at some point over the course of the 1200s.

The Mongols were in many ways a product of their environment. The steppe was a harsh and forbidding land: "flat, empty, and desolate in every direction," according to one Chinese visitor in the early 1200s. There were few streams or rivers, and rainfall was irregular and light. The climate was frigid, the weather highly erratic; it sometimes snowed in the middle of the summer. Little grew there except the wild grass. The grass turned green in

May, grew thick in July, and withered by September. The seasonal rhythms of the grass affected the animals, which grew lean in the winters and fat in the summers.[18]

The Mongols relied on their flocks to convert the grass into food and raw materials. Without their animals they could not survive. The women looked after the oxen; the men, the horses and camels; and both sexes managed the sheep and goats. In the winter they camped down south, and in the summer they stayed up north. (Depending on the local topography, they might change altitude instead of latitude, migrating down into the plains or up into the mountains.) During the spring and autumn they traveled from one camp to the other, spending several months on the move to avoid overgrazing.

Because they were often on the move, the Mongols had no cities or even buildings. They lived in large tents, made of interwoven sticks covered with felt, which could reach thirty feet in diameter. When they struck camp, the tents were disassembled or else loaded on large wagons drawn by oxen or camels. The wagons and the flocks moved at no faster than a walking pace, covering just a few miles each day.

The Mongols spent much of their lives on horseback. "When I went back and forth on the steppe, I never saw a single person walking," wrote one Chinese emissary. Infants were tied with rope to a board, which was in turn tied behind the mother's saddle. At the age of three, they were tied to the saddle of their own horse. At the age of four or five they began to carry small bows and short arrows and to learn how to hunt.

Hunting was good training for warfare, not only for "the handling of the bow and the endurance of hardships," but also for the discipline and organization that characterized Mongol armies. For great hunts, the Mongols would send out scouts to locate the game, then send out more men to encircle it. They would spend one or two or even three months driving the game into a smaller and smaller area, taking care not to allow any animals to break through the ring, until it was time for the final slaughter.

The basic weapon for both hunting and warfare was the bow, and every man carried at least one, with several quivers of arrows. Some had swords, and some had lances, and the lances had hooks to drag other horsemen from their saddles. The men might be protected by armor, made from leather or iron or steel, but they generally did not use shields. Since the Mongols did not produce their own iron or steel, but acquired metal products through trade or plunder, their equipment varied in quality. Each man had a string of horses, and they all fought on horseback except under special circumstances.[19]

On campaign, the Mongols would not make a move without first sending out scouts in every direction. In battle, they used their speed and maneuverability to harass the enemy from long range with their bows. If this proved ineffective, they might feign flight to lure the enemy into an ambush. Sometimes