The Development of Late Medieval Warfare

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ABSTRACT
During the Late Middle Ages warfare began to shift with new technology and social structure leading to a change in the way wars were fought. With the forming of the infantry and the gunpowder revolution the growth of professional armies became a necessity in the Late Medieval period. By evaluating the various types of warfare, such as infantry, cavalry, sieges, different armies, and their army composition, we can see how war changed in the time spanning the late medieval period.

KEYWORDS
Infantry Revolution, Siege of Rhodes, Battle of Agincourt, Battle of Tannenberg, Hundred Years' War

Warfare changed drastically during the Middle Ages. Although the Middle Ages lasted almost 1500 years, warfare for the first millennium changed little.[1] Significant changes, however, came in the Late Middle Ages. European social, economic, and political dynamics changed rapidly beginning in the 12th century. Warfare outside Europe during the Crusades shaped new military technology to address the different weaponry and tactics used by the Turks. The Italian Renaissance and the creation of the Swiss Confederacy stimulated the growth of a middle class with an economic stake in the outcomes of war. The beginning of the Hundred Years' War in the 14th Century showed the impact of changing military technology with the use of gunpowder and changes in the methods and personnel of war. England instigated the Infantry Revolution, making use of the rising middle class as both infantrymen and auxiliaries. New military technology, tactics, and doctrine changed the emphasis in warfare to infantry, light cavalry,

* I would like to thank Dr. April Harper for her help with revisions to this review.
[1] Maurice Keen, *Medieval Warfare: A History* (Oxford: Oxford University Press, 1999), 5-6.

gunpower, fortifications, newly developed siege methods, and discipline.

Warfare through the early and high Middle Ages was characterized by two models: the calling of the fyrds and professional cavalry. The social distinction between these two forms of military service were socially distinct. The fyrd, or levy, was the natural recourse for kingdoms without professional militaries. Rome had been the last empire with the resources to fund a professional military. After its fall, none of the successor kingdoms in Europe had the wealth or manpower to maintain a professional military.[2] The Scandinavian system of jarls (earls) who had a duty to protect territory, dispense justice, and provide military service to their king in exchange for land was used in England. A similar system, influenced by Roman administration, was used in lands such as France, which had a system of both dukes and counts who also held land in exchange for military service to their kings.

It was under King Alfred of England (848-899 AD) that common English soldiers were formed into a quasi-professional army that first challenged the prevailing notion of military power. Alfred uniquely responded to the Viking threat by creating a system of fortifications known as the burh system. Each burh was a fortified enclosure; some were old, walled Roman cities or encampments that had their walls rebuilt, others were Iron Age forts that were reinforced, and some were new constructions. The burhs were roughly twenty miles apart and enabled the population to quickly travel to a place of safety during Viking raids. The system also consolidated the fighting men so that families assigned to each burh were also a fighting unit. The system became more complex over time, as these military units later turned into geographic taxation and judicial units. The Alfredian system allowed for the strength of the military to be not the earl and his fighting men, but the average man, using common weaponry and tactics such as the Anglo-Saxon shield wall. These formations were much cheaper than cavalry.[3]

The complex political system of the Frankish kings produced a much different kind of government and military in medieval France. The Merovingian kings who ruled the Frankish people after the fall of the Western Roman Empire engaged in a form of inheritance called

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[2] Patrick J. Geary, *Before France and Germany: The Creation and Transformation of the Merovingian World* (Oxford: Oxford University Press, 1988), vi-viii.
[3] Ryan Lavelle, *Alfred's Wars, Sources and Interpretations of Anglo-Saxon Warfare in the Viking Age* (Woodbridge: Boydell and Brewer, 2012), 209-262.

"partial inheritance." This inheritance pattern allowed all adult sons of a ruler to inherit an equal share of their father's land. This resulted in constant division and redistribution of lands; an enormous number of cadet lines, each with titles and lands; and almost constant civil war.[4] This created a massive nobility and hence, the largest and strongest cavalry in the Western medieval world. The French heavy cavalry was key to victory. Use of the French heavy cavalry was important to Emperor Alexios Komnenos when he made his bargain with Pope Urban II in 1068, later known as the First Crusade, to reclaim land in the Near East from Turkish control. In exchange, Emperor Komnenos ceded control of the Eastern Orthodox Church to the Pope.[5] The Norman migration to England and Italy, and French crusader states modeled on landed military elite, established the mounted warrior as the key to successful warfare.

As time went on technology and tactics were developed to counter mounted warriors. Military tactics began to shift back towards the use of the common man. Although lower-class men were previously used to fill in the gaps as auxiliaries and footsloggers, the skill and use of basic infantry changed in the High Middle Ages.[6] England's use of infantry in the Hundred Years' War was the key military strategy that resulted in English success over the French heavy cavalry and allowed an army as small as England's to dominate warfare overseas.[7]

Mounted knights were costly, especially as warfare became prolonged and the mounted elite demanded payments of money or land to honor their oaths of service.[8] Of great help to historians are "horse rolls" that exist as part of the Kings of England's "rolls" or records of payments. Horse rolls recorded the number of horses that members of the nobility brought for service in the wars. Historians can use these sources to calculate the size of English cavalry present in not only every battle but at almost any point in the wars. These lists were soon

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[4] Geary, *Before France and Germany,* 221-232.
[5] A.C. Krey, "Urban's Crusade – Success of Failure?," *American Historical Review* 53, no. 2 (January 1948): 235-250.
[6] Keen, *Medieval Warfare*, 36-135. Military historians debate whether Edward's use of infantry should be seen as the first phase of a move to infantry prioritization, or whether it was merely an effect of losing pivotal battles to terrain that did not suit cavalry and the Scottish and Welsh forces who often used bog and heather land against cavalry that necessitated this move. Michael Brown, *Bannockburn: The Scottish War and the British Isles, 1307-1323*. (Edinburgh: Edinburgh University Press, 2008), 117.
[7] Keen, *Medieval Warfare*, 123.
[8] Keen, *Medieval Warfare,* 123.

accompanied by lists of other soldiers who were also demanding payment or repayment, including archers. The horse rolls were meticulous records that detailed expectations and the crown's obligati for repayment. While it was expected for a knight to bring and lose horses in battle, the nature of a lifetime at war changed the military an financial obligations of the nobility. A king could not expect each member of his nobility to furnish an endless supply of horses. The Crusades had already decimated the personal and national finances of most of Europe. The Hundred Years' War was a breaking point for th financial capacity of the English king's subjects.[9]

One of the key features of the new armies of the Kings of England was the use of archers, particularly longbowmen. The English adopted and modified the longbow, which was Welsh in origin.[10] Many men trained from young ages to meet the high demands of using the bow. During the Hundred Years' War, Edward III went so far as to command that every boy in England learned to use a longbow.

The English knew the ability of the weapon to travel many times the distance of a regular bow and its ability to pierce armor. The English had learned from the Welsh that this weapon was the equalizer between a small, infantry-based army and a powerful cavalry. The bowmen, though only commoners or yeomen, were so in demand that they became professional soldiers. These men were able to gain a level of respect that they had not previously enjoyed. In the early Middle Ages, society was divided into three estates: those who worked, those who prayed, and those who fought. The category of "those who fought" was often equated with the nobility, but the heavy reliance on the infantry and archers was changing the very definitions of society by allowing lower-class individuals to serve an important role in warfare.[11] Ruth Mazo Karras and Thelma Fenste have both noted the importance of reputation for men in this period. One's reputation, or *fama*, impacted not just one's social status but created opportunities in business, paved the way in legal suits or business dealings, and acted as a kind of social currency. The closed doors of medieval knightly chivalry had excluded lower-class men from opportunities, but the Infantry Revolution began

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[9] Anne Curry, *Agincourt: 1415 the Archer's Story* (Charleston: Tempus, 2008); David Green, *The Hundred Years War, A People's History* (New Haven: Yale University Press, 2014).

[10] Clifford J. Roger, "

[11] Green, *Hundred Years War*, 125.

to pave the way for these men to achieve previously unattainable masculine standards.[12] The average soldier was no longer a basic levy that was called up to march with a shield, spear, and nasal helm. Michael Prestwich argues, "the English Longbowmen in the Great Battles of the Hundred Years' War…provided the most stunning demonstration of the potential of the ordinary soldier, when equipped with an extraordinary weapon."[13]

After conquering the Welsh, the English quickly adapted the bows to their armies. Some of the first engagements the English used them in were against the Scots, but the English longbow demonstrated its prowess against the French knight at the Battle of Crecy in 1346. The English arrayed their troops with a line of men at arms in the center of the field with longbowmen flanking on each side and could stay out of the main fight that the central line would attract. At Crecy, the English longbowmen were pitted against Genoese mercenary crossbowmen in French service. Due to the extra range afforded by their bows, the longbowmen outmatched the famed crossbowmen and forced them into flight.[14] After this, the archers began to loose arrows into the nobility of the French army. The French knights were thus forced to charge, only to be cut down in a thicket of arrows and mopped up by the dismounted men at arms of the English who "went afoot with great knives, and they went in among the men of arms, and slew and murdered many as they lay on the ground, both earls, barons, knights, and squires, whereof the king of England was after displeased, for he had rather they had been taken prisoners."[15] It is estimated that the French lost almost a quarter of their nobility in one battle. The effect was powerful. Not only could the English win against superior forces, but there was a new fear—a commoner with the right weapon could bring down the nobility. The French formally protested such weaponry and accused the English of challenging the natural order.[16]

After the disaster at Crecy, French commanders began to rethink the use of the effective cavalry and "chose to fight mainly on foot at

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[12] Ruth Mazo Karras, *Boys to Men* (Philadelphia: University of Pennsylvania Press, 2002); Thelma Fenster, *Fama* (Ithaca: Cornell University Press, 2003).
[13]Michael Prestwich, *Armies and Warfare in the Middle Ages: The English Experience* (New Haven: Yale University Press, 1999), 115.
[14] G.C. Macauly, *The Chronicles of Froissart* (London: MacMillan and Co., 2009).
[15] G.C. Macauly, *The Chronicles of Froissart*.
[16] Green, *Hundred Years War*, 23.

Poitiers and thereafter."[17] The tactics against the French cavalry were so effective that the Black Prince of England used them when helping to defend England's ally Portugal in its war against Castile. The French dismounted their knights and used them in formation in some smaller-scale battles in 1351 and 1352. This strategy only worked well defensively, as marching across an open field towards a steady line of English longbowmen was a tiring and deadly prospect.[18] This factor also led to an English victory at the battle of Poitiers, where they employed their longbowmen as they had at Crecy and rained arrows on their enemy. The longbowmen were able to fight off a cavalry force that had been sent to wipe them off the field to save the advancing French army and afterward showered the enemy with arrows until they ran out of them. After this, the fighting became desperate as the last of the French army moved in. The longbowmen rushed into the melee, with some being sent to flank the French force, leading the French to waiver and flee, thus winning the day for the English.[19] The longbowmen were not undefeatable though, as at a small-scale battle near Counstances in Normandy, French soldiers with large pavis shields managed to advance in formation, blocking the arrows of the English and forcing them to withdraw.[20]

After Crecy and Poitiers, the French avoided open field battle. However, the Battle of Agincourt in 1415 marked a return to the tactics of the previous century. Henry V of England invaded France and was forced into battle by the French army. The English were in a good position, as they chose the field where they would fight. The weather had also worked in their favor by making the ground muddy in between the forests, which was where they set their battle lines. The English army was heavily outnumbered by the French, so it was able to set one main battle line. The English formation was as follows: "The main force was in the center, with the vanguard placed on its right, as a wing, and the rearguard brought forward on the left to make another wing. The archers were arranged in wedges (*Cuneos*) set between these divisions. They were not equipped with stakes as an additional defense against cavalry attack."[21] The French cavalry was unable to advance on the

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[17] Keen, *Medieval Warfare,* 142.
[18] Prestwich, *Armies and Warfare,* pg. 322
[19] Desmond Seward, *The Hundred Years War: The English in France, 1337-1453* (Harmondsworth: Penguin, 1999), 88-91.
[20] Prestwich, *Armies and Warfare,* 322.
[21] Prestwich, *Armies and Warfare*, 323.

flanks due to the forest. The main assault in the center was met by a rain of arrows, which also halted their advancement. By the time the French reached the English lines, their men had taken many casualties and were severely fatigued. Despite these dire conditions of the French, a brutal melee ensued by the men of both armies. The battle ended as a heroic victory for the English, becoming known as the "Death of Chivalry," and "was to show that as late as the fifteenth century the English longbow was still a weapon of quite exceptional capabilities."[22]

Archers had long played an important role in warfare, where their primary use was to harass enemy formations in an effort to slow or halt them.[23] The longbow, however, was more of a threat. It was best used in defensive scenarios, where it proved to be devastating. Horsemen were particularly vulnerable because of their mounts. A well-placed bodkin arrow that brought down a galloping steed often left the rider injured or dead. If the rider had survived the fall and was trapped under his dead horse, there was a good chance the knight would fall victim to additional arrows from the opposing archers. He could have also met a worse fate by being trampled into the dirt by his fellow cavalrymen who were unable to steer their horses around him. Against infantry, the archers were less effective, but at Poitiers "the English bowmen were still able to wreak havoc."[24] The English mixed elements of horse and archer, as they employed mounted bowmen as well as archers on foot. Mounted bowmen usually accompanied a lord's retinue and served as mobile archers. It was decided in 1327 that the English would mix their armies with knights, infantry, and mounted bowmen and that both the mounted bowmen and knights would usually fight on foot in battle.[25] These mounted bowmen were so important that "200 mounted archers were recruited from Cheshire in 1334 to serve as a bodyguard to King Edward III."[26]

To counter the longbow, the French began to use the crossbow more widely. The crossbow was far slower to reload than the longbow

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[22] Prestwich, *Armies and Warfare*, 325.
[23] Prestwich, 324.
[24] Prestwich, 324-425.
[25] Michael Prestwich, "
[26] (Master's thesis, Army Command and General Staff College, 2015), https://apps.dtic.mil/sti/citations/ADA623973.

but provided a steadier aim and could punch through plate armor. As the quality of armor increased, there was only so much more power that could be put into the design of the longbow. Crossbows on the other hand, could be made with assisted loading systems, such as a windlass crank, which allowed for the weapon to have more power. Though it might be outranged by the longbow, as seen with the Genoese mercenaries at Crecy, the crossbow stood as a solid contender against the English and was widely adopted throughout Europe. One of the main attractions of the crossbow was that just about anyone could pick it up and use it, so instead of the specifically trained and raised men who had the proper musculature to use a longbow, anyone given minimal training could point and shoot a crossbow.[27]

Soldiery that was drawn from the lower class of society became an increasingly important factor in the medieval army. With the exception of mounted bowmen, most mounted soldiers were members of the upper class and nobility, whereas "[p]ikemen and archers were usually drawn from the common populace, rather than the aristocracy."[28] The usefulness of infantry changed the composition of armies. Large numbers of men could be formed in ranks as crossbowmen or as line infantry equipped with various polearms such as halberds. It was much cheaper to equip a footman with a shield and spear, or a halberd than it was to give them a sword. The footmen of this kind often had far less armor than the nobility, being equipped with what they could get by themselves or loot after a battle.[29] Trained infantry equipped with longer and braceable weapons could stop cavalry charges, and in disciplined tight formations were a threat on the battlefield. A strange example of this is the 'Combat of the Thirty' where a duel took place between thirty English and thirty French knights instead of fighting a siege. It was written that "[t]hey all fought on foot, with swords and halberds…It seemed impossible to break the English, who fought in a tight formation, shoulder to shoulder."[30] The English lost the duel when a French knight snuck away and retrieved his horse, charging them and breaking their formation. The French knights breaking their formation shows why large numbers were needed in infantry formation to disable a cavalry charge. Unless infantry were

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[27] Morgan Kuberry, "Medieval Missile Weapons: Crossbows, Longbows and Handgonnes in Late Medieval Warfare," *Renaissance Magazine* 22, no. 3 (2018): 44.
[28] Keen, *Medieval Warfare: A History*, 143.
[29] Keen, *Medieval Warfare: A History,* 144.
[30] Seward, *The Hundred Years War,* 79.

aided by terrain that funneled the cavalry to them or were present in a large enough group to have multiple formations covering the flanks of each other, cavalry could still inflict significant damage if not faced head-on.

The increase in infantry was an important military factor for rulers who could save money and field larger armies by using them. This increase of infantry also led to a social change, where common people were not just workers, but also served as soldiers. On top of this "the lower cost, easy availability, and great effectiveness of common infantry now made it possible for smaller powers to stand up to their more powerful neighbors, a fact contributing significantly to the frequent particularistic rebellions of the period, which led to greater independence for the Scots, the Portuguese, the Flemings, the Frisians, and the Swiss."[31] The battle of Courtrai saw one of the first signs of the significant use of polearm-wielding infantry in this era by being able to use terrain and disciplined formations to defeat what was thought to be a superior French cavalry force.

In 1302, a French army consisting of roughly 2500 cavalrymen and 8000 infantrymen was sent to break Flemish rebels' siege of Courtrai. The French believed that the size of the force would scare the besiegers into submission.[32] When they arrived, the Flemish soldiers, mostly wielding goedendags, a shorter pike-like weapon, formed into a defensive position with their backs to the river and irrigation ditches in between them and the French.[33] This position left them with nowhere to retreat and gave the French cavalry a serious obstacle. The French knights expected the Flemish to break when they charged, but as they drew nearer to the tightly closed Flemish formations, they began to fall victim to pit traps and deterrents integral to the irrigation canal system. The Flemish did not waver and, when the cavalry was bogged down, they rushed forward in formation and began to cut down the French knights with their polearms.[34] At the end of the battle, a jarring one thousand French knights had died in the clash. This high casualty rate shows how destructive a determined and well-positioned infantry force could be against arguably the best soldiers that the medieval European

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[31] Keen, *Medieval Warfare: A History*, 144.
[32] Keen, *Medieval Warfare: A History*, 137.
[33] Keen, *Medieval Warfare: A History*, 141.
[34] Hans Delbrück, *History of the Art of War,* vol. III: Medieval Warfare, trans. Walter Renfroe (Lincoln: University of Nebraska Press, 1990), 435.

world had to offer.[35] The men were disciplined and knew that "an unwavering array was the key to victory."[36]

When it comes to successful medieval pike formations, it would be unwise to not to discuss the Swiss. The Swiss became famous in the Late Middle Ages as formidable pikemen and mercenaries. Switzerland was an important military asset to the Holy Roman Empire as a place for emperors to raise troops because of their large population and few nobles.[37] The rural lifestyle and poverty of Switzerland led many to search for paying work. This led to the creation of mercenaries. However, the Swiss' experience in war also came from defending their territory.

When the Swiss broke off from the Holy Roman Empire, emperors made multiple attempts to reclaim Switzerland. One such attempt led to the Battle on the Morgarten in 1315. In this battle, the Swiss ambushed the Hapsburg army of Duke Leopold I, catching them in a narrow pass with the ability to retreat blocked by a lake. The Swiss blocked the advance and stationed crossbowmen to harass the advancing Austrian columns, then descended on them with well-formed lines of halberdiers. Between the tight conditions that cavalry could not easily maneuver, and the armor-piercing capabilities of the halberds, the Swiss killed many Hapsburg knights and forced many to drown when they retreated but were blocked by the lake.[38]

In 1385, Duke Leopold III would attempt to invade the Schwyz Cantons again but was killed at the Battle of Sempach when the Swiss pike formations outflanked and cut him and his knights down.[39] The first time the Schwyz Confederation met a clear defeat was at the Battle of Bicocca, where the opposing army adopted a Swiss-like pike formation. The Swiss lost more men than in both previously mentioned victories combined.[40] The expertise and capabilities of the Swiss pike formation, along with the increased popularity of gunpowder weapons, led the way to the development of pike and shot warfare.[41] The exemplary capabilities of the Swiss mercenaries dominated the Northern

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[35] Keen, *Medieval Warfare: A History*, 141-142.
[36] Keen, *Medieval Warfare: A History*, 139.
[37] Delbrück, *History of the Art of War*, 547.
[38] Delbrück, *History of the Art of War*, 551-557.
[39] Delbrück, *History of the Art of War,* 572-575.
[40] Delbrück, *History of the Art of War,* 575
[41] John Stone, "Technology, Society, and the Infantry Revolution of the Fourteenth Century," *Journal of Military History* 62, no. 2 (April 2004): 365.

Italian war scene and became so renowned that a company of Swiss mercenaries became the designated Papal Guard.

The Hussites, a group of religious rebels in Bohemia, are another example of what the common foot soldiers could do against professional cavalries. Jan Ziska led the main part of the Hussite rebellion, and his innovative tactics as well as his ability to adapt the poorly trained people fighting for him into an effective fighting force was remarkable as "in an exceedingly short space of time he created from peasants and artisans a people's army, a thing quite new to the Later Middle Ages."[42] Due to the zealous nature of the rebellion, many joined the cause with no military experience or weaponry, including many women who either accompanied their families or joined out of religious fervor. To compensate for this lack of experience and equipment, Ziska and his people armed themself in a way that would require little training or expertise. They utilized crossbows, pikes, and even gunpowder handguns to great effect. One of the main close-range weapons that the Hussites used was farming flails designed to break apart grains of wheat. The swing of a flail could do a significant amount of bludgeoning damage to a fully armored knight.

The strategy the Hussites used to great effect was the wagon fort. It was the wagon that allowed the simple weapons of the Hussites to best armies of crusading knights. Jan Ziska first used regular wagons, but then had custom ones built with a defensive wooden wall stretching to the ground into which arrow and gun slits were cut. The wagons were chained together and led by four horses each so that they could be led along in a line to allow the defenders to easily establish a mobile defensive position. When stopped, up to ten men could be stationed on each wagon. If given enough time, they would also dig a ditch along the front line to further bolster their defenses.[43] The use of firearms by the Hussites was advantageous because these forts allowed them a safe place to stand, reload, and fire upon the charging enemy. At the Battle of Horic in 1423, the Hussites put their firearms and effective tactics to use as Ziska's troops waited behind their wagons until enemy cavalry drew near before they let loose a barrage.[44]

Jan Zizka died only a year later, and the Hussite rebellion split into opposing factions, the "Orphans" and the "Taborites."

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[42] R. Urbanek, "Jan Zizka, the Hussite Leader," *Slavonic Review* 3 (1924): 277.
[43] Delbrück, *History of the Art of War,* 490-491.
[44] Delbrück, *History of the Art of War,* 492.

The Hussites still achieved victories as the Taborites became a dominant militant faction. They fought off more crusading armies, but the rebellion split into a civil war. In this conflict, the Taborities were defeated and the "Ultraquists" became the dominant Hussite faction. They discarded the use of the wagon fort for more conventional tactics. After this, the remnant Taborite forces, who by this point were experienced soldiers, made their way into the mercenary scene of Eastern and Central Europe.[45] Some of these men were recruited into what became known as the "Black Army of Hungary."

The Black Army of Hungary was the name used to describe King Mathias Corvinius of Hungary's professional military force made up largely of mercenaries. With the ever-growing threat of the Ottoman Empire on his southern border, and some of the more powerful kingdoms of Europe surrounding him, King Mathias sought to create a standing army. The army was founded in the early 1460s, "after the pacification of northern Hungary, thousands of—predominantly Czech, Moravian, and Polish—soldiers found themselves without a livelihood."[46] After the Hussite wars, many people were displaced and moved into northern Hungary including one Jan Jiska. Jiska was a noble turned mercenary who had returned from Bohemia accompanied by Hussite soldiers looking for mercenary work and ended up raiding northern Hungary. After Jiska was defeated in battle, King Corvinius saw his martial ability and his status as a Hungarian nobleman, and appointed Jiska to be a commander of the Black Army. Jiska's Hussite veterans joined its ranks.[47]

The Black Army itself had an interesting composition. One-third of the Army was mounted knights, one-third was Hussar light cavalry, and one-third was infantry. The infantry base played an important role in wars in northwestern Hungary. The infantry was crucial in siege battles and several field ones.[48] The infantry were professional soldiers, mainly mercenaries, including skilled handgunners and artillerymen who knew how to properly handle the siege guns of the time. The infantry were split up into three subdivisions: common infantry,

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[45] Delbrück, *History of the Art of War,* 498.
[46] Tamas Palosfalvi, *From Nicopolis to Mohacs: A History of Ottoman-Hungarian Warfare,* (Leiden: Brill, 2018), 31.
[47] Clifford J. Rogers, *The Oxford Encyclopedia of Medieval Warfare and Military Technology* (Oxford: Oxford University Press, 2010), 152.
[48] Palosfalvi, *From Nicopolis to Mohacs,* 37.

armored infantry, and shield-bearers. The tactic used by the Black Army infantry was, "[n]early all of the Infantry and handgunners are surrounded by armored soldiers and shield-bearers as if they were standing behind a bastion. The large shields set in a circle present the appearance of a fort and are similar in a wall in whose defense the infantry and all those among them fight."[49] The defensive formations of the infantry allowed them to protect their missile and lighter armored troops, and in a way harkened to the mixed unit tactics that would develop in the pike and shot era.

The light cavalry of the Black Army served an important purpose as well. While infantry manned the border forts with the Ottoman Empire, the Hussars were employed specifically to counter Ottoman cavalry raids. The Hussars were lightly armed and armored to function as fast-moving soldiers that could swiftly respond to an Ottoman raid, and counter Ottoman troops more effectively than a heavily armed knight could. On top of this, they could raid Ottoman territory, adopting tactics seen in the *chevauchée* warfare in France. These Hussars became the key to the war on the southern border of Hungary, as "with equipment and fighting methods very similar to those of the Ottoman raiders and less expensive than the men-at-arms but easier to mobilize, they were perfectly suited to the kind of cross-border *kleinkrieg* that became the dominant feature of Ottoman-Hungarian warfare from the second half of the fifteenth century."[50] The mounted knights of King Mathias' army were effective soldiers that proved most useful in pitched battles in western and southern Hungary, where they were employed and used as the heavy shock cavalry. They did not play a large role in the new developing tactics of the time. These soldiers were not necessarily outdated or useless, as a charge of heavily armed cavalry was still effective, but with shifting tactics, the use of both heavy and light cavalry had different purposes.

The interesting cavalry tactics of the time can be seen in the clashes involving the Teutonic Order and its neighbors. The Teutonic Order was renowned for having elite cavalry who provided a significant threat to the peoples of Eastern Europe, as they set out to convert the pagan population through conquest and crusade. Some of the places conquered included the Kingdom of Poland, the Grand Duchy of

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[49] Clifford J. Rogers, *The Oxford Encyclopedia of Medieval Warfare and Military* 152.

[50] Palosfalvi, 35-36.

Lithuania, and the land of Samogitia. Although the conquests of the pagan lands mainly took place in the Baltic crusades in the 12th and 13th centuries, the occupation and conversion of Samogitia continued into the 15th century, when the Order fought further wars with the lands of Poland and Lithuania. For a time, the knights of Poland, though they had shaky relations with the Order, fought with them in crusades and against the Mongols.[51]

The light cavalry of the Lithuanians was utilized in the way Hussars were generally used, for quick attacks followed by retreat from more heavily armored enemies. This skirmishing tactic allowed them to counter the knights of the Order, who were better armed and armored than the light horsemen. The Lithuanian horsemen were largely horse archers who could also dismount and hide in forests, swamps, or other terrain that was not welcoming to knights. The Teutonic Order, though, had a counter to this tactic, a unit made up of local Prussians mounted on small light horses that could give chase to the Lithuanians.[52] This tactic may have been introduced by the English members of the Order. The Order, although mainly made up of German knights, hosted men from all lands of Europe looking to fight and adventure in the name of God. Although the Lithuanians had an advantage in their home terrain when the knights invaded utilizing the skirmish tactics, they were ill-equipped to face the knights in prolonged siege warfare, where the knights "took many strong castles through force by fine assaults."[53] Polish soldiers filled this gap. The Polish army was more in line with conventional European tactics and had many heavily armed knights that could fight in contingent with the light cavalry of the Lithuanians, as they did to deadly effect in the battle of Tannenberg.

The battle of Tannenberg shows the pros and cons of different styles of fighting, such as where light cavalry falters or excels, or how artillery can be unreliable. The two armies of Poland and Lithuania faced the Teutonic Order. They were made mostly of different kinds of cavalry, except a contingent of Czech mercenaries hired by the Lithuanians. The Lithuanian army consisted of light horsemen that

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[51] Mikolaj Gladysz, *The Forgotten Crusaders: Poland and the Crusader Movement in the Twelfth and Thirteenth Centuries* (Leiden: Brill, 2012), 385

[52] Eligijus Šmidtas, "What Type of Cavalry Did Lithuanians Use to Counter the Crusaders in the 13th Century," *Lietuvos istorijos studijos* 44 (2019): 8-9.

[53] Alan Murray, "The Saracens of the Baltic: Pagan and Christian Lithuanians in the Perception of English and French Crusaders to Late Medieval Prussia," *Journal of Baltic Studies* 41, no. 4 (2010): 419.

"were known for extremes of valor and panic, and therefore were better on the attack than in a defensive position. They knew that they could not stand up to heavy cavalry, but the knights' advantage in armor was paid for by lessened speed and endurance."[54] The Polish army was made entirely of heavy-mounted Knights. The Teutonic Order's army consisted of the Knights of the Order and guest crusaders from Germany and other nations, along with bowmen, crossbowmen, infantry, and cannons. It would seem obvious that the Teutonic Knights would be the victor as they had an army consisting of multiple assets that had proven to be effective against cavalry, but this was not the case. The artillery in the battle had little impact, as it began to rain early in the fighting and the cannons could not fire with wet powder. The archers were more successful against the light cavalry that was opposing them on the Order's left flank, the Polish-Lithuanian right.[55] The Lithuanians engaged first in the battle but could not stand against the heavily armed cavalry of the Order in prolonged combat and fled the field with a large host of guest crusaders and mercenaries taking pursuit to try to claim loot. The men who did not follow the Lithuanians moved to flank the Polish as they clashed with the Order's battle line but were instead stuck into a devastating melee. As the day wore on, the Polish had more men. After moving his reserve into the battle, the Grandmaster of the Teutonic Order, Jungingen, was killed in the fighting and his army broke up. The victory may be attributed to the retreat by the Lithuanians, as the men who pursued them were ambushed and cut down.[56] It is debated whether this was a tactical decision, or whether the retreat was real, and the Lithuanians managed to rally enough men to perform an ambush. No matter at the case, the rout drew away a large portion of the Order's army, not only taking them away from the battle but also leading those who did not turn back into an ambush.[57] This battle shows how heavy cavalry was still a formidable force, but also how light cavalry could be used in unorthodox ways to change the course of a battle.

The last of the major developments in medieval warfare was siege warfare. Sieges were commonplace in warfare before the Late

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[54] William Urban, *The Last Years of the Teutonic Knights: Lithuania, Poland and the Teutonic Order* (London: Greenhill, 2019), 109.
[55] Delbrück, *History of the Art of War,* 525.
[56] Urban, *Last Years of the Teutonic Knights*, 121
[57] Martin Hofbauer, *The Battle of Tannenberg in 1410: Strategic Interests and Tactical Implementation* (Oxford: Oxford University Press, 1999), 36.

Middle Ages, but they became a more refined system during this time and were revolutionized by different technologies, both in weaponry and defenses. Sieges often relied on stone throwers to damage the walls of castles. The most common and effective in this period were trebuchets. The most effective type of trebuchet was a counterweight trebuchet that relied on a large weight to whip the sling of the siege engine around and launch the stone. Trebuchets allowed sieges that would have caused many casualties for the attacker or wasted a large amount of time to be more efficient, as they did at the siege of Caerloverock where the defenders eventually had to surrender after being bombarded by trebuchets.[58]

More effective and impressive were the gunpowder cannons that saw more extensive use as the Hundred Years' War dragged on, and as more nations saw their effectiveness. The adoption of cannons "[s]peeded up the previously leisurely pace of siege warfare,"[59] and allowed for castle walls to be brought down more quickly, such as at the siege of Dax, where the castle was surrendered after only three weeks, compared to the months that it would have previously taken. The development of larger cannons by the Ottomans contributed to the fall of Constantinople, whose walls, while strong, had not been improved to contend with the new artillery. New defenses were put in place at this time to counter both trebuchets and cannons, primarily the strengthening of walls, the increase in their height, and the development of round towers that stone could glance off of.[60] Along with this, shorter, angular towers were designed in Italian castles that gave a stronger base, fewer direct areas to be hit by projectiles, and allowed the flat top of them to be outfitted with cannons and mounted guns of their own.[61] These new developments in castle design led back to longer, more resource-draining sieges.

These new developments in warfare were visible in the Ottoman siege of Rhodes in 1480. The Knights Hospitaller owned the island and the fortress on it and prepared as well as it could. The Knights outfitted themselves with "many crossbows and both heavy and light guns and earthenware fire-pots and receptacles of boiling oil and Greek fire and

[58] Prestwich, *Armies and Warfare in the Middle Ages*, 285.
[59] Prestwich, *Armies and Warfare in the Middle Ages*, 93.
[60] Prestwich, *Armies and Warfare in the Middle Ages*, 296.
[61] Keen, *Medieval Warfare*, 278.

pots full of pitch lashed together,"[62] and hired Italian engineers to develop the wall of the city. The Ottomans, however, had ample supplies and effective artillery, as they employed the service of a Greek cannon maker named Master George, who provided them with at least three great basilisk cannons for the siege that were "capable of firing balls of nine palms (about seven feet) in circumference."[63] The walls of Rhodes, although strengthened, still had some weak points. Not all of the city could be upgraded to the new style of fortifications and "[t]he newly constructed Italian bastions resisted the pummeling of the guns well, but some of the older sections, particularly the English zone, were more vulnerable."[64] When the siege began, these older walls became the main target for the Ottoman guns, which were aimed at the tower of St. Nicholas. The Ottomans put their massive amount of manpower to work and built two large ramps that were as big as, if not taller than, the walls themselves on which to place their guns. The Ottomans also used their manpower to "encircle the landward perimeter in a Turkish crescent that stretched from shore to shore, one and a half miles. An extensive network of trenches started to inch forward day by day, their tops covered with screens of wood and skin."[65] The Ottomans made multiple breaches in the wall that were reinforced with palisades as fervently as possible by the defenders. At one point, the Ottomans attempted a naval invasion on the mole near the tower of St. Nicholas, but they were shot to pieces and slaughtered by the defenders in the attempt.[66]

The siege finally ended when the Ottoman army made a major breach in the walls in the Jewish Quarter of the city. The defenders established makeshift defenses and created a funnel point to trap the attackers as they came in. When the Ottomans finally attacked, it was disastrous for them. In the assault, the Ottomans sent forward their arrow fodder soldiers first. The men sent into the kill zone the Knights had set up with their improvised defenses were killed mercilessly. Although some managed to break through into the city or make it to the top of the walls, they were eventually cut down and began to flee. In the end, the Knights followed the retreating men out of the city, fought their

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[62] Eric Brockman, *The Two Sieges of Rhodes: The Knights of St. John at War 1480-1522* (London: John Murray, 1969), 65.
[63] Brockman, *Two Sieges of Rhodes,* 67.
[64] Roger Crowley, *Empires of the Sea: The Siege of Malta, The Battle of Lepanto, and the Contest for the Center of the World* (New York: Random House, 2008), 15.
[65] Crowley, *Empires of the Sea*, 14.
[66] William E. Welsh, "Siege of Rhodes 1480," *History of War* 100 (2021): 52.

way to the tent of the Ottoman commander, and took the sultan's standard.[67] The final attack resulted in the death of somewhere between 3000-3500 Ottoman soldiers, but it left the Grandmaster of the Hospitaller order gravely wounded. The Grandmaster died from his wounds soon after.[68] If it had not been for the foresight of the Grandmaster in preparing the island for a siege with the most modern technology, it is uncertain whether the Hospitaller Order would have been able to defend the city of Rhodes so successfully.

The Late Middle Ages was a time of constantly shifting warfare. New tactics and technologies began to challenge the tried and tested ways that were popular in the High Middle Ages. The longbow and crossbow were deadly weapons that improved the importance of archers. The infantry tactics in the Late Middle Ages limited the powerful cavalry armies in Europe, partially because of ranged weaponry, but also because of the large number of men that could be fielded into formations with simple weapons to counter cavalry tactics. The professional armies that began to appear at this time were also a major advantage. The development of light horsemen became a popular element that was useful in more unorthodox warfare such as ambushes and *chevauchées*. Lastly, the use of gunpowder in sieges led the way for both more advanced methods of besieging settlements and new engineering for the defense of these places. Overall, these significant technological changes as well as the widespread adoption of new military tactics and doctrine changed the course of warfare in the Late Middle Ages in numerous deadly ways.

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[67] Brockman, *Two Sieges of Rhodes*, 88.

[68] Theresa M. Vann and Kagay J. Donald, *Hospitaller Piety and Crusader Propaganda: Guillaume Caoursin's Description of the Ottoman Siege of Rhodes, 1480* (Burlington: Ashgate, 2015), 179.