The Death of the Knight:

Changes in Military Weaponry during the Tudor Period

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Abstract

The Tudor period was a time of great change; not only was the Renaissance a time of new philosophy, literature, and art, but it was a time of technological innovation as well. Henry VII took the throne of England in typical medieval style at Bosworth Field: mounted knights in chivalric combat, much like those depicted in Malory's just published *Le Morte D'Arthur*. By the end of Elizabeth's reign, warfare had become dominated by muskets and cannons. This shift in war tactics was the result of great movements towards the use of projectile weapons, including the longbow, crossbow, and early firearms. Firearms developed in intermittent bursts; each new innovation rendered the previous class of firearm obsolete. The medieval knight was unable to compete with the new technology, and in the course of a century faded into obsolescence, only to live in the hearts, minds, and literature of the people.

In the history of warfare and other man-vs.-man conflicts, often it has been as much the weaponry of the combatants as the number and tactics of the opposing sides that determined the victor, and in some cases few defeated many solely because of their battlefield armaments. Ages of history are named after technological developments: the Stone Age, Bronze Age, and Iron Age. Our military machine today is comprised of multi-million dollar airplanes that drop million dollar smart bombs and tanks that blast holes in buildings and other tanks with depleted uranium projectiles, but the heart of every modern military force is the individual infantryman with his individual weapon. Many have often quipped, "God made all men; Colonel Colt made them equal."

The modern infantryman is equipped with a fully-automatic rifle (the U.S. now uses an M-16 with only a three-shot burst capability to conserve ammunition) that is easy to use, but very effective. This has been the trend in military weaponry for many years. Weapons designers make the rifles and other weapons "idiot proof" so that even a poorly educated soldier can learn to use them quickly.

This ease of use has not always been the case. In medieval times, after the rise and bloom of the feudal system, the best weapon systems of the day were only available to the select few, the lords and knights of the realm. The primary weapon was deceivingly simple: a long, narrow piece of steel sharpened on both sides and pointed at the end—the sword. Other weapons included lances, maces, war hammers, and axes. Because opponents wore armor that could deflect most glancing blows, precise control of the weapons was required. To develop this precision, combatants needed intense and expensive training, which was only offered to a select few, so the common peasant could neither afford nor even really aspire to it. With a mastery of

the sword, a knight was a formidable force on the medieval battlefield equal in projected power to many infantrymen armed with pole arms. However, prowess on the battlefield became less important as time passed because of the rise of siege warfare and later, firearms. The development and proliferation of the use of gunpowder ended the superiority of the mounted knight and completed the shift in warfare started by the inception of siege warfare.

Initially, foot soldiers' poor weaponry and lack of training ensured the rise of the knight and his effectiveness through the first few centuries following the conquest of William of Normandy. This clear superiority fostered a sense of confidence heretofore unchallenged. "When the 14th century began, knights were as convinced as they had always been that they were the topmost warriors in the world, that they were invincible against other soldiers and were destined to remain so forever [. . . .] To battle and win renown against other knights was regarded as the supreme knightly occupation" (Rudorff 183). The mounted knight was most effective as a fighting unit in the open battlefield where he could exploit his mobility advantage. In the case of a siege, the knight's mobility was greatly compromised, which made him an inefficient warrior, and his limited role likewise reduced his fighting effectiveness. Most siege warfare operations were conducted by the low class peasantry, with the knights only joining in the fight when the majority of the hard work of erecting the siege towers and catapults or digging the tunnels was completed. On foot, a knight could still exert considerable offensive force, but even under the best circumstances, the knight's protective armor was rapidly becoming eclipsed by better-made weapons and better-trained soldiers.

> During the fifteenth century the knight was more and more often confronted by disciplined and better equipped professional soldiers who were armed with a variety of weapons capable of piercing and crushing the best products of the

> armourer's workshop: the Swiss with their halberds, the English with their bills and long-bows, the French with their glaives and the Flemings with their hand guns. (Edge and Paddock 96-97)

This rise in the power of the peasant infantryman was like a burr under the saddle blanket for the knights accustomed to single combat against other knights; it went against their sense of honor. They were also probably worried about getting killed. Even though he was armored, which allowed him an almost god-like invincibility to the weapons of the peasants, and so thoroughly trained in the arts of war that the meager defenses of the unlucky peasants that might field a resistance caused him little concern, the bows and crossbows represented a credible threat to his safety. "The projectile weapon greatly reduced the odds and was therefore hated. The sword knew where it struck. Thus, it was an honorable arm. The arrow knew not whom it might injure. It was a scoundrel's weapon" (Peterson 20-21). Something about the randomness of the arrow, the carelessness with which it killed, ran against all that the knight believed. These were the times when the outcomes of single combat signified guilt or innocence, righteousness or wickedness. The justice of God was handed down through his warrior representatives in face to face combat, not the seemingly pagan ideal of a bolt or arrow falling from the sky to strike death. These projectile weapons, later to include the firearm, were often referred to as the tools of the devil, and gunpowder the creation of the devil.

It is often said that in the conflict between weapons and armor, the weapon will always win. This was the case with plate armor. Armorers could certainly have made the breastplates thick enough to withstand arrows and bolts from longbows and crossbows, but the knights could not have carried such a weight around all day in the summer time without dying of heat stroke. By this time, the use of gunpowder was growing at a fast rate. "[T]he use of hand

guns provided the final factor in the inevitable process which would render armor obsolete" (Edge and Paddock 97).

The first uses of gunpowder on the battle field were in imitation of the existing forms of siege machines. Early drawings of the first cannons depict a vase-shaped exterior, presumably thicker at the base to provide extra strength. These drawings reveal much about the reliability of these early, experimental weapons: the soldiers serving the cannon are shielding their heads with their hands as one of them discharges the weapon. In the muzzle of the weapon is a large arrow-like projectile, much like one that could be fired from a ballista (enormous crossbow). Successes in these early endeavors lead to a much more potent weapon, the bombard. Designed to be placed on the ground with the barrels pointed upward at an angle of about forty-five degrees, the bombard's projectiles mimicked the high, arching trajectory of those fired from that great wall-leveling machine, the trebuchet. The successors of the bombard were also greatly effective, essentially continuing and sealing the fate of the medieval castle. Also from the bombard came a smaller weapon suitable for single-person transportation to and use on the battlefield. The new weapons fell into two categories. The first was a kind of small mortar, with the breech end of the gun terminating in a long iron rod which was designed to be placed on the ground to absorb the recoil. The muzzle end of the weapon was propped up by a crude wooden crutch. The other was a more user-friendly design that had the iron portion of the gun strapped to a long wooden stock (known as a "telar" or tiller). This meant that the gun could be fired from the standing position (Pope 41).

Eventually the guns became smaller in size and easier to handle, but the soldiers still faced many problems with the emerging technology.

Because the gun had to be ignited by hand, this left only one hand to hold and aim it,

which was not very conducive of accuracy. "Fifteenth-century illustrations show that there were two main ways of firing the guns. The pole-like stock could be rested on the shoulder like a modern bazooka, or it could be tucked under the arm. In each case the gun could be steadied with one hand and the match applied with the other" (Blackmore 7). The soldiers charged with firing the guns had an unenviable task. They had to fire a weapon that was comprised of a cast iron barrel of questionable metallurgical integrity, bound to a wooden stick with iron straps of the same quality, filled with a propellant still in the early stages of development. Any flaws in the system resulted in the failure of the piece, and chunks of cast iron moving rapidly cause terrible wounds.

Military armorers made great progress in the early period of guns. Early models featured simple holes drilled into the breech end of the gun, to which a red-hot wire or coal was applied to discharge the weapon. Soon the armorers developed a better system, known as the match, or slow match. Essentially it was a slow-burning wick made of twisted hemp rope that was dipped in a solution of saltpeter (one of the key ingredients in gunpowder, the oxidizer) and spirits of wine. The match served the same role then that modern punk does today; it kept the fire burning close at hand. While the match was eventually consumed if left burning for a long period of time, it was a major technological breakthrough when compared to the old system. The two earlier systems, the red hot iron and the burning coal held in tongs, required the soldier to remain close to a source of fire until he was ready to shoot. The match allowed the soldier to move around on the battlefield (Peterson 41).

With the development of the match, the hand gun became a useful infantry weapon because soldiers were no longer bound to a base encampment and a fire in a siege situation. The obvious drawback of this system was the challenge of keeping the match lit, a difficult

proposition at best in the rainy climate of England. Many records detail the results of unexpected rain showers and storms. "And in 1471, first of many such episodes, a band of 300 Flemish mercenaries armed with handguns were put out of action by a storm which extinguished their matches and damped their powder" (Barber 201). A soldier with wet gunpowder was entirely useless, and remained so until he could either dry it out (certainly not by a campfire) or replace it with a fresh supply. While bowstrings also lost some of their effectiveness in wet weather due to stretching, an archer at least had the ability to use his weapon with lethal force in virtually any weather condition, and the soldier with pole arms or other non-projectile weapons did as well. The advances of the gun, however, could not be stopped.

The match brought along with it many other changes that aided in the usability of the firearm. These changes greatly enhanced the effectiveness of the firearm. The touch hole, which had previously been located at the top of the breech end of the barrel, was moved to the side when the serpentine emerged as the ignition method of choice. The serpentine was a Z-shaped lever attached to the stock on a pivot and used to both hold the burning match and lower it into the pan of priming powder; it served as both trigger and match holder. The tiller of the guns was changed into a rudimentary stock; the wood was curved or bent downwards at the rear so it could be rested against the chest of the shooter (Edge and Paddock 103-131).

The smaller diameter, yet longer barrel decreased the recoil of the gun, but improved the efficiency and accuracy of the system at the same time. Changing the stock so that it was positioned against the chest allowed the shooter a better way to aim. The best improvement by far, however, was the serpentine, which provided a way to keep both hands on the gun while firing. This oddly-bent piece of iron was the first trigger of sorts, and it resembled the trigger of the armor-piercing crossbow of the time. The trigger allowed the shooter to hold and carefully

aim the gun while lowering the match to the pan in a controlled manner, a much superior system to the juggling required with earlier models. However, even with these improvements, the gun remained a finicky, unreliable, and inefficient weapon.

These early hand guns were woefully inefficient due to the lack of projectiles that matched the bore size of the weapon; a loose projectile meant that much of the expanding gases from the ignited gunpowder escaped around the sides of the projectile instead of propelling it out of the weapon's bore. Like the giant trebuchets, the accuracy of the weapons depended on the uniformity of the bullets, which early on were actually shaped stones. The accuracy potential was also compromised by the smooth bore of the gun; it was not until much later that the rifled barrel was invented and put into production. Yet another variable in the system was the gunpowder itself, the composition of which was still being perfected to yield the best burn.

> The gunpowder used in these early guns varied from county to county, perhaps even city to city, and by 1546 different proportions were used for large and medium guns and for mortars. The proportions of saltpeter to sulfur and charcoal recommended by fourteenth-century writers varied from 6:1:2 (Marcus Graccus, c.1300) to 22:4:5 (Montaubon, c.1400).
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> (Reid 54)

Even with the inherent flaws of the system, the hand gun gained rapid acceptance across Europe. It seems that everyone wanted this new, extremely powerful weapon, flaws and all. However, the weapons of the earlier medieval times still were used in wartime along with the new technology. Like World War I, the Tudor period in English history was a time of military metamorphosis, where the medieval ballistas, onagers, and trebuchets served alongside the new cannon and mortars, where crossbowmen and longbowmen still had almost the power of the

hand guns. The scent of change (or reek of gunpowder) was in the air, however, and this impending change can be seen in the rooms of King Henry VIII's armory.

> Both the longbow and crossbow continued to be used in warfare, but the gun rapidly overtook them in importance. At his death in 1547, Henry VIII had 3,000 bows in the royal arsenals, together with 13,000 sheaves, each containing 24 arrows; however, the number of hand guns totaled 7,700 and as early as 1513 the ambassador of Venice had reported that the king possessed "cannon enough to conquer hell." (Edge and Paddock 149-150)

One can safely assume that the leaders of the other great nations also possessed great numbers of hand guns, for a failure to adopt them would have exposed a weakness that others would have certainly exploited, given the troubled times and the ongoing Hapsburg-Valois conflicts.

Other technological innovations appeared and further improved on existing designs, including rifling and other means of sealing the gap between the bore of the gun and the projectile. As with most of the technological improvements in the form of the gun, these first saw use in hunting firearms. These were directed towards raising the level of accuracy, increasing range, and speeding up reloading and firing. Rifled barrels saw increasing use in the period. This development shrank the gap between the bullet and the bore of the gun, and also imparted a degree of spin to the projectile, which resulted in "a more stable trajectory, a longer range, and greater accuracy" (Nickle, Pyrhh, and Tarassuk 136). A side benefit of the closer bullet/bore tolerance was improved power. Less gas could leak past the bullet upon ignition, ensuring that most of the power of the exploding powder was used to propel the projectile out of the barrel of the gun. This led to higher velocities and more penetrating power. David Edge and John Miles Paddock assert that cast iron bullets were preferred over their cast lead brethren due

to the ability of the former to penetrate even the best armor plate (131). Up to this point the armored knight still garnered some protection from his steel skin, but the improved velocities of the rifled guns proved too much for the antiquated equipment.

The knights did not relish the idea of guns in warfare because of their relative ease of use. Commoners were using them and wielding a power far in excess of their station in life. Some of the nobles even wanted the weapons outlawed so they could retain their romantic personas. If they died, they wanted it to be at the hands of some far nobler knight or a fire-breathing dragon, not at the hands of some commoner with a fire-breathing musket. "In addition to fear that wheellock and snaphance guns could form a public danger, Maximillian, 'the last of the knights,' may have dreamed of stemming the polluting spread of the powder reek that had already begun to sully the brilliant colors of chivalry, which had fewer champions in each successive generation" (Reid 90). Even some of the nobles had been swayed by the seductive power of the new weapons.

The changing face of warfare can easily be seen from the kinds of weapons produced. For the most part, the arms race for the new guns and cannons sacrificed beauty for functionality, a concept unheard of in the medieval period.

> What mostly mattered to the English was that their products would perform the task and cost as little as possible. No more striking contrast can be found to this attitude than the extravagance of some contemporary Italians who for the sake of beauty were engraving and decorating not only the guns but even the gun-shots, knowing perfectly well that this was detrimental to the efficiency of their artillery. (Cipolla 43)

The English, at least on some level, had accepted the new face of warfare with little reservation

(or were able to put aside the reservation), while the Italians were still clinging desperately to the old world ideas of beauty and grace.

The wheel lock, the next technological advancement, truly sounded the death knell of the armored knight and medieval warfare. The greatest inconvenience of the firearms of the time was the match. While a much better ignition system than a simple coal, the match had serious limitations. Keeping the match lit was almost impossible in rainy weather, and the match consumed itself if left burning for long periods. The typical method of operation was to leave the match unlit, then light it when the situation warranted. One could not fire quickly. The wheel lock solved the problem.

> Far more important than this discovery [rifling] was the invention of the wheel lock. Till it was discovered lighted matches had to be applied to discharge an arm. Surprise was impossible, mounted fire tactics out of the question. The wheel lock changed all this. Firearms suddenly became practical and useful and the short weapon, the pistol or dag, came out as an important military novelty. For the first time in history here was a firearm with a self-contained ignition mechanism. (Pollard 18)

All previous forms of firearms ignition had depended on applying a burning coal or ember. Then someone figured out that if the grains of black powder were fine enough, a shower of sparks could be used to ignite them.

The wheel lock is comprised of a serrated wheel driven by a wound spring. A flint or iron pyrite, attached to a lever, is lowered into contact with the wheel, and then the wheel is released, creating a shower of sparks that land in the pan of finely-ground black powder, igniting it and in turn the main charge of the weapon.

This design was not without its own flaws, but the problems were more reliability-centered than fatal design flaws. The iron pyrite that generated the sparks could shatter, rendering the firearm useless; the mechanism was much more complicated than earlier designs, making the search for competent gunsmiths to repair the gun if needed much more difficult; and the mechanism required a special wrench for winding the spring, an essential item that could be dropped or knocked out of the hand in the heat of battle. All of these contributed to the fallibility of the weapon. "Because of these drawbacks the use of the wheel lock was relatively restricted. Mounted troops usually carried them, as did elite organizations, such as princely bodyguards, where expense was no object. Hunters also quickly took to the new gun, and so did other private citizens who could afford the price" (Peterson 69).

The expense of the new gun prohibited its proliferation amongst the ranks of the commoners, so the noblemen again had a superior weapon that was only available to them. This last flair of superiority to be flaunted by the gentry was soon eclipsed by a more reliable and less expensive design. But the dwindling numbers of knights, if they can even be called so at this time, "made hay while the sun shone," as the saying goes, even though they must have known that the winter of progress was soon to overtake their last bit of chivalric autumn.

As the knight was slowly pushed off the battlefield by better weapon systems, he turned to other avenues by which he could continue to feed his dreams of chivalry and the "good old days." They were men from a time gone by, and much as he would like to do so, no monarch would send these dinosaurs onto the field to be slaughtered.

> Their decline was not only due to such new weapons as the longbow and gunpowder artillery, but also to the inefficient way they fought. While they continued to fight for glory and as a sport, the kings who employed them looked

> elsewhere for fighting men with a less flippant attitude towards warfare. The number of unromantic, unchivalrous but hard-headed and effective, professional mercenary soldiers rapidly increased in the royal armies. (Rudorff 226)

The last of the technological innovations in black powder guns in the Tudor period was the snaphaunce, the predecessor of the flintlock, and it addressed the weaknesses of the wheel lock system. The soft iron pyrite was replaced with harder flint, the spring was moved to power the serpentine or "dog" which could be used as a lever to load the spring, eliminating the need for a separate wrench, and the entire mechanism was much simpler than its overly-complicated cousin. When the trigger is pulled the serpentine containing the flint (now usually called the hammer, a percussion rifle term) rotates quickly on its mount, allowing the flint to strike the steel frizzen (which doubles as a cover for the pan) and produce the necessary shower of sparks to discharge the weapon. This system was more reliable, easier to operate, and less expensive than any of its predecessors. It was so successful that it remained essentially unchanged for almost two hundred years, yielding its throne to the percussion cap.

The death of the knight can be traced to many factors. The first is the loss of superiority on the battlefield for various reasons. The training and equipping of infantry troops with pole arms contributed significantly to the initial resistance to the aforethought invincible armored knights. The next was the gradual change in warfare from a pitched battle comprised of mainly cavalry on both sides to siege warfare in which the knight's importance was greatly reduced, the majority of work being done by peasant laborers. The next innovations that continued to chip away at the white tower of chivalrous knights were the crossbow and the longbow. Indiscriminate volleys of bolts and arrows not only attacked the knights physically, but they also struck at the heart of their ethos, the belief that they were the only individuals charged with

meting out justice.

The development of gunpowder finished off the wavering belief in the chivalric code once held above all by the knights. While initially inferior weapons to the longbows and crossbows, rapid technological innovations increased the power, range, and accuracy of guns and catapulted them into the forefront of battle. The crude, pipe-lashed-to-a-stick construction of the initial hand guns evolved into an easily aimed, comfortable firearm to shoot. The major improvements, however, were in the area of lighting the gunpowder. Dodgy ignition systems like the hot wire or coal were replaced by the slow match and eventually the wheel lock and flintlock methods, both of which were self-contained units—no external means of fire was required. These improvements increased the mobility of the infantryman greatly, which correspondingly affected his military presence on the field of battle.

Each of the above factors reduced the military efficacy of the knight, but perhaps the greatest opponent to the viability of chivalry was chivalry itself. It was a code of ethics, morals, and conduct that had failed to keep pace with the times; it reflected the medieval mind, not the new ideas sparked by the Renaissance, which was raging at this time. Richard Barber ends his book *The Knight and Chivalry* with a wonderful passage that succinctly conveys the flaws of chivalry.

> Chivalry had been used for far too long as a mere escape from reality for its ideals to have any relevance to the problems of society; the themes which had once had very concrete implications for the world in which they had been developed had lost all but the remotest link with everyday life; the word itself had acquired a new meaning, that of the very courtesy and politeness which had replaced chivalry proper. All that remained of the old high dreams and visions was an

empty shell, a pretty relic of the past, fit to while away an idle moment. (338)

The knights had become priests of a dead religion. They were the epitome of grace and honor for the entirety of the medieval period, but like all things, their time came to an end. Warfare today has become even more impersonal and abstract; almost all vestiges of honor in battle have been wiped away and replaced with the keen desire for victory over all.

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Biographical Sketch

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