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1 *Introduction*

Fundamentals

If change, but variety in change, is a key theme of this book, then it is important to consider the earlier background to the period, both because that provides a context within which change can be assessed and because it helps explain this variety. Two significant socio-political themes emerge from this background, first the warfare of large states or empires and their opponents, and, secondly, warfare on a different scale involving both smaller states and societies that were not organised for deploying significant forces. This distinction is different to the standard one between settled societies and nomadic or semi-nomadic peoples, but, in practice, the two distinctions capture features of an overall matrix of military activity in which scale, political development, social characteristics, and environmental constraints were linked and mutually interacting.

Nomadic and semi-nomadic peoples generally relied on pastoral agriculture or slash-and-burn shifting cultivation, were less populous, and their governmental structures were less developed. These people did not therefore tend to develop comparable military specialisation, especially in fortification and siegecraft. A good example is provided by the peoples of highland South-East Asia,[1] or those of New Guinea and most of Borneo. While the agricultural surplus and taxation base of settled agrarian societies permitted the development of logistical mechanisms to support permanent specialised military units, nomadic peoples generally lacked such units, and had far less organised logistical systems. In war, these peoples and others lacking a defined state system often relied on raiding their opponents, and generally sought to avoid battle; although there was also frequently endemic violence between villages, clans and tribes. As a result, many, if not most, settlements were fortified.

Partly, however, because of a neglect of such people, but also as a result of the standard emphases, both in the history of war and, more specifically, in the study of the warfare of states, much of the discussion of the nature of conflict focuses on battle, more particularly battle between specialised

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military units. As a result, much of the discussion fails to give sufficient weight to the alternative 'little war' of raids, skirmishes, and small-scale clashes that were far more frequent aspects of war, both for nomadic or semi-nomadic peoples and for settled societies with specialised units. Moreover, this 'little war' was an important feature of 'big war' that could undermine or undo the consequences of victory in battle. This level of conflict was one in which the mobility of cavalry and light infantry proved particularly valuable, while battlefield formations and tactics were largely irrelevant.

As yet, there has been no systematic study of 'little war', although it was one in which distinctions between the regular forces of the state engaged in such fighting and irregulars were often far from clear. Moreover, irregular forces could be very substantial and several represented bodies with some of the attributes of independent statehood, for example the Cossacks. The range of such forces and conflict requires emphasis and they should not be seen as necessarily less effective than the 'high end' of warfare, represented by large-scale battles on land and sea, and the regular sieges of well-prepared fortresses.

Linked to these tensions over the relative significance of different types of conflict comes those over the description of warfare. For example, in the scholarship on Central Asian and pre-colonial sub-Saharan African conflict, there is a contrast between the argument that much, probably most, conflict was, as raiding war, qualitatively different from Western warfare, and, on the other hand, the claim that 'real' warfare, similar to that practised in the West, can be seen, and not simply what is dismissed as raids. Looked at differently, and challenging the use of Western terminology that downgraded warfare in other parts of the world, raiding can also be seen as real warfare. This issue is further confused by the extent to which military cultures have been constructed and greatly simplified, not least by misleading external categorisation in terms of militarism or passivity.[2]

The issue of subsequent academic construction is indeed pertinent when discussing the inherent military cultures of particular societies, although, at the same time, war-making was in fact culturally specific in particular societies.[3] Moreover, the culture of war could change in its characteristics and/or manifestations, as when Japan in the early seventeenth century essentially gave up war while maintaining many of the social and cultural attributes of bellicosity.

These factors all played a role in the pull-and-push dynamics of military activity; the dynamics arising from the demands placed upon the military and, on the other hand, the possibilities that it could offer. Military capability and action were framed in accordance both with the tasks or goals that

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political and military contexts gave rise to, and with the possibilities they created. These pull-and-push dynamics could be seen in terms of strategies, operations and tactics, each of which reflected tasks and possibilities. The dynamics could also be seen in force structures, notably the varied emphases on numbers of troops as opposed to experience, infantry as opposed to cavalry, and firepower as opposed to mobility.

At the same time, alongside differences between particular types of conflict, there were fundamentals to warfare in the early fifteenth century, fundamentals that remained pertinent throughout the period covered by this book. Most obviously, but so taken for granted by contemporaries that it was scarcely subject for mention, the conduct of warfare in all societies was very much the duty of men. Women were closely involved, notably because their agricultural labour was crucial to the economic survival of societies at war, and also as victims, whether directly or indirectly, and whether physical, mental, social or economic.[4] In particular, the rape and enslavement of women were habitual in raiding warfare. Nevertheless, the direct involvement of women as fighters was exceptional.

Secondly, the relatively low level of applied technology, and in even the most developed societies, ensured that all warfare remained subject to environmental and physical constraints which were common worldwide. The absence of any real understanding of infectious diseases, for humans and animals, combined with low agricultural productivity and the limited nature of industrial activity to ensure that population figures were low everywhere, by modern standards, and that the potential pool of warriors was restricted, although the armies deployed in the field were often larger than those deployed today. Moreover, the predominance of agriculture produced fighting men who, in areas of cultivation, were most available outside the harvesting season. A need for troops encouraged enslavement and slave raiding not only to provide labour but also to increase the pool of warriors, particularly in Islamic societies, or, at least, the auxiliaries necessary for conflict, such as porters carrying supplies and rowers propelling galleys.

Moreover, most labour was probably exerted by generally malnourished human or animal muscle, while other power sources were natural and fixed: water and wind power and the burning of wood, a bulky and immobile product. These power sources could not be moved with armies or fleets, which limited the mobility of the latter and made their operations dependent on resources obtained en route, most obviously with wind-powered ships. The nature of technology was such that there were no rapid communications on land or sea, which affected the movement of soldiers, supplies, and messages everywhere in the world. Nevertheless, there were notable

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examples of highly developed communications systems, for example the pony express of the Mongols, the runners of the Incas, the use of galleys in the Mediterranean, and the widespread employment of beacons.

Scale as well as speed was at issue. By 1450, no state had dispatched and sustained major naval and amphibious forces across the Atlantic or Pacific, let alone to the other side of the world, although such forces had been used at closer range, as with the unsuccessful Mongol invasions of Japan and Vietnam.

Returning to differences, the tasks and possibilities confronting military forces on land and sea were subject to perception, contingency and testing, and there was no fixed nature of warfare that could be affected by technological change, most obviously gunpowder. Indeed, given that the rise of gunpowder weaponry and its impact is an important theme in this study, it is necessary, at the outset, to stress that it is mistaken to see this rise as the sole theme. Moreover, such weaponry impacted on a very varied and dynamic global military environment, and these variations helped influence, if not determine, the response to this weaponry, and thus affected its influence.

In 1450–1600, especially 1450–1540, many established states were to be brought down by conquerors, including the Aztec empire of Mesoamerica (Mexico), the Inca empire of the Andes, both at the hands of Spanish conquerors; Byzantium (the Eastern Roman empire), the Mamluk empire of Egypt, Syria and Palestine, and the Jagiello kingdom of Hungary, all at the hands of the Ottoman Turks; the Aqquyunlu confederacy, which ruled Iran and Iraq, at the hands of Safavid invaders; and the Lodi Sultanate of Delhi, at those of Mughal invaders. Each of these successes indicated the effectiveness of force as a medium of change, as well as the frequency of war; and several of the conflicts highlighted military differences between particular cultures, in some cases major differences.

The Mongols

The situation of the Mongols was a direct continuation of centuries of conflict, conflict that has attracted particular attention in the case of Eurasia, as the sources are better there. Conflict frequently reflected the tension between settled societies and attackers, but this tension was also more complex than this explanation suggests because, alongside conflict and tension, there was frequent military co-operation across this border. Such co-operation rested on a careful politics of mutual advantage. For example, Chinese relations with nomadic and semi-nomadic peoples of the extensive steppe lands to the north-west and north, notably the

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Mongols, rested on a combination of force with a variety of diplomatic procedures, including *jimi* or 'loose rein', which permitted the incorporation of 'barbarian' groups into the Chinese realm. Their chiefs were given Chinese administrative titles, but continued to rule over their own people in the traditional fashion, which assisted the policies of divide and rule that were important to the Chinese influence in the steppe.

Such management spectacularly broke down in the thirteenth century, and this failure contributed directly to the starting point, for part of the world, of a process of change that offers an alternative to the Western European focus, in discussing and explaining change, on Western European trans-oceanic activity from the 1490s. The latter emphasis reflects a more general Western assumption that modernity as a distinctive condition began in the period 1450–1550 and that an early modern period beginning then is a helpful tool for historical analysis.[5] This approach, however, has limited value as far as most of the world is concerned. Indeed, the Chinggisid (descendants of Temüjin, Chinggis Khan) Mongol empire of the thirteenth century has been claimed as the starting point for continuous global history since it led to the beginning of interlinking exchange-circuits of technologies, ideas, and even diseases. Moreover, it has been suggested that the Mongol rulers deliberately helped such circuits in order to strengthen their system, which took further already-existing links along the silk roads west from the Orient, and was particularly important to relations between China and Iran.[6] Both were overrun by the Mongols who, also conquering southern Russia, Turkestan (Central Asia), and Iraq, advanced as far as (although not conquering) Poland, Hungary, Serbia, Syria, Java and Japan, thus creating the largest contiguous empire in the world.

Weaponry and tactics were both important to Mongol success, but organisation more so. Defining the challenge for many other military systems, the Mongols used cavalry, specifically mounted archers, to provide both mobility and firepower, and such archers remained a key military force across much of the world into the seventeenth century and, in some cases, beyond. Storing compressive and tensile energy by virtue of its construction and shape, allowing it to be smaller than the longbow, their compound bow was a sophisticated piece of engineering. Mongol skill in employing bows and arrows was tactically crucial, with horsemanship being particularly important. The Mongols used short stirrups, which had a major advantage over long stirrups for accurate fire, as the rider's torso was free of the horse's jostlings, while his legs acted as shock absorbers. The use of short stirrups required greater ability as a rider as it was easier to be unhorsed, but their use helped provide a steady firing platform, although skill was also necessary to shoot arrows in any direction and also when

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riding fast. Standing in the stirrups provided more accuracy than bareback riding or the use of cavalry saddles. A Song general noted of the Mongols, 'It is their custom when they gallop to stand semi-erect in the stirrup rather than sit down.'

Aside from skill in riding, the Mongols also benefited from the hardiness of the horses. As in the savannah lands of West Africa, the emphasis was on small breeds of horses, employed more for mobility than for shock.[7] In turn, control over the major breeding and rearing areas of effective horses of this type provided a major advantage, notably for the Mongols. Such control remained very important to the geopolitics of military power. The Mongols, moreover, were adept at cavalry tactics, such as feigned retreats, and at seizing and using the tempo of battle. Cavalry was crucial to the envelopments that characterised many of their battles. The Europeans had nothing to match them. The Mongols also had heavier cavalry lancers as part of their well-balanced mobile forces. As another instance of variety, the cavalryman of the West African savannah was armed with lance, sword and javelins, as well as bows.

Fighting skill alone did not suffice. Temüjin, known as Chinggis Khan, or fierce, firm, resolute leader, who was named khan, or overlord, of the Mongols in 1206 after a period of sustained tribal warfare, restructured their army, uniting the nomadic tribes into a single force, as well as appointing commanders on the basis of talent, and not of blood-right. He displayed exceptional leadership. In addition, the Mongol culture and way of life provided a ready-made manpower pool of trained warriors used to extensive travel over large areas. Mongol logistical support was highly effective because it reflected and mirrored their normal nomadic state. The Mongols were effectively logistically self-contained in their early conquests, and used local knowledge and resources effectively when they needed to bring up heavier siege equipment.

Moreover, the Mongol tsunami method of conquest was especially effective: they invaded and devastated a large region, but then withdrew and held only a small section of territory. The Mongols thus created a buffer zone that made it impossible to attack them and also weakened the enemy's resources. Also, by only occupying small chunks of territory, they did not tie down troops in garrison duty. Instead, a relatively small force could control the region while the civil administration moved in and integrated territories into the empire. Then, the border troops moved forward and added new territory. This tidal-wave process – the large invasions, then pulling troops back, then surging forward again like a wave – allowed the Mongols to fight on multiple fronts without overextending themselves.[8] This process lasted until the reign of Möngke Khan (1250–9), a grandson of Chinggis

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Khan, under whom administrative reforms permitted a maximising of their resources, enabling the Mongols to send huge armies, such as that under Hülegü which captured Baghdad, a centre of Muslin civilisation, in 1258, an attack referred to by Saddam Hussein in 2003 when seeking to mobilise Iraqi public support against invasion by an American-led international coalition.

As with that of other successful steppe peoples, the military skill of the Mongols depended in part on making a transition to city-taking conflict. To move from raiding and victory in battle to seizing territory required an ability to capture fortified positions, and, largely by using Chinese expertise, the Mongols acquired skill in siege warfare during the numerous campaigns required to conquer the Jurchen Jin empire of northern China and the Song empire of southern China, campaigns that represented the most impressive use of force in the thirteenth century. The lengthy nature of the sieges was possible only because of Mongol organisation and persistence, while their ability to elicit and coerce support was also important. Similarly, the Mongols developed a navy from captured Chinese maritime resources, acquiring the relevant expertise from the Chinese and the Koreans. The latter provided the better ships, and for his unsuccessful invasions in 1274 and 1281, Khubilai drew on resources from his entire East Asian empire not just China.

The Mongol ethos was also important, as, if opponents refused to accept terms, the Mongols employed terror, slaughtering many, in order to intimidate others. This policy may have increased resistance, but also encouraged surrender. Success also helped the Mongols, at least initially, to maintain cohesion as well as to win support from other steppe peoples. No other state matched their military strength nor, on land, was any to do so in the period 1450–1600. Indeed, the idea of development in military history has to address this contrast, as it is all too easy to assume that the passage of time automatically brought greater strength and lethality, which is a view far more correct for the nineteenth and twentieth centuries than for earlier periods.

After the death of Möngke, a civil war over the throne ensued, and then rivalry between other Chingissid princes tore the inheritance into four empires: the Empire of the Great Khan, the Khanate of the Golden Horde, the Chagatai Khanate, and the Il-Khanate. Defining the political context across much of Eurasia, these were still far-flung empires, especially the first, which united China, included the Mongol homeland, and held sway over Korea, Tibet, and much of South-East Asia. Khubilai, the Great Khan, a grandson of Chinggis, moved the capital from the steppe to Beijing in 1264.

The fourteenth century was an age of Mongol decline, in part because of conflict within the ruling élite, but other factors also played a role. In China,

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corruption in the bureaucracy angered many, as did animosity between the rulers and ruled, natural disasters, and less competent rulers. The Mongols were driven from China by rebellions in 1356–68: the establishment of the Ming dynasty of Zhu Yuanzhang in 1368 followed the flight of the Mongol emperor from Beijing back to the steppe ahead of the approaching Chinese army.

Having effectively controlled or threatened much of Eurasia, the withdrawal and decay of the Mongols offers an appropriate starting point for the subsequent military history of much of Eurasia. A range of weapons played a role in this history. Thus, in India, the impact of improved cavalry, not least more effective mounted archers, was increased in the thirteenth and fourteenth centuries by developments in siege technology, notably the introduction of trebuchets, counterweight ballistic machines, from the Middle East, as well as of gunpowder, fired in bombs by ballistic machines or used for sapping under the walls, from China via the Mongols.[9]

Timur

A new power emerged in Central Asia in the person of Timur the Lame (1336–1405; later called Tamerlaine), who modelled himself on the Mongols and claimed descent from Chinggis, a significant source of legitimacy, although, in fact, he was not a Chinggisid. Timur married Chinggisid princesses so that he could have the title of Güregen or son-in-law. Timur provided a clear instance of the potential of steppe forces. He filled the vacuum left by the Mongols and employed the same methods. Having gained control of the Chagatai Khanate, Transoxiana, where his capital was at Samarqand, Timur conquered the city of Herat in Afghanistan in 1381, before successfully turning on Persia (Iran), and then he attacked the Golden Horde. Prestige and legitimacy were important as Timur wished to demonstrate his superiority over Toqtamysh, the Golden Horde khan, who had earlier gained his position as a protégé of Timur. Victory was followed by the sacking of the capital, New Sarai, and Timur rerouted the Central Asian trade routes to converge on Samarqand. Timur pressed on to sack Delhi (1398), a traumatic event for the Islamic sultanate of Delhi that left it greatly weakened, followed by turning west to capture Baghdad and Damascus in 1401.

Next year, with rumours circulating of his plans for global conquest, Timur turned against the Ottoman Turks, defeating them at Ankara on 20 July: after a long struggle, Timur's army, which was mostly cavalry, was victorious, not least because much of the Ottoman cavalry defected or abandoned the field. Subsequently, in a pattern that was frequent, the Ottoman infantry was finally broken: the cavalry struggle tended to decide

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the fate of any battles which increased the significance of cavalry. At the time of his death in 1405, Timur was planning to invade China.[10]

The two great nomadic empires of Chinggis and Timur, and, in particular, alongside their cavalry lancers, their light cavalry armed with compound bows, had been exceptionally successful in extending their sway, not least because China, Europe, and the states of South and South-West Asia, really had no answer to the sort of power they deployed. This situation remained partly true for centuries, although the sixteenth century indicated that, alongside reliance on using mounted archers against mounted archers, as in the frequent conflicts between the Safavids and the Uzbeks, fortifications and firearms could act as important force-multipliers in successfully resisting their attack.

However, although the nomadic empires had more organisation than is often appreciated and were more than simply raiding empires, they lacked the density of resources that the Europeans and Chinese were to command. Moreover, the political decay of these nomadic empires, which was brought about through lack of legitimating principles, frequent succession struggles, and absence of a common ethnic base, rather than military limitations, provided opportunities for other powers. Timur, in particular, failed to plan for the future. Yet, these problems were scarcely unique to nomadic empires, and the territorial changes in Christian Europe between 1400 and 1600 often reflected similar factors. Timur's son and successor, Shāhrukh (r. 1405–47), lacked his father's dynamism and aggression, and under his rule, based in Herat, Timurid government became increasingly sedentary.

The Americas

Extensive steppe grasslands were an important basis for light cavalry, but this was not the natural or military environment of war across much of the world. The horse was not native to the Americas nor to Australasia and Oceania, and was not found across much of Africa south of the savannah belt, in part due to disease. However, far-flung empires were not created by cavalry only. The successive empires of the Andean chain in South America, including the Chimú empire (*c.* 700–1475) and, far more, the Inca empire (1438–1532), showed what could be achieved by infantry-based armies. The Incas conquered the Chimú and spread their power into modern Ecuador and central Chile, although their technology was relatively unsophisticated. Subject peoples were used to provide the porters that ensured the logistics of their far-flung campaigns.

The Incas' counterpart in central Mexico, although scarcely on the same grand scale, was the Aztec empire, which gained control of much of the

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region in a series of campaigns in the fifteenth century, while also making adroit use of alliances. Like the Incas, the Aztecs were highly militaristic. Huitzilipochtli, the God of War, was a major force in their religion.

There were no empires, however, across most of the Americas, let alone Australia, Siberia and Oceania, where native peoples fought with wood, bone or stone weapons. Instead, population densities in these regions were low, and both settlement and authority were dispersed. That, however, did not mean that there were no wars or conquests. Indeed, accounts of aboriginal peoples as essentially pacific are seriously misleading and fail to appreciate the consequences of a lack of state authority to limit conflict. For example, in northern Canada, the Dorset culture of the Palaeo-Eskimos of the eastern Arctic was overwhelmed from about 1000 by the Thule people of northern Alaska, whose kayaks, float harpoons and sinew-backed bows made them more effective hunters of whales. On land, the Thule gained mobility from dogsleds. The Dorset people were killed or assimilated.

Further south, in southern Ontario, where, because it was warmer, it was possible to cultivate crops, the spread of settlement led by 800 to the construction of villages protected by palisades, and, eventually, by double palisades, which created a series of defendable cul-de-sacs. These agricultural societies fought: in about 1300, the Pickering people conquered and partly assimilated the Glen Meyer, while, in the fifteenth century, the Huron conquered the St Lawrence Iroquois. In North America, there was 'public' warfare, in the form of conflict between tribes, but also 'private warfare': raids with no particular sanction, often designed to prove manhood.

Africa

There was a similar pattern in Africa to that in the Americas. Alongside wide-ranging polities, such as the Malinke empire of Mali in the thirteenth century, there were many areas in which there were no such polities, for example South-West Africa. Moreover, as in Asia, nomadic herders pressed when they could on settled peoples. Thus, in the thirteenth century, the Banu Marin advanced from the fringes of the Sahara to overrun Morocco. Subsequently, Abu'l-Hasan, the 'Black Sultan' (r. 1331–51) of the Marinid dynasty in Morocco, overran the Maghrib (North-West Africa), capturing the city of Tunis in 1347, but found it impossible to defeat the Christians in Spain when he invaded in 1340.

Alongside Islam, there was a spread from North Africa to inland west Africa, from at least the fourteenth century, of larger breeds of horses, new equestrian techniques, and new tactics of cavalry warfare. As with Eurasia,

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changes in cavalry capability proved significant, which focused attention on the supply of horses. Cavalry was particularly important in the *sahel*, the savannah belt to the south of the Sahara, which was suitable cavalry terrain; but, in turn, this reliance on cavalry increased the dependence of operations on the availability of water and fodder, especially grass.

Europe

Compared to the range and sway of the great Asian conquerors, their (Christian) European counterparts were insignificant. On the global scale, European (Western) impact was limited. The Russian principalities were unable to prevail against the powers to their east, had to pay tribute, notably to the Golden Horde, and found themselves the victims of high rates of slave raiding, much of which fed the slave trade via the Black Sea to the Near East and the Mediterranean. As another instance of limited impact, the Vikings established settlements in Greenland and (far more briefly) North America, but could not maintain them. At a far larger scale, the Crusades to the Near East, first proclaimed in 1095 and pursued with great energy over the following two centuries, failed.

Moreover, although the Muslims were driven from most of Spain, while, thereafter, there was Spanish and Portuguese expansion into the Atlantic islands and Morocco;[11] there was also a significant shift of success away from Christian Europe in the fourteenth and fifteenth centuries on its south-eastern boundaries. This shift was particularly apparent after the defeat of the allied Balkan army at Kosovo in 1389, following which the Ottoman Turks reduced Serbia and Wallachia (southern Romania) to tributary status. The Ottomans combined the classic mobility and fluidity of Asian light cavalry tactics with an effective use of infantry. They were helped by a further victory at Nicopolis in 1396 in which Western cavalry, many from France, advanced impetuously through the Ottoman infantry, only to be broken on the Ottoman gun lines and then driven back and routed by the Ottoman cavalry reserve.[12]

The Ottoman advance was greatly delayed by the impact of Timur, whose victory at Ankara in 1402, which led to the capture and imprisonment of sultan Bayezid I, the victor of Nicopolis, was followed by the reversal of Ottoman dominance over much of Anatolia. Indeed, Timur's victory was celebrated in Constantinople (Istanbul), the capital of the embattled and truncated remnant of the Byzantine (Eastern Roman) empire. Subsequently, the Ottomans' advance was adversely affected by civil warfare, but, in the 1430s, they resumed their pressure, driving the Venetians from the city of Thessalonica in 1430 and overrunning much of Serbia in 1439.

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Another large crusade was launched in 1443 in response to the Ottoman successes, and it was initially successful. The Hungarians captured the cities of Nis and Sofia, and supported rebellion against Ottoman rule in the Balkans; but, in 1444, the predominantly Hungarian army was heavily defeated by the Ottomans under sultan Murad II (r. 1421–44, 1446–51) at Varna on the Black Sea. The Crusader army totalled about 16,000 men, the Ottomans close to 60,000. King Wladislas I of Hungary (Wladyslaw III of Poland) was killed on the battlefield.[13] Four years later, the Hungarians were defeated again at Kosovo; Ottoman successes underlining the weaknesses of Western warmaking and military organisation.

Western warmaking was varied, with the French emphasis on heavy cavalry and castles not matched in Spain where, instead, there was a far greater stress on light cavalry. This cavalry proved more effective against the Moors, less expensive, and better attuned to the arid environment in Spain, although heavy shock cavalry still had a value in battle which indeed led to the hiring of Christian knights for conflicts between Islamic rulers in Spain and North Africa.

Infantry was of particular significance in northern Italy, the Swiss cantons, Flanders and Scotland. Combining infantry with firepower, the English developed archery. Their longbowmen, however, lacked the tactical and operational flexibility of Central Asian archers. The longbowmen were sometimes mounted for movement on campaign, and indeed Philip II of Spain, when he visited England in 1554, was to have a bodyguard of 100 mounted English archers. However, longbowmen could not fire from the saddle and, even if they rode to the battle, tended to fight on the defensive. This situation meant that their men at arms were also required to fight on foot, sacrificing their mobility and shock effect in the process. This practice ensured that armies with longbowmen as their core component depended on being attacked; a general problem with infantry forces in the period.

The relative limitations of longbowmen is instructive as there is a tendency to treat archers as progenitors for the subsequent introduction of hand-held gunpowder weaponry and, more generally, to present the development of infantry, especially when armed with bows or handguns, as the route to military proficiency. This teleological approach has led to a slighting of the variety of medieval warfare, not least the value of cavalry, and to a misleading account of the changes in this warfare, including those through the use of pole arms, pikes, field fortifications, wagon forts, and the continued development of heavy and light cavalry.

A more significant problem than the failing of particular arms was posed by the difficulty of turning victory in battle into a permanent settlement, as the English discovered in Scotland and France in the fourteenth

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century. This problem recurred in the early fifteenth century in the latter stages of the Hundred Years War between the kings of England and France (1337–1453). In support of dismounted men-at-arms, Henry V of England's archers helped defeat the successive advances of the French at the battle of Agincourt in 1415, and Henry subsequently conquered the Duchy of Normandy and the valley of the Seine. He was helped by his use of siege artillery but these did not prove to be decisive, and mining and starvation tended to be the methods used to bring a successful conclusion to a siege. Henry owed his overall success to the continuing divisions between the Burgundian and Orleanist branches of the French royal family. Although, by the Treaty of Troyes of 1420, Henry was recognised as the heir to Charles VI of France, his area of control did not extend south of the Loire Valley, and did not include the Burgundian domains of eastern France.

The struggle continued with Charles VI's son, Charles VII (r. 1422–61), rejecting the claims of Henry V's infant son, Henry VI (r. 1422–61, 1470–1). The French suffered further defeats, notably at Verneuil (1424), where they were assisted by a large Scottish expeditionary force. This battle was on a similar scale to Agincourt, and illustrated the effectiveness of the English archers. In the battle, fully-armoured Italian *condottiere* (mercenary) cavalry, riding barded (armoured) horses, and with arrow-proof armour, rode down the English archers and broke the English front line. However, the English reformed and successfully used the lightly-clad archers in support of the men-at-arms in the close-quarter fighting that followed.

Nevertheless, the English forces became over-extended, and home support began to wane. This led to a major English reversal at Orleans, where their siege works were incomplete due to a lack of manpower, which allowed a French army, whose morale was restored by a charismatic peasant girl, Joan of Arc, to break the siege in 1429 and to inflict a series of defeats on the retreating English forces. The political context, however, was the crucial factor for continued English success, and when, in the mid-1430s, they lost the support of Philip 'the Good' (r. 1419–67), the powerful Duke of Burgundy, their defeat became inevitable. The surprising thing is that the English occupation of Normandy, Anjou, Maine and Gascony lasted as long as it did, but the collapse in 1450 was spectacularly swift, and was aided by an effective use of siege cannon by the French.

Gunpowder

The genesis of gunpowder weaponry was a long one. It had first developed in China, where the correct formula for manufacturing gunpowder was discovered in the ninth century. An established arsenal to produce

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gunpowder existed by the mid-eleventh, effective metal-barrelled weapons were produced in the twelfth, and guns were differentiated into cannon and handguns by the fourteenth.

Each of these processes in fact involved many stages. Although the ability to harness chemical energy was a valuable advance – and cannon have been referred to as the first workable internal combustion engines – gunpowder posed serious problems if its potential as a source of energy was to be utilised effectively. It was necessary to find a rapidly burning mixture with a high propellant force, while an increased portion of saltpetre had to be included in order to transform what had initially been essentially an incendiary into a stronger explosive device. Saltpetre was not easy to obtain.

The effectiveness of cannons was limited by their inherent design limitations throughout the fifteenth century. Large siege bombards were extremely heavy and cumbersome to move and position, and confronted all armies that used them with a major logistical problem. The use of a separate breech chamber to hold the powder and the shot made them slow to load, and the requirement to cool down after firing limited their rate of fire. Great skill was required by the gunsmiths to hammer lengths of wrought iron together to ensure that the seams were able to withstand the pressures generated within the barrels. In 1460, James II of Scotland died while laying siege to Norham Castle when one of his Flemish bombards exploded beside him, as the wedge holding the breech chamber in place was blown out.

However, the employment of improved metal casting techniques, that owed a great deal to the casting of church bells, and the use of copper-based alloys, bronze and brass, as well as cast iron, made cannons lighter and more reliable, as they were able to cope with the increased explosive power generated by 'corned' gunpowder. Improved metal casting also allowed the introductions of trunnions that were cast as an integral part of the barrel, with the improved mobility that this gave, along with higher rates of fire. The introduction of more powerful and stable 'corned' gunpowder and iron cannonballs, supplemented by canister, or grape shot, and mortars combined with the advances in casting and metallurgy alluded to above, made cannons more flexible and effective. Around 1420, 'corned' powder was developed in Western Europe, the gunpowder being produced in granules which kept its components together and led to it being a more effective propellant, providing the necessary energy, but without dangerously high peak pressures. Furthermore, the use of potassium sulphate, rather than lime saltpetre possibly from about 1400, helped limit the propensity of gunpowder to absorb moisture and deteriorate.[14] As a result of these changes, the military possibilities offered by gunpowder were to become increasingly apparent in Europe in the mid-fifteenth century.

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Maritime Power

However, it was far from clear at that stage that gunpowder was to help lead to greater relative power on the world stage for the West. The same was true of maritime power. A Portuguese amphibious expedition had seized the city of Ceuta in Morocco in 1415 beginning what was to be a major commitment to conquest there, Portuguese settlement of the Atlantic island of Madeira began in 1424 and of the Azores in the 1430s, and in the 1440s the Portuguese explored the coast of West Africa as far as modern Guinea.

At the same time, however, the Chinese were far more wide-ranging and powerful. In 1161, gunpowder bombs fired by catapults helped the navy of the Song to defeat that of the Jurchen Jin. Such bombs were also used by the Mongol rulers of China in naval operations, including their unsuccessful invasions of Japan in 1274 and 1281, while the Ming fleet possibly carried cannon from the 1350s. In contrast, although shipboard cannon were used earlier, the first naval battle in which European guns were used by both sides occurred at Chioggia in 1380 between the two leading European naval powers: the Venetians defeated the Genoese. Each was able to support its naval strength on the profits of maritime commercial empires, while this strength helped sustain the trade and bases that were central to these empires.

Under the Ming, a series of seven expeditions was sent into the Indian Ocean between 1405 and 1433 under Admiral Zheng He (1371–1433), and, at considerable expense, Chinese power was made manifest along much of its shores. The largest ships carried seven or eight masts, although claims that they were nearly 400 feet in length have been questioned, not least as the dimensions do not correspond to the figures for carrying capacity, tonnage and displacement. Nevertheless, these were probably the largest wooden ships built up to then and, thanks to watertight bulkheads and several layers of external planking, they were very seaworthy. A stele erected by Zheng He explained his mission as one of spreading a Chinese world order of peace that held barbarianism at bay: 'Upon arriving at foreign countries, capture those barbarian kings who resist civilization and are disrespectful, and exterminate those bandit soldiers that indulge in violence and plunder. The ocean route will be safe thanks to this.'[15] Indeed, Chinese patronage was important to the commercial strength of the leading South-East Asian entrepôt of Malacca (Melaka) and the Indian entrepôt of Cochin.

Conclusion

At the same time that, on land, they were pressing south-west into the uplands of South-East Asia and also attempting, albeit unsuccessfully

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in the face of guerrilla warfare, to control Dai Viet (North Vietnam), the Chinese under Zheng He, in a major show of force designed to extend the Ming tributary system, reached Zabid, the capital of the Tahirid sultan of Yemen, and Mogadishu in Somalia. On the third expedition, the Chinese successfully invaded Sri Lanka in about 1411. In addition, they intervened in Sumatra in 1407 and 1415.[16] South Asian trading patterns were affected by the expeditions. Just as on land there was no reason to assume that the Western armies were superior in weaponry, tactics and organisation, so it was by no means clear that the West would dominate the oceans and eventually, therefore, the world.

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