MEDIEVAL ARMS, ARMOR, AND TACTICS

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Abstract

This project examined and photographed nearly 300 examples of medieval arms and armor in the Higgins Armory collection, and documented the characteristics of armor, weapons, and their associated tactics during the middle ages (approximately 500CE to 1500CE) as well as the historical and technological background against which they were employed.

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Introduction

The middle ages were a time of relative chaos for Europe. With the collapse of the Holy Roman Empire at the end of the 5th century, the countries of Europe were thrown into disarray. After a great deal of border-shifting and consolidating, Europe was stable enough to work together and begin the first crusade in the late 11th century. 500 years and three crusades later began the Renaissance, which is considered by most as the end of this chaotic era.

The weapons, armor and tactics of medieval combat evolved simultaneously. Arms and armor evolved constantly to negate each other; for instance, the use of plate mail in the 12th century caused the addition of spikes to most pole-arms that could penetrate it. Tactics were also changed with the invention of a new weapon or a better piece of armor. The infantry that could formerly be dispersed easily by cavalry became a formidable foe when wielding pikes.

Overall, the middle ages were a hard time for Europe. "Dark Ages" may be a bit too strong to describe this era, but times were far from easy. Wars and border disputes between countries were far more common than they are today. The weapons, armor and tactics used during this time were both brutal and effective, which is a fair statement about the times themselves.

Historical Background

The End of Western Rome (5th Century)

At the end of the 5th Century, the Western Roman Empire was left in tatters. The Germanic tribes held much of the land that had been imperial lands. The Ostrogoths, who had been hired by the Eastern Emperor to reclaim Rome, instead settled there themselves. The Franks were moving into what is now France, and the Anglo-Saxons had begun conquering what we know as the British Isles, though some of the Britons had escaped to mainland Europe to settle Brittany. Vandals were marching through much of western Europe and settling into northern Africa. The Visigoths had, by this point, conquered the area of Spain (Strayer 1974: 29). Nominally, most of these tribes recognized the Emperor in Constantinople as their superior, but to no practical extent. The Germanic tribes did not set out to destroy Roman culture, but their own culture doomed that of the Latins. Laws were local and rulership hereditary for the most part. Delegation of authority, the key to Roman bureaucracy, was impossible to a German ruler, who stood to lose too much political strength to an empowered subordinate. Taxation, necessary to provide for public services, was viewed with suspicion by German eyes. The culture of the Romans was doomed to meet its end as a living culture (Strayer 1974: 30 – 32).

Still, whatever scraps of civilization were left in western Europe, they were still descendant from Rome. The Eastern Emperor was nominally the head, and the Mediterranean region was still the seat of civilization in Europe. Europe was clearly not Arabic, and western Europe had yet to define itself separately, so it was Roman (Strayer 1974: 35).

The Byzantine Empire (6th Century)

The Eastern Roman Empire, which became known as the Byzantine Empire, was finding itself with new difficulties. Local cultures, somewhat suppressed throughout the duration of the Empire, were beginning to bubble back to the surface, especially in Syria and Egypt. Constantinople had a problem. It could placate those of the Greco-Roman culture in the West, Greece, and the Balkans, or it could placate the resurging local cultures in Syria and Egypt. Since Constantinople was the seat of the Orthodox church as well as the Byzantine Empire, this cultural stress found its voice in religious debate (Strayer 1974: 36 – 37).

Justinian, Emperor from 527 to 565, tried to combat this growing schism and unite the Empire, and the Mediterranean, again (Collins 1991: 113). He conquered Italy from the Ostrogoths, pushed the Visigoths from southeastern Spain, and recovered north Africa from the Vandals. But now Justinian found the same difficulty that had suffocated the Western Roman Empire; there was no real desire for societal unity in the empire. Though the Mediterranean was again united by force, it was not united by ideal. Heavy taxes to pay for the wars alienated his own people from him. Egypt, among others, was alienated by Justinian's need to win the support of the Roman Church, which held religious ideas quite to the contrary of those in Egypt. Lands were ruined, local political autonomy was dissolved, and Justinian won little support despite all of his conquests. It didn't help that he had lost northern Italy to the Lombards during his reign (Strayer 1974: 37, 38).

The Empire was split apart. The eastern lands of the Empire finally broke free from Constantinople, becoming Arab nations. Mohammed (570 to 632) did much to unite the Arabs into one political and religiously united nation (Collins 1991: 136 – 40). The strengthened Arab nations, even after Mohammed's death, were thus able to conquer Syria, Egypt and much of North Africa, and Spain. The Arab conglomerate controlled much of the Middle East, though Turkey was still held by the Byzantines, and had considerable holdings in North Africa and Western Europe by 720, and was by this point raiding into Gaul (Strayer 1974: 40, 41).

Pre-Carolingian Europe (7th Century)

With the East and West separated physically by the Arab Empire as they were ideologically by their cultural differences, the two regions grew even further apart. The remnants of the Byzantine Empire - Greece and the Balkans - united under patriotism and a sense of religious identity. This did not do much to unite the Orthodox Church with the Roman Church, and tensions rose between the two factions of Christianity. Western Europe, at this time nominally identifying with the Roman church, felt all the more alienated from the East by these tensions. By the 7th century there were three distinct regions in Europe: the West, occupied by the "barbarian" tribes, and identified with the Roman Church, but culturally and socially still disunited and the poorest of the three regions; the Arab Empire, largely Moslem, and the most advanced in the intellectual arts of science and philosophy, inherited from Greece; and the East, the remnants of the Byzantine Empire, culturally dependant on Constantinople and the Orthodox Church (Strayer 1974: 42,43).

Western Europe was weak and without the benefit of a common civilization. Lombards still stand in Italy, the Franks hold Gaul, the Anglo-Saxons have conquered much of England, Visigoths still, for the time being, call Spain their own, and Germany is split between the Bavarians, the Franks, and the Saxons. These peoples were not unified even, necessarily, amongst themselves; much less could they hold unity across a continent. The stage was set in Western Europe for either total chaos, annexation under a stronger people, or a strong leader to come in and change nearly everything. Fortunately for the West, this latter is what occurred.

The Rise of the Carolingian Empire (8th Century)

Of these peoples spread throughout the West, the Franks were the strongest in relation to the other nations. They were not yet strong enough, though, to assert their presence as they would soon. Throughout the West, including the Franks, the Germanic traditions kept kings from being able to effectively hold power over large portions of land. Rule was mostly effective locally, but to rule at a distance meant delegation of authority, which meant, in essence, no authority on part of the king.

Such was the unpromising background for the rise of the Carolingian dynasty, named after its most prominent member, Charles the Great, or Charlemagne. Charles Martel, who was to be Charlemagne's grandfather, set the stage for the Carolingian dynasty by holding a powerful mayorship of the Frankish king, originally an office of mere stewardship that gradually became an office of some power, though, in theory, less than that of the king. By Charles Martel's time, though, the mayorship had effective control of the kingdom. Even when the king died in 737, there was no need to establish a

new one, so no one bothered until Charles's own death in 741 (Collins 1991: 248). Charles used some of his power to encourage missions to the pagans, setting a precedent for his progeny (Strayer 1974: 46, 47).

Pippin, Charles's son and the next mayor, felt secure enough in his power to simply depose the standing king and take his place in 751 (Collins 1991: 247). Pippin strengthened his position, and that of the Roman Church, by both asking for Papal approval of his crown, and, later, even being anointed as king by the Pope himself (Strayer 1974: 48). Pippin's strength grew from being recognized by God's Representative on Earth as a legitimate ruler, and the Pope's grew by receiving the power to declare such a thing. Also, Pippin saw to it that Rome was protected from the Lombards, powerful enemies that still held much of Italy.

Pippin's relationship with the church, already strong, was made stronger by increasing the power and organizational efficiency of the church. Missions were established to convert pagans to Christianity. Reforms were made to intensify Christian identity amongst the nominally Christian. Other reforms organized the church into a system of subordinates, with the Pope the head of all, a position he theoretically held previously, but was now more strongly in place (Strayer 1974: 48).

Charlemagne continued these efforts when he was king, starting in 768, but did so in such a competent manner that they led, ultimately, to a Europe that possessed a clear identity. He saw to it that more peoples were converted to the church, either by missionary or by martial means. He organized the clergy and arranged education for them such that they were made more intellectual, moral, and effective. He crushed the Lombards and established himself in much of Italy, freeing Rome from the fear of that

particular enemy. He established a strong parish system, spreading Christianity to the rural areas and keeping it strong (Strayer 1974: 49, 50).

Charlemagne's political and military strength was such that, at the turn of the 9th century, he had himself crowned emperor by the Pope. Christianity and the state were now recognized, for the time being, together throughout the empire. The West had won its own civilization, clearly apart from that of Constantinople. The Roman Church, too, was freed from the last ties leaving it nominally subordinate to the Orthodox Church. It had an empire to represent it, too, now (Strayer 1974: 50).

The Fall of the Carolingian Empire (9th Century)

Though the Carolingian Empire was to fail in another century or so, it had done what was needed to give a distinct civilization to the West. The church had gained the power and organization that it held through much of the Middle Ages, and the shattered fragments of what had been Charles' Empire would live to become some of the major political units through the rest of the Middle Ages.

Charlemagne's Empire fell in part to the fact that localism still existed in most parts of the Empire. The people were theoretically politically united, but they were not interdependent or materially united. Local authority was strong, even under Charlemagne. After he and his immediate successor, Louis the Pious, were gone, there was no way to keep the lands politically united (Strayer 1974: 57, 58).

This was aggravated by the fact that Louis left the land to not one of his sons, but all three, one taking the west (France), one the east (Germany), and one the middle (the Low Countries and central Italy). This led to internal conflict, in which the eldest son,

once controlling the middle lands between France and Germany, lost his lands to his brothers. The powerful local rulers, the counts, took up more power, and by 900, the Carolingian family only nominally ruled their empire.

The Rise of Feudalism (10th Century)

From this fractured empire evolved feudalism as a response to the dangers present in the world. Norse, Magyar, and Muslim raiders from the North, East, and South, respectively, were harrying Europe, making travel and trade difficult and dangerous. The danger fueled experimentation with a governmental "system" that has come to be known as feudalism. Feudalism is a term describing a relationship between a superior and a subordinate, wherein the subordinate accepts a fief of land in return for a promise to serve, specifically in a military capacity. More can be learned of feudalism in the section Feudalism starting on page 29.

The Ottonian Empire (10th Century)

By the 10th Century, the lands of Germany were the most powerful in western Europe. From the ashes of the eastern portion of Carolingian Empire rose a new leader, Otto I, who ruled from 936 to 973 (Strayer 1974: 67). Otto annexed northern Italy. In response, the Pope reinstated the title of Emperor of Rome, gone since 924, on the head of Otto, officially starting what became known as the Holy Roman Empire and permanently tying the new empire to the affairs of Italy and Rome (Strayer 1974: 69).

Otto's Empire remained strong even after his death. His rule, and that of his successors, prevented feudalism from entering their kingdom, but their system, which

relied on voluntary support by local lords and leaders, did not develop systems that mirrored those created by feudalism. The emperor was more dependent on his subordinates than they were on him, at least in terms of direct control. This, and the Emperor's need for clerical economic support, led to the weakening of the empire by the 12th century, when the Emperor and the Papacy bashed heads. Henry II, the emperor, had tried to place his own Pope in Rome. He narrowly avoided being excommunicated, but the damage was done, and Henry's princes and the local clergy had withdrawn support. Feudalism made its way into Germany. This drama turned out to be a victory for the Church, which had won independence from lay authority for the election of Popes (Strayer 1974: 70 - 73).

The Burgeoning (11th and 12th Centuries)

The 11th and 12th centuries saw expansion and a degree of economic surplus. Social cooperation and the gradual development of a true western civilization had begun. Feudalism was gradually turning from lordship to stateship (Strayer 1974: 75). Things were gradually looking up.

The people of Flanders and Normandy were especially involved in expansion. The former was by and large peaceful, involving clearing of land and migration to sparsely populated regions. The Normans favored martial methods. They conquered southern Italy and claimed Sicily from the Moslems by 1091. Also, and most famously, they began the conquest of England from the Anglo-Saxons.

England, which had a well-organized system of local government and a strong sense of unity, was poorly suited to resisting a strong military, especially one that

included knights. At Hastings Duke William won a total victory in 1066. He combined feudalism with the organized government institutions in place and built one of the strongest central governments that Europe would see (Strayer 1974: 77-79).

In the 11th century, there was a great deal of reform in the Church. Though Europe had been Christian since the end of the Roman age, it was only in the 10th century that the full church, parish, and monastic system could contact most of the people in the West. This religious revival strengthened the movement to free the church from secular rule. It also led to many more people donating property to the church, and an increase in the admission to religious orders.

The First Crusade (Late 11th Century)

This background made the First Crusade possible, and may have even led to it. At the end of the 11th Century, the Arabs in the east had conquered much of Asia Minor, leaving the Byzantine Empire feeling exposed. Byzantium asked for help, and Pope Urban II, perhaps motivated by a number of factors, began to preach a Crusade throughout the West in 1095. A Crusade to rescue the East from the Arabs might help to repair the rift between the Churches. It might also open the avenues for pilgrimages to Jerusalem, since the political situation at the time amongst the Arabs made this difficult. Whatever the reason for his decision, he took up the Byzantine cause, and word spread quickly throughout the West (Strayer 1974: 80).

The First Crusade set out with two goals. The first was to protect the Byzantine Empire, as requested. The second was to "regain" the holy city of Jerusalem. The religious nature of their objectives, and the fact that the war was called for by the Pope,

clearly added to the religious zeal of the undertaking. The crusaders were pilgrims, at least in a literal sense, as they were granted the rights and duties of pilgrimage before their departure. While it is certain that some of the crusaders had ulterior motives, perhaps plunder or merely the glory of combat, it seems likely that the majority of crusaders went out of true Christian idealism (Riley-Smith 1987: 11).

Unfortunately, the fanned flames of Christian idealism led to anti-Semitism in the west. Jews were slaughtered in many places in Europe (Riley-Smith 1987: 16). In time, though, the crusaders went east as they were supposed to.

The first crusaders, who left before the date set by the Pope, met a number of obstacles. They left during a famine, and were undersupplied, a characteristic they couldn't seem to shake. This led to disorder in the ranks, and attempts at pillage during the journey in areas that were not initially hostile to the crusaders. Finally, upon arriving in the Empire, they found themselves unprepared for. The Emperor did not have systems in place to supply them (Riley-Smith 1987: 20). They attempted more pillaging, straining the relations.

The second wave (though the term "wave" is a generalization; new crusaders were constantly coming and old ones going) fared better. They were well supplied after a good harvest in western Europe. They were well led by strong nobles, as well. They met resistance in Hungary, which had annihilated three crusading armies already due to pillaging earlier. Hungary was placated when one crusading noble allowed himself to be taken hostage (Riley-Smith 1987: 21)

The crusaders continued on. They encountered a distrustful Emperor and little Greek support (Riley-Smith 1987: 24). This led to further Western distrust of the Empire

and, by proxy, the Orthodox Church. Emperor Alexius demanded vows of fealty of each noble leader, as well as vows to turn over lands won in the war to the Empire. This latter vow was not well received, since the imperial army was apparently more interested in occupying lands conquered by the crusading army than it was in actually assisting them in conquest (Riley-Smith 1987: 24).

The Crusaders met a number of victories. They first took Nicaea, the first major obstacle. Shortly thereafter, in June of 1097, Edessa was won, and made into the first Latin settlement of the East. Antioch was to fall in 1098. Finally Jerusalem was won in 1099 (Riley-Smith: 26-29, 33).

Though the goals of the Crusade had been fulfilled, the Pope threatened with excommunication any that did not complete their vows to crusade. This, and the victory achieved by returning crusaders, spurred what may be called a third wave, but this accomplished little.

The 12th Century

At the end of the 11th century the political and religious revivals across Europe, coupled with the confidence gained in the successful Crusade, helped lead to an economic revival. Settlements were expanded. Lands were cleared. Agricultural surplus allowed for expanded town settlement and trade and craft professions. The potential freedom available to serfs of the time in large part forced feudal leaders to free the peasants from the land, or lose them to towns or new lands. Things were, in broad terms, looking up by the time of the 12th Century (Strayer 1974: 83-87).

The economic expansion, the political reform, and the strengthened arm of the Church lead to a number of changes. Justice was becoming a stronger motivation for government. As a result, interest in study and practice of law began to revive. The food surplus could support scholars, and scholars there were, though few by our standards. In monasteries, or in schools that would shortly become universities, students studied law, mathematics, sciences, and philosophy. The classics were revived for study. Greek and even Moslem knowledge was sought by eager minds (Strayer 1974: 94, 95).

Educated men, especially those that had been schooled in law, began finding themselves in positions of authority in the church and among the lay rulers. More effective bureaucracies began forming, allowing for remote administration of lands and systems. The Church bureaucracy, with help of the reform, was highly organized by the end of the twelfth century, with the Pope as administrative head as well as religious leader of the church (Strayer 1974: 101).

The system of canon law, both in theory and application, gradually developed. The monk Gratian codified much of Church law during this time. Also, a system of courts and appeals was being developed (Strayer 1974: 105). Already methods of witnesses and investigation were gaining dominance over trial by ordeal. The desire for reason and order, sought after by the intellectuals that were beginning to surface in Europe, was beginning to spread throughout the West's conscience.

The strength of the church, aided by the success in the East, gave the people of Europe a strong feeling of Christian identity. It was much as if there was one Christian civilization. There were still kingdoms, domains, and battles over land, but nationalistic identities and local identities were secondary to Christian identity (Strayer 1974: 100).

This Christian identity was bolstered by the threat to the Christian conquered lands near Jerusalem.

The Second Crusade (12th Century)

The Second Crusade, called in 1145 after the loss of Edessa to the Turks, did not achieve much. The first force, led by the German king Conrad III, was too large and slow. It ran out of provisions in Asia Minor without being able to meet the Arab forces and was forced to disband. The French force, led by Louis VII, might have fared better if not for the apparently intentional interference by the Greeks, who were suspicious of the French. Supplies were not made available, so famine and starving horses were a problem. Greek settlements did not deter the progress of Turkish harassing forces. Finally, the fleet promised by the Emperor to carry the French to Antioch was far too small to carry all the army. Conrad and Louis, realizing that Antioch was impossible to defeat with the force they had, made for Damascus, but was unable to score a victory. They were forced to return to Europe with nothing but a growing resentment for the Greeks (Strayer 1974: 93-102).

The conquest of Jerusalem encouraged the West greatly, though it was to be lost again in 1187 to the Arab leader Saladin. It gave greater power to the Church, since it had been the Pope who directed the action. It demonstrated the power of the West, that they could accomplish such a task. It helped to open the Mediterranean to sea travel and trade as well (Strayer 1974: 83).

The Political Powers of the 12th Century

Through the 12th century, and through most of the Middle Ages, England and France were at odds. England held feudal lands in France, which did not please the French monarchy. England's financial strength, supported by efficient collection of revenues and its strong centralized government, made it very powerful, despite its relatively small size and population. Louis VI, king of France, managed to gain control of much of his own French lands during his reign, and did much to increase the power of his throne. The Holy Roman Empire was greatly weakened and poorly respected at the beginning of the 1100s, due in part to the Emperor's run-in with the Papacy in the previous century (Strayer 1974: 101). Frederick Barbarossa would try to turn things around and centralize the Empire, but would not complete this task before drowning while on the 3rd Crusade. In fact, after his heir's death, the Empire would fragment more, effectively destroying any central government.

The 3rd Crusade (Late 12th Century)

By 1188, much of Frankish Syria – the land that had been taken by crusaders and was now ruled by lords that came from western Europe - was being retaken by Saladin. Jerusalem has already fallen to him, and the French King of Jerusalem was held captive. Tyre, regarded as the "last bulwark of Frankish resistance," held off Saladin while sending a representative bishop to Europe to preach a Third Crusade.

The kings of the major kingdoms in Europe personally vowed to crusade. Thus Frederick Barbarossa of the Empire, who was to die at a most fateful time, Henry II of England, and Phillip Augustus of France would join the many other knights and peasants

on the crusade. Henry and Phillip, though, were slowed by petty bickering, and Frederick left Europe without them (Lindsay 1970: 178).

Meanwhile, the Greeks were conspiring with Saladin to sabotage the crusade by lack of supply. Frederick, in outrage, sacked the city of Adrianople, but decided to spare Constantinople. He continued east. His army first took Konya, the Seljuk Turkish capital. Saladin, rightly fearful of the power of this German army, withdrew and razed fortresses on his way (Lindsay 1970: 178, 179). The German army, though, was left demoralized and disorganized by Frederick's death. They could proceed no further.

Guy, King of Jerusalem, was released by Saladin, perhaps so that he would get in the way of the French lord Conrad of Monferrat, who was masterfully defending Tyre against the Turks. Guy was turned away from Tyre, but managed to recruit an army on his own from crusaders. He began to prepare an attack on the "Second City" of Acre (Lindsay 1970: 180).

Saladin followed Guy with his own army. The armies met, but managed only to balance one another's forces and advantages and cause a stalemate. Now neither army had an advantage. The Frankish army, under Guy, was at Acre, but could not lay a proper siege with Saladin at his back. Saladin could not force Guy out. A war of attrition commenced, and each army was situated to prevent supplies to the other (Lindsay 1970: 181).

After a desperate re-supply mission by Conrad in 1190, the Frankish army was no longer starving, but a new development ensued. Guy's wife, by whom he had right to be King, died without heir. The inheritance passed to the Queen's sister, who was married to a man with no leadership ability. Conrad's strong friends forced a divorce between the

two, and he himself married her. Guy and his allies did not recognize the crown of Conrad, and the camp was significantly divided (Lindsay 1970: 183).

Matters were made worse by the coming of the French and English. Richard the Lionheart of England, who replaced Henry as king, led the English, where Phillip led the French. Richard, upon arriving, took up support of Guy. Phillip, of course contrary to Richard, supported Conrad. Both armies reinforced the siege of Acre, which could finally continue. Temporarily, a truce between Richard and Phillip was arranged, and under their strength Acre fell (Lindsay 1970: 185).

The truce quickly dissolved, and hostilities presented themselves in the matter of crowning the King of Jerusalem. A compromise was reached: Guy would be king, but Conrad would succeed him. With this done, Phillip left for Europe, leaving Richard to go for Jerusalem.

Things looked promising. Saladin could not stop the approaching army. Harassing attacks, which involved shooting at the flanks of the column by mounted archers, did little due to the heavy armor worn. When Saladin met Richard outside Arsuf, the charge of the mounted knights put the Arab army to rout. Saladin couldn't stop Richard, but he could keep him from taking Jerusalem by keeping a large ground force behind Richard. The English king knew he couldn't besiege a city as strong as Jerusalem and hold off a flanking force (Lindsay 1970: 190).

Time was running short for Richard. Behind him in Europe, Phillip and Richard's brother, John, were conspiring against him and ravaging his lands. After a raid on a rich caravan and a heroic defense of Jaffa, Richard left Asia Minor in 1192, leaving Jerusalem in the hands of Saladin, who was to die in 1193.

The 13th Century

If the twelfth century had brought great change, then the thirteenth century was the time to meditate on them. Concentration was on the details of the new thoughts and ideas that had come out of the previous century, not so much on developing new ideas.

One idea with great impact was reason and logic. It had gained prominence in the twelfth century, but now it was definitely becoming the standard of the intellectuals in Europe. Desire for law was profound, and legal techniques and study of law were improved yet more. University graduates were found in positions of respect and authority. Nature was seen as a place of orderly and reasonable rules (Strayer 1974: 144). Literacy and learning was gradually spreading to those not normally academic. More books were being written, and new universities were emerging. Compendia and encyclopedias were written, summarizing all of human knowledge. Thomas Aquinas, the most influential theologian of the Middle Ages, was active during this time (Strayer 1974: 178 – 180).

This dependence on order and a population density reaching its limit in potential growth led to a lesser degree of social mobility. Whereas in the twelfth century it was somewhat possible to better one's lot in life by moving to a town or settling new ground, the thirteenth century saw a people that understood in their hearts that everyone had a place and a classification. The relatively new middle class of the townsfolk did what they could to prevent those from peasant classes from joining their ranks (Strayer 1974: 145).

The economy of Europe, having provided a surplus in the century before, was now growing at a slow but stable rate. Attention was focused more upon retention of current success than risky ventures that might result in great success or great loss (Strayer

1974: 145). The importance of social and economic stability was correlated with a relatively peaceful time for most of Europe.

By the end of the century, Italy had demonstrated itself to be amongst economically elite. The cities of Italy did much trading, especially with profitable and expensive items. Their seamanship grew strong, and they were sailing and selling to England by the close of the thirteenth century. Other regions, such as Germany, were becoming more industrial, providing more income for their inhabitants. Agriculture was doing well, and the peasant classes saw a better standard of living than those that would come in a few generations (Strayer 1974: 177).

The Gradual Decline of the Church (13th Century)

The beginning of the thirteenth century saw the church at its strongest, but the end of 1200s was to see its decline. Innocent III, Pope from 1198 to 1216, was a strong, if somewhat ruthless, leader. Under him the Albigensian heresy was suppressed and Waldensian heresy was eliminated, but the former was done at the expense of the support offered by southern France when Innocent placed lords from northern France into the seats of the south. The orders of the Franciscan and Dominican friars were established and encouraged. The court of the Pope was the supreme ecclesiastical court in Europe, and he did much to improve the administration of the church. However, his actions involved the church in a long and ultimately dangerous feud with the Hohenstaufens, the ruling family of the Holy Roman Empire, that would ultimately lead to the embarrassment of the church and contribute to its decline. When King John of England (1199 – 1216), Richard the Lionheart's brother, failed to appoint Innocent's choice of

archbishop of Canterbury, Innocent III excommunicated the king and declared an interdiction. When this didn't produce quick results, he had France invade England. John backed down, and even ceded England to the Pope, who granted it back to John as a feudal fief of the papacy (Strayer 1974: 147-151).

His strong-armed methods would eventually bring the church trouble. The papacy was becoming too secular for its own good. Though this fault was due to too much strength in the Holy See, the next was to be due to too little strength, when Innocent was unable to control a crusading army.

The 4th Crusade (Early 13th Century)

In 1202, a 4th Crusade was declared to once again try to free Jerusalem. French and Italian lords set forth to Venice, from whom they had hired ships to take them east. Upon arrival, they found that they did not have enough men to fill the ships that they had asked for. Unable to pay their debt, and with Venice unwilling to forgive it, the crusaders agreed to attack the Christian city of Zara, a trade rival of Venice. The Pope protested to no avail. The Venetians, apparently, had found an army that they could convince of nearly anything. Venice produced a man to claim the throne of the Byzantine Empire, and directed most of the crusaders to conquer Constantinople, which was also the seat of the Orthodox Church. The crusaders, perhaps thinking that a friendly Byzantium would allow easier passage to Asia Minor and therefore Jerusalem, agreed. In 1204 Constantinople was overrun by the crusaders. The Venetian candidate had quarrels with the crusading army, so they deposed him and set up their own Latin Empire of the East. The Byzantine Empire, though greatly weakened, would reconquer some of its lost lands

in 1261, ending the ill-fated Latin Empire of the East. (Strayer 1974: 152). Innocent III forgave the crusaders, since with Constantinople under western rule, he may have been able to heal the breach between the churches.

The Church Under Innocent III

Another of Innocent's mistakes was to impose taxes on the clergy, often paid directly to the kings of Europe for use in crusades. The precedent for taxation of the clergy was set, and kings would soon begin taxing the churchmen for their own military endeavors by the end of the thirteenth century. It also set the clergy on the unpleasant task of being more worldly wise and more careful when collecting revenues (Strayer 1974: 154, 162).

By 1250, the feud between the papacy and the Hohenstaufens resulted in the embarrassment of the church and the destruction of central authority in Germany. The feud persisted in Sicily and Italy. Innocent IV called in the French lord Charles of Anjou, who received full crusade benefits to put down the Hohenstaufens. Charles was victorious by 1268, but would lose Sicily to a revolt in 1282. Still, the French, who were traditionally friendly with the church, held Naples and much of the mainland of Italy (Stayer 1974: 161).

Meanwhile, the church had finished its battle with the Albigensian heresy in southern France. The heresy had risen again after the southern French were unable to hold it down. Another crusade was called against them, this one led by Louis VIII. By 1226, Louis had made sure that the Albigensians could never pose a military threat or hope to gain their own independent state. However, the heresy still existed underground.

Pope Gregory IX finds a solution: he instates the Inquisition and sends educated, pious, and fervent Dominicans to investigate and root out the now underground heresy (Strayer 1974: 162).

The Temporary Rise of Central Power (12th and 13th Century)

In England and France, royal authority was growing strong. King Phillip II of France, who ruled from 1180 to 1223, and who was called Phillip Augustus, did much to increase and strengthen central authority in his land, including winning many French fiefs that were feudally under the king of England by summoning King John to his court. A strong and clever king, he left much to be desired in way of morality.

His son, grandson, and later successors, did a better job of strengthening the moral authority of the crown. Louis VIII, Phillip's son, ruled only until 1226, three years after his reign began. Louis IX (1226 – 1270), who would one day be canonized as a saint, was a man of strong moral character and political power. He believed strongly in his authority as king, and believed that feudal lords should indeed be subordinate. His administrative reforms did much to ensure that his bureaucracy was staffed with, in broad strokes, men more moral and fair that many of those that had come before. His administrators gradually absorbed some of the legal authority of the barons when Louis gave the royal court, generally staffed with these legally trained administrators, rights to hear and judge appeals. By and large, much of Louis's progress in power was made by legal maneuvers such as this (Strayer 1974: 164 - 167).

Phillip III (1270 – 1285) was not as great a ruler as was St. Louis, but through accident or design he did strengthen the crown by obtaining two great fiefs, one by

inheritance from an uncle, and one by marriage. By this time, only four great fiefs were not under direct royal authority. He had also inherited or earned the loyalty of his people, the old friendship with the church, and the subordination of his feudal lords. By the middle of the 13th century, the French king was the most respected ruler in Europe (Strayer 1974: 167, 168). Things were going well for the French, but they retained two weaknesses. The first harked back quite some ways; the people of the land identified themselves first with their province, not their nation. The second: France had set no precedent for taxation, which would soon be needed.

England, by contrast, had a strongly unified national identity. Central authority was strong, but would soon be weakened. In 1215, the great barons under King John rebelled after too many taxes had been asked for. John was forced to sign the Magna Carta, which protected the rights of the feudal lords, and limited "arbitrary government" under the king (Strayer 1974: 171). The Magna Carta, though, did not make it impossible for the king to rule. It was rather reasonable, demanding that the king gain consent of a council of barons before imposing large taxes, and forcing the king to follow due process of law to redress grievances. By presenting the Magna Carta, the English barons had learned to act together, and to engage popular support by appealing to the common welfare.

John would die a year later, during an indecisive civil war with his barons. Henry III (1216 – 1272) was too young to rule, but his regent did admirably well to secure peace with the lords. Henry, when he came of age in 1225, confirmed the charter, forcing him to consult the lords for any major policy change or general tax. Politically, support of the lesser landholders and burgesses was beneficial when appealing to the great lords. For

expediency, he began to gather them all together to meet in what was being called Parliament by the 1240s. Soon enough, Henry asked for representatives from each county in addition to the merchants and lords already attending.

Henry's desire for popular support was well founded. When he lost it for being too concerned with international politics, Simon de Montfort led the Baron's Rebellion against the king between 1258 and 1265. Henry, though defeated, remained king. He gradually rebuilt his power and defeated Simon. Henry, and the barons, had learned that the king must attend to baronial demands (Strayer 1974: 173 – 176).

The end of the thirteenth century would mark the gradual decline of medieval structure and thought. The church had lost power, but was still recognized as some sort of authority, though it had still lost its power to command. People were beginning to identify themselves less with a Europe-wide Christian community, and more with local or national communities. Economically, Europe mysteriously slowed down, and economic stability was damaged.

The 14th Century

England and France, ruled by Edward I (1272 – 1307) and Phillip IV (1285 – 1315) respectively, were drifting towards war. Both taxed the clergy, crossing the thin line from the precedent set by Innocent III in taxing the clergy for crusades, in order to pay for their war. Pope Boniface VIII (1294 – 1303) objected, and ordered that the clergy not pay taxes unless ordered by the papacy. In France and England the clergy became unpopular and were seen as unwilling to make personal sacrifices for the common good. The clergy begged the Pope to rescind his order. The Pope backtracked,

and revised his order to read: taxation of clergy is forbidden without papal consent, except in the cases of emergency and defense. This was vague enough to allow the kings to do as they wished (Strayer 1974, 193).

In 1301 Boniface foolishly had a showdown with Phillip, using the pretext of Phillip's arrest of a bishop on questionable charges. Boniface wanted to assert his authority over all ecclesiastical affairs, while Phillip wanted to assert control over all denizens of his domain. Boniface tried and failed to bring popular support against the king. Phillip, in a series of conferences and local meetings, stirred up a great deal of outcry against Boniface in France. Finally, Phillip accused the Pope of heresy, among a number of other charges. Phillip even sent a representative to the papal palace in Anagni to arrest the Pope and bring him to face the charges before a General Council of the church. Boniface was held for several days before Anagnisians rebelled and forced out the representative of Phillip. Boniface, old by this time, could not bear the strain caused by these unprecedented events, and soon died (Strayer 1974: 194 – 195). This demonstrated the power of the secular governments over the Holy See. The popes afterward, until 1327, would stay in France, not in Rome. The Pope gained a bad reputation for injustice, and by around 1350, the papacy had lost nearly all of its political authority, as well as moral credibility.

Edward and Phillip were well on their way to establishing modern sovereign states. The confusing system of overlapping jurisdictions and conflicting authorities that accompanied feudalism was gradually being destroyed in England and France. They each had gained a great deal of sovereign authority over the citizens of their lands, demonstrated by Phillip's showdown with the church. Nationalism was growing as the

primary identity of their lands, as opposed to previous years when local or provincial identities were more prominent. They had all the prerequisites for a sovereign state, but they could not hold them. Their goal was to grow quickly, too quickly for their own good. Feudal lands were brought under direct rule, and from this the short step was taken to annexing bordering principalities. Lands that couldn't be taken by legal manipulations were attacked by force. This didn't succeed in Scotland for the English or Flanders for the French. Both monarchies resorted to long, expensive, and ultimately unsuccessful wars to try to annex these locales (Strayer 1974: 198-200). People were unhappy with their governments, as otherwise successful as they seemed to be.

Ultimately, both kings ran into the same conflict. They could tax no more without upsetting their own people. Edward resorted to Parliament, which grew in strength and representation. Parliament became the highest court in England. It gave the king the opportunity to meet most of his subordinates at once, but it also gave the lords a chance to meet and gave some degree of authority to the council. This would prove damaging to Edward's weaker successors. The French ruler had to secure the support of his people as well, but he did not have a regularly meeting council with which to do so. He resorted to sending representatives to meet with local assemblies. These were not as successful at drumming up support (Strayer 1974:203)

The Decline of Central Power

The death of both Edward and Phillip brought aristocratic rebellion. These rebellions did almost nothing, but they demonstrated the dissatisfaction that both France and England had had with their kings and began to take down the pre-sovereign state

structures that both had held. The aristocracy gained power and popular support. Unpopular taxes passed by both kings had weakened them, and the lords jumped at the opportunity to be seen as protectors of the people. The kings that followed, greatly weakened by baronial power, were forced to depend on the great lords. They gave them positions of authority and respect, and relied on them for military support, as the barons now held the armies. This is feudalism, but with the focus changed. The landholders were not dependent on the king because they held his lands. He was dependent on them and was thus forced to grant them lands (Strayer 1974: 204).

The barons were not interested in destroying central authority. They were interested in controlling it. This led to civil wars and intrigues between barons as they struggled for power. Kings in England had trouble holding their thrones; between 1304 and 1485 six of the nine English kings to rule were deposed (Strayer 1974: 204).

The Hundred Years War (14th and 15th Centuries)

The Hundred Years War was caused by this political instability and contributed greatly to it. This war, between England and France in the years from 1337 to 1453, involved sporadic conflict over any number of pretexts, but primarily to reduce anxiety over domestic issues by resorting to foreign ones. England nearly won twice, once in 1346 at the battle of Crecy and once at Agincourt in 1415. Each time the French rallied behind a heroic figure, Du Guesclin first and then Joan of Arc. Each time England was pushed back, rebellion and civil war commenced in English lands. French lands were devastated, but the victories over England won support for the monarchy once again. With the end of the Hundred Years War, the French monarchy was once again in a

position of authority. England would see the Wars of the Roses before the Tudors would reclaim English monarchial authority (Strayer 1974: 205, 206).

The Recession (14th Century)

Those that saw the Hundred Years War saw other difficulties and disasters. The economy was in a depression. People strove to hold on to what assets they had rather than build new sources of wealth. Money was becoming important, even to those with land, not pleasant when there were wild fluctuations in currency value. Maximum wages were set by guilds, which had developed monopolies in the towns. Many industrial areas were experiencing large unemployment. Social mobility was even more diminished than it was in the 13th century. Economic distress led to uprisings throughout Europe (Strayer 1974: 206-207).

The economic difficulties were exacerbated by the bubonic plague that swept through Europe in the mid 14th century. Estimates of the mortality rate are widely varied, but at least in urban centers 20 percent of the population fell under the Black Death. The population shrinkage deepened the economic difficulties. The economic consequences of the plague would last into the 15th century (Strayer 1974: 208).

The Great Schism (Late 14th, Early 15th Century)

The Great Schism of the church, caused by French cardinals declaring the papacy of Urban VI invalid in the late 1300s, shook the faith of the followers of the church. The French raised up Clement VII as their Pope, and some secular authorities supported them. A General Council of the church set out to fix the situation, but instead elected a third

Pope in 1409. This was getting silly, even the secular authorities agreed. They had a new General Council meet in 1414, which became the first great international assembly, which was theoretically led by the clergy, but very much guided by the kings. In the end, the kings agreed to depose the French and the council-elected popes. Urban VI resigned, and the Council appointed a generally recognized Pope (Strayer 1974: 209). The damage had been done, though. The church was coming under fire from reformers already, claiming that the clergy were too greedy and the church was too worldly.

The Close of The Medieval Era (Late 15th Century)

The end of the 15th century, with the end of the Hundred Years' War, saw revival of popular support for the monarchies. Baronial control had only led to war, which tired the people. France began the revival with the crown successfully resting on the heads of Charles VII (Charles the Victorious, who had backed Joan of Arc) and Louis XI. Spain soon followed when Ferdinand and Isabella married in 1477 and ended civil war. After the Tudors rose to the throne after the War of the Roses in 1485, England joined the monarchial revival (Strayer 1974: 222). These new monarchies for the most part relied on old institutions, such as assemblies and Parliament, which were no longer opposed to a strong rule by the throne. People had come to prefer a government that was too strong to a government that was too weak, which would lead to more war.

The strength of the government and the weakness of the central authority of the church led to the clergy to depend on the kings in their lands. This made it a short step for the rulers to split away from the church, and laid the foundation for the Protestant Revolution.

The end of the 15th century and the stability it brought caused a surge in European energy. The economy reversed itself and began growing. Technological advances, with some designed for war, and some dependent on advances made for war, were relatively prominent. Kings of this time were interested in commerce, and thus encouraged navigation and exploration, that would one day lead ultimately to European empires spreading around the world. A revival of art and literature, influenced by the Renaissance that was already booming in Italy, began to flourish (Strayer 1974: 225). Though medieval institutions and ideals persisted for years to come, some even evolving into structures surviving in our own modern states, the stage was set for a new era, growing enthusiastically from the boom at the end of the 15th century and the beginning of the 16th.

Feudalism

From the fractured Carolingian Empire evolved feudalism as a response to the dangers present in the world. Norse raiders from the North, Magyars from the East, and Muslim raiders from South were harrying Europe, making travel and trade difficult and dangerous (Strayer 1974: 60). Feudalism came about differently in various parts of Europe – England barely saw feudalism until William the Conquer brought it to the isle, but the lands that had once been the Carolingian empire were relatively quick to feudalize (Koch 1978: 39). It was not a coherent system, but an evolved response to needs, especially need for security. It came about in parallel throughout Europe, but generally independently and with great variation.

Feudalism is characterized by vassals and their lords, bound to agreement by oath, service, and land. Though elaborations were present, the most basic agreement between lord and vassal was as follows: the vassal would declare himself the lord's man by paying homage, a gesture of subordination. The vassal would agree to provide a specified term of military service per year, either by his person, his support of a specific number of knights by subinfeudation, or, often, both. In return, the lord would provide the vassal with means of economic support. Throughout much of the Middle Ages, this support came in the form of a parcel of land called a fief, complete with arable land and villages of peasants to till it. Early in the Middle Ages, the vassal might have more commonly been supported by the lord's own household, such as the German ministerial, though this is not technically feudalism. A ministerial was a serf-like warrior bound to a superior that could not own property or marry, among many other things, without the superior's leave. Other, less common, benefices in return for service include rights to toll a bridge

or road, rights to the fees at a certain mill or press, or similar. By and large, though, the most basic means of infeudation was by passage of land (Koch 1978: 38, 39).

Vassalage, though subordination, was not considered derogatory; by being the vassal of a noble, one was a noble. Vassalage was a combination of Germanic and Roman traditions of subordination, military service, and lordship, and therefore was already somewhat natural to many of the people of Europe, for they had descended from Germanic and Roman backgrounds (Hopkins 1990: 26).

The smallest portion of land that could be granted as a fief was that which was reckoned to be the minimum support of a single knight, with all of his arms, armor, retainers, horses, etc. This was called a knight's fee, and could be on the order of 300 to 600 acres (Gies 1984: 97). Vassals with larger fiefs, often required to supply military service in the form of a particular number of knights, would grant land feudally to subordinates, becoming lords in their own right by having vassals. Thus "lord" and "vassal" were relative terms.

Had this been an organized system, then this hierarchy of lord and vassal would have been clear and efficient. But many nobles held lands from more than one lord, and were thus feudally subordinate to them. It has been said that a man cannot serve two masters, and when such a vassal's lords were at odds with each other, a conflict certainly arose with the duties of the vassal. Furthermore, the tendency for vague or confusing subordinate relationships in the feudal system could lead to jurisdictional difficulties. Borders were considerably more vague than those of the modern nation states. Outlying principalities in a kingdom ostensibly belong to the king, but practically do so only if he is strong enough to assert his ownership. The kings of England through the 12th century

were the feudal lords of many large provinces of France, such as Normandy, and Aquitaine. Thus the king of England was both an independent king and a feudal vassal, at least until King Phillip managed to wrestle most of them back.

Manorialism

Clearly, then, feudalism was not an organized system, if system it could be called. It was built on an agricultural economy and a military class: the knights. But, had manorialism – a system by which peasants congregate in villages under the protection of a local lord – not been in place, feudalism would have been impossible (Stephenson 1941: 161).

The Middle Ages saw an economy totally dependent upon land and agriculture. Successful agriculture required land and tools, along with draft animals to plow and till. An average peasant family could not afford the tools and animals required. So, sensibly, communes formed wherein draft animals, tools, and skills were shared. Each peasant family still maintained its own portion of land in the village, and was dependent upon what it produced (Stephenson 1941: 152).

A village of peasants was safer than a family on its own, but not very safe. Too poor to purchase proper arms – swords, armor, lances, horses, shields, etc. - and incapable of intensive training, due to time constraints, a village needed a protector. Enter the manor lord.

By the 9th century, heavy mounted warriors were coming into play. These warriors, who were destined to become the warrior class known as knights, required economic support to provide for their expensive armaments, as well as support for a life

devoted to training in combat. This is especially true for mounted troops. Peasants needed a warrior, and warriors needed support provided by a relatively large economic base. Not to say that it came about so simply, but peasants and warriors found their needs met in the other (Koch 1978: 31).

Manorialism, as it ultimately came about, was the relationship by which peasants, in addition to providing for themselves by agricultural work, would also provide for a local lord. This lord was responsible for caring for the peasants that supported him. The peasants were responsible for farming and harvesting the lord's lands, typically interspersed with their own. They were also responsible for paying rent for their own lands, or for the right to farm on land belonging to the lord. Most of the debt to the lord was paid through labor, but some was often paid in kind, such as a trivial payment of grain or eggs. The peasants must also pay for use of the mill and oven, which were also owned by the manorial lord. There were also special payments that may have been incurred based on location and custom: upon marriage, death and inheritance, or intention to move from the village, peasants might be required to make some sort of payment. All in all, these payments constituted the living and the income of the lord (Stephenson 1941: 154 – 156).

In return for these revenues, the lord was responsible for the well being of the villagers. He was to protect them from harm, domestic and foreign. The lord, or a servant acting in the lord's name, would hear civil cases, try petty criminals, and basically administer the law of the land, which was mostly set down by custom rather than noble injunction (Stephenson 1941: 156).

Conclusion

Feudalism, with its hierarchical structure intended, at each step, to provide a knight, could provide a powerful and responsible military under a strong king. Throughout much of Europe through much of the Middle Ages, though, the counts were stronger than the kings. In these circumstances, feudalism, with subinfeudation, allowed these counts to mobilize powerful militaries against one another.

War in the Middle Ages

As in any time period, the reasons behind the wars of the Middle Ages varied with the wars. Wars were fought for property, for redress of violated rights, for ostensible protection of innocents, and for many other myriad reasons. Great wars were called and led by great authority figures – kings, popes, organizations of barons, etc. – but more minor, local wars were often a threat to medieval peoples. These minor wars could be called on a more local scale by lords whose superiors were too weak or too uninterested to stop them. In the remnants of the Carolingian Empire, for example, the princes and dukes waged war between themselves, with the kings unable to stop them.

Perhaps more interesting than who began the wars that plagued medieval Europe may be who fought in them, how, and why. Knights are generally considered the primary combatant of the Middle Ages, and this is for the most part true from the 11th century, when the class is clearly established, to about the late 14th century, when non-nobles - such as squires - were equally well armed and trained, but less expensive.

Pre-Feudal Armies

Before the rise of feudalism, the armies of Europe were varied greatly. Saxon and Frankish armies consisted of lightly armored foot soldiers, armed with swords, spears, daggers, and shields. Mounted warriors wearing mail and using swords and spears were prominent among the Ostrogoths and Lombards, but the use of cavalry was slow to catch on among the Franks, though they were gradually incorporated from the 6th century onward in the Frankish military (Warry 1980: 210). With feudalism not yet the rule, many of the warriors in these armies were free men who had pledged loyalty to a ruler, as per the old Germanic traditions.

The Carolingian Empire saw a rising dependence on cavalry. All notable people, and their immediate servants were by this point used to mounted combat (Oman 1953: 18). The Carolingian Empire was bureaucratically and militarily dependent on the support of the great dukes of the empire for the Emperor. They supplied personal armed service, as well as armies of well-equipped foot soldiers (Oman 1953: 19).

Beginning of Feudal Armies

The dependence on subjects for military service was continued through the rise of feudalism. Now, though, military service was given not simply as support for government, but in return for land that provided livelihood. The equipment and armor of a heavy cavalryman, who had grown to dominate the battlefield, had grown too expensive for most to afford on their own, and it was the custom of the Middle Ages for each fighting man to supply himself with arms and equipment. The grant of a fief allowed a man to afford his expensive equipment and the time to train with it.

The early feudal times were rife with war. The Carolingian Empire had splintered into petty principalities, each warring with one another. Other peoples, such as the Magyars, still posed a threat to those in Europe. Furthermore, no universal code of behavior had yet been imposed on the knights. As a member of the military elite, only a strong superior or a rival could prevent an errant knight from doing as he wished. It was not uncommon for knights to kill and rob as they wished. Even civil and criminal cases were settled often with trial by arms (Gies 1984: 17).

The Christianization of the Knight

In response to this brutality, the church began to organize a reform, known as the Gregorian Reform, to counter the violence. The first stage was the Peace of God, in 989 CE, which sought to "protect some of the people all of the time" (Gies 1984:18). The Peace of God protected peasants, the church and church property, merchants, and similar unarmed people and undefended places. In execution of this reform, clerics throughout Europe would gather together all the nearby nobles, peasants, and knights, and convince them to swear oaths on the dearest relics and holy items available to uphold the Peace of God as described above.

By the early 11th century, the Truce of God reform began. Similar to the Peace of God, it focused its attention on nobles and knights. It sought "to protect all of the people some of the time" by forbidding military action on Sunday and holy days (Gies 1984:18, 19). When this was accepted with only minor grumbling, it was gradually expanded to include Saturdays, Fridays, and Thursdays, all saints' days, Lent, and Advent (Gies 1984: 19). Again, oaths were exacted from the nobles and knights to adhere to these guidelines.

It can be expected that the letter of these laws was not obeyed. Certainly, very few wars were limited in engagement from Monday to Wednesday of weeks that did not fall in holy times. Still, it was the spirit of the law that was important. The idea that the carriers of arms are meant to respect the unarmed was being re-introduced to Europe. From here the church could maneuver to forbid any Christian to hurt another Christian, though this inducement was hardly listened to at all. But the church reformers were building on an old concept that the world was divided into three types of people: the warriors, the clergy, and those that worked to feed all. The ideas began to emerge that it

was in the best interest of the warriors to protect the peasants rather than ravage them. Finally, when the dubbing ceremony became gradually more ceremonial, the church – always interested in adopting ceremony – adopted knighthood. The final step towards Christianizing knighthood was to introduce the concept of the Soldier of God, and send the European knights east to Jerusalem as a holy expedition in 1095 (Gies 1984: 20-24). Despite this Christianization of knights, some could still be quite brutal, as is evident in the apparently remorseless slaughter and dismemberment of the inhabitants of Jerusalem as it fell (Gies 1984: 43).

The Rise of Chivalry

In this we see the gradually forming image of the knight that is familiar: bold, strong, well armed and mounted, and pious. The image that eludes us still is chivalry, the code of conduct and courtly manners that evolved in southern France in the 12th century (Strayer 1974: 134). Great romances were written, revering women and courtly, servile rather than intimate love, sentiments that some conjecture diffused to the French from Moorish Spain (Strayer 1974: 134). Great men were acclaimed in these tales. They were bold, loyal, true hearted, strong and clever with arms, and generous with their wealth. They revered noble women, rescued those in danger, and protected those that had no means to protect themselves. To what extent the knights of the time lived up to these expectations is likely limited. It was, after all, an ideal. But chivalric tones were spreading, and the knights, now mostly nobles by the 13th century, were expected to be well lettered, well bred, and courtly as well as a terror on the battle or tournament field (Gies 1984: 50 –53).

The Knight's Dangers

Some, though, have questioned the terror the knights themselves might have experienced in battle and tournament, which was, in the early Middle Ages, not so different from battle for a knight. The stout armor the knight wore was capable of fending off great blows that would fell an unarmored man. Furthermore, the practice of ransom, wherein a captured knight paid or arranged to have paid a large sum of money for his release, encouraged the capture rather than the slaying of a knight. Maurice Keen, though, cautions against too quickly assuming that these factors meant that knights were truly relatively safe in battle. Disease was a constant threat, he says, and one that did not consider class before killing. Furthermore, though it was generally the policy to take knights captive, there are several cases in which prisoners were, for one reason or another, killed rather than held. For instance, it was the practice of the Swiss to give no mercy to captives (Keen 1999: 220-224).

The Development of Scutage

As mentioned, knights were generally nobles by the 13th century, usually tied feudally to a lord. This nobility, and the construction of gradually more centralized governments with more emphasis on law, meant that knights were more and more becoming governors. In England, knights were an important part of the government as early as 12th century. This reliance on knights in government discouraged the use of them in war, so in the 12th century England adopted scutage, or shield tax, wherein knights paid a sum of money instead of personally providing military service. This

money was used by the king in part to hire mercenary knights instead of depriving lands of local rulers (Gies 1984: 99, 100).

Knights' Changing Roles, and the Professionalization of the Army

By the late 13th century, the role of the knight was changing. War was not the only knightly business, and war was no longer a business for primarily knights (Gies 1984: 105). It was, indeed, becoming a business. War was a good way for quick riches, typically spoils taken from levies on captured towns, ransoms of captured knights, and theft. The number of knights was declining, as cost of equipment, armor, and horses increased and the economic stability of Europe declined. Potential knights often remained squires, where they may be as highly trained, but could often have their equipment provided for them, or at the very least be freed of the knightly obligation to maintain at least three horses and equipment for a squire of their own (Gies 1984: 102) . The 14th century brought the Hundred Years War, and with it, new ways of creating and using armies. Early in the war, the French tried to use the established system of drawing upon feudal relationships to obtain a number of heavy cavalry and footmen. The English opted instead for an indentured army, one hired and paid in cash; a professional army. In particular, bowmen were hired, the effect of which was the defeat of the French at the battle of Crécy (Gies 1984: 146, 147).

The success of the indentured army quickly led to its adoption through much of Europe. Heavy cavalry was still an important part of the armies, but now it included both knights and squires. As mentioned above, squires were as heavily trained and armed as knights at this point, and were as experienced in battle. The distinctions were primarily

social and economic, not military. Squires were preferred, as they could be paid half the sum paid to a knight. Foot soldiers and archers, as always, were included in these armies, but were paid soldiers rather than forced servants (Gies 1984: 150, 153). Furthermore, the 15th century brought greater reliance on artillery, and with it, the commoner specialists that operated them.

With relatively consistent war, and the established practice of professional armies, it was a small conceptual step to create a professional standing army, as King Charles VII of France first did in 1445. Cavalry and infantry were stationed in specified towns and fortresses. Furthermore, a corps of reservists, called free-bowmen, was established. These would stay in their homes, be trained and inspected, and be called if need be to fight. In addition to these, the king kept a corps of royal artillerymen (Gies 1984: 196). This, and the echeloned military structure of company, squadron, etc. established by the Duke of Burgundy in 1473 formed a basis for the modern professional army (Gies 1984: 196).

Medieval Technology

Though the Middle Ages are largely perceived as a technologically primitive era, the people of medieval Europe did significantly develop the technologies available to them. Most of the technology available at the beginning of the Middle Ages was incorporated from the late Roman Empire, which in turn had assimilated much of its technology from conquered cultures. Also, many of the devices incorporated into medieval technology were borrowed and adapted from other cultures, but medieval Europe did much to assimilate those technologies and disseminate them on a large scale to make them useful to the lives of those that lived there (Gies 1994: 17, 41).

Though significant technological progress is found in most industries and crafts, such as carpentry, cloth preparations, masonry, etc., and especially agriculture, the progress most interesting in the scope of this project is that related to power technology, forge technology, and metallurgy.

Power Technology

Mechanization of a simple task not only alleviates so much human labor, but can provide more power than human labor alone could have produced. So, the more mechanized and powered a task is made, the more the product the system can process. The key to this process in the Middle Ages was the waterwheel.

A waterwheel is a relatively simple device that uses the current of moving water (or, with an overshot wheel, the weight of falling water) to spin a large wheel that is connected mechanically to some system. The rotation of the wheel powers that system. The Romans had poorly realized the potential of this power source, and used the

waterwheel primarily for milling grain. The undershot waterwheel worked by positioning the bottom of a vertical wheel into a stream, so the moving water would push the bottom of the wheel and set it spinning. It was 15% to 30% efficient at converting waterpower to mechanical power. The overshot waterwheel, far more efficient (50% to 70%), required water to be channeled by a millrace or chute, which would bring the water to the top of the wheel. The water fell into the top of the wheel at an angle, causing a torque to turn the wheel. This arrangement required a high initial cost, since it involved damming of the stream, the millrace, and an assembly of gears to transfer the power. Thus, while it was known to the Romans, it was generally unused (Gies 1994: 35). A horizontal waterwheel, typically immersed in the stream with the water partially diverted from half of the wheel so that it would turn in the direction with the greatest flow, was cheaper and more widely distributed throughout the Roman world, but it was less efficient than the undershot waterwheel.

By the tenth century, the waterwheel was very highly valued in its capability to processes that which had been farmed, such as wheat and other grains, and was thus widely distributed (Gies 1994: 49). In the largely agrarian society, a device that is capable of efficient production of useful foodstuff from raw crops is clearly an advantage. It was soon to be held in even higher status. The vertical waterwheel was employed for drainage in the underground mining endeavors of the 13th century and onward (Gies 1994: 168). It was applied to cloth production, especially to the process of fulling cloth. The carpenter and the smith both made use of it by the 14th century, especially in use with the blast furnace developed before 1350 and the trip hammer, both of which will be discussed later (Gies 1994: 199-201).

The waterwheel provided power advantage to those with access to moving water. Not all of Europe had such access. To meet power needs, other devices were created, still working on the principle of using a moving medium to turn a wheel. The tidal mill, dating back to at least seventh-century Ireland, utilized the tidal motion of bodies of current-less water, such as harbors or lagoons. They were limited by the eccentric and limited hours of operation, six to ten hours a day during times of fast tidal change (Gies 1994: 117). Another and more widely used alternative was wind power. The European vertical windmill was independently developed in the last part of the twelfth century, though other cultures had developed windmills previously. It featured a tall vertical wheel, using a shield to divert wind from one half of the wheel. The wind incident on the other half caused motion similar to that of the watermill. The wheel had to be able to turn in order to face into the wind, so it was constructed on a stout pole capable of rotation by laborers (Gies 1994:117). Both of these devices, though, were intended primarily for grain milling.

Metallurgy

Iron was used throughout the Middle Ages in tools for many professions. Most important were its uses in agriculture and arms. The former allowed more efficient production of staple foods, while the latter provided strengthened military power.

Wrought iron was widely used for creation of these tools, along with arms and armor (Gogan 1999: 28). It was malleable, ductile, and relatively resistant to atmospheric corrosion. When iron was mined, it consisted of impure iron oxide in an ore. A long process of purification commenced, first by breaking the ore and physically selecting the

reddish-brown iron oxide, then by roasting to remove sulfur, and finally by smelting. During the smelting process, pieces of iron oxide, along with heavily carbonous materials, such as charcoal, and another material known as a flux were placed together in a bloomery hearth. The hearth was heated, assisted by a bellows. The carbon would combine with the oxygen in the iron and rise off as carbon monoxide. The flux material would gather other impurities, and would be poured off as slag. Remaining in the hearth would be the bloom of iron, and the remains of the charcoal and slag. The iron would be removed, and somewhat purified by heat and beating, though the final product contained inclusions and alloys still. Finally, it could also be forged by beating, usually at high temperatures.

The blast furnace greatly increased the rate of iron production in the Middle Ages. It was definitely in use by 1350, and may have been in use earlier. Assisted by waterpowered bellows, the blast furnace also incorporated a greatly improved architecture, with a vertical chimney that first widened at an angle and then narrowed more slowly. The intense heat of the blast furnace allowed carbon to combine rapidly with the iron, forming an alloy of carbon and iron with a much reduced melting point (Gies 1994: 201). This pig iron, or cast iron, could be cast into a mold for relatively quick production of metal products, though this metal was brittle, and therefore not suitable for arms production.

The pig iron could also be remelted in order to more efficiently produce wrought iron of a higher purity than bloomery iron. The pig iron would be placed in a similar furnace, a finery, with two bellows. One would supply oxygen for heating, the other

would supply oxygen to combine with the carbon to leave the pure wrought iron. Thus wrought iron could be produced with less labor and cost (Gies 1994: 202).

Steel was harder than iron, which made it more desirable for production of weapons. Steel is an alloy of carbon and iron, usually in a ratio of about 1.7% to 98.3% respectively. The first European steels were merely surface deep, called blister steel or carburized iron. To produce it, iron was strongly heated in contact with a high carbon material, such as charcoal, in an atmosphere weak in oxygen. The surface of the iron would become carburized, and thus would be stronger (Gogan 1999: 33,4). The temperature required for this process to take place is called the transition temperature for the steel. Blister steel was often used for cutlery and edged weapons when crucible steel - more expensive, but higher quality – was unavailable or too expensive.

Crucible steel, rare if not non-existent in Medieval Europe, was produced by taking wrought iron and placing it into a closed container with carbonaceous materials, such as charcoal. The carbon could diffuse throughout the molten iron, allowing steel to form uniformly (Gogan 1999:45).

Steel had the advantage that it could be further hardened by repeatedly heating, beating, and quenching it. It was only the existence of the carbon in the metal that allowed this, so pure iron could not be so hardened. In fact, the degree to which the hardening was possible was proportional to the amount of carbon, up to a cutoff of 0.9%. After this point, increased carbon content would not result in increased capacity for hardness.

To harden steel, the steel piece was heated above the transition temperature and allowed to remain for approximately one hour per inch of thickness. This allowed the

heat to permeate the material. Afterwards, the steel would be quickly quenched in a cool material, such as room temperature water. The more quickly the metal was cooled, the harder the steel could be made. The price was brittleness; the harder the steel was made, the more brittle it would become.

To combat this phenomenon, smiths tempered the steel. It was again heated, but at a temperature below the transition temperature. Then the steel was allowed to cool slowly, for example by sitting in room-temperature air. Through this method, brittleness was decreased while retaining hardness.

If the smith wished to soften the steel, perhaps to cut it, then a process similar to hardening called annealing was used. To anneal the steel, it would be heated to a temperature higher than the transition temperature, again for about one hour per inch of thickness. Afterwards, the steel would be cooled slowly, perhaps in room temperature air. When cooled, the steel would be soft compared to recently forged steel (Gogan 1999: 109, 110).

The quality of the steel produced in some areas was superior to that produced elsewhere due, at times, to elements native to the ore or smelting materials. For example, Toledo steel included manganese, nickel, and tungsten. This made the steel naturally stronger, and therefore helped Toledo become a major armoring location. Milan and Nuremberg were also major armoring centers in the Middle Ages, and it may be that the ore deposits in these locations also had favorable inclusions (Gogan 1999: 60).

Mining

The Roman Empire had a well-developed mining technique. Slave labor applied iron tools, such as hammer, pick, chisel, and wedge to the walls of the mine. As they dug, pillars were left to support the mine and prevent collapse (Gies 1994: 24). Though mining operations declined with the fall of Rome, the mining techniques were not lost, and were available when medieval mining operations began to pick up in the eighth century (Gies 1994: 40). At first, much of the mining in the Middle Ages was small-scale, local mining using an open-pit technique (Gies 1994:62). By the twelfth century, the demand for iron necessitated larger mining production. Since slave labor was no longer widely used, the work fell to peasant workers. Similar to the agricultural system, workers would cooperate in labor in order to share a portion of the ore, which could then be used or sold to those that would use it (Gies 1994: 129). Production was further increased with the introduction of the wheelbarrow in the 14th of 15th century (Gies 1994: 168).

Guilds

The guild structure, a familiar feature of cities in the Middle Ages, was first developed by Italian merchants in the tenth century (Gies 1994: 121). By the twelfth century, guilds of craftsmen were forming. Each guild was specialized in its memberships: carpenters banded together, as did cobblers, as did fabric makers, each into a guild. The guilds were structured into a hierarchy: apprentices, journeymen, and masters. Apprentices worked under the guidance of a master craftsmen, learning the trade and providing menial labor. Journeymen were sufficiently advanced to hire their

services to masters. The rank of master was conferred to a craftsman after those in the guild were convinced of his capability, demonstrated by a masterpiece the craftsman created. The rank of master entitled him to run his own shop as a full member of the guild.

Guilds functioned to protect its members from foreign competition, and to supply mutual aid amongst its members. They also set guidelines for price, quality, wages, and working hours for their members. They were undeniably oligarchies, but initially they were reasonable and primarily concerned with protection of the membership, not with fleecing the population through unfair pricing and practices, though in time some guilds did (Gies 1994: 124).

Armor of the Middle Ages

Introduction

Warfare was endemic throughout the middle ages, offering ongoing incentive and opportunity for the development of military technology. Along with technology designed for increased offensive power, technicians of the middle ages sought defensive technologies for those that went to war.

Medieval armor, though broadly varied throughout the period and especially so during the 15th century, was generally constructed out of some of a handful of materials. So-called soft armors were made quilted fabrics or leather, possibly studded with metal. Harder armor was constructed of cuir-bouilli – leather hardened by dipping in wax – horn, baleen, and, of course, metal. Hard armors came in a variety of constructions. Intertwined rings of metal was known as mail, and was almost the universal defense material until 1250 or so; thereafter it is was very gradually replaced with plate, although it continued to be used throughout the duration of the middle ages. Lamellar construction, wherein plates of metal were laced to one another, allowed greater protection against the force of the blow while still allowing freedom of movement. Lamellar construction was most prominent in Eastern Europe, though the Scandinavians made use of it until the early 14th century; after the 15th century it became rare in the west. Similarly, scale construction consisted of small overlapping plates, and was used throughout Europe during the period; it was particularly used in the east. The coat-of-plates design consists of metal plates riveted to a fabric or leather covering, again allowing flexibility and solid defense. Though it was likely available throughout the

period, it was most commonly used from the very end of the 13th century through the 14th and into the early 15th century.

Solid plate defenses were first used for the head, a use that harkens far into the past before the medieval era. Aside from helmets, the first solid plate armor that emerged during the middle ages (specifically, in the mid-1200s) was for the protection of the legs, which were the most vulnerable area of a mounted warrior facing opponents who were on foot. Plate knee defenses known as poleyns were the first to come into common use. Plate arm defenses came shortly after the solid leg defenses. Armor made of large metal plate emerged slowly during the 13th century, and gradually became dominant by the late 14th century. Clearly, all armor needed to flex at the joints of the human body, so plate armor developed articulations to allow freedom of movement along with its powerful protection. It is possible that the development of plate body defense was contemporary with the plate protection of the extremities, but this is uncertain due to period illustrations of armor being obscured by the surcoat. The coat-of-plates design becomes the prominent body defense by the end of the 13th century, though mail is still worn beneath. During the 14th century complete arm armor sets emerge, with each piece integrated into the whole and generally riveted together in many places. Leg armor follows suit shortly. Independent breastplates evidently emerge by the beginning of the 15th century, and thereafter there is significant specialization in armor produced by the two major armoring centers, Germany and Italy.

The following sections give a more detailed chronological treatment of the development of armor for the body, head, legs, and arms, respectively, and finally shields. The subsequent section gives a short description of the regional differences,

particularly those during the 15th century. Finally, the last section gives chronologically organized examples of up-to-date armor ensembles.

The issue of terminology must be remarked upon. A particular item might be known by a number of names that could vary geographically as well as chronologically. Some devices apparently went by several names in one area and time; these names often each individually meant variations of the device later during their lifetimes. This document will simplify this by referring to each device by one name, often based upon Claude Blair's terminology.

Armor for the Body

Pre-13th century

Mail was used throughout the early middle ages as the dominant form of armor. It probably was developed by the Celts, and by the 3rd century BCE, it was widely used throughout Europe (Edge 1988: 9). It was used during the Classical period, though forms of plate armor were more prominent at the height of the Roman Empire. With the fall of the Empire, plate technology fell into general disuse except for head protection, even though Roman armor factories were initially still intact for use by the Germanic tribes that took the lands on which they stood.

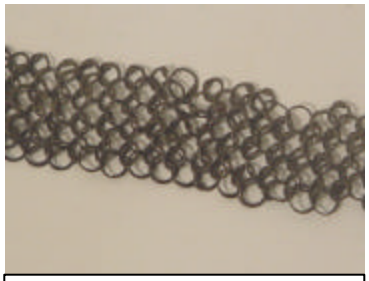

Figure 1: Interlocking rings of mail. HAM No. # 498

European mail is constructed of rings of two types: riveted or solid circles. The riveted rings are used to connect rings together, as solid rings would be impossible to inter-link. In some cases, mail was made up of only riveted rings (Blair 1959: 20). In others, riveted and solid rings are alternated by rows or individually, such that each riveted ring is joined to four solid rings.

The rings were made by first taking sheets of metal and cutting long strips from it. These strips were, at first, beaten into wire tediously. Later, the strips were pulled through successively smaller dies until the proper gauge of wire was obtained. In both cases, once the wire was formed, it was wrapped around a rounded stick. Hammer and chisel were used to cut along the edge, turning the spiral into a series of open rings, the ends of which were beaten flat and pierced. When they were closed, a rivet was inserted through the pierce holes and then pinched or hammered flat (ffoulkes 1912: 44, 45).

By the 8th century, the typical body protection was a long shirt of mail known as a hauberk. During this time, it was customarily of knee-length, with slits in the front and back from groin to hem to allow the wearer to mount a horse. The sleeves were short, coming only as far as the elbow. This hauberk was pulled on over the head. A coat-of-plates design – a type of construction in which plates of metal were riveted to a fabric covering – was also in use, but not nearly as common (Edge 1988: 9).

Figure 2: A 15th- 16th Century Mail Hauberk. HAM # 3927

As late as the 11th century, the hauberk changed little from that described above. The sleeves lengthened slightly, reaching past the elbow to mid-forearm. They would lengthen more by the end of the 12th century, reaching the ends of the arms and forming mail mittens called mufflers. A mail coif – essentially a hood – had in the meantime become directly attached to the hauberk. Otherwise, the hauberk was still knee-length and split from hem to groin for ease in mounting a horse (Blair 1959: 23). This type of hauberk weighed about 30 pounds (Edge 1988: 19). A belt was worn to distribute this weight beyond the shoulders, and to generally keep the hauberk in place.

During the mid-1100s the surcoat apparently emerged. This was a loosely fitting, long garment that hung on the body over the armor. At this stage, it did not contribute to the defense of the body, and there is some speculation as to what, precisely, its purpose was. Some have suggested that it served as protection from the sun, which could heat exposed metal and make it unbearably and even dangerously hot. It is unlikely that it emerged to display identification or heraldic symbols, as it is rare to see illustrations bearing such marks until the early 1300s (Blair 1959: 28).

Quilted garments were often worn with the armor, or without the hard armor and used as an independent defense. A number of terms – aketon, gambeson, and pourpoint – were all used to denote quilted garments involved in defense. Generally, although not universally, pourpoint is used as a general term, referring to any quilted defense. Aketon was used to describe the quilted coat defense usually worn under the armor. Gambesons were usually made from expensive materials and decorated.

Though likely worn earlier, the first sufficient evidence of use of the aketon comes in the second half of the 12th century. The 13th century aketon, as worn

independently by foot soldiers, was knee-length and quilted vertically. The bottom edges were straight or dagged. The sleeves were either tightly fitting and long to the wrists, occasionally with quilted mufflers, or loose and ending just above the elbow. Like the lower edge, the sleeve edges were straight or dagged. It is likely that the long-sleeved version was the very similar to the aketon worn under the armor of those that had it (Blair 1959: 32 – 34).

The first instance of a rigid body defense during the middle ages is the curie or cuirass. It was made of leather, likely cuir-bouilli, and emerged during the third quarter of the 12th century. It is likely that it was made of two pieces, one for the front and one for the back, strapped over the shoulders and around the sides like the later cuirass of metal that would follow in the centuries to come. It was worn under the surcoat and over the hauberk (Blair 1959: 38).

13th century

The first sure evidence of large plate defense comes from Guillaume le Breton's description of a duel between Richard Count of Poitou and William de Barres. Each was described as wearing a plate of worked iron underneath the hauberk and aketon. Le Breton died in 1225 C.E., indicating a maximum date for this early use of the plate chest defense (Blair 1959: 36, 37). The lack of further accounts of plate use at this early date suggests that it was rare.

The true and constant development of plate defenses begins near 1250 C.E, as can be seen by the development of poleyns and couters. Blair suggests that the development of plate body armor was contemporary with the development of plate limb defense.

Evidence for this is obfuscated, however, since period illustrations typically include a surcoat, which was worn over the armor.

However, it is known that this surcoat also provided bodily protection. Long, vertical rectangular plates were riveted in rows within the trunk of the surcoat. At least one illustration for the second half of the 13th century, as well as early 14th century artifacts from Italy and Scandinavia, provides examples of this defense (Blair 1959: 39).

Another form of the reinforced surcoat was evidently in use. It was like a poncho in form. The front portion held wide flaps extending from hip to armpit that were wrapped back around the body to overlap with the back portion. Rivets held oblong metal plates to the front, nearly up to the neck (Blair 1959: 39, 40). The mail coif appears to be attached to the surcoat, though it is separate from the hauberk.

14th Century

The largest change in mail defenses after 1250 is the growing infrequency of them being the sole defense. By 1330, it is rare to find illustrations of knights entirely or nearly entirely suited in mail. Still, it forms the basis of defense, and did undergo some design changes. The coif, once made in one piece with the hauberk, was separate by the second half of the 13th century. The introduction of plate gauntlets made the mufflers of the hauberks more rare, especially after 1330. A hauberk sans mufflers had tight wrist-length sleeves or, especially after 1325, wide sleeves extending to the mid-forearm (Blair 1959: 46, 47). During the early 14th century, a standing collar of thick mail becomes part of the hauberk, and later becomes a separate piece called a pizaine or standard. The 1320s brought a shorter hauberk called a haubergeon (Blair 1959: 47). Both the

hauberk and haubergeon were used throughout the 14th century and 15th century, though by the second quarter of the 15th century it became more rare for an entire hauberk or haubergeon to be worn under the plate armor. Instead, mail skirts, collars and gussets – fillers for joints, in this case attached by points to the garment under the armor (the aketon) – were used for shoring up the defense provided by plate (Blair 1959: 73).

The most popular body defense throughout the 14th century is now known as a coat-of-plates, wherein metal plates line a short cloth or leather coat. In on design, vertical lames line the mid-abdomen and the waist at the sides. Horizontal lames line the stomach area. From the 1290s the coat-of-plates became more prominent; by the 1320s it was nearly in universal use. It was normally worn under the surcoat and over the hauberk (Blair 1959: 40). By the mid 14th century, the lower abdominal portion of some of the coat-of-plates was constructed of horizontal metal hoops rather than vertical plates (Blair 1959:56).

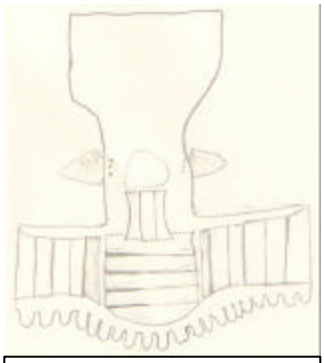

Figure 3: Inside view of a coat-of-plates

Other forms of the coat-of-plates were in use, in which the front and back defenses were separate, but joined over the shoulders. They were then laced up the sides. Some came connected at one side or one side and one shoulder, leaving the rest to be laced, strapped, and buckled. Vertical metal plates are along both portions, even extending slightly into the sides. Some had small plates over the shoulders. In some forms the armholes are bordered by scales (Blair 1959: 56).

Brigandine armor developed in the latter half of the 1300s in Italy and was still generally used throughout Europe two and a half centuries later. Brigandine is a coat-of-

plates design in which the lames, which are small, are made to work over one another, providing great flexibility (Blair 1959: 59).

By the 1340s rudimentary breastplates were beginning to develop, though they were still part of the physical coat-of-plates. Until the 1360s these rounded, globular breastplates extended only as far as the diaphragm. Below this, horizontal hoops were still in use. The bottom edge gradually extends to the waist, relegating the metal hoops, still riveted to a garment, into a protective skirt known as a fauld. The rounded breastplate remained in use well into the 1400s. However, by the 1370s a less rounded form gained popularity. This new form had a clear medial ridge centered vertically on the chest (Blair 1959: 57, 58).

The first sign of a breastplate independent of the coat-of-plates occurs in the second quarter of the 14th century in the inventory of King Edward III. The first clear illustration (~1370's) is one of a flat reinforcing breastplate with rounded edges extending from neck to waist worn over a coat-of-plates (Blair 1959: 60). Within a few years, another illustration bears an independent and fully developed breastplate that extends from neck to waist and around the sides. It is shaped to the armpits. It was worn over a simple (i.e. non-reinforced) jupon. By the 1380s the breastplate was generally worn without the coat-of-plates. It was by this point generally rounded and occasionally bore a medial ridge, which was favored into the 15th century (Blair 1959: 60).

In Germany a different style was favored between 1380 and 1420. This breastplate was short and globular; occasionally it was fluted vertically. Sometimes this was attached to a laminar or scaled fauld.

An early white breastplate (white armor is the term used for metal not attached to a fabric cover) dates from 1380 – 1390. Before this, armor was nearly always covered with a fabric lining, even when not necessary as it was in a coat-of-plates design. This early breastplate is made of nine plates – one large, central, globular plate and four plates of decreasing size on either side. The smaller plates wrap around the sides towards, but not around, the back. The lower edge of this arrangement extends to the waist. Straps secured the piece over the shoulders and around the back. Two features of latter breastplates are first found on this artifact. The first is a stop-rib, a V-shaped bar just below the neck that prevents a weapon sliding up the body and into the neck. The second feature is a lance-rest, which becomes common only after 1420 (Blair 1959:61).

By the later half of the 14th century, the surcoat had, in many places in Europe, become shorter. The jupon, also called coat-armor, seems to be a cross between the surcoat and the gambeson, and emerged from the short surcoats of 14th century England. The jupon was generally a short, tight, and probably quilted or padded garment that usually had no sleeves. However, Exceptions exist to many of these descriptors. There are surviving examples of jupons that extend down to the knees or have long sleeves. The jupon was usually decorated, and remained so until it fell out of fashion by the third quarter of the 15th century (Blair 1959: 74, 75, 78).

15th Century

Another early white breastplate dates from 1400. It is made from one globular piece that extends from neck to waist. It presents a stop-rib as well. The edges of the piece are turned over, rolled slightly to strengthen them (Blair 1959: 61).

It is more difficult to gauge the development of the backplate. Blair suggests that backplate development is similar to the evolution of the breastplate from the coat-of-plates. It is likely that solid backplates were in use by the first decade of the 15th century. After 1420, the most common form of body protection was a one-piece backplate strapped to a breastplate at the sides and shoulders, joined by a laminated skirt (Blair 1959: 61).

As white armor grew into general use, Germany and Northern Italy, already prominent producers of armor by the end of the 1200s, grew as the dominant centers of armor design and production for much of Europe. Though local variations exist, the fundamental styles of armor were those created in Germany and Italy.

Figure 4: An Italian plackart and fauld – last quarter of the 15th Century. HAM # 3127.9

By the 1410s, Italian body armor finished its evolution of style with the creation of homogeneous sets of armor. The earliest homogenous set of armor, Italian or otherwise, consists of a breastplate extending to a straight edge at the waist. A shallow plackart (lower breastplate) overlaps this, extending into a point towards the center of the chest. A fauld of 3 horizontal, vertically overlapping lames hangs from the plackart. The backplate, similarly, held an overlapping lower-backplate which held a culet (skirt on the back) of one to three lames. The fore and back defenses were strapped together at the shoulders and waist (Blair 1959: 80). This armor also consists of late 14th century style vambraces, hour-glass gauntlets with some variation, and late 14th century style cuisses and greaves (Blair 1959: 80, 81).

During the 1420s German body armor developed into the Kastenbrust design, in which the upper portion of the breastplate was sloped outwards from the body. The lower third or so sloped back in to meet at the waist. Vertical or radial fluting can often be found on this sort of armor until 1450. A stop-rib typically accentuated the neck, and a hinged lance-rest could be found on the side.

By the 1430s this German breastplate was joined by a one-piece backplate, a hooped fauld, and a hooped culet. The lowest lame of the fauld was arched upwards or, sometimes, replaced by a pair of tassets (Blair 1959: 93).

A probable midpoint between the previous body defense and the type that would be popular in Germany after 1450 originates in 1438. This Kastenbrust carried several narrow, articulated lames near the diaphragm (Blair 1959: 92).

Gradually throughout the 15th century, the Italian cuirass emerged from the tendency of the breast- and backplate to be worn with a forked fauld. The central points of the fauld lames gradually rise higher through the development. By the 1430s, the bottom lame of the fauld was replaced by two lames called tassets, one over either thigh. Accompanying these was a single long lame added to the culet, called the rump-guard. Through the rest of the first half of the 15th century, the tassets grew longer and tapered, until by 1450 they were roughly triangular. Smaller tassets were also used post-1440 at the sides, in addition to the main tassets. Occasionally, these smaller tassets were used instead of the rump-guard (Blair 1959: 81).

By 1425, front and back pairs – backplate and breastplate, fauld and culet, plackart and lower-backplate – were hinged upon the left side and buckled down the right

side. The central points of the plackart and lower-backplate became higher by this point, and are now held to the main plates by a single strap and buckle each (Blair 1959: 82).

After 1440, the lower portion of the upper-backplate was constructed by three pieces, each of which curved upward into a point up towards the neck in the middle. These points lengthened until fifteen years later the point of the topmost lame reached the neck. The plackart developed in the same way over the same period. When the point of the topmost lame in the plackart reached the neck, also around 1455, the stop-rib at the neck was removed. After this, the plackart gradually widened, covering more of the breastplate until, around 1490, it nearly completely overlapped it. Afterwards, perhaps disapproving redundancy, armorers returned to the rounded breastplate sans plackart, with the fauld attached directly to the bottom of the breastplate. However, sometimes additional plackarts or reinforcing breastplates were separately added to the ensemble (Blair 1959: 82).

After the 1440s, the pronounced boxing of the Kastenbrust breastplate decreases, and the breastplate becomes flatter, though still with a medial ridge. The post-1450 body defense ends in both the backplate and breastplate above the waist. One broad lame in front and one broad lame in back, articulated to the upper body defenses on sliding rivets, were riveted to the fauld and culet, respectively (Blair 1959:92).

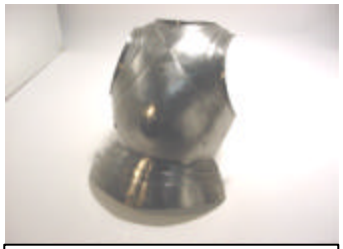

Figure 5: Italian Made Infantry Breastplate in the German Style. Circa 1480. HAM # 2001.02

During the 1450s a new type of breastplate, much like a cuirass, emerges and gradually replaces the Kastenbrust in Germany. It was similar to the Italian form, with a plackart

protecting the lower abdomen. This plackart was articulated to the breastplate on a sliding rivet (Blair 1959: 93).

The Gothic armor style emerged in the 1460s in Germany and would remain in fashion until the end of the century. The Gothic form was slimmer and more elongated than the preceding forms. Rippled fluting is a characteristic of the Gothic-style armor. The cuirass becomes slimmer at the waist. The fauld and culet both shrink to just below the hips and become more pointed and angular. The fauld often carried tassets similar to the Italian manner. A plackart, sometimes of two overlapping lames, was often worn. This plackart carried the fauld. A lame on the back of the waist served as a lower backplate and onto this was attached to the culet (Blair 1959 94, 95).

One-piece breastplates and backplates were under construction in southern Germany by 1490. These were flanged at the lower edges for the attachment of the fauld and culet. Soon movable armhole gussets – small, articulated lames filling the gaps in the joints - and tassets formed of several overlapping lames joined this style, which was generally used "almost as long as armour was worn" (Blair 1959: 95).

A backplate of three plates was used between 1490 and 1510. The main plate, covering the back from neck to waist, was approximately pentagonal in shape. To either side a plate was attached and hinged to protect the sides (Blair 1959: 96).

In the 1430s the gorget appears to have emerged in German armor design. This neck guard consists of two plates, front and back, which cup the lower neck and upper shoulders. Upon this a few lames are riveted to front and back to build up protection along the neck. At the end of the century, the tops of the gorget are turned to fit a hollow rim in the helmet, allowing turning motion of the head. It was customary for the gorget

to help support the armor. It was often worn under the cuirass to distribute its weight, and during the 16th century support the pauldrons (see below) by straps. The gorget does not seem to have caught on in Italy until the 16th century (Blair 1959: 96).

Armor for the Head

Pre-13th Century

The favored armored headwear of the early middle ages descended directly from the Roman Empire. These rounded or conical helmets were constructed after a fashion now called Spangenhelm, assembled from multiple pieces. Initially, the helmets were made in three pieces: two halves and a central arched comb. Later, a circular band around the brow and a crosswork of arching ribs supported plates in the interior. They sometimes sported features common in Roman helmets, such as hinged plates that covered the cheeks and nasals, bars that hung from the brow to protect the nose (Edge 1988: 8). The framework and fillings were sometimes of different materials; e.g. one might have a bronze framework with iron sheets.

During the time of the Norman Invasion, as depicted in the Bayeux Tapestry (late 11th century), it was customary for soldiers to wear conical helmets on top of the mail coif, a hood made of interconnected rings that was often, at this point, a part of the hauberk, as it would generally be until the latter half of the 1200s. These helmets have a nasal and were mostly constructed in the Spangenhelm fashion. Some few of the helmets of this time, however, were made of single sheets of metal, often with the nasal later attached (Blair 1959: 25). The conical helmets, along

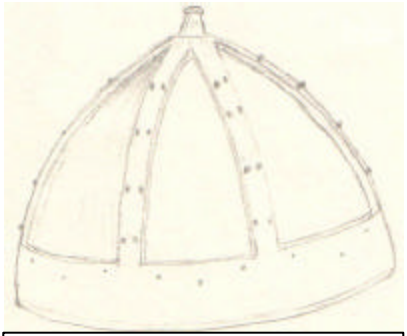

Figure 6:Conical helmet made in Spangenhelm fashion.

with the other armor depicted in the Tapestry, was used throughout Europe through the second half of the 12th century (Blair 1959: 29).

The coif of this period was worn with a band around the head above the brow to keep it in place. By the late 11th century, the coif was fitted with a ventail – a flap of mail that could be drawn across the mouth and laced on the side of the head. This provided some protection to the lower face (Blair 1959: 27).

After 1150 C.E., a slightly different helmet gained popularity. It was similar to the conical helmet, except that the head was rounded. This helmet also carried a nasal (Blair 1959: 29). Another variation, in use after 1180, was cylindrical, with a flat top. Both were used until 1250.

Figure 7: A kettle-hat

The kettle-hat, a broad-brimmed metal hat for head defense, seems to have not been in use before the end of the 12th century, despite the fact that a very similar Romanesque head defense continued to appear in medieval artwork as late as the second half of the 11th century. The hat was constructed after the fashion of the Spangenhelm. A framework for the skull was created from a cross-shaped piece bent over the round of the head. Between each arm a rounded plate was riveted. The broad brim was then riveted to the bottom edges. A lining was stitched inside and a chinstrap was attached to hooks on the brim. Generally, the kettle-hat was a defense for the common soldier. However, it was in use amongst the knightly classes (Blair 1959: 32).

13th Century

By 1220, the cervellière (also called a bascinet, a term I will save for a different device) became the most popular choice for head protection. The cervellière was a deeply rounded skullcap, often worn under the coif, especially after 1250 (Blair 1959: 30). It remained in use into the early 15th century, though the bascinet began to replace it after 1300.

The helm, a cylindrical headpiece completely covering the neck and face as well as the head, was in use by 1220. It evolved from the practice of adding full face guards, complete with ventilation holes, as well as short neck guards to the conical, cylindrical, and rounded helmets described above. With time the face guard and neck guard had met, creating a cylindrical protection completely around the head. By the beginning of the 14th century, the flat-topped cylinder was by far the most prominent helm form. A long eye slit allowed for vision (Blair 1959: 30). The helm was worn over the coif. In addition to its own lining, an arming cap – quilted fabric over the head and ears with laces that tied under the chin – helped prevent irritation from the coif and helm. The helm was secured with laces under the chin. After 1250, the upper portion of the helm inclined inwards (Blair 1959: 47). It become shaped much like a truncated cone by the last quarter of the 13th century, though sometimes the apex was rounded rather than flat. The bottom of the helm deepened to touch the shoulders at the sides and come over the very top of the chest at the front. By the turn of the 14th century, a movable visor guarded the upper face. It could be lifted when not in use. Concurrently, a pivoted reinforcing-bevor overlapped the face-guard below the visor (Blair 1959: 48). However, despite the developments, the helm was used sparingly on the battlefield through the 14th century. It was more often used in tourney than war at this date.

By the mid 13th century, an arming cap was worn with the coif (often over, but sometimes underneath), probably to support the weight of the helm. The arming cap was a quilted fabric skullcap with flaps that covered the ears and cheeks and tied beneath the chin. Around the brow the skullcap was quite thick, perhaps to distribute the weight of the head protection under which it was worn (Blair 1959: 34)

14th Century

After 1320 the skull of the kettle-hat is long and pointed, not dissimilar to the bascinet below. At about this time the kettle-hat is more commonly constructed from one or a few larger metal plates; the Spangenhelm construction is discarded.

By 1300 the helmet was being increasingly worn on top of the coif, though the cervellière and low bascinet (see below) were still worn underneath occasionally; the former until the 1330s. By 1260 the coif was occasionally supplanted by an aventail (tippet). The aventail was much like a coif separate from the hauberk,

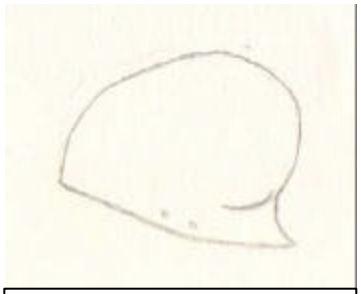

Figure 8: A short bascinet

but with the top removed. Instead of a mail top, the aventail was attached to the inside of the helmet. Thus it was much like a mail curtain for face, neck, and upper-shoulder protection. The aventail, of course, became more popular as it became customary to wear the helmet above the mail.

The bascinet appears to have been in general use since 1300 or so. There are three varieties. The first, the shortest form, is small and globular. The sides are deep enough to cover the ears, though by 1325 the sides extend yet further down the face to the base of the neck. Occasionally it was worn with a movable visor, either of the full-face

variety extending even over the chin, or of a smaller variety that covers the center of the face that would be unprotected by a coif (Blair 1959: 51). It was sometimes worn under the coif.

A second form is deep and conical. The sides and back extend to the shoulders. Usually, a nasal or a moveable visor protects the face. With a visor down, this form of the bascinet is very familiar if not nearly indistinguishable from the visored helm (Blair 1959: 51). By 1330, the sides begin to draw inwards to partially cover the cheeks.

The final form is similar to the conical helmet described above. The rim comes only to the tops of the ears (Blair 1959: 51). This was also occasionally worn under the coif, but more rarely than the short bascinet. After 1330, the sides extended over the ears and the back reached to the neck.

During the last quarter of the 1300s the apex of the bascinet gradually moved backwards in the skull, until the back edge was barely tapered by the early 1400s. By the 1330s almost all bascinets were built with aventails; the aventails were attached to leather linings that were in turn laced to staples on the edges of the bascinet. The aventail covered most of the face, leaving only the nose, mouth, and eyes bare. The lower edges of the aventail hung in a small capelet nearly to the shoulders (Blair 1959: 68). Some bascinets supplemented the aventail with reinforcing plate bevors to protect the lower face, chin, and neck. Through much of the 14th century in much of Europe, the bascinet had a visor for face protection, as well. Generally this was the case unless a helm was worn over the bascinet. However, in Germany and Italy between 1340 and 1370, a padded metal nasal attached to the aventail and hooked to the brow of the bascinet served (perhaps barely) as protection for the face. The plate bevor gradually expanded and

replaced the aventail. By 1400 the bevor began to be riveted permanently to the bascinet, creating a form called the great bascinet (Blair 1959: 70).

Figure 9: Bascinet with klappvisier and aventail. 14th century style. HAM #938.a

Germany, during the 1360s, developed a novel visor now known as a Klappvisier. This visor was attached by hinges at the center of its upper edge to a bar studded to the head of the bascinet. By 1380, both the Klappvisier and the form of visor rotating from each side of the head filled the open area of the bascinet at the face, while at the same time each began to protrude in the center forming a snout-like appearance, causing bascinets equipped with them to be called "pig-faced bascinets" (though the protrusions are generally pointed rather than flat). The visors sported eye slits and ventilation holes (Blair 1959: 68, 69).

The common use of visors coincides with the popular use of crests on top of the helmet, probably to make the wearer distinctive and more readily identifiable. Crests are first reintroduced in the 12th century, but seldom appear in contemporary illustrations until the 13th century. Thereafter, it is only in the 14th century that they see common application. Crests employed a number of devices including fan shaped plumes, pennons, and figures of animals. It was also common for knights to wear gold or silver crowns called circles to indicate their rank (Blair 1959: 31).

15th Century

The German great bascinet, in use by 1420 and common by 1430, was somewhat smaller and fit more closely to the head and neck than the form popular to the rest of

Europe during the same time. The back of the skull extends into a gorget plate, either in one piece or in two pieces riveted together. On the front, another gorget plate is hinged for ease in putting on the bascinet. A bevor, sometimes attached to the front gorget, covers the face to the nose. A pivot visor protected the upper face (Blair 1959: 102).

Between 1380 and 1420, the tall bascinet with visor was the superlatively popular head defense through most of Europe. After 1420, the great bascinet reigned most popular until it became more for tournament use past 1450.

The sallet (celata) was one of the three most common forms of head protection during 15th century Italy. A first sign of the celata comes in 1407, but it is obscure and difficult to trace. Things become easier by the 1430s, but both celata and barbuta (barbut in England) are terms both used to describe two similar helmets. Both have long sides and back, which reach to the shoulders. The back curves to the nape of the neck and has a tail at the back formed from an extension of keel-shaped comb from the top. Both also have a rounded head. The difference is in the face opening. In one there is an open arch, though it sometimes narrows at the bottom under the chin. The other has a T shaped opening, with the upper arms extending to the eyes and the stem opening for the mouth and nose. Later, the upper arms of the T are formed by upward-angled ovals rather than perpendicular bars. In both cases, the T is bordered by metal additions much like stop-ribs. The T faced sallet seems to disappear by 1470, whereas the open sallet remains in use until the end of the century (Blair 1959: 85).

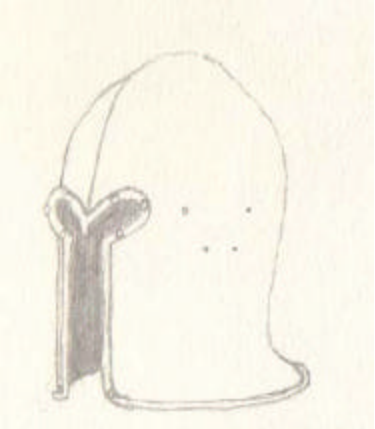

Figure 10: A barbut

Two more versions of the sallet emerge in Italy by the end of the century. By 1480, a form emerges with a shallower skull and longer tail, now made of several riveted plates. A reinforcing plate strengthens the brow. This form was used into the 16th century. The second form comes in the 1490s. A pivoted visor, deep enough to cover the chin, is added. Horizontal fluting provided decoration. In this form, the sight is formed by a slit between the visor and the face opening of the helmet. This form was used into the 16th century as well (Blair 1959: 86).

Figure 11: Sallet Helmet. Southern Germany 1480s. HAM # 2608.a

During the first half of the 15th century, the Germans were primarily using two head defenses: an open (though sometimes visored) French sallet with a medium tail with a bevor, and a German kettle-hat with low brim that had slits for vision. This latter also was accompanied with a bevor. After the 1450s, this kettle-hat evolved a short sallet-like tail and by 1470 combined with the western European kettle-hat into the "sou'wester" style of German sallet. It had a downward sloping tail and was rather larger than the western European kettle-hat. There were two prominent forms: one with a upper-face visor with the eye slit formed between the visor and the brow, and a one-piece head defense comprising both face and head protection. Some had full visors, covering the whole of the face. After 1480, the tail became sometimes laminated (Blair 1959: 106).

The kettle-hat maintained its popularity through Germany and most of Europe during the 15th century, but it was not as popular in Italy. The German kettle hat of the

15th century was formed of one piece. The crown was cylindrical with a flat or bell shaped top. The brim was turned downward all along the edge.

One distinctive form of the kettle hat that emerged in the 15th century is known as the cabacete in Spain, where it was popular. The head was almond shaped, with a fin along the top. The brim sloped downwards with a slight outward curve. A deep bevor covered much of the face, and extended down in a gorget plate that pointed into a V shape to the center of the chest (Blair 1959: 110).

In the 1490s, Germany saw the emergence of two new sallet forms. The first was a cheap and rough form used by the sub-knightly soldiers. The skull is flatter than the common sallet, and the tail extension is straighter, conforming less to the head. The surface is usually unfinished (giving this sallet the name "black sallet"), or painted or covered. It was apparently not polished (Blair 1959: 106, 107).

The second form appears very similar to the Italian from of the visored sallet, and is probably related. A short laminated tail protrudes from a skull shaped to the head. The visor is full, covering below the chin, and is worn without a bevor (Blair 1959: 107).

The armet, as the term applies now, is a headpiece closed by hinged pieces that extend over the cheeks and under the chin. It was probably evolved from the bascinet, and was developed by the 1410s. Typically, in the Italian form, the skull has its lower edge on the sides leveled just above the ears. The back extends to the nape, all the while keeping in contour with the head. The cheekpieces are hinged to the lower edge of the skull. They overlap the back extension of the headpiece and lock together under the chin. The remaining opening in the face exposes the eyes, nose, and part of the cheeks. This

can be closed by a bluntly pointed visor (Blair 1959: 86). Later, by 1440, a roundel (a circular plate concentric upon a short extension) appears at the back. The purpose of this roundel is likely to protect the strap and buckle of a wrapper – a reinforcing bevor of two parts that protects the face below the visor and extends in a point on the upper chest. After 1450 the face was gradually opened by shortening the top of the cheekpiece extensions. During the rest of the 1400s, the cheekpieces became more shaped to the cheeks and chin (Blair 1959: 88).

Armor for the Legs

Pre 13th Century

In the early middle ages, when the legs were given particular protection at all, they were garbed in mail leggings know as chausses. These were made in two fashions serving the same protective purpose: either one long flap of mail was hung in front of each leg, then wrapped around and strapped behind the leg, or closely fitting tubular mail hose with a garter under the knee for support. In the Bayeux Tapestry, only the leading figures appear to have chausses (Blair 1959: 24).

13th Century

By the second quarter of the 13th century, an additional quilted defense was added to the chausses. These "gamboised cuisses" were padded and quilted fabric leggings that extended to just below the knee. They themselves were not for protection against the chafing of the mail, as evident by the fact that they were often worn over the chausses. Instead, they provided padding against the blunt impact of a blow that the mail could not protect against (Blair 1959 34).

Plate was first used (besides helmets) in the construction of leg defenses, a sensible development considering the vulnerability of a mounted warrior's legs to a man on foot. The first plate leg defense was likely the poleyn, a knee defense that was in use by 1250. Initially poleyns were small, but by 1270 they had become hemispherical and large enough to protect the front and sides of the knees (Blair 1959: 39, 42). They were attached to the knees of the chausses or gamboised cuisses. After 1340, the poleyn is small again, using a circular or fan-shaped side wing to protect the sides of the knee, most especially the outside (Blair 1959: 63). By the late 14th century, the poleyn is formed of three lames: the top lame protects the patella; the central lame articulates the top plate to the lowest lame, which extends down to overlap the greave with which it was worn. The poleyn at this stage was articulated to the plate cuisse above it (Blair 1959: 63).

Schynbalds, plate shin defenses, emerge nearly concurrently with the poleyn. They were at this stage gutter-shaped and likely worn under the chausses before 1300. After this, they were worn over the chausses and used through the 14th century and, though less frequently, in the 15th century.

14th Century

Greaves, however, were already emerging by the early 14th century. These lower leg defenses were constructed of two gutter shaped plates that enclosed the lower leg in a roughly tubular shape. They were hinged together, usually on the outside, and buckled and strapped closed on the inner side (Blair 1959: 43). By the late 14th century, the lower edge of the greaves (now more prominent than schynbalds) extends down to the instep and is embossed to the shape of the ankle. The lower edge overlaps the sabaton with which it was worn.

Figure 12: Italian Cuisse with Poleyn, 1450 -1490. HAM # 938.o

Cuisses made of plate emerged by 1320, though they were rare before 1350 (Blair 1959: 43). They came into common use after 1370, at which point they were made of one wide plate over the thigh extending to the top of the knee and extending laterally and boxed on the outside of the thigh. A sharp outward turn at the top serves as a stop-rib to prevent the armor from guiding a weapon into a vulnerable target. The lower edge is embossed to the shape of the top of the knee. It is articulated to the poleyn by a narrow lame. It was secured to the leg by laces behind the thigh and knee (Blair 1959: 63). During the last quarter of the 14th century a hinged plate was added to the outside edge to protect the side of the leg (Blair 1959: 64).

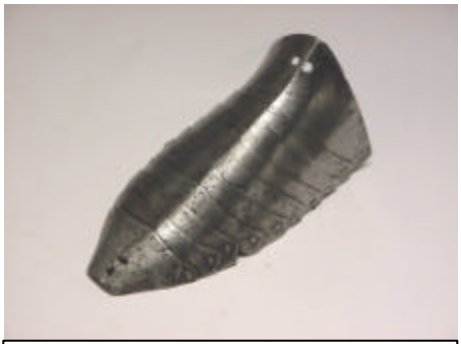

Figure 13: Late 15th Century German Plate Sabaton. HAM # 2686.s

Sabatons, plate foot defenses, come into use by the 1310s, but are rare before 1320. These were made of lamellar plates, overlapping and shaped to the top of the shoe, including the pointed toe. They were probably riveted to a leather lining that was laced to the shoe worn underneath (Blair 1959: 43, 44). They retained this form past the period of interest.

After 1340 the gamboised cuisses are often shown in illustrations with rivets, suggesting that they were being constructed in a style similar to brigandine.

15th Century

Leg defenses changed only a little during the 15th century, and these changes followed regional tastes. After 1460, the German cuisse lengthened towards the hip (left unprotected by German disfavor of the tassets) by the addition of horizontal lames. By the end of the 15th century the German cuisse returned to its normal length, but retained a couple of lames at the upper edge. The Italian cuisse, however, began to extend upwards on the front top of the main plate with a rounded extension. The Italians in the 15th century generally forwent plate sabatons in favor of mail defenses that covered the top of the foot. The Germans preferred a plate sabaton, very pointed at the toe until the very end of the century, when the toe region was broadened greatly. The poleyn was similar in both regions, only in Italy a large side-wing "puckered" to bend in behind the knee was preferred to the fan shaped side-wing common in Germany. Also, the bottommost lame on the Italian poleyn was sharply pointed downwards, though it was often replaced with a mail fringe instead (Blair 1959: 84, 85, 100, 101).

Figure 14: Late 15th Century Italian-Style Left Cuisse and Poleyn. HAM # 2886.1.a

Armor for the Arms

13th Century

Before the second half of the 13th century, the mail sleeves of the hauberk, which extended to the wrists, were the chief protection for the arms. By the last quarter of the 12th century the sleeves had extended into mufflers, mail mittens with one bag-like section to cover the fingers and a separate thumb section. The palm area was not mail, but fabric or leather. Mufflers were slitted near the wrists so they could be easily

removed from the hands when not needed. Often, a lace at the wrist allowed tightening to keep a good fit to the muffler (Blair 1959: 29). The muffler was displaced by the gauntlet during the end of the 13th century, though it did continue in general use into the 1330s, and then in rare use until the third quarter of the 14th century (Blair 1959: 46, 74).

As early as 1260, couters – disc-shaped metal plates to protect the elbows – make their appearance. They are uncommon before 1300, however, and by this date small plate discs were also found attached to the shoulders of the hauberk as well. The mail sleeves of the hauberk still provide the bulk of the protection of the arm. Plate metal gauntlets formed in the coat-of-plates technique emerge just at the end of the 13th century. The plates are tinned or coppered in order to prevent rusting. By 1320 the back of the wrist cuff is protected by a gutter-shaped plate, or several gutter-shaped lames (Blair 1959: 42).

14th Century

The first full vambraces emerge during the 1310s. Each is formed by a gutter shaped upper cannon covering the outer arm, a cup-like couter, and a gutter shaped lower cannon, again on the outer arm, all strapped outside the hauberk sleeves. Often, two besagews – disc-shaped plates – are laced to the front of the shoulder about the armpit and to the upper bend in the elbow. This is common until 1335 and extant as late as 1347 (Blair 1959: 45). As early as 1325, the lower cannon begins to be made of two gutter-shaped pieces hinged on the outside that enclose the lower arm and lace on the inner side.

By 1335, in England, a full vambrace emerges with upper and lower cannon joined by a laminated couter. The lower cannon is apparently completely tubular, with no clear joins or hinges. The upper cannon is nearly tubular, with a narrow opening on the inner portion where laces secure the vambrace to the arm. The couter had developed a circular side-wing for the protection formerly provided by the besagew at the upper bend of the elbow mentioned above. Some are joined by laminated spaudlers that just cover the shoulders and shoulder besagews that cover the front of the armpit region. By 1340, both the upper and lower cannons are formed by hinged gutter-shaped plates that close to cover the whole circumference of the upper and lower arm, respectively. The cannons are joined together by a laminated couter with a circular sidewing. The upper cannon is laminated to a spaudler that covers the shoulder and the extreme upper arm. Until 1360 a circular besagew protects the front of the armpit. After this date, the English discard it until the 1420s (Blair 1959: 64, 65). In addition, English armorers after 1360 decrease the number of plates in the couter until at last the couter is one plate with a heart-shaped side wing. The couter is articulated to the upper and lower cannons by one or two narrow lames (Blair 1959: 65).

Figure 15: A hinged vambrace lower cannon. HAM # 3084.18

At the very end of the 1300s, a developed spaudler, more properly called a pauldron now, emerged. This pauldron extended past the shoulders onto the chest and back. After 1410 the pauldron would grow to become the most popular form of shoulder defense outside of Germany (Blair 1959: 66).

The German preference for arm protection varied greatly during the 14th century. Generally, the arm defense consisted of a separate upper and lower cannon, either gutter-shaped or tubular, and sometimes a separate couter. All were secured to the outer garment, either the hauberk or aketon. Sometimes, the lower cannon held an extension to cover the outside of the elbow. In fourteenth-century Germany, the coat-of-plates provided shoulder defense (Blair 1959: 64).

15th Century

Late 14th and early 15th century Italian arm defenses were provided with a gutter-shaped upper cannon, joined to the lower cannon by an articulated couter. The tubular lower cannon constricted at the wrist and flared out again; this is known as the tulip form. The upper portion of the lower cannon had horizontal slots for the rivets of the couter, which allowed for lateral motion of the arm (Blair 1959: 65). It was customary for the arm defense to be worn without couters, though by 1410 pauldrons became popular even in Italy. When spaudlers were worn, they were separate from the upper cannon. By 1430, the upper cannons of the vambrace were longer and extensive around the sides, such that by this date the upper cannon began to nearly enclose the upper half of the upper arm. The side-wing of the right couter extended to cover the tendon of the elbow, and is reinforced with a plate over its upper half. The left couter is enlarged only slightly, but is joined by a very large reinforcing plate known as the guard of the vambrace (Blair 1959: 83). Later, after 1450, the couters were made symmetrical again, and were each joined by large shell-like extensions to cover the tendons in each elbow. Also, by this date, the lower cannons of the vambraces become less tulip-shaped.

The fifteenth-century pauldron in Italy was asymmetric: the left pauldron was large and square-shaped, while the right pauldron was much smaller, though still square-shaped. Each carried a stop-rib on the upper edge. By 1420, a circular reinforcing plate overlaps much of the left pauldron. After 1425, a device known as a haute-piece was added to the upper edges of both pauldrons, with the left pauldron carrying a larger haute-piece. The haute-piece is made by an upward turn at the inner end of the pauldrons. It was designed to protect the neck. By 1435 a reinforcing plate, shaped to the left pauldron and covering the lower three quarters of it, is generally used. This latter form is known as a gardbrace. The right pauldron also carried a gardbrace, albeit a smaller one. Both were held to their respective pauldrons with pin and staple. With the development of the gardbrace, the haute-pieces were now extensions of the reinforcing plates rather than the pauldrons themselves. 1440, and there afterwards, brought more rounded and larger pauldrons until they finally overlapped at the back. After 1490 the pauldrons were cut off vertically to prevent overlapping without a decrease in size (Blair 1959: 82, 83).

Figure 16: Mitten Gauntlet. German or Austrian. Circa 1440-1460. HAM # 2440.1

The gauntlets made after the coat-of-plates fashion were used until the third quarter of the 14th century, but after 1340 the lames in the gauntlets began merging into one another. The effect was the construction of the gauntlet by fewer, but larger, lames. By this date some gauntlets already had one plate covering the back of the hand from wrist to the ends of the metacarpals, bordered by the thumb joint and embossed around the finger joints and the base of the thumb. Overlapping plates over the fingers and thumb and a cuff of longitudinal lames completes this artifact. By 1350 the cuff and metacarpal lames became one plate, creating the hourglass form of

gauntlet. The overlapping plates were riveted to leather strips that were riveted to the metacarpal plate. All of this was riveted to a leather glove for wearing. Sometimes, the whole was lined in fabric as well (Blair 1959: 66). By 1370 the hourglass form was the dominant hand-defense in use. Also by this date, gadlings – shallow spikes over the finger joints – have grown into general use. After 1430, the gauntlet changed form. Laminated plates protected the fingers. Two lames, articulated to one another and to the metacarpal plate, covered the right hand, while only one covered the left, which did not need as much range to move as did the right. The cuffs gradually lengthened during this time, at first rounded and then pointed after 1440. By 1450 they had become pointed and reached nearly to the couter. This fashion remained in Italy through the rest of the 1400s (Blair 1959: 84).

Figure 17: 15th Century Southern German Gauntlet. HAM # 2528.h

By 1420, German armor fashion incorporated spaudlers. These were small, round, and laminated, fitting on the sleeves of the haubergeon or coat-armor. Lames of gradually decreasing size extended from the spaudlers halfway down the upper arm. With a besagew for the armpit (occasionally a part of the main spaudler plate, but generally hung separately), this defense, along with the three-separate-piece vambrace or the Italian form of vambrace, sufficed for the German tastes until 1450. Around this time, the upper cannon of the vambrace became a lamellar construction, and the spaudlers became a lamination to the upper cannon (Blair 1959: 97).

The German pauldron also emerged during the 1450s. Similar to the Italian pauldron evolution, the spaudlers gradually extended onto the chest and, primarily, the

Figure 18: Right pauldron. Perhaps Austrian, Circa 1490. HAM # 2608.d

back. These were worn separate from or, occasionally, laminated to the upper cannon. A besagew protected the armpit. After 1470, the extension over the armpit was cut to fit the arch of the armpit while the back extended further. With the High Gothic style in development, the back extension was rounded at the edge, with a fluted surface and scalloped edge. German pauldrons gradually became more like the Italian style. Gardbraces began to reinforce the pauldrons. Haute-pieces grew from the gardbraces, or, sometimes, were formed separately and riveted to the pauldron. During the last decade and a half of the 15th century, the German-made pauldrons followed the Italian style (Blair 1959: 98)

During this last decade and a half, the inner portion of the elbow was filled with small, articulated lames. This style lasted 40 years, and made a comeback in the 17th century. During the last decade, the side-wing of the vambrace – previously fan or heart-shaped – became plainer and more ovular. The side-wing is depressed towards the inner portion of the bend in the elbow to slightly fit to it. Also, during this last decade, the upper cannon of the vambrace is formed in two pieces, the upper of which is flanged and the lower edge so that the lower portion can rotate in a groove, allowing more rotational motion of the arm (Blair 1959: 98, 99).

Shields

Shields were worn by warriors of all types for defense of the body and, often, the legs and head. The use of shields was not limited to defense, however. The shield could

be used to push back or even strike and opponent. This latter function was supported by the inclusion of a boss, a metal cup on the outside of some shields corresponding to the handhold on the inside.

Early shields were often of the "Viking" design, whether Vikings were the ones wielding them or not. These shields were round, nearly circular, with a diameter short of 3 feet. They were made of thin wooded boards laid with alternating grain. A layer of leather covered the wood, and a circular boss and handle fit in the center. A metal rim may have been placed on the edge. These shields were likely between 0.6 and 1.2 inches in thickness (Edge and Paddock 1988: 23). The construction of the shield, if not its shape, remained constant through the period.

By the latter half of the 11th century, the kite shield generally replaced the rounded shield. This was shaped much like an elongated teardrop, with the point down and the rounded portion up. It extended from the shoulder to the knee and curved slightly to provide simultaneous protection to the front and the side. It was held by a long strap that hung over the right shoulder called a guige. Enarmes, smaller straps worn over the left forearm, provided additional support and control. The kite shield provided greater protection for the legs, especially for the mounted warrior (Edge and Paddock 1998: 23, 24).

The kite shield remained in use through the 12th century, though by the end it was getting smaller and the top, previously rounded, was growing flatter. This trend was to continue throughout the middle ages until the triangular heater came about

The typical 13th century shield was still roughly a kite shield, though it was growing shorter and less rounded. However, the shrinking stature of the kite shield was

slow until after 1250. At this point, improvement in head defense reduced the need for reinforcement by the shield. Further armor advancements in the leg and body armor caused the shield to shrink and become flatter, somewhat triangular. This form is known today as a heater shield due to its resemblance to a clothes iron (Edge and Paddock 1988: 61, 83). The shield remained virtually unchanged from this point on until its dismissal from knightly use by the 15th century, when armor was strong enough that a shield was more encumbering than useful (Edge and Paddock 1988: 121).

Snapshots of Armor Ensembles over Time

This section features brief descriptions of common ensembles of armor worn by warriors of the middle ages as a function of time. The reader is urged to bear in mind that these descriptions are generalized, and that in truth there was a great deal of variation in ensemble generated by local practices, local resources, personal wealth, and personal preference.

Before 1000 CE

The armament of the warrior elite before the 11th century was pretty consistent, especially after the 8th century, when more information becomes available. An elite warrior of this time was garbed in a long mail hauberk reaching nearly to the knees, but slitted in the front and back to allow the warrior to mount a horse. The sleeves were short, reaching to the elbows at their longest. A helmet, usually conical and constructed after the Spangenhelm fashion, was worn to protect the head. A nasal on the helmet protected the face. The legs were generally not protected by anything more substantial than common leggings. The arms carried no more protection than the short sleeves that covered them, though a large rounded shield was carried.

1000 CE to 1100 CE

The 11th century elite warriors were garbed in knee-length hauberks with attached mail coifs. The sleeves of the hauberk reach to mid-forearm. The helmet they wore was conical and fashioned after the Spangenhelm, with an iron or bronze framework with iron plate infills. A nasal hung from the brow of the helmet to protect the face. Only the

sleeves of the hauberk protected the arms, and the legs were usually unprotected. However, either a large rounded shield or a large kite shield served to protect the arms and legs as well as the body.

1100 CE to 1150 CE

During the first half of the 12th century, the warrior elite was garbed with a knee-length hauberk with attached coif. A conical helmet, less commonly with a nasal, defended the head. The sleeves of the hauberk reached mid-forearm. Neither legs nor arms customarily carried other defense than that provided by the hauberk. A large kite shield served to protect the arms and legs as well as the body.

1150 CE to 1200 CE

The warrior elite of the latter half of the 12th century wore knee-length hauberks with attached coifs. A helmet, now often rounded and with or without a nasal, was worn. The sleeves of the hauberk reached to the wrists, where they terminated in mufflers to defend the hands. The legs were defended with chausses, often formed with each leg constructed of a flap of mail to be drawn around the warrior's leg and laced up the back side. The aketon was often worn with the hauberk, probably under it. A surcoat was sometimes worn over the ensemble. A large kite shield served to protect the arms and legs as well as the body.

1200 CE to 1225 CE

The warrior elite of the earliest quarter of the 13th century wore a knee-length hauberk with coif and mufflers. An aketon was worn with the hauberk, and a surcoat was worn over it. Chausses protected the legs. The helmet was of either the rounded, conical, or flattened top form, generally with a face guard and often with a neck guard. A large kite shield served to protect the arms and legs as well as the body.

1225 CE to 1250 CE

The warrior elite of the second quarter of the 13th century wore a knee-length hauberk with coif and mufflers. An aketon was worn with the hauberk, and a surcoat was worn over it. Chausses protected the legs, along with gamboised cuisses. A cervellière was worn with the coif. A cylindrical helm was worn over the cervellière and coif. A slightly smaller kite shield served to protect the arms and legs as well as the body.

1250 CE to 1275 CE

The warrior elite of the third quarter of the 13th century wore a thigh-length hauberk with mufflers. An aketon was worn with the hauberk, and a surcoat was worn over it. The surcoat was sometimes reinforced with vertical lames in rows. Chausses protected the legs, along with gamboised cuisses. A small plate poleyn protected the knees. Plate schynbalds protected the shins. A cervellière was worn with the coif, or a cervellière with an attached aventail was worn. A roughly cylindrical helm with a tapered skull was worn over the cervellière, coif, and padded arming cap. A heater shield served to protect the arms and legs as well as the body.

1275 CE to 1300 CE

The warrior elite of the last quarter of the 13th century wore a thigh-length hauberk with mufflers. An aketon was worn with the hauberk, and a surcoat was worn over it. The surcoat was sometimes reinforced with vertical lames in rows. Chausses protected the legs, along with gamboised cuisses. A large, hemispherical plate poleyn protected the knees in the front and sides. Plate schynbalds protected the shins. A cervellière with attached aventail and a roughly cylindrical helm with a tapered, almost rounded, skull were worn. An arming cap helped support the weight of the helm. A heater shield served to protect the arms and legs as well as the body.

1300 CE to 1325 CE

The warrior elite of the first quarter of the 14th century wore a thigh-length hauberk with mufflers. An aketon was worn with the hauberk, and a surcoat, now called a coat-armor, was worn over it. The surcoat was sometimes reinforced with vertical lames in rows. If not, a separate coat-of-plates was often worn. Chausses protected the legs, along with gamboised cuisses. A large, hemispherical plate poleyn protected the knees in the front and sides. Plate schynbalds protected the shins. Couters and besagews were worn to protect the elbows and armpits. Vambraces made of gutter-shaped plates were laced to the upper and lower arms. A cervellière with attached aventail was worn, along with a roughly cylindrical helm with a tapered, almost rounded, skull and a visor. An arming cap helped support the weight of the helm. A heater shield served to protect the arms and legs as well as the body.

1325 CE to 1350 CE

The warrior elite of the second quarter of the 14th century wore a thigh-length hauberk. An aketon was worn with the hauberk, and a coat-armor was worn over it. The surcoat was sometimes reinforced with vertical lames in rows. If not, a separate coat-of-plates was often worn. Chausses protected the legs, along with gamboised cuisses. A large, hemispherical plate poleyn protected the knees in the front and sides. Plate greaves protected the lower leg. Sabatons of plate made worn on the feet. Couters and besagews were worn to protect the elbows and armpits. Vambraces made of gutter-shaped plates were laced to the upper and lower arms. The lower cannon of the vambrace was now hinged and tubular. A gauntlet made after the coat-of-plates fashion with many lames was worn to protect the hands instead of the muffler. A bascinet with attached aventail and a roughly cylindrical helm with a tapered skull and visor were worn. An arming cap helped support the weight of the helm. A heater shield served to protect the arms and legs as well as the body.

1350 CE to 1375 CE

The warrior elite of the third quarter of the 14th century wore a hip-length hauberk. An aketon was worn with the hauberk, and surcoat was worn over it. The surcoat was sometimes reinforced with lames. If not, a separate coat-of-plates was often worn. In either case, the upper chest lames were replaced with a single solid breastplate. Chausses protected the legs, along with cuisses made after the coat-of-plates fashion. A small, plate poleyn with a sidewing protected the knee in the front and on the outside. Plate greaves protected the lower leg. Sabatons of plate were worn on the feet.

Vambraces made of gutter-shaped plates were laced to the upper and lower arms. The lower cannon of the vambrace was now hinged and tubular. The cannons of the vambrace were attached together by a laminated couter with a sidewing. A gauntlet made after the coat-of-plates fashion with few lames was worn to protect the hands. A medium bascinet with attached aventail was worn, usually with a visor, either of the standard side-hinged form or the Klappvisier form. The bascinet extended on the back and sides to cover the nape of the neck and the cheeks. A heater shield served to protect the arms and legs as well as the body.

1375 CE to 1400 CE

The warrior elite of the fourth quarter of the 14th century wore a hip-length hauberk. An aketon was worn with the hauberk, and surcoat was worn over it. A coat-of-plates reinforced the hauberk. It consisted of a breastplate with an attached lamellar fauld. Sometimes a rounded breastplate was worn over the coat-of-plates, along with an attached fauld. Chausses protected the legs, along with cuisses constructed in the coat-of-plates fashion. Solid, one-piece plate cuisses now complemented the protection of the legs. Sabatons of plate made worn on the feet. A small, plate poleyn with a sidewing protected the knee in the front and on the outside. Plate greaves protected the lower leg. Vambraces made of gutter-shaped plates were laced to the upper and lower arms. The lower cannon of the vambrace was now hinged and tubular. The cannons of the vambrace were attached together by laminated couter with a sidewing. An hourglass gauntlet was worn to protect the hands. A medium bascinet with attached aventail was worn, with a visor or Klappvisier, often of a snouted form. The bascinet extended on the

Other types of swords were experimented with to combat this new armor. The most successful was probably the falchion. This was a single-edged sword with a shape resembling that of a modern machete. The distribution of weight far up the length of the blade gave it a great amount of shearing force. Most falchions had a regular sword hilt, but some were attached to a short wooden shaft by means of a socket (Norman & Pottinger 1979: 19).

In the 1300s the length of the sword changed dramatically. In this century, the average blade length was approximately 50 inches. To balance the extra weight of the blade, the handle was made longer (1 ½ - 2 hands in length) and the pommel was made larger and heavier (North 1989: 39). The crossguard also changed slightly, it was common for it to be turned up at the ends. Besides these newer, longer swords, the stabbing swords from the previous century continued to be used.

Dual-purpose swords were also created as a sort of sidearm. These swords were created for both cutting and stabbing, but were often not the main weapon. They were often wide and sharp near the hilt, but tapered down to a sharp point at the end of the blade. These swords were often carried in case the soldier's main weapon was broken or lost (Tarassuk & Blair 1979: 472).

These three types of swords were further developed in the 15th century. The dual-purpose cut-and-thrust sword continued to be popular, and remained virtually unchanged. The thrusting sword took on two new forms. The first was a short (approximately 28

inch), broad blade, with a hilt made for use with one hand. The second was a long (approximately 40 inch), narrow blade, which was fitted with a slightly longer hilt for occasional use with two hands.

To solve the problem of the unprotected finger while holding the stabbing sword with one finger on the crossguard, a small loop of metal was added for the finger to go through (Wagner 1967: 27). This way, the finger could not be as easily hurt. In the latter part of the century, swords were being made with a loop on either side of the blade, so that the blade could be reversed if desired.

The slashing sword was also further improved. The long swords from the 14th century had evolved into an even more fearsome weapon. The blade was made progressively longer until at the end of the fifteenth century most of these great blades were the height of a man or longer (72 inches or more) (North et al 1989: 39). During the late 15th century, the lower part of the blade was blunt and covered in leather so that it could be grabbed with one hand and the sword could be used in closer quarters. A triangular projection was made in the blade above this leather part so that an enemy blade sliding down this blade would either stop or bounce off before hitting the exposed hand.

Bladesmithing was a closely guarded secret with many smiths. Therefore, it is hard for modern researchers to discover how swords were made. From the beginning of the middle ages until around the 9th century, the vast majority of sword blades were made by a process which is known today as called pattern welding, so called because of the odd patterns produced on the surface of the blade (North 1989: 3). Even after the 9th century,

pattern welded dagger blades were made well into the 12th century (Edge & Paddock 1988: 46). The process of making a pattern-welded blade was forgotten until an English researcher named John Anstee reproduced the operation in the 1950s using a small forge and primitive smithing techniques. This process is as follows:

Narrow iron bars with a 9:1 width-thickness ratio are case-hardened by placing them in an iron box which is packed with charcoal and heated to red-hot for several days. The resulting bars have a layer of hard iron outside because of the added carbon, but remain soft iron inside. Three of these bars were laid on top of each other and twisted together in the forge. Two "filler rods" of square cross-section were incorporated at the same time, presumably to keep the edges of the twisted bars even and assist in welding. Once completed, the resulting composite bar was placed next to two other composite bars twisted in the opposite direction with "packing rods" in between them to assist in welding. The three bars were then welded together into one large bar. The material for the cutting edges was then welded on separately to the edges of the composite bar.

Once this was complete, the sword was ground to the appropriate thickness; for Anstee's blade, about 70% of the cross-sectional area had to be removed; this also reduced the weight by half. No tempering of the resulting bar was necessary, as the low carbon content meant that tempering would not have worked very well. However, in some of the later pattern welded blades, the carbon content was high enough to warrant tempering. Finally, the blade was treated with acid to bring up the pattern and leave a clear, smooth surface. There are many suggestions as to what may have been used;

tannic acid, urine, fruit juice, and sour beer are some examples. However, tannic acid makes the most sense; it leaves a deep blue-black color on the blade and provides excellent rust resistance. The resulting blade could cut like a razor, and was extremely hard and flexible (North 1989: 27-29). Such a blade could take up to a month to make, and usually cost the equivalent of 120 oxen or 15 slaves (Edge & Paddock 1988: 26).

Throughout the middle ages, the sword held an almost religious significance, sometimes in a literal sense. During the crusades, the sword of a knight was a sacred weapon. It was often consecrated in a church ceremony before being given to the wielder, and if the wielder were to die, the blade was returned to the altar that it was consecrated on (Oakeshott 1960: 185). The sword's cross-like shape also made it into the perfect holy weapon. Knights and soldiers alike sometimes gave names to their swords. It seems that the name "Footbiter" was fairly common.

There are many legendary swords in history. Most of them exist only in larger-than-life stories (such as Beowulf's 'Hrunting' and Arthur's 'Excalibur'). Several were real, however; Charlemagne's 'Joyeuse', for example, was said to contain a fragment of the spearhead that pierced the side of Christ (Karcheski 1995: 79).

It would seem from simple observation that the sword is a clumsy, overbalanced weapon. This is in almost all cases (the exception being the falchion) not true. True, the blade of the sword was often heavy, but the weight was balanced somewhat by the weight of the pommel. As blades got longer, the pommel became heavier and the handles longer

to give more counterbalance. Thus a hand-and-a-half sword could be wielded by most warriors with only one hand, only using the second hand if a stronger blow was needed.

The medieval sword was the favored weapon of anyone from the powerful knight to the poorest peasant who could afford or acquire one. It was as much an effective symbol as it was an effective weapon. Despite being an expensive weapon, a sword was almost invariably carried by every king, knight and nobleman throughout the middle ages. In both the modern times and the medieval, the sword has been a symbol of nobility, justice, and power. It is a symbol that will probably still hold true a thousand years from now, as it has already been so for over a thousand years.

Axes

Although the axe had existed long before the middle ages, it was during this period that the axe became known as a useful and respected weapon. In the times before the middle ages, the battle axe was almost exclusively a Germanic weapon (Gamble 1981: 28). Even before that, it was probably just a tool that was used as a weapon in case there was a need. It never really caught on in Europe as a mainstream weapon until about 900ce (Gamble 1981: 28). After 900, however, it became a knightly weapon of great prestige.

The original Germanic battle axe from the early medieval period was fairly simple in design. The shaft of these axes was usually between 4 and 6 feet long. At the end of the shaft, there was a short (1 or 2 inch) socket that went outward and formed a large convex

blade**.** This basic yet remarkably useful design remained virtually unchanged until the 13th century.

After approximately the year 900, the battle axe started to be accepted by mainstream Europe. After seeing the weapon used by the Vikings to great effect, it is no wonder that the axe eventually caught on. Its European use began primarily as an infantry weapon; an example comes from the Battle of Hastings in 1066, in which the Danish used axemen on a large scale. By the 12th century, the axe had become a popular secondary weapon for Anglo-Norman knights, both on foot and on horse (Norman & Pottinger 1979: 49).

The first change in the axes design came in the late 13th century. Because of the increasing use of metal plate armor, the axe was changed to serve a dual purpose. The heavy blade, as it turned out, excelled at crushing and deforming armor plates, and sometimes it would even cut right through them; there are accounts of Scottish axemen cutting the legs off of fully-armored English knights. However, to further improve the axe as an armor-destroying weapon, a sharp spike was forged onto the back of the head of the axe to pierce armor (Gamble 1981: 33). Thus the axe became an even more feared weapon. Also, because the heavy blows given with the axe put a great deal of strain on the shaft directly below the head, axes started to be made with the socket extending down the shaft for an extra three or four inches (Norman & Pottinger 1979: 69). This reduced the chance of the head breaking off in battle.

Around 1375 the axe changed again when an ingenious smith decided to forge an axe with a hammer in place of a spike. This design formed the basis for a sort of dueling axe. This axe was all metal, even the shaft, and was 4-5 feet long. Sometimes there was a guard for the hands built into the shaft. It was made to be used with two hands by a knight in trial by combat. Of course, the axe-warhammer, axe-spike, and the old simple axe head designs were also still used by foot soldiers. Around this time the axe was used extensively for fighting on foot. The footman's axe was also modified in this century with a spike on the upper end of the axe shaft for stabbing in close quarters (Norman & Pottinger 1979: 69).

In the late middle ages and Renaissance, from around 1470 until around 1550, a small horseman's axe was created and in use. This axe was usually about 2 feet long and all steel, even the shaft. It usually used the axe-warhammer head design, and was hung from the saddle in case the rider's main weapon was broken or lost. There was also yet another addition to the battle axe. Metal strips were now nailed down the side of the shaft to prevent the head from being chopped off in action. Each end of the shaft now had a spike at the end of it, and a circular steel guard was fitted in front of the hand. These are what are modernly referred to as a "poleaxe" or "ravensbill" (Norman & Pottinger 1979: 125).

Although rare, throwing axes were used at times during the middle ages. In the early middle ages (around the year 500), the Franks were using a heavy, short-handled axe with a curved blade for throwing (Wilkinson 1970: 28). It would often be used to shatter an

enemy's shield from a distance, then close with them and fight the unprotected opponents with a sword. Later in the middle ages, around 1350, the Germans started using a cross-shaped throwing axe called a "Wurfbeil". One arm of the cross was an axe blade, and the other three were sharpened points; that way, any side that hit an enemy would do severe damage.

Many knights and several kings used an axe as a main weapon as well as a sword. The most notable is Richard I, or Richard the Lion Heart. He used an axe with a 20-lb head to "Break the bones of the Saracens". Scottish hero Robert the Bruce was also famous for his skill with the axe.

From its creation at the hands of an unknown craftsman in the stone age, through the middle ages, and even into the modern age, the axe has changed little. It has played the role of both the useful tool and feared weapon equally well. Although heavy and unwieldy, its striking power made it one of the most feared and respected weapons of the middle ages.

Halberds

The name of the halberd can be derived from the German "Halm" (staff) "Barte" (axe). It probably originated in Switzerland around the year just before the year 1300 (Oakeshott 1960: 259), although not in the form that it is usually recognized as. The original halberd is modernly known as the Swiss Vogue, and it was simply an axe blade with a point for stabbing affixed to a long pole (Tarassuk & Blair 1979: 246). At the end

of the 15th century the Halberd took the form that we recognize today. The head was still had an axe blade, but the spike on top stood alone and resembled a spearhead. There was also a spike added opposite the blade for stabbing and breaking armor (Tarassuk & Blair 1979: 246).

In its time, in both of its forms, the halberd was a feared infantry weapon. It was used by the Swiss in the Battle of Morgarten on Nov. 15, 1315. One account of the battle reads:

> "The Schwytzois were armed with terrifying weapons, known as halberds, and although their opponents carried weapons almost as sharp as razors, they cut them to pieces" (Tarassuk & Blair 1979: 248)

The halberd was also used against the Austrians in the Battle of Sempach in 1386 with similar results (Norman 1964: 119). Halberds served in military use until the beginning of the renaissance when, like most medieval weapons, they were used for purely ceremonial purposes.

Glaives

The name "Glaive" probably comes from the Latin word "Gladius", meaning sword. From the 13th century onward, the term denotes a pole-arm with a sword-like head. For the most part, the blades were single-edged and convex (Sargeaunt 1908: 23). On the reverse edge of some blades is a spike or hook for breaking through armor. The large blade surface provided ample room for decoration; coats of arms and other decorations

are etched into the blades of ceremonial glaives from the middle ages (Tarassuk & Blair 1979: 194).

Bills

The bill is the descendant of an agricultural tool called a billhook (Tarassuk & Blair 1979: 83). The weapon consisted of a straight spike with a hook coming off of it which was sharpened on both the inside and outside edges. The bill was in use from the 13th century until the 17th century, though battlefield use did not continue past the mid-16th century. After that, it was sued fro purely ceremonial purposes (Tarassuk & Blair 1979: 83). Some bills had a spike opposite the hook for armor piercing.

Maces

The earliest recorded use of the mace in the middle ages was at the Battle of Hastings in 1066, where it was used by both the Normans and the Saxons. Throughout the middle ages, the mace was used by knight and peasant, horseman and footman alike, with very little variation. The mace was used as a weapon and, after the 14th century, as a status symbol, until the very end of the middle ages.

The typical medieval mace was, compared to the sword, a very easily produced and inexpensive weapon. A typical medieval mace had a shaft long enough to be easily wielded with one hand (usually about 2-3 feet). The head was made of steel or lead and consisted of a central core with often had 6 or more radiating flanges, although there are examples of maces with fewer flanges (the Norman maces in the Bayeux tapestry, for

example, had only 3 flanges (Tarassuk & Blair 1979: 313)). Sometimes a spike was also added to the end of the head for stabbing (Sargeaunt 1908: 10).

In the 14th century, the mace became a symbol of rank or status. Its sudden rise in popularity was probably because as it turned out, the mace excelled at destroying plate armor (and, consequently, the person wearing it). Thus it was during this period that the mace truly shone, and respect for the weapon grew. It became a standard weapon of army officers, and in parade the king of France was preceded by a Sergeant-at Arms bearing a mace (Tarassuk & Blair 1979: 314). While the sword came to be regarded as the symbol of justice, the mace became known as the symbol for power.

It should also be noted that the mace was the weapon of choice for militant churchmen, whose scripture forbade the shedding of blood but not the crushing blows of the mace (Sargeaunt 1908:331). Because of this, until very recently, the Pope's personal guard consisted of a corps of mace-bearers.

Morning Stars

The morning star is an 11th century offshoot of the mace (Sargeaunt 1908: 11). It was most used on the European continent, especially by Germanic nations (Fox-Davies 1909: 329). The main difference between the mace and the morning star is in the shape of the head; the mace has a flanged central shaft, but the morning star has a ball with spikes. Also like the mace, it could be made cheaply and by unskilled smiths; this made it a good weapon for peasant armies that needed to be armed with relatively inexpensive weapons.

The construction of the morning star was often very simple; a wooden or metal shaft with a heavy head which bristled with spikes. The infantry version usually had a 3-foot shaft for one-handed use, or a longer shaft for two-handed use. The cavalry version was shorter, usually about 2 feet long (Sargeaunt 1908: 11). The head could be either metal or a simple wooden block with nails in it, as cost dictated (Sargeaunt 1908: 11).

The name "Morning Star" is the recent English translation of the original German name, "Morgenstern". The name was actually coined later than the period that the weapon was actually used (Tarassuk & Blair 1979: 345). There are two possible reasons for the name. The first is the weapon was named after the tradition of attacking at dawn, though this theory is rather questionable (Sargeaunt 1908: 11). The other is that the weapon was named "morning star" because of its star-shaped head (Tarassuk & Blair 1979: 345).

Flails

The medieval military flail began as a simple farmer's tool. The original tool was a long shaft (about 4-5 feet) with another short shaft attached by a chain. The tool was used for threshing grain. Its use as a military tool begins in the 11th century, although it does not become popular as a weapon until the 15th century (Sargeaunt 1908: 11).

The military flail took three forms; there could be multiple chains, each with an iron ball on the end, there could be a single chain with either a plain or spiked ball on the end,

or there could be a single chain with a spiked stick of wood or iron attached to it (Sargeaunt 1908: 11). All had long shafts, but the infantry version was longer and could be made for use with one or two hands, while the horseman's version was shorter. The version with a single ball on the chain is sometimes called a *holy water sprinkler* because of the shape of the head; it looks just like the sprinkler used in church.

Though the flail never became as popular of a weapon as the sword or mace, it was still a powerful weapon in its own right. Because it wasn't as good against armor as the mace, it never became a particularly respected or sought-after weapon.

War Hammers

The war hammer is a weapon from the very early middle ages. Most early war hammers were short, and able to be wielded with one hand. By the 13th century, though, there were two types of war hammer; the two-handed infantry type and the short horseman type. The infantry type could be up to 7 feet long and usually had a spike on top for thrusting. The horseman's version was much shorter and often did not have this spike (Tarassuk & Blair 1979: 499).

There were constant features through all war hammers, though. The shaft was almost always made of wood, except for some horseman's hammers, which are made entirely of metal (Sargeaunt 1908: 12). The head was that of a hammer, and after the 1300s the surface was roughened like the surface of a meat tenderizer to prevent glancing off of

armor plate. On the reverse side of this hammer head, there was almost always a spike or beak for armor-piercing and stabbing.

Spears

Man's earliest weapon is, in its simplest form, a sharpened stick (Tarassuk & Blair 1979: 445). Throughout the middle ages, principle weapon of both infantry and mounted troops was the spear. A spear can be used three ways, though not all spears are designed for all three uses: they can used by foot infantry, used from horseback, or they can be thrown as missiles.

Carolingian spears (8^{th}-11^{th} centuries) were strictly used for thrusting. They were also by far the most numerous weapon in Charlemagne's armies (DeVries 1992: 11-12). These spears had heads made in the common style of the 10^{th} and 11^{th} centuries; a long-bladed, leaf-shaped head with lugs on both sides of the socket (Norman 1964: 111). The Franks also used spears to a great extent, but their spears were different. They used Carolingian-style spears, but they also used spears called *angon*, which they would often throw before beginning an attack. The spear had a barbed head which would pierce armor, shields, or men and were impossible to remove. Most of the shaft was covered in iron, so that the spearhead could not simply be cut off. Once they struck a man, he would almost certainly die. If they struck a shield, having a spear through your shield makes it very hard to use (DeVries 1992: 10-11).

By foot infantry, the spear was most often used for two types of attacks. The first was a downward stabbing motion, used when your opponent was on the ground or lower then you. The second was an upward thrust used to knock a man off of his horse or to try to get under an opponent's armor (DeVries 1992: 12).

The leaf-shaped spearhead was the most common until the 14th century, when the Italians started using a triangular-shaped spearhead (Tarassuk & Blair 1979: 447). Spear shafts were often made of ash or yew, since these woods were both hard and flexible. Occasionally, sections of the shaft were textured or covered with leather for grip.

Eventually, the spear became specialized for each of its tasks. The footman's spear evolved into the pike by the 15th century. The cavalry spear evolved into the feared lance over the course of the middle ages (Tarassuk & Blair 1979: 447). Finally, the throwing spear became the dart, a three-foot long Irish or Spanish spear with fins for stability (Norman 1964: 114). Like most other weapons, spears fell out of favor with the invention and use of firearms. The exception was the pike, which stayed in use because a group of pikemen could protect a group of hand-cannoneers while they reloaded (Norman 1964: 112).

Lances

The name "Lance" is derived from the Latin word "Lancia", which means "Spear" (Tarassuk & Blair 1979: 307). The term had been used from the 13th century in England; before that, the term had been synonymous with "spear". The main difference

between the lance and the spear was that the lance was a great deal longer, and thus was only an effective weapon if used from horseback. In the 13th century the footman's strategies for using long spears like pikes were not yet developed, so infantry spears were often kept about six feet long so that they could be used.

Lances had long, straight shafts which were made of ash until the very end of the middle ages. This made them very sturdy, but also very heavy. Most 13th century lances were between 9 and 13 feet long (Oakeshott 1963: 258). Most lances had a head shaped like a willow or laurel leaf, which was made of iron and tapered to a sharp point (Tarassuk & Blair 1979: 307). This head was made for mounted combat and was designed to pierce rather than cut. As a weapon, it was used with devastating force. An excerpt from *The Song of Roland* illustrates this in detail:

> "He breaks his shield and bursts open his hauberk, cuts through his bones, and tears away the whole spine from his back; with his lance he casts out his soul; he thrusts it well home and causes his body to swing back and hurls him dead from his horse a full lance-length away" (DeVries 1992: 12)

In the 13th century, when tournaments became a popular spectacle, the "courtesy lance" was created. It had a blunt, three-pronged head that was intended to dismount rather then kill the opponent (Tarassuk & Blair 1979: 307). It should be noted that although these lances were designed to prevent needless deaths, it was not uncommon (or unacceptable) to accidentally kill your opponent.

After the 13th century, the lance began to change. From the 13th century onward, lances became progressively longer and heavier (Tarassuk & Blair 1979: 309). Lances grew up to four meters long (approx. 12 feet). They were also outfitted with a wing-like attachment behind the lance head (called a *pennon*) that kept the lance from penetrating too deeply to be easily removed (DeVries 1992: 13). From the 14th century onward, a metal ring called a rondel or a thick leather ring called a graper was added to the grip behind the hand. This acted as a stop against the armpit and checked the rearward jerk of the lance when it hit something (Tarassuk & Blair 1979: 309). Later that same century, a small folding bracket called an *arrest* or lance-rest was added to the side of breastplates (Norman 1964: 114). This acted as a stop for the graper instead of the armpit, and allowed more force to be applied through the lance (Tarassuk & Blair 1979: 309).

In the 15th century, lances changed quite a bit. The lance had become much longer and thicker than the original 13th century versions, by this time they were around 14 feet in length (Tarassuk & Blair 1979: 309), and so thick that a section had to be cut out of the wood for a handle (Sargeaunt 1908: 31). The handle was protected by a vamplate, a heavy, funnel-shaped metal plate fitted in front of the handle. These lances were made lighter by perforating them for almost their entire length. The lighter lance was retained in this period for use by light cavalry, especially by England, Spain, and the march lands of eastern Europe (Norman 1964: 114).

In use, the lance was gripped far to the rear to keep the point as far advanced as possible so that the rider had a long striking range. The most common method of holding

a lance was with the right hand, with the base of the lance tucked into the right armpit. The shaft of the lance crossed diagonally over the neck of the horse so that the rider could hit targets on his left side (Tarassuk & Blair 1979: 307).

Throughout the lance's time of battlefield use, the lance and sword were the most popular cavalry weapons. To the Normans, the lance and sword were marks of "free men" (Sargeaunt 1908: 29). The lance's major flaw was, ironically, also its strength. The length and weight of the lance made it ideal for use in open fields and tournaments; in dense forests, however, the lance is almost impossible to maneuver (Tarassuk & Blair 1979: 309). Despite its shortcomings, the lance was still a devastating and effective cavalry weapon.

Pikes

The pike was an extremely long infantry spear used from the 15th century until the 17th century. It was between sixteen and twenty-two feet long and had a small, diamond-shaped head. This was attached to the staff by long steel straps, to prevent the heads from being chopped off by swords or axes. The staff was often made of ash, and the grip was made of leather or velvet, to prevent the hand from slipping (Norman 1964: 114-115). It was first used by the Swiss, though eventually use of the pike spread to all of Europe.

In use, the pike made an impressive defense against cavalry and infantry alike, and could be used for attacking or defending (Tarassuk & Blair 1979: 367). Pikemen

would form ranks three or four men deep, with pikes thrust forward through their own ranks to form a wall of long spears (Norman 1964: 114). Regrouping or reloading allies could hide behind this wall until they were ready to attack again (Tarassuk & Blair 1979: 367). Pikemen were often combined with archers, crossbowmen or hand cannoneers to form a defended position from which they could fire.

Bows

The bow had been a weapon long before the middle ages. It was not a respected weapon in its day; archers were sometimes portrayed as cowards, "Brave in waging war with beasts, in naught besides" (Bradbury 1985: 3). Fighting men did not like the idea that they could be killed without ever seeing the face of the man who killed him, or without even a chance for fair combat (Bradbury 1985: 3). However, by the end of the middle ages all of Europe recognized the bow as a valuable battlefield tool. Archers had an important place in any army in Europe until archery was overtaken by handguns in the 16th century.

Two types of bows were used throughout the middle ages; the longbow and the composite bow. Early in the middle ages a short wooden bow was used, but these were being phased out of most European armies by the 12th century (DeVries 1992: 37). The Bayeux Tapestry shows the Norman infantry using a short bow which was drawn to the chest to fire a relatively short arrow. Quivers are attached to the right hip, and the archers wear no armor (DeVries 1992: 36). By the 12th century, most European armies were discarding their short bows in favor of crossbows, with only Spain and England

continuing to use bows exclusively. Spain would continue to use these short bows for the rest of the middle ages. England eventually replaced these short bows with the famous longbow in the 13th century (DeVries 1992: 37).

The longbow had a length of two ells (2.3 meters), a thickness of four thumbs (10 centimeters), and could discharge an arrow a meter long. They were made from yew, either imported from Spain or Italy, or grown in England (DeVries 1992: 34). The staff thinned slightly towards the ends, where a notch would be cut for the bowstring. To string this bow required a good deal of strength and skill, as the draw weight was about 80 pounds (Wilkinson 1978: 62). Also, unlike the short bow, the longbow was drawn to the ear instead of the chest. The longbow had a range of about 400 meters, and could pierce mail armor at 200 meters (DeVries 1992: 37). The arrows were about a meter long, fletched with goose feathers, and had a very acute point.

The composite bow is a more direct descendant of the short bow. At the core of the composite bow was a short bow; however, the inside of the composite bow's curve was reinforced with horn, and the outside was reinforced with sinew. The assembly was then glued and pressed together. This enhanced the wood's natural springiness, making it more powerful than ordinary bows of the same length (Bradbury 1985: 12). Composite bows were rarely used by western forces, but were common in the east. The Saracens, for example, used the composite bow a great deal. The shorter length also made it easier to shoot from horseback. This made mounted archery fairly rare in Europe, except

among the Spanish (DeVries 1992: 36). However, the Saracens had quite a few archers that could shoot from horseback (Bradbury 1985: 12).

There were a few things that were common to all forms of the bow. The bowstrings were made of waxed linen twine. The bow was carried unstrung until just before use; otherwise, the bow would eventually lose its spring (Wilkinson 1978: 62). Arrows were carried in a quiver which could be either slung across the back or at the belt. In a battle, arrows were stuck into the ground in front of the archer (Wilkinson 1978: 62).

The decline of the bow that began in the 12th century with the invention of the crossbow was finished in the 15th century with the invention of the handgun. The number of archers in the armies or Europe fell steadily after that, while the number of handgunners rose. By the 16th century, the archers in most continental European armies had been completely replaced with handgunners (DeVries 1992: 39).

Crossbows

Though there is evidence that crossbows were used in the time of the Roman Empire, it did not become a popular weapon until the central and late middle ages (DeVries 1992: 39-40). The crossbow consists of a short bow turned horizontally and fixed to the end of a wooden stock. The string is thicker then that of a Norman bow, usually made of many linen strands twisted together (Oakeshott 1690: 298). The string is held drawn by a rotating nut set further down the stock. This nut has a groove in one side to hold the

string, and a groove on the other side that contacts the trigger and prevents it from rotating. When the trigger is pulled, the nut is free to rotate and the string is released.

There were also several methods of drawing the crossbow, which varied over the course of the middle ages. The first and most simple was the crossbowman would place his feet on the inside of the bow and pull the string back with both hands. Also in use with early crossbows was a simple lever mechanism. One end of a rope was attached to the crossbowman's belt, and the other ended in a hooked claw. The crossbowman would bend over and hook the claw onto the undrawn bowstring. He would then stand up, using his own body as a lever to draw the bowstring (DeVries 1992: 39-40).

By the end of the 13th century, most crossbows were composite crossbows. This means that the inside edge of the wooden bow was lined with horn, and the outside edge was lined with sinew. This whole assembly was glued together, and the result was a bow that was much more powerful than the wooden bow. It was also a good deal harder to draw then a plain wooden bow. In the 15th century the all-steel crossbow came into use. These bows were the most powerful ever made, but at the expense of extremely high draw weight (Norman 1964: 123). To draw such a powerful bow, three new mechanical devices were used. The first was called the goat's foot lever. This is likely a modern name given because of its shape, that of a cloven goat's foot. On the crossbows that this can be used, there are two pins protruding out from behind the nut. Hooks about halfway down the length of the lever catch the bowstring, then the lever pivots on the pins until the string is in place (DeVries 1992: 41-42).

The second drawing device, introduced in the 14th century, was called the windlass. The windlass was a rope with hooks on it, which was run through a series of pulleys and a crank that were attached to the end of the stock. The hooks were hooked onto the undrawn bowstring, and then the string was drawn back to the nut by the crank. This mechanism could draw the bow in about 12 seconds (DeVries 1992: 42).

The final drawing mechanism, introduced in the late middle ages, was called the cranequin. The cranequin consisted of a toothed steel bar with a gear attached to a crank that could roll along it. The bar was hooked onto the butt of the stock, and the crank-gear assembly was hooked to the bowstring. When the crank was turned, the bowstring was pulled back. This mechanism took less strength than the windlass, but took about 35 seconds to load (DeVries 1992: 42).

The crossbow bolt, also called a quarrel, was approximately 40 centimeters long (Edge & Paddock 1988: 35). This shaft was thicker than arrow shafts and the head was heavy, diamond-shaped and very sharp. Most often the shaft was made of ash or yew. Like arrows, crossbow bolts were fletched with goose feathers to aid flight (DeVries 1992: 42). Bolts were most often carried in a quiver at the waist, point-upwards (Norman 1964: 126). To fire, the bolt was laid on the stock in front of the drawn bowstring, and when the string was released the bolt was thrown forward.

The crossbow was both a feared and respected weapon in its time. Anna Comnena, who was the daughter of the Byzantine emperor and kept detailed chronicles from 1118 until 1148, was impressed by the crossbow;

> In shooting the string exerts tremendous violence and force, so that the missiles wherever they strike do not rebound; in fact they transfix a shield, cut through a heavy iron breastplate and resume their flight on the far side, so irresistible and violent is the discharge. … Such is the crossbow, a truly diabolical machine. The unfortunate man who is struck by it dies without feeling the blow; however strong the impact he knows nothing of it. (DeVries 1992: 40-41)

The crossbow was such a brutally effective weapon that the Second Lateran Council in 1139 forbade its use among Christians. This condemnation was ignored by most commanders because of the crossbow's usefulness, and in 1200 the church relaxed its decree, allowing the crossbow's use against infidels, pagans, and in the case of a "just war" (DeVries 1992: 41).

There were two noteworthy variations on the crossbow. One was the pellet crossbow, which discharged pebbles or lead balls from a sling-like pouch. The other was a spring-bow, which was basically a crossbow that was remotely triggered. This was basically an assassin's trap, as the trigger could be many things, such as opening a door (DeVries 1992: 44). In the end the crossbow suffered the same fate as the bow, its use eventually declining in the face of more powerful gunpowder arms. Still, in its day, the crossbow held an important place as a brutally effective infantry weapon.

Slings

A simple sling consists of a leather or linen pouch in the center of a cord of the same material. One end of the cord was a loop, and the other a knot. The loop was looped around one finger, and the knot was held in the hand. The shot for this weapon was either a smooth, rounded stone or a lead pellet, whichever was available. The shot was placed in the pouch, and then the sling was swung over the shooter's head until it gained enough speed to be released. To release, one simply had to let go of the knotted end of the cord; the loop would keep the sling from being let go completely (Edge & Paddock 1988: 65).

The sling had been a peasant's weapon since well before the middle ages, the most famous example being the story of David and Goliath. They were also very popular military weapons in the ancient world, but were not widely used in the middle ages except by the Muslims (DeVries 1992: 33). One manuscript shows staff-slings being used by European naval soldiers. The sling would make sense for use at sea, since its performance will not deteriorate from being wet like a bow or crossbow would (DeVries 1992: 33).

The shot from a sling could penetrate bare flesh, but was not very useful against armor. Once this was discovered, the sling found other uses. A "staff-sling" was exactly as the name describes it; a sling attached to the end of a staff. These were used to throw normal shot as well as "stinkpots", which were small clay pots filled with burning sulphur or quicklime (Edge & Paddock 1988: 65). Overall, the sling was not a very

important or decisive weapon in the middle ages. However, history shows that there was still at least some use for this ancient weapon.

Firearms

The powerful firearms of today had their humble beginnings in the late middle ages. The first man-portable firearm appeared around the late fourteenth century (DeVries 1992: 148-149). In some early manuscripts they are referred to as "fire sticks", which fit well because of their shape (Greener 1897: 46), though they were also called "coulevrines á main", "haquebusses", and "culverins" (DeVries 1992: 149). In the middle ages, they were simply a very small cannon attached to a straight wooden stock.

The original "hand cannon" was heavy, but still light enough to be used by one person. It took two hands to fire; one hand to hold and aim the gun, and the other to touch a burning match to the touch-hole in the powder chamber (Greener 1897: 45). These guns were fired from the shoulder.

Heavier versions of this weapon were also made. These often weighed between 10lb and 60lb. These heavier versions were still portable, but required a 2-man crew; one man would carry and position the weapon while the other loaded and fired it (Greener 1897: 47). The gun was not fired from the shoulder, but the butt of the stock was braced against the ground and the gun was positioned by the crew.

Still another form of the hand cannon was developed. This consisted of combining a hand cannon with some other weapon. Most often the hand cannon would form the shaft of a hand-to-hand weapon, such as an axe or war hammer. However, there are also versions of crossbows with built-in hand cannons (Greener 1897: 46).

By the middle of the fifteenth century almost every army in Europe was armed with personal firearms (DeVries 1992: 149). They did not change very much in form or function until the musket in the 16th century. There was one notable improvement during the middle ages, though; the invention of the matchlock. In its simplest form it was an s-shaped lever called a serpentin, one end of which held a burning match and the other end used as the trigger. The center of the lever was the pivot, and when the trigger end was pulled, the burning match was lowered into a flash pan and touch-hole at the side of the gun. Matchlock mechanisms are shown in manuscripts as early as 1460 (Greener 1897: 51). The system made firing a gun easier, and its adoption was rapid. Several years after its introduction the matchlock system had been improved, with a lever-reversing gearbox and a spring to keep the match out of the firing pan (Greener 1897: 53).

Gunpowder went through major improvements during the middle ages. When gunpowder was invented around 1320, the charcoal, saltpeter and sulfur were simply mixed together. The combined mixture had the texture of talcum powder, making it hard to control the amount you used. Also, the mixture would separate into its component parts when shaken. This means that an army on the march couldn't carry their powder

pre-mixed. Instead, they would mix their powder just before use, which was a dangerous process (Pope 1965: 44).

In the second half of the 15th century, an improved process for mixing gunpowder called "corning" was invented (Tarassuk & Blair 1979: 240). This consisted of mixing the powder with a liquid, then evaporating the liquid off. What remained would be large grains of gunpowder, each containing the proper mixture of charcoal, saltpeter and sulfur. This powder also burned more quickly then the old powder, so its use was relegated to handguns because cannons that were built for the old powder would explode (Pope 1965: 44). This powder could be carried by soldiers without separating and was a good deal more resistant to moisture then the old powder (Pope 1965: 44).

Original firearms were not very powerful or accurate, but they improved over time. By the mid-16th century the use of muskets had all but eliminated the use of armor; to make armor thick enough to protect against a musket ball also made it very heavy. Troops eventually stopped wearing their armor because it was too cumbersome (Norman 1964: 83-84). In the modern age, firearms are the principle weapon of infantry around the world. Where most other medieval weapons have fallen out of service, the firearm has evolved and endured.

Tactics of the Middle Ages

This document traces the tactical developments of the Middle Ages, roughly the period of time between the 7th and 15th centuries. It focuses on the tactics of western Europe but contains sections that contrast these with the developments in the east.

Early Middle Ages: The Dominance of Heavy Cavalry

In the early Middle Ages, cavalry combat did not have a monopoly over warfare, as it later did. Nor was it as rigidly codified: a variety of tactics were prevalent, instead of the single 'shock combat' charge with a lance that came to overshadow the rest. A horsed knight would carry a spear, and wield it by thrusting downward at the enemy, or by throwing it as a javelin. It was equally common, during this period, for the knights to dismount before a battle, in the same way mounted infantry were accustomed to doing. This remained the tradition in England, where, well into the heyday of cavalry, in the 12th and 13th centuries, many knights would fight on foot alongside the infantry. This is exemplified by such battles as Tenchebrai in 1106 (Norman & Pottinger 1979: 40).

In continental Europe, however, cavalry tactics were evolving in a way that would permanently change medieval warfare. The stirrup had been introduced to western Europe sometime in the 8th century. At the same time, the saddle was evolving to become more supportive, with a rigid cantle (back plate). The synthesis of these elements created a condition where the mounted knight was firmly locked in place while riding. He did not have to worry about keeping his balance, but at the same time, because the stirrups were inconveniently far forward and because of his bulky armor, he could not

easily rise from the saddle in order to engage in swordplay. (Keen 1999: 188) It is worth noting that the stirrup was adopted slowly in Europe, and in a patchy way, not in a singular revolutionary overhaul of technique. (Hooper & Bennet 1996: 154) Perhaps the stirrup first became popular to augment the skill of the inexperienced. It was not nearly as relied upon in the east, where skilled horsemanship was valued and the mounted combatant used his agility and freedom of movement to his advantage.

The lance remained the favored weapon of the mounted knight; and some time in the 10th or 11th century a new tactic was developed which spread quickly, and eventually supplanted all other mounted combat techniques: the couched lance. The couched lance was held firmly by the rider's right arm, tucked under his armpit. (Nicolle 1995: 78) The knight would then charge, depending on the momentum of himself and his horse firmly locked together by saddle and stirrup, to penetrate the defenses of the enemy. Previous to this, a charge would be made more slowly, and the knights would ride into battle with shorter spears, which were not held immobile, instead gripped underarm or swung with an over-arm thrust. By the 12th century, however, armored cavalry used couched lances almost exclusively.

The tactics of the charge itself were fairly straightforward. Armored knights would charge straight toward their opponent, in *conrois* formation. This denoted a small but dense squadron of riders, many of which would attack together in *battailles*, formations of riders staying in line. (Hooper & Bennet 1996: 154) This charge came after the enemy had been weakened by volleys of arrows. Sometimes the cavalry would feign retreat, to gain a tactical advantage.

Once the cavalry had charged into action, it would often retreat and prepare for a subsequent charge, until the enemy was sufficiently weakened. The battle then continued in close quarters, with the sword and mace. In the ensuing mêlée the knights sometimes dismounted to attack. Although developments in saddles and armor made it increasingly rare, a horsed knight could also make use of the stirrups, standing up in them to swing his weapon downward. (Hyland 1994)

Several factors tempered the usefulness of this newly specialized heavy cavalry. Armored cavalry was valuable in battle, but outright battles were sometimes rare. Many times the enemy was holed up in a castle, and a siege was called for, in which cavalry did not have much use. Furthermore, a straightforward charge of armored cavalry was only applicable and effective on level ground against an enemy that was out in the open. When such circumstances did arise, the battle was often a small-scale, local affair for which few knights could be summoned.

Nor did the use of heavy cavalry guarantee victory in large-scale warfare. Cavalry was susceptible to the attacks of archers with longbows, or to crossbowmen, and the charge could be seriously impeded by infantry bearing pikes. A rigid formation of pikemen became a standard infantry tactic, in response to the growing use of heavy cavalry. Popularized by Swiss armies, the pike and the tactics associated with it were applied throughout continental Europe by the later 14th century. (Norman & Pottinger 1979: 127)

For these reasons, cavalry was, in fact, dependent on a supporting infantry. Archers and crossbowen were needed to counter the archers of the enemy, who could damage the charge before it landed. They were also vital in creating holes in the enemy's

defense. A charge could not succeed against an enemy infantry that was still locked together holding pikes. This formation needed to be disturbed and weakened by a hail of arrows, or else the charging men and horses would all simply be impaled.

The continued necessity of infantry to support the knightly cavalry was not recognized by many of the knights, who preferred chivalry to strategy. They held contempt for infantry, both as enemies in battle and in their own armies. The knightly charge was considered the noblest tactic and the only one necessary. Infantry were considered useless to the less strategy-minded of the knightly class, and crossbows were even vilified by the church when it was realized how effective they were at stopping the righteous charge of noble cavalry.

The reason for this reluctance to acknowledge the value of the infantry lies in the feudal class structure and the idea of chivalry. The equipment of a knight was enormously expensive to purchase and maintain. A warhorse would cost 'something like the annual income from quite a big village'. (Keen 1999: 188) Therefore, knighthood became a position of aristocracy. Nobility alone could afford knight status, while infantry and archers were culled from society's lower strata. It was this class difference, and society's celebration of the chivalric knight, that lead to the devaluement and suppression of the infantry class. Since the writings and illustrations of the time were commissioned by and often produced by the upper class, they were more concerned with the chivalric portrayal of knights than with the (socially) less important infantry. Because of this, medieval manuscripts and illustrations about warfare focus on the cavalry, to the exclusion of infantry. Relatively little primary-source documentation exists about the infantry.

In order to demonstrate bravery, knights would struggle amongst themselves to be the first into battle, often triggering the charge before it was ordered. At the battle of Courtrai in 1302, the French reliance on armored cavalry was their downfall. Robert of Artois ordered them to commence the charge before his crossbowmen had inflicted many casualties on the Flemmish pikemen, with disastrous results. (Keen 1999: 190) This happened again at Agincourt (1415), where the French were so eager to get into battle that they rode down their own crossbowmen. (Ellis) In this way, armored cavalry dominated medieval warfare through the 12th to 14th centuries, sometimes even to its own detriment. Few other developments were made to the technique of the cavalry charge- indeed few were possible. It was a strategy that didn't adapt to tactical developments, and waned with the end of its era.

Of note is the contrast between western Europe's horse tactics and those techniques employed by mounted warriors in the east. The Asian and Turkish horseman's equipment was much lighter, and he was armored less extravagantly. His equestrian skills were more refined, and he would nimbly weave and dodge in battle. A heavily armored Christian knight would likely defeat a Magyar horseman in close, head-to-head combat, but such a situation rarely occurred- he was inevitably slower, and thus vulnerable to an advance-and-retreat, during which his enemy could strike with a well-aimed arrow, lance, or sword. The Turkish weapon of choice was the composite bow, a short bow that could be used while riding. The Turks also used lances, but in a way that was less rigid than was common in the west. (Keen 1999: 190) The couched lance never found favor in the east.

The Role of Archers

In the early middle ages, the bow and arrow were rare on the battlefield. Archeologists in Poland found a relatively sudden shift from unbarbed to barbed arrowheads some time in the 10th century, indicating roughly when archery changed from simply a means of hunting to one of war. (Nicolle 1995: 80) Archery began to play an important part in medieval warfare, filling specific niches both in supporting a cavalry strike and in defeating one. The bow was primarily the weapon of the lower-class infantry; but it was effective, when combined with infantry bearing mêlée weapons, against the knightly heavy cavalry.

Arguably the simplest bow was the longbow, a long wooden stave, often made of yew, which was strung and fitted with a handgrip. The longbow was used primarily by the English, although it was subsequently adopted by western continental Europe. It is thought to have been originated with the Welsh. As the bow evolved it got longer and more powerful- the draw weight was probably from 100lbs to as much as 175lbs. It was at first drawn only to the chest, but in the height of its use it was drawn all the way back to the ear. (Prestwich 1996: 133)

The short bow was a composite bow, made of horn, sinew, and wood. The compound design allowed it to be as powerful as the longbow, but much shorter. For this reason, it was the weapon of choice in the Middle East; the art of horse-archery, as practiced by the Maygars, demanded a shorter bow. (Bradbury 1985) Composite bows were less common in Western Europe.

The crossbow is a short composite bow, combining wood, horn, and sinew, attached to a stock and fitted with a trigger mechanism. It was accurate and had a very

long range, and could be carefully aimed because the tension of the bow was held by the trigger, not by the archer's hand. The trade-off was that it was slower to prepare for shooting than an ordinary bow- an experienced archer with a longbow could shoot over 20 arrows in a minute, compared with the few bolts that could be loaded and shot with a crossbow. (Prestwich 1996: 133) The bow was more powerful than a normal hand-bow, and it often couldn't be drawn in the normal way. Because of this several methods were devised for drawing, or *spanning*, the crossbow. These were mechanical devices that were invariably slower than the hand-drawing of a regular bow. (Nicolle 1995: 131)

The crossbow was such a powerful weapon that the bolts it shot could pierce armor. It may therefore have been the waxing popularity of the crossbow in Europe that led to the knights' adopting face-covering helmets, heavier body armor, and horse armor. The crossbow was dangerous to the armored knight, and could strike from a distance, before he was within range to retaliate with sword or lance. For these reasons it came to be known as an ignoble weapon, one fit for a coward. The church denounced it, and tried to ban the use of the crossbow in warfare between Christians. This attempt failed because of the bow's military value. (Nicolle 1995: 130) Its use became encouraged in France and England, but it remained more common, as a war weapon, in southern Europe until the end of the 12th century. In the 13th century it spread throughout Europe, including into Scandinavia.

In battle, several tactics were employed by the archer. England's longbow archers would be among the front rank, starting the battle by shooting when the enemy came into range. They would sometimes loose their arrows high into the air, in a wide arc, so that the arrows would rain down on the enemy in great clouds, at a further distance than could

be achieved by a straight shot. Each archer would save a good number of arrows, however, for when his enemy was close enough that he could shoot direct, aimed shots. (Bradbury 1985) These close-range volleys could be devastatingly effective: the Saxons lost the battle of Hastings when King Harold was killed, probably with an arrow to the eye. The prevalent tactic of the medieval archer was simply to damage the defense of the enemy, so that when the cavalry charged they could break through and inflict heavy casualties. The English, however, used archers alone to great success. English longbow archery in the 14th century was so devastating because of the number of bowmen employed: they were able to rain arrows upon the enemy in a storm that was lethal, as well as disorienting. (Keen 1999: 204) The effectiveness of these archers was one of the contributing factors to the downfall of cavalry dominance in the late Middle Ages.

The archers themselves were protected from the inevitable cavalry charge of the enemies, sometimes by infantry bearing pikes. They also used terrain to their advantage, stationed behind small hills or bushes, or any other area that was inaccessible to the horses of their enemy. On flat, unprotected terrain, they would often need to create such obstacles: they would dig a trench or plant pikes into the ground in front of their position.

As stated previously, the Maygars and eastern peoples were largely horse archers, and could wield the short bow, or alternatively a lance, in the thick of battle, at the same time maneuvering their horse agilely. (Keen 1999: 190)

The crossbow also found use in battle, despite its shortcomings, and its deadly accuracy and power inspired fear and awe. Richard I used crossbowmen extensively in the 12th century. (Prestwich 1995: 129) A large group of infantry crossbowmen could be

easily mustered, because it took fairly little skill to use the weapon. Hence companies of crossbowmen were utilized. The problem with the crossbow, of course, was the time it took to load and span. The longbow was far quicker to use, although it took more skill to aim because the archer had to do so with the tension of the string. In battle, an archer wielding a crossbow could easily get overwhelmed when the infantry or cavalry of the enemy was closing. For this reason the crossbow was less popular than the longbow in Europe, but only in battle. For sieges the crossbow was ideal. (Koch 1978: 50) It could be prepared to shoot and then carefully aimed, and the archer could wait behind cover for the opportunity to discharge it. Since a great deal of medieval warfare involved the siege, the crossbow was used heavily.

One of the factors that hampered the use of archers was the cost of equipment. Europe's knights were not interested in a weapon as ignoble and low class as the bow, so its use fell to the infantry amassed from the commoners. And although a bow and arrows weren't overly expensive, they were still often out of the price range of the peasantry. Furthermore, the typical peasant could not afford the time necessary to practice and gain skill in the use of the bow. Sometimes the government was reluctant to afford the people the equipment and the time to become proficient archers, concerned that arming the masses during peacetime would only encourage an uprising. On the other hand, in England, where the longbow was popular and vital to the strength of their armies, the government actually outlawed other sports and held archery tournaments, as a way of encouraging practice.

Late Middle Ages: The Resurgence of Infantry

Throughout the high Middle Ages, heavy cavalry had completely dominated warfare. It had become completely entrenched in both the military and socioeconomic systems of the day- the noble knight was a key component of the feudal system. In this way, infantry was overlooked as strategically important, even when certain groups of foot soldiers again began to claim victories against the knightly cavalry.

By the 14th century, infantry (without the large support of cavalry) was reasserting its effectiveness in combat. In certain areas of Europe, infantry was becoming a well-organized and capable fighting force, which was even able to stand against heavy cavalry. Flemish infantry of the early 1300s, for example, were organized by guild into regular militias, and well equipped with mail habergeons, steel helmets, gauntlets, shields, and even plate armor; and they bore an assortment of weapons, including bows, crossbows, pikes, and *goedendags*. (This was a heavy wooden staff, four to five feet long, and tipped with a steel spike.) Because of their structure, in particular their ability to hold the line when facing a cavalry charge, the Flemish were able to achieve a decisive and influential victory against the French chivalry at Courtrai in July of 1302.

The cities of Flanders were rebelling against the King of France, and laying siege to Courtrai castle. The king sent 2,500 men-at-arms and 8,000 infantry to relieve the Courtrai garrison and dispatch the rebellion. He took it for granted that the Flemish would flee when they found themselves outnumbered in heavy cavalry, which was widely acknowledged as the master of the battlefield. Instead, the Flemish withdrew to a predetermined position away from the city, in marshland where their flanks were protected by streams, and prepared for the French advance.

The infantry was broken up (by guild and region, so that men who knew each other would be fighting together, which boosted morale) into four divisions, three in line and one as reserve. The soldiers were densely packed, about eight deep, with their pikes and *goedendags* extended. The Flemish knew that success depended on their holding formation during the French charge, and they did so. The charge was foiled, and degenerated into a vicious mêlée, in which Flemish infantry outnumbered the French men-at-arms. The surviving French, disarrayed and demoralized, and finding little ground to retreat, began to flee. Over a thousand French noblemen were killed in the battle. The dominance of cavalry in warfare now became subject to question.

The implications of this victory were far-reaching. The Battle of Bannockburn, in 1314, saw a set of similar circumstances. The Scottish pikemen, led by Robert Bruce, crushed the English chivalry by adopting a *schiltron*, a dense formation of spearmen, against their charge. It is noted in the *Scalacronica* that the Scots were imitating the tactics used at Courtrai. (Keen 1999: 142)

Around the same time, the Swiss were also challenging the concept of infantry as inferior to heavy cavalry. The Swiss Confederacy distinguished itself in many battles: Morgarten in 1315, Laupen in 1339, and Sempach in 1386, the last of which was to profoundly transform infantry tactics.

The weapon of choice of the Swiss infantry, in addition to the pike, was the halberd- a staff approximately 1.8 meters long with a large hatchet attached at the end by two eyes. In addition to the broad hatchet blade, the weapon had a spike at the top, similar to a pike, and often a hook opposite the blade. The halberd took considerable strength to wield, but because of its tremendous leverage it could cleave straight through

armor and inflict massive wounds that were most often fatal. It could not be used with a shield, and so a battle of halberds was brutal and quick, and missing one's target was a deadly mistake.

The key to the prolonged success of the Swiss in battle was superior military organization, and a sound and simple system of tactics. They organized by region, and were therefore able to assemble their ranks quickly. They moved rapidly as well, because they only wore light armor. They functioned almost autonomously, and were able to make up for the deficiencies of incompetent leadership.

The Macedonian phalanx was the prototype of their array in battle. They would, like the Flemish before them, amass in dense and deep formations, with the first four ranks leveling their pikes. The pikes were gripped by both hands, widely extended, and held slightly downward in the front row. Because they were about eighteen feet long, with an additional foot for the steel tip, they would extend through the ranks from the back. Each successive row held them higher, forming an impenetrable barrier. The rest of the formation kept their pikes upright, in reserve for when the first line of pikemen fell. In the interior were also located the halberdiers, as well as men bearing an assortment of two handed swords, morning stars, and war hammers. They waited until a charge had been broken, and fell on their scattered enemy. At the same time, they were a contingency in case the enemy broke through the hedge of pikes.

In 1386, the Swiss faced the men of the Austrian Duke Leopold III, who sought to reclaim his territory. Among an army of infantry and mercenaries were 4,000 knights. They met at Sempach, a hamlet of Hildesriechen. All of Leopold's men dismounted- even the knights- because he wanted to "prove the effectiveness of the dismounted lance

against the halberd." The momentum of the Swiss halberd and pike overcame them, however, and at the end of the day 1800 Austrians were dead, versus around 200 Swiss.

The Landsknecht were a German class of mercenaries who imitated the tactics of the Swiss pikemen. They came into existence in the 15th century, and established their superiority to most other infantry, save the Swiss, who consistently beat them. Their favored weapon was again the pike, and they attacked in tightly grouped squadrons.

During this period, it was proven that a capable infantry could not be defeated by a cavalry making use of the now stagnant couched-lance charge. Knights began to dismount for battle again, making use of their skills in mêlée combat. On the ground, their armor was effective in protecting them against an infantry, but they were hampered by a severe lack of mobility. When firearms were developed to the point of usefulness in warfare, they could penetrate a knight's armor easily and be used by a less skilled infantry than the bow. This lead to the decline of armor suits, and the end of the Middle Ages.

Siege Warfare

Battles were actually somewhat rare during the middle ages; this is because much of medieval combat did not take place on a battlefield at all. Many times one side was protected inside a castle, and thus had the advantage of higher ground and fortified walls, so that no straightforward attack on them could be attempted. Instead, a siege was required.

A siege deals with the problem of defeating an opponent who is protected inside a castle. It can refer to attacks made on the enemy's fortifications, attempts to batter down their walls or to scale them and engage in combat. In theory, however, a siege can be

carried out passively, with no direct contact between attacker and defender. The besieging army need only cut off their entrenched foe from communication and supplies, and wait for starvation to force the enemy to surrender. This requires a lot of patience on the part of the attacker, in addition to a great supply of food so that they can hold out longer than their opponent. For this reason, a siege would often become aggressive, with attacks made either to demoralize the defending garrison or to gain entrance to the castle and defeat them.

The medieval castle is a fortification that evolved to resist the siege. The basic theory behind the construction of a stronghold is to place a series of obstacles between the attacker and defender. The attackers are either discouraged, or at least slowed down to afford the defender an opportunity to reduce their numbers, fighting from an advantageous position. Thus the first thing an enemy would encounter was typically a deep ditch encircling the castle, often filled with water. The outer castle wall would be so close to this moat that the attackers could gain no foothold on the near side to attempt to scale or bring down the wall. An *allure*, a walkway around the top of the wall, allowed bowmen to shoot downward, and other defenders to drop heavy objects or boiling water. The archers were in turn protected from enemy projectiles by the parapet' alternating sections of raised *merlons* and lower *embrasures*, which give castle walls their well-known shape. Towers were much taller than the surrounding walls, and gave the defenders a view of the front face and the base of the outside wall, in addition to affording a higher vantage point to keep watch from. They also served as anchor points, and it was from them that the garrison was deployed. Inside the wall was the *bailey*, an open area in which there may be another surrounding ditch and wall. These would both

enclose the *keep*, a strong and well-protected tower that was the last defensive position. (Koch, 1978: 46)

Naturally, a siege against such a well-defended fortress was very costly and time-consuming, and the besiegers were often reluctant to commit to one. The first step taken would be to "summon the castle," to address some representatives of the targeted castle and attempt to negotiate a surrender. Aside from fighting or surrendering immediately, the defenders may have been given the option to agree to surrender after a certain period of time, if no relieving force arrived to help. To capitulate when outnumbered or when the chance of victory seemed slim was not considered ignoble, and the decision was not to be taken lightly; because of the difficulty and expense involved in the siege a garrison which persisted in fighting could expect little mercy in the event of defeat.

Once the actual siege began, there was more or less a set of steps to be followed. The attackers would draw up a camp somewhere near the castle- if they were close enough, they would be able to continuously "snipe" at the enemy with crossbows, however they would probably be within range of the enemy's weapons. The camp would be delineated by a rampart around the perimeter; a ditch would be dug and the dirt thrown up as a wall, which could have been augmented along the outer edge by wooden stakes or wicker panels. This was to protect the besiegers from sallies of the enemy garrison. At the same time, men were sent out to forage for food, building their own supplies while at the same time removing any sustenance the enemy could access. Wood was also gathered, for the camp and the future construction of siege engines or whatever would be called for, and rocks collected for ammunition. Barricades were made across all roads leading to the castle, and men were assigned to guard against the approach of a relieving

force to the castle. Reconnaissance was made of the grounds to search for weak spots in the enemy's defense. When this was completed a council was held between the commander of the siege and the nobles who had ordered it, and a plan was constructed for how to proceed.

There were essentially three ways to get into the castle: over the walls, under them, or through them. The preferred method was through: by way of bombardment by siege engines, until a section of wall collapsed. This was the safest for the attacker; they never had to engage the enemy directly, and were for the most part out of range of their artillery, except for machines comparable to their own. It was also a discouraging prospect for the castle garrison, because the only way to counter it was to make sallies out into the enemy's encampment to destroy their engines. They could also try lowering mattresses or cushions against their walls to absorb the impact, but if the enemy were persistent this would not hold out.

These siege engines were referred to sometimes as "gyns," and their operators as "gynors." These preceded the invention of cannons, and were subsequently supplemented (and finally replaced) by them. It is beyond the scope of this project to go into a detailed account of the manufacture and operation of these engines, but I will give a brief description.

The *espringale*, known previously to the Romans as "ballista," was essentially a giant crossbow. It served as an anti-personnel weapon, used by the defenders to disrupt the firing of the attackers' siege engines, and by the attackers to counter this. The flat trajectory of this weapon made it very accurate, with a range of about 150 yards.

The *trebuchet* used a large, counterweighted lever to hurl rocks or other ammunition at the walls of the castle. These devices could be built in massive proportions, and fling giant stones. They were also used to throw Greek fire, or even plague-ridden corpses. (Koch 1978: 52)

The *mangonel*, known better nowadays as the catapult, used a springy timber to propel rocks of one or two hundred pounds. It was a smaller weapon than the trebuchet, and played a secondary role, eventually becoming obsolete. (Koch 1978: 52)

The wall could also be breached by battering ram, usually directed at the relatively weak door. Because this would expose the attackers to crossbow fire, as well as stones or boiling water dropped from the *allure*, a roofed structure on wheels, called a tortoise, was sometimes built to defend them. (Koch 1978: 49)

To scale the walls was even riskier, as the besieging men were attacking from a much-disadvantaged position. Ladders were simple to construct, but very difficult to use in battle. More appropriate was the *beffroy*, a wheeled tower that could be pushed up to the wall, once the ditch was filled with dirt. The tower's platform carried soldiers who would cross onto the wall when it was in place, while more soldiers climbed the tower's ladder to join the fray. (Koch 1978: 47)

To go under the walls meant to employ miners, whose objective was to collapse a section of wall; this method, then, is actually yet another endeavor to create a hole in the wall to attack through. Sometimes protected by a tortoise, the miners would dig under the castle wall, supporting it as they went with wooden spars. When they had finished, they filled the hole with kindling and set it on fire, burning through the beams and collapsing the wall. This was particularly hard to defend against, but the defenders could

put out bowls of water around the inner perimeter of their wall- if vibrations could be observed, they would betray the position of miners. Additionally, the miners' digging could sometimes be heard. Once mining had been detected, the garrison had to dig a countershaft, enter the miners' hole and fight them off. Such a clash, underground in a confined space, was very dangerous.

The final method, and the one most assured to succeed, was the blockade; the besieger cut off all supply and relief to the castle and waited for its occupants to starve. This was practiced concurrently with the above tactics- while the army was attacking, it was also on the defense to prevent supplies or a relieving party from reaching the castle. But waiting for this to take effect was often the last resort, as it took so much time and consumed so many resources. It was always preferable to oust the enemy more quickly, through some combination of the methods mentioned above.

The crossbow, which was often too slow a weapon to be used on the battlefield, was ideal for sieges, and, as mentioned previously, was used both by the attackers and by the defense. The castle was often equipped with large, wall-mounted crossbows, which were so powerful they needed to be drawn by a winch. These had a long range and could be used to counter the attacks of siege engines, by shooting the "gynors" operating them.

Conclusion

By Jack Waddell

I once read that fairy tales can only end "happily ever after" because the storyteller knows when to quit. Otherwise adventures are forgotten, heroes grow old, great loves part, and castles fall down. A similar principle applies to history; lines are drawn to discretely demark periods that flow continuously into one another, otherwise all the aspects that make the specific study interesting will devolve or evolve, and be obscured rather than satisfyingly concluded. Not all elements of the middle ages ended on January 1st, 1500 CE. Nor did all aspects of the middle ages begin like the flip of a light switch. But for conclusions to be drawn and comparisons to be made, we differentiate eras, just as we do colors on the visible light continuum.

Similarly, a specific study must at some time end with a sharp delineation. Ideally, these demarcations are made early in the project so that objectives are set and, with patience and work, met. Though there may always be more to do in some sense – more questions to ask, more facts to find – in a more realistic sense the storyteller must at some point say, "and they lived happily ever after for the rest of their days." Fortunate or no, a deadline does much to facilitate the terminus.

This project started with the goal of examining the relationships between the development of armor, weapons, and tactics used during the middle ages. This necessarily involved the investigation of specific weapons, armor, and tactics to find when, where, and how they were used. With time, the latter goal dwarfed the former, particularly due to the difficulty in completing the latter as described below.

Hopes were high throughout the project, despite numerous early signs that the project team was something less than a functional unit. Specific members were not contributing, were not working, were not engaging the opportunity to do research that is relatively unique, particularly for engineering and science students. While these signs were not overlooked, the gaffs were repeatedly forgiven by the remainder of the project team, a practice that benefited no one, least of all those to whom mercy was intended.

In regard to this aspect of the project, I believe that the team would have done much better to assign specific consequences to acts that indicate a lack of effort. For example, if a particular assignment is not completed by a specific deadline, the individual responsible should be reprimanded. If a second deadline is missed, the team should strongly consider cutting the individual loose. If a third deadline is missed, particularly for the same assignment, the individual should certainly be expelled. It is the team's responsibility to do this, though the advisor should certainly be consulted. Failing to follow these guidelines is likely to result in a situation similar to what this team experienced.

With that said, I will now summarize the course of the project.

Initially, during the PQP, our goal was to get enough information to understand what our project would entail. Access to resources beyond the WPI library was essential. Clearly, the Higgins Armory Museum (HAM) collection is extensive in regards to books on arms and armor. Due to my close acquaintance to a student in the Amherst 5-college area, I was able to obtain a number of books about tactics, arms, armor, and history from this source as well. These could be checked out and taken home, a significant advantage. Between the Amherst area libraries and the Higgins library, all the requisite sources were

obtained. Specific topics were quickly assigned to various members: I took the historical background, Brent Palermo chose weapons, Paul Tyler was assigned armor, and Justin Therrien picked tactics. Plans were made by each member as to what would be researched and written about during each week of the first term of the IQP proper. The ultimate goal was to finish the first complete draft for each section by the end of the first term.

During the first term of the IQP (C term 2002), we set about arranging a schedule for research at HAM. I brought books from the Amherst schools, and things, broadly, went decently at first. The arms, history, and tactics sections were worked upon, if a bit spottily at times. The armor section was not developed at all. The term progressed, but little of the writing did after this point. By the end of the first term, the history document was essentially complete, the arms document was mostly complete, but with several omissions, the tactics document was roughly half done, and the armor document consisted of half a page of near-gibberish. This would have been the point to seriously assign consequences for failure to complete assignments. However, mercy, cowardice, or optimism on our parts prompted us to continue blithely along.

The revised goals for the second term were to photodocument all relevant artifacts in the HAM collection and finish all the documents. The photodocumentation went relatively well, though there were occasional technical difficulties related to using unfamiliar models of digital cameras. A database on a laptop, sorted by artifact location, served very well to organize and streamline the photodocumentation process. This was one of the most exciting portions of the project, getting to see and feel items that had seen the sun over 500 years ago. Some were significantly older, with 1000 years on this earth.

There is indeed something to artifacts that represent history; it touches the temporal part of the human being that recognizes both the limited span of time it has seen and the limited time it will see, and thus respects items that human hands touched dozens of generations before.

The progress of the research documents was somewhat less awe-inspiring. Justin learned that he would not be returning for the next school year, and so he rushed to finish his tactics document. Some more slight progress was made on the arms section. The armor section consisted of 3 pages of material that was, while not gibberish, not up to the standards of scholastic rigor that was expected. Meanwhile, a few scripts were developed in order to facilitate a search of artifacts and to generate a webpage for a selected artifact, giving all acquired pictures of it, its name, and its description.

It was decided that Paul would work on the armor section over the summer using the books checked out from the Amherst area schools. Justin had given a nearly complete treatment of medieval tactics. It lacked many citations, but at least the information was there. He did not finish his and my collaboration of description of specific battles, the tactics utilized therein, and the historical relevance. The skeleton of this sub-project can be found in Appendix A.

The summer provided ample opportunity for concentrated research and writing. It may as well not have. Paul produced no results from the summer he had to write, and so I decided that we would swap duties: he would write the webpage code and associated scripts, and I would write the armor research.

Using the source available to me during the last week and a half of the summer and the wider variety of sources available during the first several weeks of terms of A

term, I managed to formulate a passable treatment of medieval armor. Paul had something resembling a web page. We were evidently ready to complete our project.

That, of course, didn't happen. The web page progressed very slowly, as did the arms document. A weird stagnation developed, and the end of A term found us up only by one armor document over the end of D term. We decided to continue into B term in order to have a reasonable final product.

It is difficult to tell if Justin's absence affected the progress of the project during A term. There was probably not enough to do at this stage for 4 people; the main hindrance was the incomplete nature of the arms document and the spinning-wheels approach to the web publication. Since it is hard to pinpoint what held us back during A term, it is difficult to say whether Justin's presence would have alleviated it.

The stagnation continued through the beginning of B term. Paul, who had agreed to sketch images of artifacts for inclusion in the documents in addition to work on the webpage, did little of either. He was terminated from the project in the middle of the term.

Halfway through B term, the last term we would devote to this project, the only obstacle was the completion of the arms document and the integration of all the documents into a whole. Paul's and Justin's absence at this point was likely not an issue.

Our journey gently wound to its conclusion. Ultimately, the vital documents were completed. Lacking enough members to cover it, the web page went into stagnation, though there are plans to complete it post-project. We have learned much – about history, about projects, and about group work, such as it is. I am disappointed that our road ended short of where I thought it might have gone, but I feel that this project

represents the sum total of good intentions and solid work of, at least, its last remaining members. I believe that it is informative and I hope that it will find use. In any case, it has been a worthwhile experience.

As for the project team and myself, well, let me steal a line. "And they lived happily ever after 'til the end of their days." At least we can hope so.

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Appendix

Appendix A: Battle synopses

The following 13 pages formulate the background and historical significance of five important battles that took place during the middle ages. They were meant to highlight the use of tactics and weapons in specific battles while giving the whole ordeal an anchor into the historical narrative. However, due to the loss of the member working in tactics, we were unable to complete the battle narrative.

The Battle of Hastings

The Norman Conquest of Enland

October 14th 1066

The Players:

1) Harold Godwineson, Earl of Wessex
2) William, Duke of Normandy

The Place:

Hastings, in southern England

The Stakes:

The Crown of England

Background:

In 1066, King Edward the Confessor of England died without an adult male heir the throne. A war followed, with four men vying for the English crown. Harold Godwineson immediately claimed the crown for himself, but would have to defend it from King Harold Hardrada of Norway, his own exiled brother Tostig, and Duke William.

Tostig fared poorly, but was the first to react to Harold's claim. In late April of 1066, he harried southern England, trying to round up support for his own claim. He was defeated in short order in Lindsey by Edwin and Morcar, serving Harold Godwineson. Tostig was out of the picture, but Harold was still endangered from the north by Norway, and from the south by Normandy. He left the northern defense to Edwin and Morcar, and concentrated himself on his southern border (Hooper and Bennett 1996: 42).

Harld Godwineson levied an army and a fleet and waited at the Isle of Wight, south of Wessex. Here he waited for a chance to ambush the flanks of a Norman invasion. But William did not come, delayed by both logistics and probably by the tactical consideration of trying to wait Harold out. Harold's levies expired.

Meanwhile, William was preparing his army. The ranks of the knights were filled by Norman nobles, feudally subservient to William, and by knights from neighboring territories intent on booty. William moved on September 12, but bad weather in the channel delayed him from arriving in southern England until late September.

Harold Godwineson's levies had dried up around this time, and Harold himself left the Isle of Wight on September 8th to return to London, leaving the channel unguarded. Harold Hardrada was preparing his own campaign in the north. He, along with Tostig that had taken up with him, landed near York with 300 ships or more. Edwin and Morcar, left in the north to defend against Hardrada, were instead defeated by him at Gate Fulfor on the 20th of September. York fell shortly after. Harold reacted quickly, covering the 190 miles from London in five days, assembling a new army along the way. The two Harolds met at Stamford Bridge, and Godwineson claimed a decisive victory (Hooper and Bennett 1996: 42 - 45).

Hardrada and Tostig were defeated, but the south was undefended against William, who landed unopposed on September 28th. Furthermore, Harold's army was exhausted, and had taken casualties. William had time to fortify a garrison on the Sussex coast and the bulk of his forces on a hilltop fort near Hastings. By the time Harold heard of William's occupancy of Sussex, it was early October.

Harold used the technique that had worked so well previously; he sped the 190 miles that separated York and London, building an army along the way. He didn't allow enough time for his army to gather, though, and the available men were tired. The army that went to Hastings was not at its prime. Neither did Harold's impressive speed surprise William, who relied heavily on reconnaissance.

On October 13th, William spied Harold's army approaching, and ordered them to stand prepared through the night, fearing an attack. But the attack did not come to William, so on the next morning, William brought battle to Harold.

The Battle:

<Justin's work will go here.>

The Aftermath:

William's victory was decisive. Harold and his brothers were all dead. William marched on to London, where Edwin and Morcar put the crown on the head of Edgar Aetheling, Harold's son and heir. William could not breach London, so he cut a swath around it, ravaging lands on the way. When his circuit was completed, he returned to London, where Edgar surrendered the throne. William was crowned on Christmas Day 1066. His conquest of England was not yet complete - uprisings continued until 1072 - but these were less vexing campaigns than had been his defeat of Harold (Hooper and Bennett 1996: 45). William's dominance of England brought with it feudalism, which merged with the existing English system of bureaucracy to form one of the most centralized and strongest governments of the Middle Ages.

The Battle of Crécy

First Campaign of the Hundred Years War

25 August 1346

The Players:

1) King Edward III of England
2) King Phillip VI of France

The Place:

Crécy, on the coast of Northern France, near the region of Picardy

The Stakes:

Potentially, Northern France. In actuality, Calais.

The Background:

The 14th century saw political instability and domestic issues harrying the kings of England and France. In efforts to distract themselves and their subjects from unsatisfying governance, both kings found a way to divert the energies of their populace. In 1339, King Phillip resumed conflict with England by trying to conquer Gascony, a land that had led to disputes between England and France before. Edward responded by claiming the French crown. In time, campaigning spread all the way from Scotland to Portugal, though the fighting was not universal and most campaigns lasted for relatively short periods, though the similarity of the conflicts added a degree of universality to them,

leading 19th century scholars to refer to the series of campaigns as "the Hundred Years War" (Hooper and Bennett 1996: 116).

Edward's attempts in France began with conventional war techniques. He acquired a large army of mercenaries and attempted to besiege Cambrai. This failed, so he decided to wreak havoc on the region instead, burning out a number of villages on the order of one hundred before Phillip roused himself to pursue Edward. Phillip, though, would not give battle, since a pitched battle would likely end in the English's favor.

Fighting continued. In 1340, the English surprised Phillip's fleet of 200 ships in harbor and destroyed 170 of the ships as well as 10,000 men. Edward was unable to press his advantage, though, and bankrupted his government in the attempt. A different strategy followed, and the English supported a claimant to the duchy of Gascony, John de Montfort. The French supported their own candidate, Charles of Blois. Two decades of guerrilla warfare followed the conflict between the Montfortians and Blois, but failed to provide England or France with a clear victory. In 1345, Edward's man Henry de Grosmont, earl of Derby went to Gascony and faced Bertrand d'Isle. Derby was the victor, leaving the English lieutenant unopposed in the region. Left there, Derby took the province of Poitou in 1346 as well, leaving the English dominant over much of southwest France.

In July of 1346, Edward tried for Normandy as well. He feigned a voyage to Gascony, but landed instead in Normandy with 15,000 men, intent on joining with a force from Flanders as well. He sacked Caen near the Channel in Normandy, and then traveled south-east, toward Paris. He challenged Phillip to meet at Poissy, but then pulled back across the river Seine and then the Somme. Phillip gave chase as the English traveled

north. The English halted in a strong position near Crécy. Phillip had been fairly successful at avoiding open battle with the English before, but politically could not withdraw from the challenge. So there the English and the French armies met and fought (Hooper and Bennett 1996: 116 – 120).

The Battle:

The Aftermath:

The defeat of the French left Edward mostly unopposed to lay siege to Calais. Phillip attempted a distraction, calling the Scottish King David to attack England from the north. Phillip even managed to bring an army of 20,000 together in 1347 to lay a counter siege to Edward's Calais. The French siege was unsuccessful, and they surrendered Calais to the English. These successful advances by the English were brought anticlimactically short by the onset of the Plague in 1348. Campaigning would begin again in 1355. The battle also demonstrated the advantages of the English longbow (Hooper and Bennett 1996: 116 – 120).

The Battle of Agincourt

The Hundred Years War

25 October 1415

The Players:

1) King Henry V of England
2) King Charles VI of France

The Place:

Agincourt, on the coast of Northern France, in the region of Artois

The Stakes:

Part of the English campaign to dominate Northern France

The Background:

English expeditions into France in 1411 and 1412 found France weakened by an oft-insane king and provincial fragmentation. Upon Henry V's rise to the throne in 1413, he began taking advantage of the French weakness.

In 1415, he invaded Normandy with 10,500 men, among them about 7500 archers, as well as siege engineers. Contracts imply that the original plan was to launch a chevauchée through Paris to southwestern France, but Henry instead decided to lay siege to the Norman port city of Harfleur. It was costly and slow, but successful. Henry left Harfleur with 6000 soldiers and took them 120 miles to Calais, facing hostile territory

and limited food supply. Henry was forced to detour around a French-held crossing on the Somme. After crossing, Henry continued up toward Calais, but the French army caught up to the tired and hungry army near Agincourt on October 25th (Hooper and Bennett 1996: 128, 129).

The Battle:

The Aftermath:

The success of the English strengthened Henry's support and France's determination against him. However, Henry had captured or killed over 1500 of France's nobles in the battle, which limited the extent to which French ire could be made manifest. Henry went on to conquer Normandy and sign the Treaty of Troyes in May of 1420, which made Henry the heir to Charles VI, and committed him to taking central and southern France from the dauphin Charles, Charles VI's son (Hooper and Bennett 1996: 128, 129).

The Battle of Arsuf

The Third Crusade

7 September 1191

The Players:

1) King Richard England, leading the crusaders
2) The Muslims, under Saladin

The Place:

Arsuf, 40 miles northwest of Jerusalem, on the Mediterranean Sea

The Stakes:

The first major obstacle between the crusaders and Jerusalem.

The Background:

The Third Crusade was called in Europe when Jerusalem was recaptured by Saladin in 1189. Emperor Frederick Barbarossa was the first European leader to head the call for Crusade, but he was drowned in Asia Minor after some initial success. His army was scattered, but portions of it rejoined under King Phllip II of France and King Richard. In March 1191, Phillip reached Acre, a Christian stronghold in the Holy Lands since the First Crusade that had been taken by Saladin.

Richard arrived at Acre a few months after Phillip, and despite tension between the kings, the city fell within two months of Richard's arrival. After a political mess involving the rightful King of Jerusalem, Phillip returned to Europe, leaving Richard the reins of the crusade. Richard began to march south to Jaffa, after which he intended to head to Jerusalem. On the path to Jaffa, he met Saladin's forces at Arsuf (Hooper and Bennett: 1996: 100, 101).

The Battle:

The Aftermath:

The Muslim forces were routed. Richard went on and took Jaffa by November, but could not risk a siege on Jerusalem, as Saladin was flanking him with another army. Also, in Europe, Richard's brother John and King Phillip were conspiring against him. So Richard, after conquering areas around Jerusalem, set sail for Europe once again in October of 1192 (Lindsay 1970: 190).

The Battle of Bannockburn

June 23/24, 1314

The Players:

1) Robert the Bruce, King of Scotland

2) Edward II, King of England

The Place:

Bannockburn, near the Castle of Stirling, in southern Scotland

The Stakes:

Traditionally, the Castle of Stirling.

The Background:

Since the strengthening of the Scottish kingdom in the 10th century, the Scots took most opportunities that they could find to invade England. These opportunities typically came when England was weakened by internal or external wars. Edward I of England, in an attempt to shore up English control, conquered Wales and attempted to do the same to Scotland. This met, for the most part, with failure. Though Robert the Bruce (who was not yet King of Scotland) gave in to Edward in 1302, and most of the other Scottish leaders followed suit by 1304.

In 1306, Robert killed a rival to the Scottish throne. He was driven out of Scotland by the remaining nobles, and lived in exile for a year. During this year, though, Scotland chaffed under Edward's rule, and when Robert returned to Scotland swinging a sword, he found a nation united behind him. Edward I died about this time, in 1307, leaving his son, Edward II, to rule England. The Scots tore through northern England,

destroying castles as they won them. The Scots did not have the resources to hold the castles, so removing them was to the English's disadvantage, but not the Scots' (Harper and Bennet, 1996: 76).

Thus was the situation when Robert's brother, Edward Bruce, was sent to Stirling to destroy it in June 1313. Stirling sat at the bridge across the River Forth, and was thus a very important strategic location. The governor of the castle, Sir Mowbray, offered Edward Bruce a bargain: instead of either army suffering a long siege, Bruce was to allow Mowbray to resupply the castle, after which Mowbray would keep all of his forces confined in the walls and would not interfere with traffic in the region. Bruce would leave the castle be, for the time being. If no English army came within 9 miles of the castle in a year and a day, Mowbray would surrender it to the Scots. Edward Bruce, seeing a way to bloodlessly conquer a castle, accepted, and a chivalric agreement was made between the two men (Nusbacher, 2000: 19).

And so, nearly a year later, Edward II rode the road through Bannockburn, intent on relieving the Castle Stirling. He was met by a smaller army of Scots under Robert Bruce, and battle was held.

The Battle:

The Aftermath:

Edward II lost at Bannackburn, though he technically succeeded in achieving the conditions of Mowbay's and Edward Bruce's bargain. This was not enough, though. The English could no longer hold the Scots back in their own lands, and the next ten years found Scottish raids into northern England. The English couldn't keep them out,

and the Scots couldn't take and hold anything of political value, though they seized a good amount of goods and ransoms with economic value. English and Scottish border fights would continue into the 1500s.

Appendix B: Armor Timeline

The following several pages were useful in organizing the snapshot sections at the end of the armor document. The database structure may very well be useful in organizing other materials in the future, so they are provided here.

Item	Sub Item - Specific	Emerged	Common by	Uncommon by	Rare By	Unused By
Body						
Hauberk	(not solely used after 1330)	Antiquity	Early MA	1420s		Post Period
	Haubergeon	1320s	14th	1420s		Post Period
	w/ Coif					2nd half 13th
	w/ Mufflers	4/4 12th		1330s		end 14th
Surcoat		mid-1100s				
	Reinforced	2/2 13th				
	Reinforced - Poncho					
Aketon			2/2 12th			
Cuirass cuir bouilii		3/4 12th				
Coat of Plates		(~1290)(arround before, but rare)	1320s			
	w/ fauld		mid-14th			
	w/ front and back portions					
	w/ rounded breastplate	1340s		1400s		1400s
	w/ less round breastplate (medial ridge)		1370s			
Breastplate (indep)		2/4 14th	1380s			
	rounded w/ medial ridge		1380s	15th		
	w/ backplate	1/10 15th	1420s			
	w/ plackart	1410s (?)				
	Kastenbrust	1420s		1430s		
	Kastenbrust w/ fauld, backplate, culet	1430s		1450s		
German "cuirass"		1450s				

	Gothic	1460s			end 15th	
Brigandine		2/2 1300s				Post Period
Cuirass	<?>					
Head						
"Norman"		Antiquity				
	Rounded	1150				1250
	Cylindrical	1180				1250
Coif				1260		
	Ventail					
Aventail		1260			1400?	
Kettle Hat		End 12th				
	Spangenhelm Fashioned	End 12th				1320
	Pointed Skull	1320				
	w/ sallet-like tail	1450s				
Cervellière						
		1220		1300		Early 15th
Helm		1220			14th	
	Slanted Top	1250	4/4 13th		14th	
	Visored	early 14th			14th	
Bascinet			1300			

	Pointed in back	4/4 14th				
	Visored	14th				
	W/ aventail	1330s				
	Pig Faced	1380s				
	Great Bascinet	1400	1430	1450		
Sallet		1430s	1430s			
	Shallow, long tail	1480s				Post Period
	Full Visor	1490s				Post Period
	Black Sallet	1490s				Post Period
Barbut		1430s	1430s		1470	
Cabecete						
		15th				
Armet		1410s				Post period?

Arm Armor

Muffler		4/4 12th		1330	3/4 14th	
Gauntlet		end 13th				
	C-o-p	end 13th			3/4 14th	
	Gutter Shaped Cuff	1320				
	Few plates, one finger plate	1340				
	Hourglass	1350	1370		1430	
	Articulated finger plates	1430				
Couters		1260	1300			

	Side wing	1335			
Vambrace		1310		1335	1347
	Enclosed Lower Cannon	1325			Post period
	Enclosed Upper and Lower	1340		Late 14th	
	Lamellar Upper Cannon	1450(G)			
Spaudler		1340	1420 (G)		
Pauldron		End 14th	1410		
	Assymetric	15th			
	w/ reinforcing plate	1420			
	w/ haute piece	1425			
	w/ gardbrace	1435			
Leg Armor					
Chausses		Antiquity?			
Gamboised Cuisse		2/4 13th		1340	
	Brigandine?	1340			
Poleyn		1250			
	Hemispherical (side prot.)	1270			
	smaller w/ side wing	1340			
	Lame to cuisse	late 14th			
	w/ puckered side wing	15th <late?>			
Schynbalds		1250	- 14th	late 14th	15th
				1310, says Edge	

Greaves		early 14th	1330
Plate Cuisse		1320	1370
	w/ outside hinged plate	4/4 14th	
Sabaton		1310	>1320