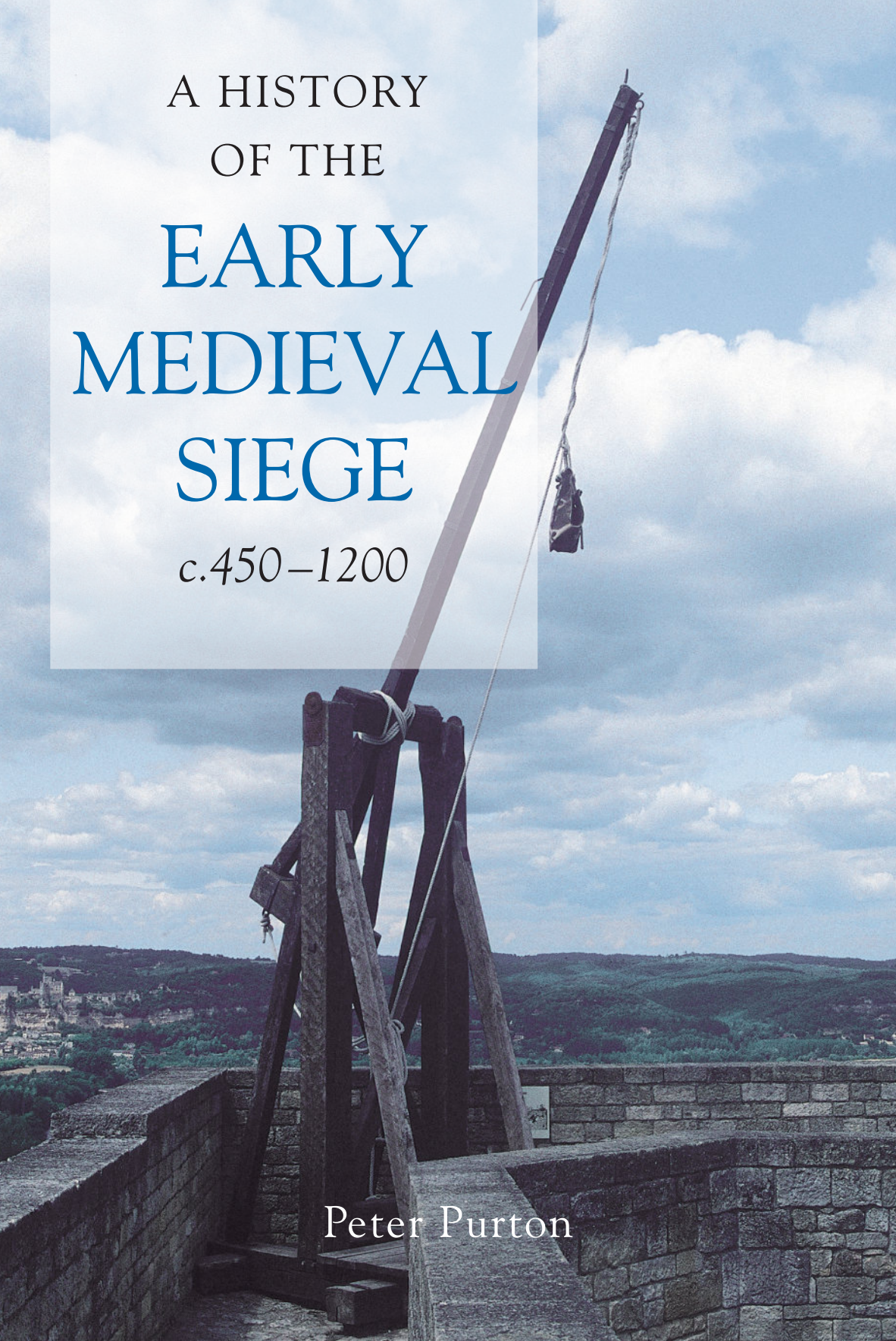
A HISTORY
OF THE
EARLY
MEDIEVAL
SIEGE
c.450–1200
Peter Purton

A history of the early medieval siege, c.450–1220

Sieges were the predominant form of warfare across the medieval world, and siege methods and technology developed alongside improvements in defence. This book goes back to the original sources to present a comprehensive view of the whole subject, tracing links across continents and analysing the relationship with changes in the design of town and castle defences, and linking contemporary historical accounts with archaeological studies. It considers the most important questions raised by siege warfare: who designed, built and operated siege equipment? How did medieval commanders gain their knowledge? What were the roles of theoretical texts and the developing science of siege warfare? How did nomadic peoples acquire siege skills? Were castles and town walls built purely of a military purpose, or did they play a symbolic role also?

The volume begins with the replacement of the western Roman empire by barbarian successor states, but also examines the development of the Byzantine Empire, the Muslim Caliphate and its successors, and the links with China, through to the early thirteenth century.

A history of the early medieval siege
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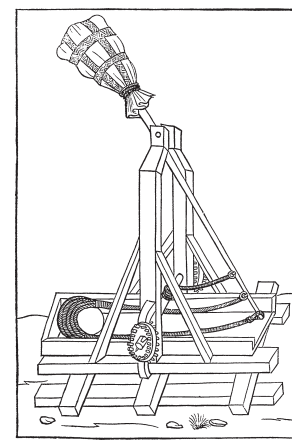

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Preface

Archaeology and history confirm that, from prehistoric times, people created fortified places, and others tried to capture them. Ancient civilisations such as Greece, Rome, Persia, India and China reached high levels of strength, sophistication and advanced technology in both defence and attack.

Two of the last great empires of the ancient world, Rome (in its western division) and Persia, were replaced altogether between the fifth and seventh centuries AD, leaving a much transformed eastern Rome (Byzantium) as the sole memory of the classical world in Europe, Asia Minor, the Middle East and North Africa. China underwent dramatic upheavals, with "barbarian" invasions and new dynasties, while maintaining cultural continuity.

The following thousand-year period is known to Western historians as the Middle Ages, and it had sufficient common characteristics to justify it being seen as another historical era. The term "medieval" has been used to suggest an interval of ignorance, superstition, barbarism and "darkness" between the glories of classical civilisations before, and a more enlightened modern age after, born in Europe with the Renaissance, then exported to other corners of the world (whether wanted or not) through imperialist expansion. This book tries to view medieval history in its own terms. But medieval times *were* ignorant, barbaric and, for most of humanity most of the time, miserable. Only for a period between the eleventh and thirteenth centuries (in Europe) was there sustained economic growth and prosperity, and even then economic development was very slow, despite significant technological innovation that made for substantial improvements in productivity. Normally, much of the surplus that was generated from the economy went (or was expropriated) to sustain the religious institutions and the lifestyle of the numerically relatively small class of rulers. Although medieval societies were different from each other and changed substantially over time, sometimes making the upper levels of the peasantry or townsfolk barely distinguishable (in economic terms) from the lower levels of the nobility, the rural knights, the fundamental shape of society remained the same, and status or caste continued to maintain social distinctions. The glories of the age, the magnificent architecture of cathedrals and major castles, stood in extreme contrast to the misery of life, most of the time, for the overwhelming majority. All the evils of underdevelopment in the twenty-first-century world — vulnerability to famine, disease and infant mortality, short life expectancy, lack of education, and the persistence of superstition — were the common fate of medieval peoples for most of the period.

There were other important distinctions. Economic and social structures

differed profoundly from modern industrialised societies. Every early medieval state — be it in Europe or Asia — could only function by devolving power to regional and local élites. These élites were the landowners (both lay and ecclesiastical), and land was the only significant source of wealth, power and influence. To the owners of the land also belonged the right to bear arms and the right to build fortifications - not, as was once commonly argued, to contest the royal power, but as a normal part of the social superstructure.[1] Only towards the end of the time covered by this volume were more centralised, less personal and more bureaucratic forms of government beginning to emerge in some areas.

Today, anachronism abounds in the information about the Middle Ages presented by the media. But at least modern cinema sometimes recognises that siege warfare was the predominant form of war. Modern warfare, following the French Revolutionary and Napoleonic wars and the writings of Clausewitz, was based until the current age on mass armies and decisive battles. Medieval warfare was different in almost every respect (with the exception of the disastrous consequences for those caught up in it), with different objectives and methods. Rarely was annihilation of the enemy through decisive victory the strategy — on the contrary, all good advice of the age proposed battle as the last resort because of the uncertainty of the outcome. Even where battles were "decisive", they rarely led on their own to the end of conflicts. Often they were actually the result of or precursor to sieges. War could have many different objectives, just as at any other time, and the notion that medieval rulers were incapable of military planning is another long-standing myth. Whatever the objective, the securing or defending of strong places was routinely an essential element.

This book therefore is a study of how siege war was conducted, how it developed, what the connection was between evolving techniques of attack and defence, and how fortifications developed. There have been many studies of individual sieges, of siege warfare as an element within the events of particular wars, and of siege weapons. Studies of castles (and, lamentably far behind castles, town walls), have advanced our understanding of the role, function and purpose of these structures out of all recognition. New volumes are added to the shelves every year. What *this* book seeks to do is to place all of this within the context of global development across the Middle Ages. Using contemporaneous evidence, I seek to reconstruct what actually happened, and where archaeology has revealed what stood at the time, the link has been made. I have been able to visit quite a number of the sites described. By comparing this information with developments elsewhere at the same time, a clearer picture of the process of development emerges.

Why cover the whole (then known) world? Because if, at the bottom, society was usually literally parochial, higher up the social ladder it was international. The ruling classes were often well travelled, national borders as known today did not exist (the boundaries of lordship being usually more significant), and ideas,

[1] The development of cities followed different patterns in Europe from that in the Far East. Many studies exist. But in neither did the urban élites become an alternative source of power to the landed class, even in places where cities themselves became, locally, independent, such as in Germany and Italy.

knowledge and experience crossed large distances without trouble. Religious institutions, whether Christian or Muslim, Buddhist or Hindu, ignored state boundaries and provided common culture and languages. People with technical skills might serve many different masters across many different lands, and unlike today's increasingly narrow specialisation, many of them could as well design a cathedral or castle as construct a battering ram, according to their paymaster's needs. Some learnt from textbooks, just as some rulers learnt their military skills from books. Some were of ancient origin (for example Vegetius in Europe or Kautilya in India), while others were newly written by contemporaries. As will be shown, they had wider use than might have been suspected. This was also a process, and I will look at the evolution of the science of siege warfare — poliorcetics.[1]

The novel geographical extent of this book is essential to achieve this book's objective, but it entails its own problems. I have relied on translations into Western languages of the medieval texts from Asia or the Muslim world. These translations cover only a small proportion of the histories and records of China, hence the smaller space devoted to these countries. However, the detail of medieval Chinese accounts puts contemporary Western histories to shame. Similarly, while many Arabic sources have been translated into Western European languages, some major histories remain inaccessible in part. Here it has been necessary to rely on secondary accounts that have used this material.

In contrast, if the evidence from early medieval European sources is limited, as the centuries passed the quantity increases dramatically. Voluminous published texts exist covering every European country, often as a result of decisions made in the nineteenth century to consolidate "national" medieval histories. Mile upon mile of chronicles, records, "lives", letters and other material fill the library shelves, and offer an immense mine of information — often incidentally — about medieval siege warfare. Often (and especially for the earlier period) the detail is minimal; for the most part, chronicles and other records were written for other purposes altogether. But the information that can be gleaned from the detail, sometimes accidentally revealed, constitutes the evidence base for much of what follows here. Adding this to the more substantial information provided by direct accounts of many sieges that have attracted the notice of later historians (and have therefore been discussed many times) enables a broad picture to be formed. To obtain a true picture of medieval sieges, it has been important to spread the net wider than most histories that either concentrate on a few relatively well-known events or limit themselves to one geographical area or one particular time. Many other events were of no less importance, and deserve to be noticed. For every remembered siege there were scores more that attract little attention, but study of which is necessary to grasp the whole picture. Siege warfare was paramount and endemic, and through comprehensiveness, hopefully, will come a fuller understanding, as well as awareness of some past events that were actually of great significance in their time or their region even if largely forgotten now.

Some compromises have been made in presentation. Since the majority of

[1] From the Greek word πολιορκητής, "besieger of cities".

material stems from sources themselves using the Christian calendar, this system has been used. Consistency with the names of people and places is impossible. Generally, I have used the modern name where it exists, but not always. Consider the names of historical Welsh or Irish people or places. The sources used earlier versions, often imposed by a conqueror, later studies "modernised" them, but modern usage has reverted to the original language. Consistency would lead to confusion rather than clarity, tolerance therefore is urged! Many places changed their names several names (often into forms completely different from the first) as a result of boundary changes — the Balkans and Asia Minor (Anatolia) give many examples. I have tried to use one form, offering alternatives in brackets. But even the original names often had different forms, no single one of them being "correct". Measurements have been quoted in both imperial and metric forms throughout. But medieval weights and measures (and currencies) offer their own challenge, with units with the same name having different values altogether. Where experts have identified modern equivalents, I have used them.

I have tried to allow contemporary sources to speak for themselves. Modern studies have been called upon where this is the only way to reach the original texts, when dealing with scientific evidence, or reconstructions. Modern archaeological studies naturally play an important part, although problems with this kind of evidence should not be forgotten.[1] I hope that my own prejudices (which will peep through from time to time) will not prevent readers from reaching their own conclusions on the evidence put before them.

[1] They are discussed in Chapter 9.

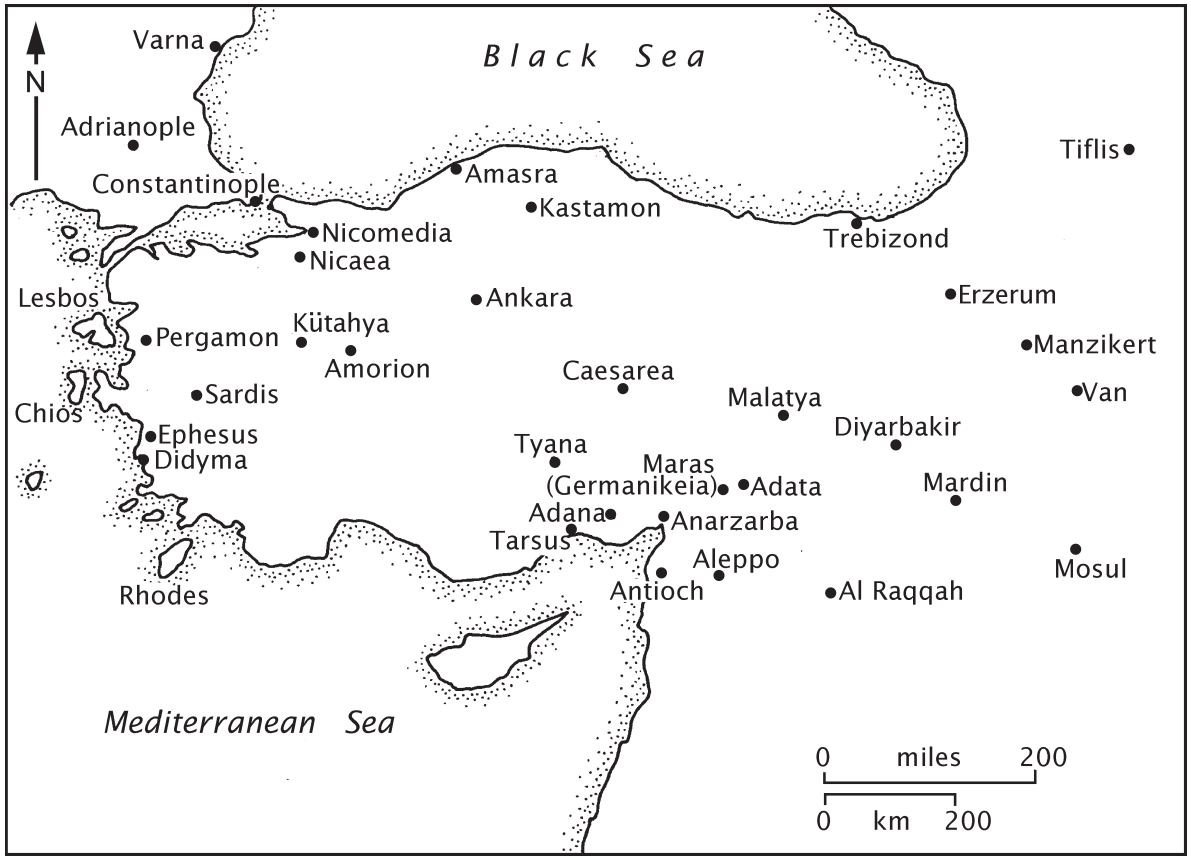
Acknowledgements

Many people helped me in this study. Richard Eales, Bob Higham, John Kenyon and Denys Pringle were kind enough to read draft chapters and offer much helpful criticism, or pointers to more recent studies or theories than I had used. Most of their suggestions have been taken on, and I alone am responsible for remaining errors of fact, or outdated theories. It would, in truth, be impossible to keep up to date with every development in studies across three continents covering a thousand years of history, but they have saved me from many mistakes. Sarah Speight kindly provided material in advance of publication. Others have assisted with information on many different aspects: I would mention here just Pam Braddock, Lawrence Butler, Steve Freeman, Peter Humphries, Rob Morgan and Peter Vemming. Boris Krivchenko organised the translation of an important article from Russian. The maps were drawn by Phillip Judge. The staff of the British Library coped with my demands over more than a decade, while the Institute of Archaeology (University College London) and the Warburg Institute allowed me ready access to their collections of journals. Other research was done at King's College London, the School of Oriental and African Studies, the Bodleian Library and the School of Slavonic and East European Studies. Their staff were always helpful. Study tours led by Richard Eales, Pamela Marshall, Denys Pringle and Sarah Speight enabled me to visit many of the medieval fortifications discussed here, while friends and, especially, my extraordinarily willing mother, have driven me to or accompanied me around stone fragments and half-buried mounds aplenty with remarkable patience and self-sacrifice, even if they did not always understand why I wished to go there. My editor, Jeffrey Dean, has saved me from many errors and generally improved the presentation of the book enormously. To all of them I express my sincere gratitude.

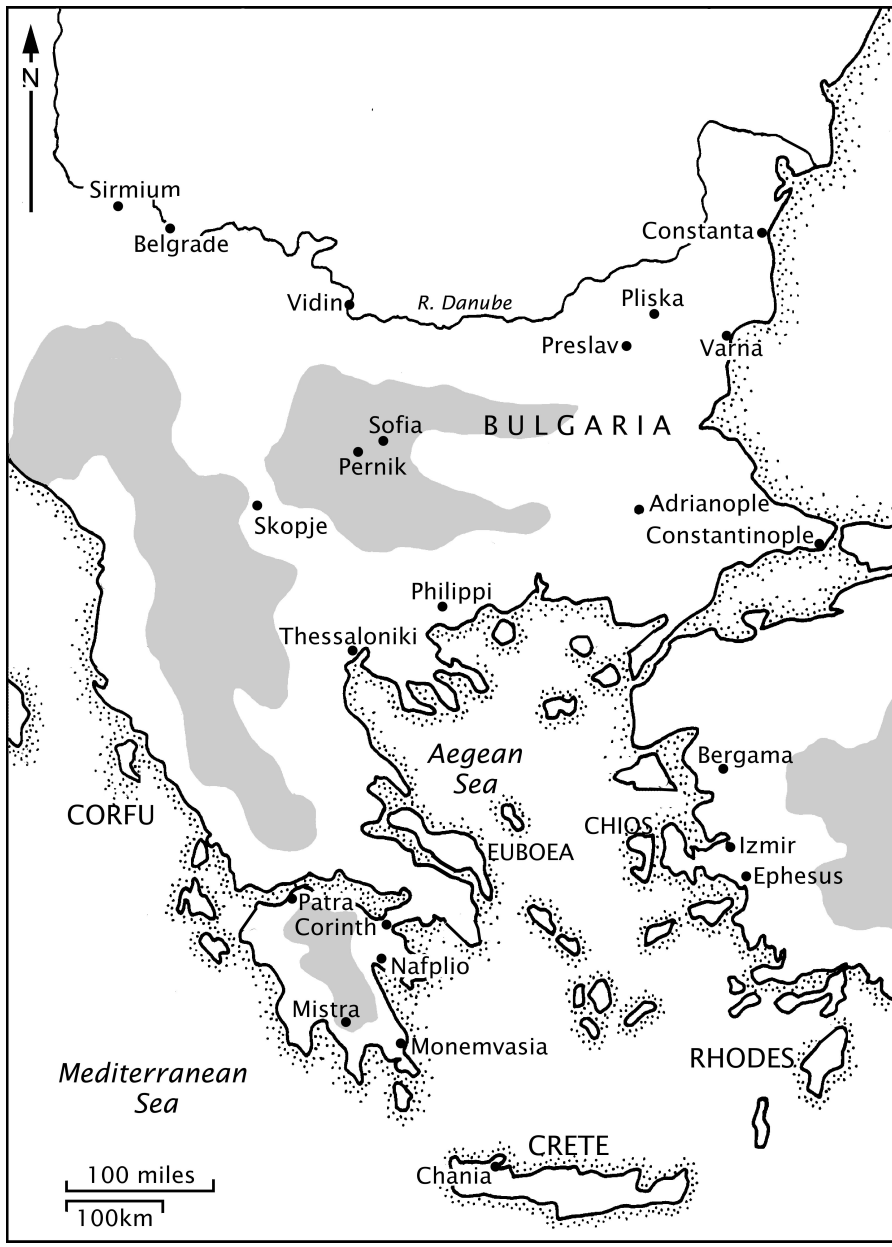
Abbreviations

The following abbreviations are used for frequently cited titles in the footnotes. Other abbreviations used only in the Bibliography are listed there.

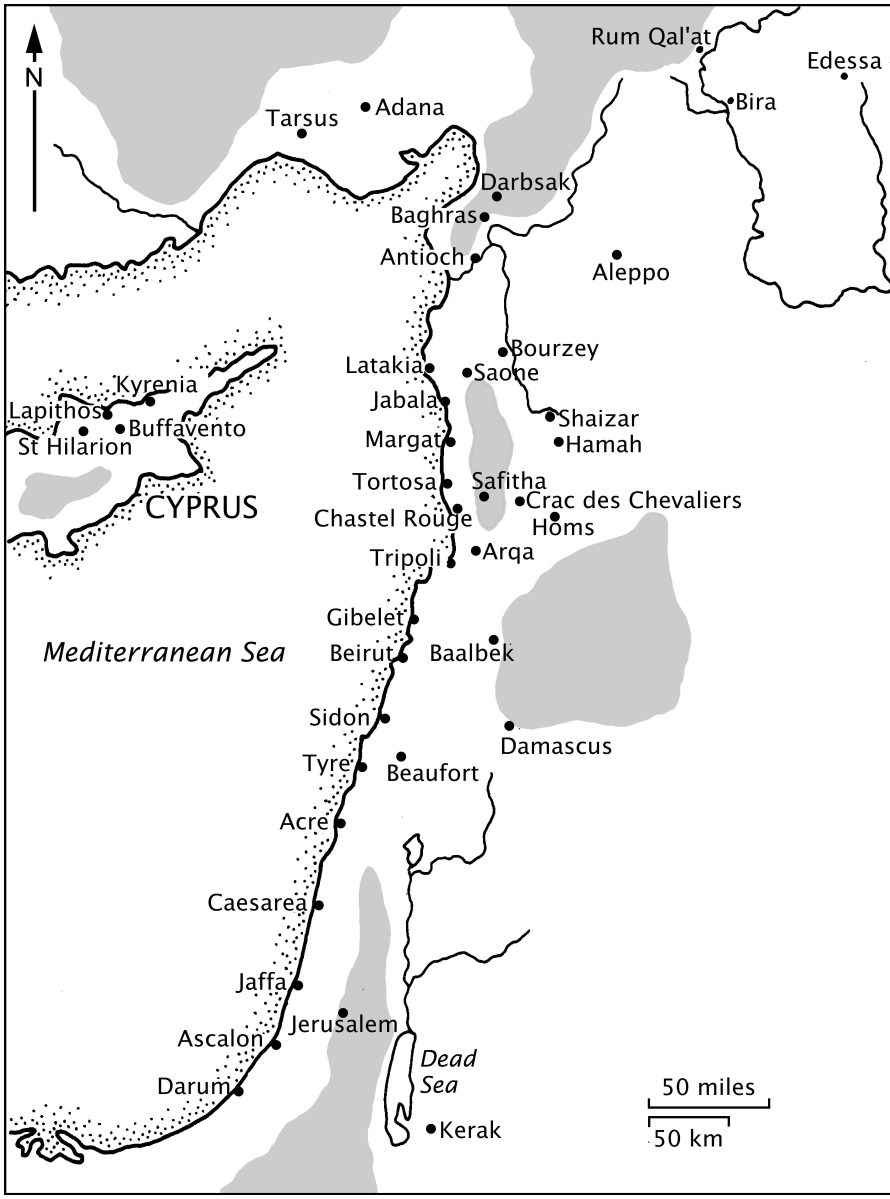
ASC	*Anglo-Saxon chronicle*
ByS	*Brenhinedd y Saesson*
ByT(H)	*Brut y Tywysogyon* (Hergest version)
ByT(P)	*Brut y Tywysogyon* (Peniarth version)
OV	Ordericus Vitalis, *Ecclesiastical history*
RCHM	Royal commission on (ancient and) historical monuments
VCH	*A history of the county of . . .* (Victoria county histories)



Map 1: Asia Minor



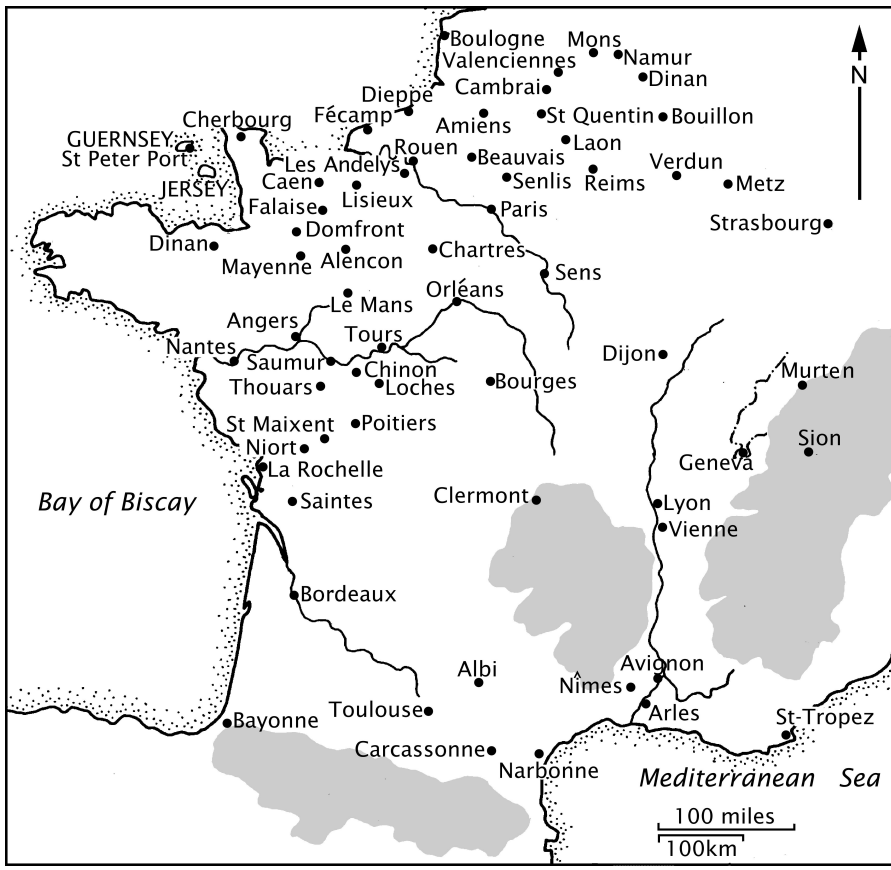
Map 2: The Balkans



Map 3: The Middle East


Trento
Cividale
N
Novara
Bergamo
Treviso
Aquileia
Ivrea
Milan
Verona
Pavia
Cremona
Padua
Mantova
Alessandria
Genoa
Bologna
Ravenna
Zadar
Cesena
Lucca
Rimini
Pisa
Split
Ancona
Adriatic Sea
Narni
Rome
Troia
Barletta
Capua
Benevento
Bari
Aversa
Naples
Melfi
Matera
Salerno
Taranto
Tyrrhenian Sea
Palermo
Messina
Lentini
Butera
Syracuse
Mediterranean Sea
Tunis
Noto
100 miles
100 km

Map 4: Italy


Boulogne
Mons
Valenciennes
Namur
Dinan
Cambrai
Dieppe
Cherbourg
Fécamp
Amiens
St Quentin
Bouillon
GUERNSEY
St Peter Port
Rouen
Laon
Beauvais
Les Andelys
Verdun
Caen
Senlis
Reims
Metz
JERSEY
Falaise
Lisieux
Paris
Strasbourg
Domfront
Dinan
Chartres
Mayenne
Alençon
Sens
Orléans
Le Mans
Angers
Tours
Dijon
Nantes
Saumur
Chinon
Murten
Thouars
Loches
Bourges
St Maixent
Poitiers
Sion
Niort
Geneva
La Rochelle
Bay of Biscay
Saintes
Clermont
Lyon
Vienne
Bordeaux
Albi
Avignon
Nîmes
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St-Tropez
Bayonne
Carcassonne
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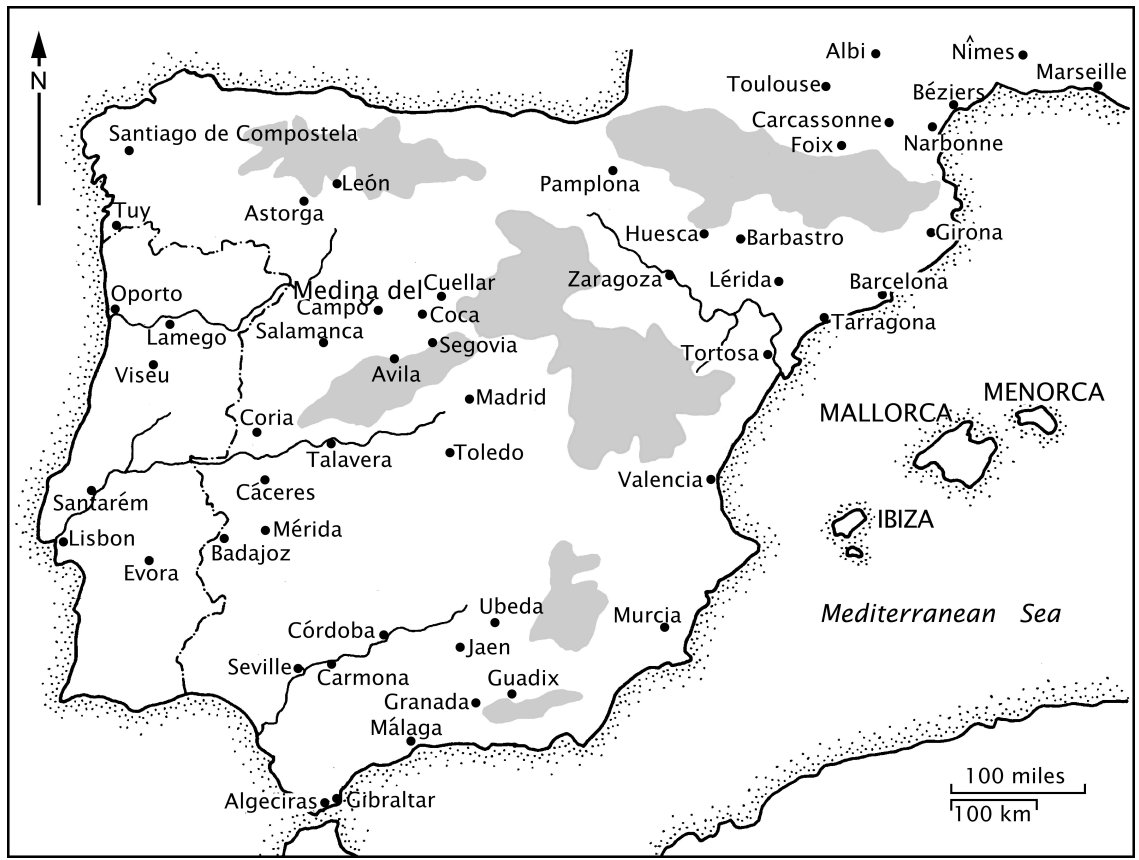
Mediterranean Sea
100 miles
100km
N

Map 5: France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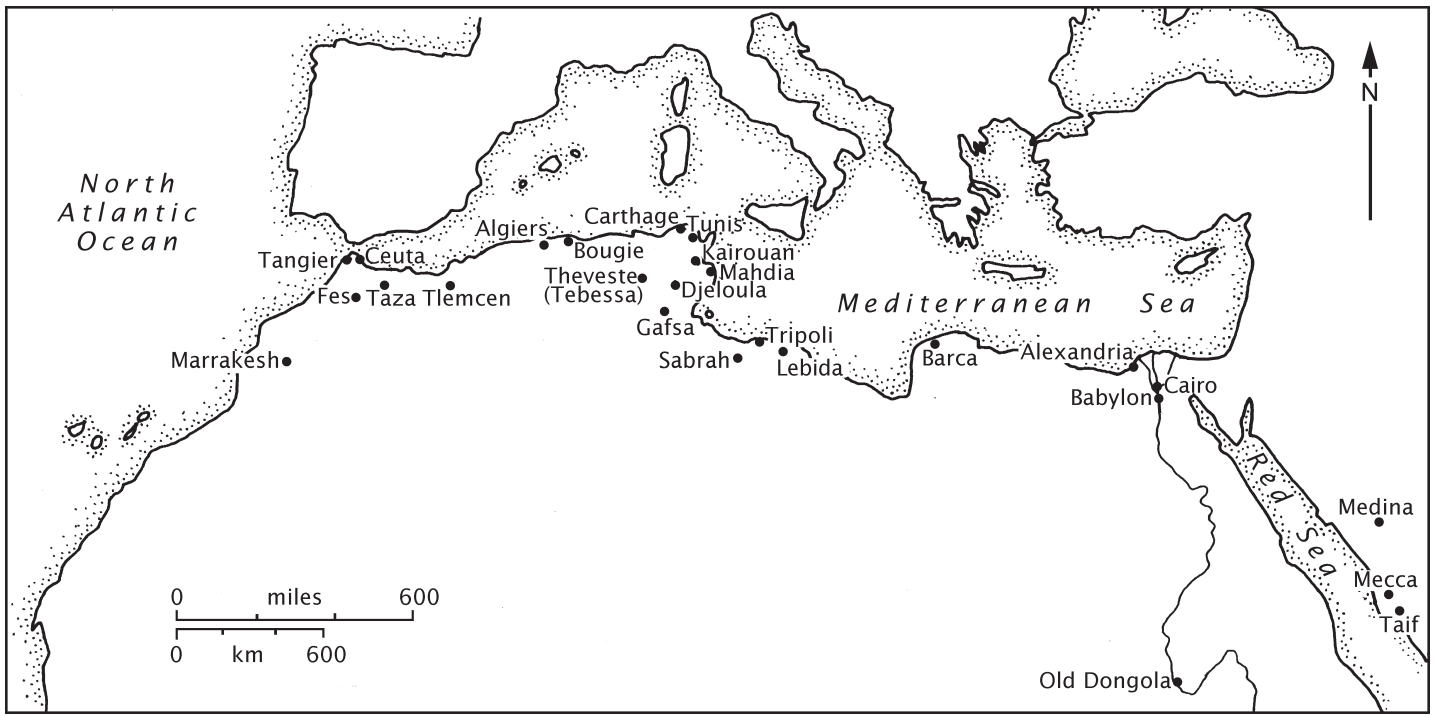
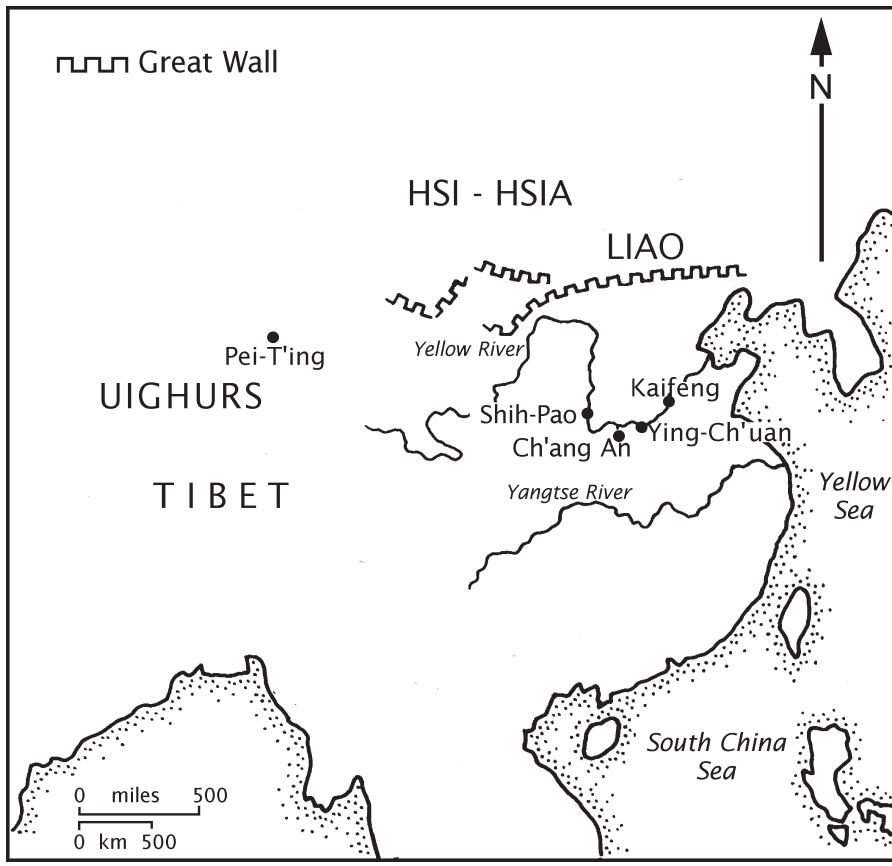
Toulouse
Béziers
Carcassonne
Foix
Narbonne
Santiago de Compostela
León
Pamplona
Tuy
Astorga
Huesca
Barbastro
Girona
Oporto
Medina del Campo
Cuellar
Coca
Zaragoza
Lérida
Barcelona
Lamego
Salamanca
Segovia
Tarragona
Tortosa
Viseu
Avila
Madrid
MENORCA
MALLORCA
Coria
Talavera
Toledo
Valencia
Santarém
Cáceres
IBIZA
Lisbon
Mérida
Badajoz
Evora
Ubeda
Murcia
Mediterranean Sea
Córdoba
Jaen
Seville
Carmona
Guadix
Granada
Málaga
Algeciras
Gibraltar
100 miles
100 km

Map 6: Iberia

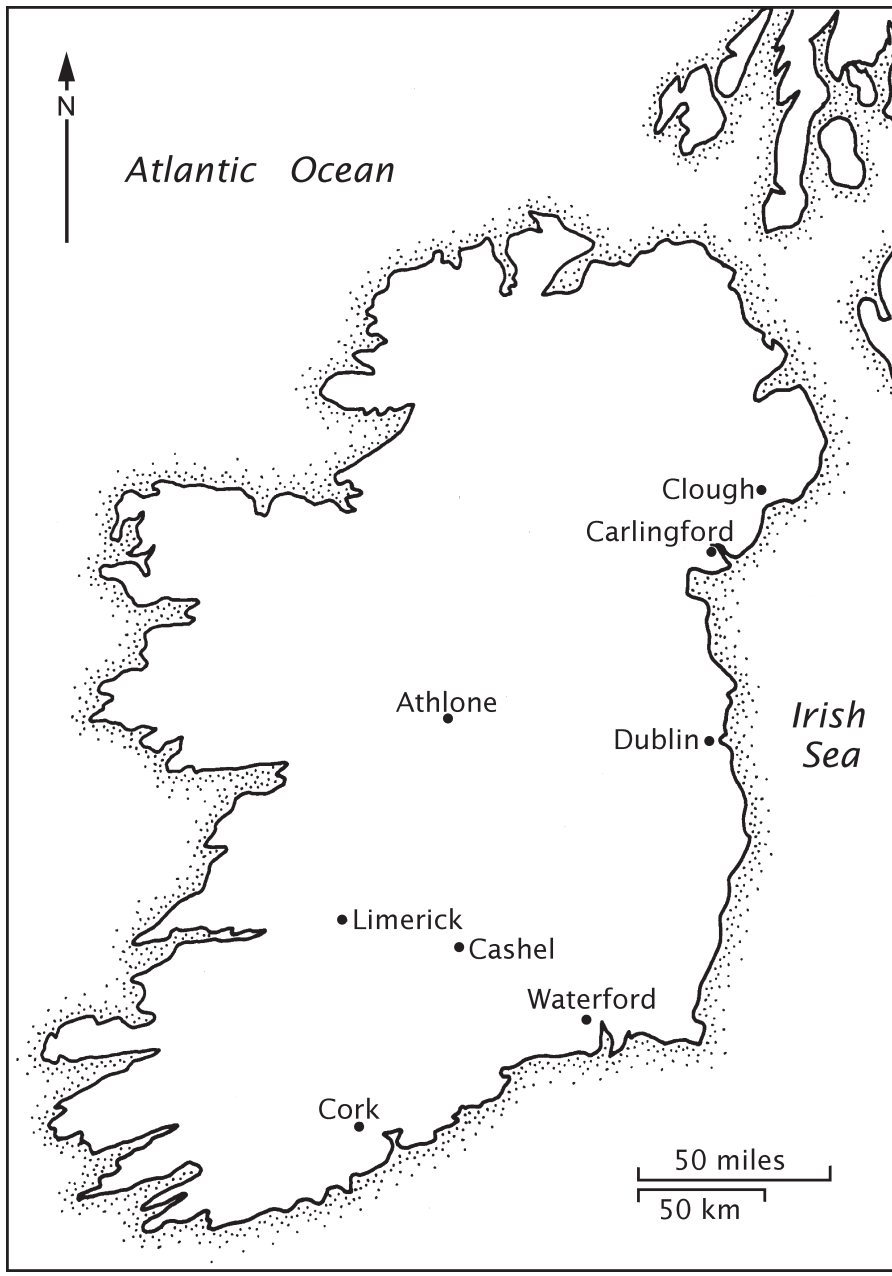


Map 7: North Africa


Great Wall
N
HSI - HSIA
LIAO
Yellow River
Pei-T'ing
UIGHURS
Kaifeng
Shih-Pao
Ying-Ch'uan
Ch'ang An
TIBET
Yangtse River
Yellow Sea
South China Sea
0 miles 500
0 km 500

Map 8: China

Map 9: Britain



Map 10: Ireland

Map 11: Central Europe

Map 12: North-west Europe

Map 13: Central Asia and Sind

Map 14: Lands of the Rus′

1 After "Rome"

The western Roman empire had been disintegrating from a combination of external pressure and internal shrinkage for a long time before the last western emperor was deposed in AD 476. The leaders of the many "barbarian" peoples who had, in reality, exercised power in the provinces for a long time, continued to rule there. Continuity with the greatness identified with Rome was maintained in two institutions: the Christian Church, and the survival of the eastern section of the empire, ruled by emperors based in Constantinople. The subject of this chapter is the extent to which Roman traditions in the attack and defence of fortifications survived into, or were modified, in the time traditionally called the "Dark Ages".

The eastern empire was in no doubt about itself: it *was* Rome, although its language was Greek. Its realm, encompassing the Balkans, Asia Minor, the Middle East, and North Africa, maintained a high level of culture and civilisation. It preserved the military traditions, the architecture and technology, and the professional soldiers and skilled craftsmen. It was, as well, a crossroads between east and west. It would undergo profound social and economic transformation during the centuries to follow, but its existence provided a link with the past that influenced the world around it for another thousand years. In western Europe, Germanic peoples now occupied the land of the old empire. The Franks were in modern (northern) France, the Burgundians west and south of the Alps, the Vandals in North Africa, and the Visigoths in the Iberian peninsula. The Ostrogoths held most of Italy. The Angles and Saxons settled in Britain. Modern scholarship and archaeological investigation have profoundly modified previous conceptions of what these settlements involved. For the most part, it seems that existing aristocratic families were not wiped out, but shared power with the new rulers. Writers drawn from their ranks (lay people or churchmen) often provide the only record of events. The new peoples, through processes still not entirely understood, gradually became merged with indigenous peoples, although sometimes the latter were driven out. While the classic view of the Dark Ages has been substantially revised to recognise much continuity with what went before, it is undoubtedly true that levels of culture and technology declined significantly with the ending of the structures of the previous, centralised regime.

The evidence for the development of fortifications and of the means of capturing them for this first post-Roman age is scantier in all respects than it is for later centuries. Of contemporary written accounts there are a few. It is almost impossible to verify their information from other written sources. With any historical

source, judgements have always to be made about reliability, but here there is precious little to base a judgement on. The monastic chronicles that provide so much of the information for later times are almost non-existent. That there are no charters, diplomas, or princely enactments does not mean that none were made, but genuine ones do not survive. The information such sources supply for the policy and practice of government (at all levels) in later ages poses no problem of interpretation here: there is none. Archaeological investigations have provided most of the usable information, but there are still many problems. An earthwork of one age can only be distinguished from one of another if datable finds are excavated. But we are talking of an age where the cultural level had sunk rather low, and rural settlements have left few traces, while in the towns anything from that time has long since been built over, many times.

Assumptions, therefore, have to be made. In doing so, it is important to remember the point that, while, despite the decline in cultural level, it was not the same everywhere, there were outposts of Roman civilisation, and the organisational, technical, and military lessons of Rome did not simply disappear.

Late Roman cities and forts

What did the Romans leave behind for the new barbarian regimes to occupy and fight over? Although the economy of the disappearing empire had been overwhelmingly rural, the culture and the administration had been concentrated in the cities. Cities had also become the natural location for the Church's bishoprics, and with the collapse of the previous regime it was often the bishops who found themselves exercising local authority, based in their cities. No fewer than 112 cities are listed for Gaul alone at the beginning of the fifth century. One important feature about these places as they passed under the rule of new kings was that they were heavily fortified. Although the walls, towers, and gates were in many cases already two centuries old,[1] and had sometimes been constructed hastily, they were built according to long-established methods and had been maintained. At first, the Romans had erected fortifications on the frontiers of their empire as expansion ceased. It is suggested that the majority of serious fort-building on the northern and western frontiers of the empire themselves took place either around AD 260–85, or occurred in a final burst (as it proved to be) under Valentinian I (r. 364–75). During the third century, the invasions of Gaul and other provinces had begun, and the fortification of the interior cities followed. Often, the defences thrown up at this time were themselves strengthened later on, by thickening and raising the walls and adding towers to the circuit. There are numerous surviving remains from which the main features can be established.[2] The height varies considerably, from about 5.5 metres to, according to Gregory

[1] Although some were more recent. Meulet, "Guide archéologique", 276, says that the walls of Chartres were erected in the early fifth century.

[2] For Gaul, see R M Butler, "Late Roman town walls in Gaul", and Blanchet, *Les enceintes romaines de la Gaule*. For Roman fortifications in general, see the excellent study by

of Tours, 9 metres at Dijon.[1] As later rebuilding has often removed the top of Roman walls, it can be difficult to be certain about their original height. Topped by a wall walk and crenellated battlements, they were at least three metres thick, often more. Construction was based on a mortared rubble core faced with ashlar blocks. Often there were tile courses too (which may be seen, for example, at Carcassonne). Towers came in a variety of shapes, square or semicircular, and could be numerous. Sometimes they were hollow, sometimes solid. Another common feature, reflecting both the pressing need for defences and the decline of the civic institutions, or the changing priorities of the now Christian states, was the reuse as building material of stones from the town's buildings. There is less certain evidence of the provision of ditches, although they were sometimes dug, being located at a distance from the wall itself. It is also evident that later defensive works (from the third century onwards) featured wider berms, distancing an enemy from the wall, with examples on the Rhine frontier ranging from 12 to 30 metres wide.[2]

Further east, similar problems faced the empire on its Danube frontier. A study has demonstrated rather more in the way of new building for much longer than in the west, with a variety of solutions according to local conditions and military or other decisions: some city defences were actually expanded, while others were rebuilt to enclose a smaller area, continuously through to the sixth century, although a generally lower standard of work was also common. Some cities remained unwalled. Several cities were certainly military bases (headquarters and barracks), and included arms factories, such as Sirmium (in modern Serbia), a very large and important city whose walls had long since fallen into disrepair but which was reconstructed in the face of the Gothic threat in the late fourth century.[3]

It was not the absence of defences that led Rome itself to suffer sack at the hands of Alaric the Visigoth in 410. At the same time as the construction campaign was underway in Gaul, new walls had been provided for the city by the emperor Aurelian from 272, and these walls are still there, almost nineteen kilometres in length. The original height of these walls was clearly felt to be inadequate, because they were raised twice, first in 309/312 and then again in 402, to reach an impressive fifteen metres. At the same time, more towers were added and the gateways also strengthened. Altogether there are 380 wall towers, thirty

Johnson, *Late Roman fortifications*. There is a detailed study of the development of the cities of Metz, Verdun and Toul in Dollinger-Leonard, "De la cité romaine à la ville médiéval".

[1] Gregory of Tours, *The history of the Franks*, 182 (book III, chap. xix).

[2] Petrikovits, "Fortifications in the north-western Roman Empire", 178 ff., 197–8. The author attributes various of the new features to measures against siege engines and mining, which seems unlikely, given the evidence cited for their opponents' awareness of siege technology at this period.

[3] Mirković, "Sirmium: its history", 45–6. For other examples in the region, see Panaite and Magureanu, "Some observations", 1–4; Poulter, "The use and abuse of urbanism", 101–30.

metres apart. However, the dry ditch outside had to await the attention of the Byzantine general Belisarius in 537.[1]

Similar building activity, although on a rather smaller scale, took place in other parts of the empire. In Britain it is still possible to see the results at a number of cities. The wall of Chester (Deva) was six metres high, and the surviving south-east angle tower rose to ten metres. This tower appears to have been designed to mount catapults.[2] At York (Eboracum), the fortress adjacent to the town was rebuilt in about 300 with a wall less than two metres thick and about six metres high, backed by an earth rampart and with an external ditch five to six metres wide and more than two metres deep. There were four large gatehouses, multiangular corner towers, and projecting polygonal and rectangular wall towers.[3] In London (Londinium), the wall was considerably strengthened in the fourth century, and towers were added to the eastern side of a circuit, which was 3.2 km long. The section that stands near the Tower of London was 4.4 metres to the wall walk, suggesting an original height of about six metres. There was a ditch here too. The towers were thought to have been about eight or nine metres high, and when they were added the original ditch was filled in and a new one dug.

Apart from the cities (*civitates*) with their walls, which were to determine the development and the limits of most of their medieval successors until well into the following millennium, the Romans had also built numerous forts, *castra* or the smaller *castella*. The style and techniques were of course the same, but the function of these garrison forts was different. In Britain we see such forts along Hadrian's Wall, a much older fortification along the northern frontier, and "Saxon shore" forts like those at Pevensey (Plate 6) or Burgh. Here again, study has shown that there was a difference in strength between those erected early in the third century and those constructed later, which had thicker and higher walls and projecting bastions designed to accommodate archers and artillery. The sophistication of the defences has led to speculation as to their function, including the possibility of being designed as fortified ports, or to resist internal enemies in the several civil wars that took place.[4] But of course, in the end, without an army to hold them, such structures did not maintain any continuous existence. However, where they were taken over by the new Germanic settlers, they might become the basis for future medieval settlements.[5]

The presence of such a large number of existing fortifications was to have a profound impact on what happened next, indeed it could not have been otherwise. Several centuries later, the walled towns of Gaul had become the main means of defence of the Franks against the Vikings, while the failure of Anglo-Saxon

[1] Krautheimer, *Rome*, 7–8; Todd, *The walls of Rome*, 20–82. On the ditch, see Llewellyn, *Rome in the Dark Ages*, 61, and Procopius (see below).

[2] Carrington, *English Heritage Book of Chester*, 29–31; Whimperley and Murphy, *The walls of Chester*, 6–7.

[3] For York, see Royal Commission on Historical Monuments, *An inventory of the historical monuments in the City of York*, 11: *The defences*, 7.

[4] Pearson, *The Roman shore forts*, 71–2, 136–40.

[5] Knight, *The end of antiquity*, reports Frankish occupation of Roman *castella*.

England to maintain its walled cities (for the most part) compelled the kings of Wessex to adopt alternative strategies. The building style and the form of these fortifications was the pattern followed by medieval stone defences. However, nothing resembling the Roman defence system was to be built in western Europe for a very long time. The resources expended must have been truly prodigious and well beyond the means of the successor states, but perhaps the needs were also different. We will look at the reasons for this.

Walled towns offered no protection for people living in the countryside, which was where the overwhelming majority of people laboured for their living. In a time of insecurity, continued periodic invasions and raiding, and weak or non-existent central authority, people everywhere had to look for ways of finding refuge when needed. One of the most obvious solutions was to reuse what already existed, and there is evidence that iron-age hill-forts, abandoned for centuries, were pressed back into service. In many cases they would form the basis for the hilltop villages that later became such a feature of, for example, medieval Italy. Earthen ramparts could be supplemented with wooden palisades or stone walls, according to the availability of the material locally, and would be of sufficient size to accommodate the inhabitants of local villages. Located on high points, they would also serve to allow for the spotting of trouble at a distance. Although not much researched, there is plenty of evidence of this in Italy.[1]

In Britain, it was recorded (by the contemporary, Gildas[2]) that the inhabitants took to the "mountains hills and valleys" as places of refuge. Many such places have been identified, some of them reused iron-age sites and some new from the fifth century. Varying enormously in size, they are of a common style of earth or stone ramparts (either one or two of these) and ditches. Located in inaccessible places, often by the sea, it is suggested that their purpose was defensive and that the people who ordered their construction were the local potentates, while their lay-out suggests some knowledge of military engineering. South Cadbury was in use during the late fifth and the sixth centuries, and was defended by a timber-laced rampart and a wooden gatehouse. No less than 20 km of timber had been used in the construction. Early annals (although not so early as the fifth century) record the existence of forts and attacks on them. The sixth- or seventh-century *Taliesin* tells of warriors attacking enemies in hill-forts or on ramparts, while similar terms celebrated the defences of Din Eidin (Edinburgh) in the *Gododdin*. These were the means of control of British rulers, as well as a defence against their neighbours, or the Anglo-Saxon invaders. They range in scale from the tiny enclosure at Dinas Powys (Glamorgan) to the mighty rock of Dumbarton, which was the centre of the kingdom of Strathclyde. The conclusion must be that the Romano-

[1] Schmiedt, "Le fortificazione altomedievale in Italia", 859, 893–6. For a good summary, see Hodges and Whitehouse, *Mohammed, Charlemagne & the origins of Europe*, 45–8.

[2] Gildas, *The ruin of Britain*, 28, 98. Gildas, writing around 540, also noted that Britain had been a country ornamented with 28 cities and with "castellis, murorum turrium" and strong buildings (p. 90).

British kingdoms were rather better organised and more effectively defended than Gildas' lament suggested.[1]

In Gaul there were similar developments. The fifth-century writer, wealthy landowner, bishop (and eventually saint) Sidonius Apollinaris, who lived between about 430 and 470, penned a long panegyric to the fortified country estate of Pontus Leontius, described by himself as a *burgus*, which led to the discovery of a Gallo-Roman villa near Blaye overlooking the river Dordogne. The poem described the recently-built luxurious dwelling and estate centre of a powerful Aquitanian nobleman, which had been fortified with battlemented high walls and towers capable of resisting the full range of siege weaponry and techniques of attack then known — *aries*, *agger*, *catapulta*, *testudo*, *vinea*, and wheeled scaling ladders. Excavations of the headland site found thick masonry walls with square bastions, apparently destroyed after the Franks conquered Aquitaine from the Visigoths in the late fifth century.[2] In Echternach (in modern Luxembourg), alongside an important Roman road, there is a natural hillock under the later church of St Peter and St Paul, where a late Roman *castellum* has been excavated and partially restored. An older fort had been rebuilt in the early fifth century to create a multi-sided stone-walled perimeter of up to 1.5 metres thick enclosing the top of the hill (diameter about 50 metres). There are four rectangular towers of uniform design, large enough to mount small artillery such as *ballistae*, four postern-like narrow gateways, and interior buildings of unknown purpose, with a well. There is evidence of its occupation continuing through to the middle of the fifth century, and of a later Merovingian church inside (Plate 4).[3] However, we depend on literary references (mainly Gregory of Tours) for the existence of rural *castra*, rather than excavated sites.[4]

Against what threat was this array of walls and ramparts intended to protect?

[1] An excellent summary of the evidence for this is Alcock, "The activities of potentates in Celtic Britain", 25–33, which has a map and gazetteer with the dating evidence for 75 such sites. Dunbarton, which is called by Bede a *civitas*, has no surviving remains of this period. Its history is summarised and a reconstruction attempted in McIvor, *Dumbarton Castle*, 14–15. See also, more recently, Dark, *Britain and the end of the Roman Empire*, 146–8, 199–205. For translations of the later accounts, see *The earliest Welsh poetry*, 24, 28 (*Taliesin*); 37, 44, 55 (*Din Eidin*). S Davies, *Welsh military institutions*, is a recent study.

[2] Nicolaï, "La villa gallo-romaine de Pontius Leontius". The poem is in Sidonius, *Poems and letters*, 271–3 (poem XXII, ll. 118, 120–25). "Battlements" is the proposed translation of "propugnacula". Sidonius was fond of demonstrating his knowledge of the classics, and it is entirely possible that the list of engines was there just to show this, rather than really to suggest the strength of the defences.

[3] Metzler, Zimmer and Bakker, *Ausgrabungen in Echternach*, 269–94.

[4] See James, *The Merovingian archaeology of south-west Gaul*, 291–3.

Late Roman siege warfare

Vegetius

Just as the Romans designed and built the *civitates*, *castra*, and *castella*, so also they were the ones who knew how to attack and defend them. Barbarian warlords originated in societies that did not live in walled cities. When they came up against the Roman-built fortifications, there was only one store of knowledge available to instruct them how they, too, should attack and defend them. To what extent did they learn and how far were they able to assemble the skills and resources to conduct siege warfare themselves once they were the masters? To answer these questions, there are a few written accounts that help.

The late Roman army was very different from the legionary army of the early empire. Fortunately, there survives one text that tells us a great deal about how siege warfare was conducted — or rather, how the author thought it should be conducted. Vegetius' *Epitoma rei militaris*[1] is a source that, because of its uniqueness, has been discussed and exploited countless times. It has been dated to the late fourth century or the early fifth, or possibly the reign of Valentinian iii (r. 425–55).[2] Its survival also guaranteed its place as a handbook for the whole medieval era. Its value at this point is to show how late Roman siege warfare should have been conducted.

Vegetius devoted chapters to the defence and attack of fortified places. In doing so he gave clear indications of the functions and effectiveness of the standard weaponry available. Advice was given to defenders about laying in supplies, starting to cultivate open spaces, getting hold of plenty of iron and timber. He advised that liquid pitch and oil (*incendiarum oleum*) be obtained, with the purpose of burning the enemies' machines. Round stones should be collected, if possible from rivers "because they are heavier in proportion to their density and more suitable for throwing", both for slingers and for stone-throwing engines. These too were for destroying enemy machines.[3] A chapter was devoted to the importance of collecting supplies of sinews (*nervi*) because these were essential to the operation of the artillery. He pointed out that "horsehair taken from the tail and mane is said to be useful . . . There is no doubt that women's hair has no less virtue in such kinds of torsion-engines."[4] In addition to handheld slings, the main projectile weapons cited by Vegetius were the *ballista* and the *onager* (literally "wild ass"). Both were powered by torsion, that is, twisted skeins of rope or sinews. The *ballista* resembled a frame-mounted crossbow. The arms were powered by two skeins mounted either side of the stock, and it propelled large darts or javelins. The *onager* was a late-Roman weapon, replacing earlier, more complex forms of engines. It had

[1] The edition used here is Vegetius, *Epitome of military science*, trans. Milner.

[2] See Goffart, *Barbarians and Romans*, 252, and the references cited there for this argument.

[3] Vegetius, *Epitome*, 116–18 (book iv, chaps. vii–viii).

[4] Ibid., 118 (book iv, ix). Historical examples known to the writer of women's hair being used are found in a number of ancient writers including Caesar.

a single arm mounted in a very strong wooden frame on the ground, which was hurled forward by the torsion power of a skein of the sinews detailed by Vegetius, its forward motion halted by a wooden crossbeam. Its projectile was usually a stone ball. He says that no heavier weapon was known. Its purpose was to "destroy not only the horses and men, but also the machines of the enemy".[1]

Vegetius described the full panoply of weapons and methods. Forms of attack included digging mines or sapping to undermine the wall, and building wooden mobile towers. This last was clearly a very major undertaking, for the finished device has to be able to be higher than the wall, to protect a battering ram on the first level, to have a drawbridge to reach across to the rampart, and a top gallery for soldiers to fire down upon the defenders. The whole machine had to be able to be moved up against the wall. All the time, defenders were able to observe its construction and to defend themselves by a variety of means: trying to burn the tower by projecting incendiary devices or by making a sortie, raising the height of the wall with earth or timber. Rams protected by fireproof coverings were another device, this time for creating a breach in the wall. The methods of defence against such attack included mattresses and hooks lowered from the wall head to obstruct or pull up the ram.

The simplest means of attacking a defended place was either to storm it, or to starve it out. Vegetius discussed how an immediate attack with ladders could succeed if the defence was inexperienced and afraid. He made suggestions as to how to ensure that ladders are constructed to the right height to overtop the wall,[2] something that was not always the case, with disastrous consequences. Starving a place into surrender depended on the besiegers having the time and the logistical resources to outlast the defence. Interestingly, Vegetius discussed this only from the viewpoint of the defence. So it is clear, this is a very practical treatise, one designed to deal with the defensive problems faced at its time (even if some of the descriptions given obviously allude to earlier times). One of the repeated points made by this author in passing was that skilled and experienced people are necessary to operate the equipment. The artillery had to be "tuned very carefully by experts".[3] This was to be a recurring theme throughout the whole middle ages. For the present, when examining the actual siege warfare of the two centuries following the eclipse of the western empire, the availability of such expertise is a basic question always to be borne in mind.

The defences described earlier were designed to accommodate the artillery discussed by Vegetius. It is important to establish what the chief characteristics of this weaponry were, to understand what effect it had. Many scholars have striven to explain this from contemporary sources and from military manuals, all of which are considerably older than Vegetius. The problem of using the sources is to know what each writer meant when using a descriptive term, because the meaning of the words changed over time. It is also not always clear that the writer was talking about something contemporary, or something that he had himself de-

[1] Vegetius, *Epitome*, 127 (book IV, xxii).
[2] Ibid., 131 (book IV, xxx).
[3] Ibid., 130 (book IV, xxix).

rived from still earlier writers. However, by this time the course of developments is generally accepted. The *ballista* has become a weapon designed for use on walls, where its slow operation (requiring a windlass to draw back the cord) mattered less. It shot bolts almost two metres long, which would have had the power to penetrate armour, hides, and possibly wooden stockades[1] — a claim we saw vindicated by Vegetius. The *onager* received its first mention in about 353 by the writer Ammianus Marcellinus. It was certainly described as being in use by the Romans when the victorious Goths tried to storm Adrianople in 378, when Ammianus called it a *scorpio*, "a type of catapult, commonly called an onager".[2] Here, its large stone smashed into the ground harmlessly, but astonished and terrified the Goths. As a single-armed machine it would have needed less maintenance or adjustment than the twin-armed torsion-powered stone throwers it replaced. Ammianus is quoted as saying it needed eight men to wind down the arm, and its immense recoil when fired made it impossible to place on a stone wall because it would dislodge the stones. It would also be very difficult to move around, to change its aim: a model constructed by Frankland-Payne-Gallwey weighed two tons (2,032 kg).[3] There are strong grounds for believing[4] that torsion-powered machines went out of use, at least in the west, during this period. The reasons are evident from the descriptions given. While the solid stone towers added to the walls of Roman defences were quite sufficient to cope with the weight of the *ballista*, it is not at all apparent that they could sustain the "violent shock", to quote Ammianus again, of the *onager*. If this weapon had to be sited on the ground in order to absorb its shock, its use in defending a wall would be limited, unless a satisfactory system of firing "blind" could be devised. No such difficulty of course stood in the way of its use as an offensive weapon. Vegetius, however, does not help us here. His concern is with artillery for the defence, not the attack.

For confirmation of the truth of this major drawback to the *onager,* observe the reconstructed *onager* at Caerphilly Castle (Glamorgan), where it is incorrectly called a mangonel.[5] The machine is considerably smaller than the machines described in the sources, but its recoil is dramatic. It can also be added that its rate of shooting is slow, and the size and range of the projectile, relative to the size and weight of the machine, is poor by comparison with the medieval lever-based weapons by which it now stands. Add to this the necessity for a supply of appropriate sinews, which could break or become distorted because of the weather, and above all the requirement for builders and operators who were experts in their trades, and one can see many practical reasons for doubting that the torsion-powered stone thrower survived long into the "dark ages".

[1] Landels, *Engineering in the ancient world*, 105.

[2] Ammianus Marcellinus, *Rerum gestarum*, III: 494–5 (book XXXI, 15, xii).

[3] Landels, *Engineering in the ancient world*, 132; Frankland-Payne-Gallwey, *The crossbow*, 249–50 and appendix. The discussion is also summarised in Southern and Dixon, *The late Roman army*, 152–9.

[4] For example by Chevedden, "Artillery in late antiquity", 132–63, and Purton, "The myth of the mangonel" . For further discussion, see Chapter 9.

[5] Humphries, *Engines of war*. The "mangonel" shot is 3–4 kg. The *ballista* there is the twin-armed torsion machine and shoots a bolt 1.5 metres long.

The evidence of siege warfare

With so many walled cities awaiting the invader after the solidly fortified frontier had itself been breached, it was inevitable that any serious attacker must address themselves to dealing with defended places, or else find themselves seriously restricted in their movements and vulnerable to attack from all sides. It has always been the case that the willingness of people to defend themselves is the most important factor in deciding whether a town would resist, thus calling for a siege. As Vegetius repeatedly argued, the first step to make resistance possible was to assemble sufficient resources. A second was to have an armed garrison. There are so many brief accounts of cities falling into the hands of rival kings during the fifth and sixth centuries, with no further information provided, that it is impossible to know which factors determined the outcome.

The Goths do not seem to have had much idea of, or appetite for, siege warfare. Of all peoples, they included those whose long association with Rome must have included some opportunity to acquire these skills, unless the Romans had managed deliberately to keep them secret (a practice we shall see attempted later by the Byzantine empire). They gave up the siege of Sens after 30 days, "muttering they were stupid . . . to have contemplated the siege of a city". After their victory at Adrianople in 378, they quickly gave up their attempt to take the city. In 490, Theodoric besieged Ravenna (see below for more on this period), and three years later had still not taken it (admittedly this city had very effective natural protection).[1] Alaric had besieged Rome three times between 408 and 410 and never once stormed it. Ricimer besieged the same city for eight months in 472. Where they were successful, for example when Theodoric captured Belgrade (Singidunum) from the Sarmatians in 472, our source, Jordanes, gives no indication as to how this was done.[2] The Franks, initially at least, seem to have been equally unsuccessful. It took Clovis several years to secure Paris, because he had no means to prevent access by river. But he did manage to capture Verdun (480).

The attackers who gave some evidence of aptitude were the Huns. In their invasion of the Balkans after 441, they are recorded as taking some one hundred towns. In 451, their ruler Attila assailed Orléans with his battering rams, although he did not take it because the arrival of Roman general Aëtius with an army saved it just in time.[3] In 454, Attila's sons captured three towns in Dacia by regular siege, not by direct storm or starvation. In 452, Attila himself had attacked Aquileia (northern Italy). He constructed and brought to bear "all kinds of machines and artillery", where the use of the word *tormentorum* implies, although it does not prove, that torsion artillery is meant. He used "many machines and other devices

[1] For these and other examples, see Elton, *Warfare in Roman Europe*, 82–5.

[2] Jordanes, *De origine actibusque Getarum*, 117 (chap. lv).

[3] Gregory of Tours, *The history of the Franks*, 116 (book II, vi). Gregory assigned the saving of Orléans to the prayers of its saintly bishop, but acknowledges that an urgent plea had been sent to Aëtius at Arles. Sidonius mentioned the siege and the leading role of the bishop, but declined a request to write a history of it: *Poems and letters*, II: 490 (book VIII, letter 15).

suitable for breaking walls". Since we know that even the most powerful artillery of this age was designed to target people and other machines and would be ineffective against a wall, this description must mean battering rams.[1] It has been argued that the historians whose accounts we use were not describing actual events, but reproducing accounts from ancient histories. When there is no corroborative evidence this is always possible. However, this account carries some conviction, at least in broad terms.

There is some debate about how the Huns acquired these skills. They were a nomadic people, although they employed other, subject peoples too. The most likely conclusion is that they got them through prisoners or deserters from the Roman army. This use of skilled engineers from other backgrounds is to be a common feature of medieval siege warfare. In the case of the Huns, it would also explain why having gained access to these skills, they were apparently lost again.

This hypothesis is strengthened by the apparent failure of besieging barbarian armies of any kind to use sapping. Undermining the wall and bringing it down in this way will be a major facet of medieval siege techniques. It does require particular skills to be carried out effectively. If no engineers with the relevant skills were available, it was very unlikely that the method would be tried. The only reference to mining is from the Gothic siege of Rome in 537, and Procopius' account indicates that this was the rather less challenging task of breaking through an outer wall without defences or defenders.[2]

We know that the armies of late Rome still possessed reservoirs of the skills needed. In 438 Aëtius was able to erect a siege tower against a Visigoth-held town. Siege towers were to be a method learnt by the Goths too, although, as will be seen, they were not very successful in using them.

Within a century, it looks as if such skills as had not been entirely forgotten were falling into disuse, except where sieges involved close encounters with Byzantium, which undoubtedly preserved the old methods. Once again, the evidence is capable of different interpretations, and of course the absence of references to particular pieces of equipment or their use is not evidence that they were not used. However, for the most part, the accounts by Gregory of Tours of the deeds (and many misdeeds) of the Merovingian dynasty of kings of the Franks in the sixth century suggest otherwise. Very much a busy man of the world as well as a bishop, Gregory knew of what he wrote. For Italy, we have the account given by Procopius of Justinian's attempt to recreate the old empire, and here the evidence for siege equipment in use is much stronger.

When Clovis (d. 511), the king of the Franks later honoured as the founder of France, was at war with the Burgundians, and besieged the city of Avignon, Gregory tells us that he accepted advice to give up because "the stronghold is too well fortified for you to capture". The next year, the Burgundian king Gundobad

[1] The second quotation is from Jordanes, *De origine actibusque Getarum*, 90 (chap. xii); *The Gothic history*, 113. It reappears in Thuróczy, *Chronica Hungarorum*, drawn from much earlier sources. Much less detailed is the account of Marcellinus comes, *Chronicon*, 75–84. The rest is from Tausend, "Hunnischer Poliorketik", 265–71.

[2] Procopius, *History of the wars*, 223–5 (book v, chap. xxii).

besieged the city of Vienne. The defenders were concerned at the shortage of provisions and expelled the common people: another common feature of sieges. Among those expelled, however, was the engineer in charge of the aqueduct, who in high dudgeon brought the besiegers into the town by showing them a water gate that could be prised open with iron crowbars.[1] So the town had an engineer, and the attackers iron tools. But they relied on this chance event to get in.

Later (582), when Gregory was recording events from his own times, he described how King Chilperic, fearing an alliance of his relations, ordered his "dukes and counts to tell them to repair the walls of their cities, and to shut themselves up in these fortifications".[2] Here again is evidence of the importance of the Roman walls inherited by the Franks, of the need to maintain them, and of the strength their possession offered. It is no wonder that so much of this history revolves around the occupation of the cities. In 586, the Visigoth Recared came out of Spain and "captured the castle [*castrum*] of Cabaret . . . and attacked the castle of Beaucaire near Arles . . . and shut himself up inside the walls of Nîmes", where he obviously felt safe.[3]

The only time Gregory described a siege in detail was at Comminges (in 585). The town, well provided with supplies, was held by a pretender to King Guntram's throne and besieged by Leudegisel, one of the king's counts. After two weeks, "Leudegisel spent his time in preparing new machines with which to destroy the city. He constructed wagons, which he fitted with battering rams and protected with wattle work, old leather saddles and planks of wood, so that the troops could rush forward under their cover to knock down the walls." But the defenders responded with "flaming barrels of pitch and fat, as well as boxes filled with stones", and the attack was repelled. The next day the besiegers "prepared fascines from bundles of sticks and tried to fill in the deep ravine which lies on the eastern side". This also failed. In the end the pretender was tricked into surrender and the townspeople were massacred.[4] But it is clear that the siege techniques of the attackers were not up to breaking through the defences of Comminges, and among all the detail there is no mention of any kind of artillery being used to drive the defenders from the walls and so make the task of breaking them down easier.

Gregory also provided important information about the organisation of Merovingian fighting forces. It is clear, for example, that the cities provided a base for a count and the focal point for the organisation of local levies, who would also presumably provide the garrison when under attack. As with the troops of later Frankish armies, they seem to have been required to arm and supply themselves.[5] What is less evident is where the engineers came from. Perhaps their existence is so obvious for Gregory's contemporaries that they require no comment. On the other hand, the description of the ineffective efforts of the king's army at Com-

[1] Gregory of Tours, *The history of the Franks*, 147 (book II, xxxii–xxxiii).
[2] Ibid., 374 (book VI, xlvii).
[3] Ibid., 462 (book VII, xxx).
[4] Ibid., 420–24 (book VII, xxxvi).
[5] Bachrach, "Military organization in Aquitaine", 4–5, makes brief reference to the situation under the Merovingians.

minges suggests no very high level of expertise. Bachrach argues that Merovingian armies included elements from the existing Roman armies,[1] and if that is the case then it is probable that this is where the siege expertise would have been found. Given the vital importance of the *civitates* and the *castra* to the Frankish kings, as Gregory has illustrated, it seems strange if they took no steps to acquire, retain or pass on these skills. It is suggested that where they could use troops from southern Gaul, which was the most romanised area, they were more likely to have such resources. But professional soldiers and engineers, after all, expect to be paid, and one of the changes of the post-Roman world was the ending of the old imperial tax systems.[2] It would be surprising if there was not a reduction in the numbers of skilled personnel available to the new rulers, but the evidence is simply not there.

Among the Franks' competitors to the south were the Visigoths, who had taken control of Roman Hispania, which included Septimania, a swathe of what is now southern France. They were to rule here until their kingdom was so dramatically and rapidly extinguished by the Islamic invasion of 711. Evidence for their siegecraft comes from a number of surviving texts, mainly from the late sixth and seventh centuries. They confirm what the account of Gregory of Tours suggests, although the absence of detail means conclusions cannot be definite. Certainly, the possession or capture of the cities remained a central objective. The Franks besieged Zaragoza (Caesaraugusta) for forty days in 541, while the Goths attacked and obtained possession of Tarragona. Euric captured Marseilles and "other castles" (*castellis*). Barcelona (Barcinona), a city with late Roman walls, was captured by the Burgundians.[3] King Leovigild also had to deal with many strongly fortified cities, but rarely was he able to take them by siege. In 570, he was repulsed from two such places and resorted to devastating the countryside, in following years he obtained possession by treachery. In 583, fighting a rebellious son and the Suevi (in the north west of the peninsular), he succeeded "now by hunger, now by the sword". When in 589 the Franks set up camp before Carcassonne, he was able to relieve the place and destroy their *castra*.[4] A hundred years on, methods were scarcely more sophisticated. St Julian of Toledo has left vivid accounts of the conflict with a rebel at Narbonne and Nîmes in 673. The defenders relied on archery and hurling stones; the attackers knew to protect their own encampment but relied on storming the walls to get in. King Wamba had to repair the walls of Nîmes after its fall, which implies some kind of siege equipment was employed,

[1] Bachrach, *Merovingian military organization*, 4–12, 20–21.

[2] See the comments by Pohl, "The barbarian successor states", 44.

[3] *Chronicon Caesaraugustanorum reliquiae*, 223; *Chronica gallica*, 665–6. The walled area of Barcelona (Barcinona) at this time was about 825 × 550 metres (9 hectares), erected around AD 260–310 to cover a smaller area than previously. The wall was protected by numerous closely-spaced projecting rectangular towers of small size, suited more to archers than artillery according to the excavator. A Balil, *Las murallas bajo-imperiales de Barcino*, 34–5, 61.

[4] Johannes Biclarensis, *Chronica*, 212, 216–18.

but it is not mentioned anywhere, and the account is such as to suggest that it would have been had it been present.[1]

While the Visigoths inherited Roman cities with their existing walls, it seems that they were quite capable of learning from them, too, although surviving remains seem to be few. A *castrum* dated to between 650 and 711 was found at Rosas (in Gerona), which had a standard type of double wall infilled with small stones, gravel, and earth, but without any mortar. The Visigothic city of Recopolis (in Guadalajara) had similar walls, and projecting rectangular towers six metres square. In appearance they must have been very similar to Byzantine constructions, as will be seen.[2]

Their Ostrogothic cousins seem to have turned their attention not only to using their inherited places as means of defence or refuge against other invaders, but also to have undertaken new building work of their own. Comments in Cassiodorus' *Variae* and in the works of the saintly bishop Ennodius of Pavia confirm that Theodoric the Great (ruler of Italy from 489 to 526) put up new defences, and there have been numerous attributions of constructions (all south of the Alps or in the passes) to the period between the arrival of the Goths and their conquest by the Byzantines, although to what extent this consisted of no more than providing garrisons for existing places (which was common, according to the sources) is hard to prove, with place names being another indicator. There were certainly new refuges created: the bishop of Novara built a *castellum* around 490–500, although no remains have been found, while there is a *castrum* of the subdeacon of Milan (no later than 556). Theodoric ordered the restoration of existing walls at Susa, Ivrea, Trent, Cividale, the repair of the walls and "aged towers" of Arles, and the strengthening of the *castellum* at Tortona. Excavation at Verona has identified a number of phases of work later than the third-century circuit of walls, including construction of what must have been a forewall eight to ten metres outside the circuit of Gallienus, described as of poor quality, during the Theodorician period.[3] Procopius recounted how Theodoric marched against his rival Odoacer, besieging him in Ravenna in 489, until a (short-lived) settlement was reached after a blockade lasting into a third year. At the same time, however, the Gothic army had captured other strong towns "in one way or another", with the exception of Ravenna and also Cesena, which could not be approached because of its location protected by the Po and great extents of shoals on all sides. The lake-island fortress of Bolsena was available for use as a prison in 535, having apparently been

[1] Julian, *Historia rebellionis Pauli adversus Wambam*, 776–91. See also E A Thompson, *The Goths in Spain*, 266–7; Reilly, *The medieval Spains*, 21–6, 43.

[2] Olmo Enciso, "Restos defensivos de Recópolis", 67–72.

[3] Settia, "Le fortificazioni dei Goti in Italia"; Cavaliere Manasse, "Le mura teodoriciane di Verona", 634–40. For the original letters of the king to his lieutenants at Tortona, Arles, etc., see Cassiodorus, *The Variae*, 14–15, 65–6 (I.17, III.41, III.44). The walls of Arles resisted attack by the Franks (507–8) and earned the loyal city a remission of taxes by the grateful Theodoric: ibid., 63 (III.32). The anonymous *Chronica theodoriciana* reported that the restoration of Rome's walls was to be paid for with an assignment on the taxes collected on wine, and the new works of the king at Verona and Pavia included new circuits of walls: Anonymus Valesianus II, *Chronica theodoriciana*, 550–51, 552–3 (chaps. lxvii, lxxi).

previously maintained as a place of great strength.[1] Ennodius' panegyric of the great Goth includes references to his work of erecting castles to defend the kingdom, and to his programme of reconstruction of cities lying in ashes, while a life of the bishop mentions the rebuilding of Pavia using "immense engines", and to the strength of the defences of that place, capable of resisting even attacks made with *Balearis fundae* (literally "slings", but perhaps a figure for engines like the *onager*).[2] As always, it is wise to treat such obviously biased statements with doubt, unless verified by archaeology.

Despite a growing number of excavations of *castella* used during this period, little evidence seems to have emerged to enable conclusions to be drawn about exactly when, or by whom, these fortifications — that range from quite large defensible refuges in heavily populated areas, to small garrison forts in strategically important locations — to be drawn. Their excavator concluded that in fact, most if not all of the north Italian locations were late Roman constructions reused by the Goths.[3] Other possible sites date to the period of Gothic rule in Thrace, with the major fortifications at Sadovets (northern Bulgaria) attributed to Bessas, who was recognised as prince by the East Romans around 488, which are part of a network of defended settlements on strong-points above the river Vit. Sadovsko-Kale stood on a terrace 80 by 20 metres, and was strongly protected on the only approachable side. Here stood a wall, now three metres high, but just 1.8 wide, standing on firm foundations and built from mortared, uncut stones. Entrance was gained through a simple gate. Inside was a second wall of similar construction, with at its terminus a five-sided tower corner tower, with walls 2.7 metres thick. The upper levels have all disappeared. Inside were a row of chambers set against the walls. Coins and burning suggest destruction, possibly in the Avar invasion. The work, clearly showing signs of Byzantine influence, but with Gothic attribution relying on circumstantial evidence, was not of great strength or quality, but seems rather strong just to have been a refuge.[4]

In Britain, the absence of records for the fifth and sixth centuries leaves the field open only for speculation. The Anglo-Saxon conquest must have encountered the many walled towns left by the Romans. Whether they were defended by the Britons or abandoned is not possible to determine. Gildas, in his lamentation of the failure of the Britons to defend themselves, notes that all the towns "were laid low by the repeated battering of enemy rams" (*arietes*), but whether this is mere rhetoric or an accurate reflection of the siege-warfare skills of the invaders cannot be determined. From the other evidence of the abilities of barbarian chieftains to capture fortified towns, it is possible.[5]

[1] Procopius, *History of the wars*, III: 7–8 (book V, i), 37 (book V, iv).

[2] Ennodius, *Panegyricus regi Theodorici dictus* and *Vita Epiphani episcopi Ticinensis*, both in his *Opera*, 207, 211, 299.

[3] Brogiolo, "Dwellings and settlements in Gothic Italy", 113–120, 136. The writer had excavated seven *castella*, of which only that at Monte Castello di Gaino (Lake Garda) was possibly built by the Goths. Other recent archaeological reports are listed in Brogiolo's paper.

[4] Welkov, "Eine Gotenfestung bei Sadowetz".

[5] Gildas, *The ruin of Britain*, 27, 98.

Siege warfare in Gothic and Lombard Italy in the sixth and seventh centuries

Procopius, on the other hand, leaves no doubt as to the full panoply of weaponry deployed in the siege operations involved in the struggle between the Ostrogoths and the Byzantines for control of Italy, a struggle to which he was a witness as secretary to the imperial commander Belisarius. It also appears from his account that the Ostrogoths had acquired some of the knowledge as well, which would not be surprising since they had been rulers of the centre of the old empire for half a century. The description of the siege of Rome (537–8) talks of rams, *ballistae*, and *lupi*. Further, the attackers "made wooden towers" equal to the height of the wall, which were wheeled and pushed by oxen. The rams are described as roofed. The Goths had four of them, each propelled by fifty men. They deployed "innumerable fascines" to fill the ditch. In response, Belisarius, commanding the Roman army, "placed machines in the towers which are called *ballistas*". Procopius goes on to describe their construction, which confirms they are of the type we have seen described by Vegetius. Furthermore, on the walls were placed "other machines, hurling suitable stones: they are similar to slings, and are called *onagers*".[1] This appears to contradict what has been said about the problem of mounting the *onager* on top of a wall because of the likelihood of its damaging the wall through the violence of its recoil. However, it was noted earlier that the defences of Rome had been substantially reinforced twice after their original rebuilding, and the walls and towers were a great deal stronger than the walls that surrounded so many Roman cities in the rest of the old empire. It may well be that the strengthening process was carried out precisely in order to enable the walls to mount such weapons. There seems little other reason, given the absence of siege skills among Rome's likely assailants at the time, to have invested so much in raising and thickening walls that were already strong by contemporary standards.

The other main point about the Goths' attempt to recapture Rome from Belisarius is that it failed. Despite substantial numerical superiority, and the apparent ability to construct rams and towers, their attempted storm was a fiasco, being repelled by the missiles and in particular the artillery of the defenders. Their skills did not extend to providing the cover needed to enable them to reach the walls, and if they did have their own artillery, it was not capable of dealing with that on the walls. The defenders shot down the oxen and left the towers stranded. As with the Franks, it looks as if the Goths were still relatively inept at siege warfare despite their long rule in a country where control of the walled cities was the single most element of political power. There is a solitary further reference to the use of *ballistae* by the Goths, where they are described as being mounted in wooden

[1] Procopius, *History of the wars*, III: 205–7 (book V, xxi). He gives a description of the *lupus*, which suggests that this was some kind of wooden portcullis designed to protect the gates. There is a stirring account of this war (which seems to be rather strongly based on Procopius) in the old history of Hodgkin, *Theodoric the Goth*, 317–40.

towers to cover a river crossing, but do not warrant further detail although the ensuing battle is minutely recounted.[1]

Following the epic siege of Rome, the war between Goth and Roman continued until 552. The Gothic ruler Vittigis (r. 536–40), having been beaten at Rome, left substantial garrisons in Chiusi, Orvieto, and Todi and in other places, including 500 men in the fortress of Cesena and at Montefeltro, to hold them against Belisarius while he marched on Ariminium (Rimini) on the coast, seized by an imperial force, to besiege it. Procopius recorded that the Goths had now learnt from their experience at Rome, and proceeded to build a siege tower on four wheels, as high as the wall, but this time (somehow) propelled by men from the inside. It had a wide ladder there as well, to enable large numbers of soldiers to mount to the top, from which they planned to enter the city. The ditch was very shallow. But they were unable to complete the attack before darkness fell, and left the tower close to the ditch overnight. During the night, the garrison commander led out his troops and managed to dig the ditch much deeper, throwing up the spoil on the inside to create another rampart. By the time the Goths realised, it was too late. Although the next day they attacked and filled the ditch with fascines, these proved unable to bear the weight of the tower, which toppled forward. There was then a fierce fight as the Byzantines sallied to prevent the engine being withdrawn, and although they failed to stop this happening, they killed many of the besiegers in the fight, and the latter settled in for a long siege, in which they would eventually have succeeded through hunger had the Byzantine army and fleet not come to the city's relief.[2]

Time and again, the defences of the cities were sufficiently daunting to persuade the Goths to resort to attempts to starve them out, leading to blockades of many months. Sometimes they succeeded; often they were thwarted by the arrival of relief. Frequently, the Goths turned to demolishing the walls of places they secured, in order to prevent their potential reuse. Totila had even begun to pull down the walls of Rome (having finally occupied it) when he was dissuaded, apparently, by an extraordinary appeal from Belisarius, reminding him of how he would appear in history if he was responsible for the destruction of the great city. On this occasion, when Belisarius reoccupied the city, he found a shortage of artisans that prevented him properly restoring the damage.[3] Later, the imperial army recaptured Rome (again) by scaling ladder, when the Gothic garrison found itself too small to protect the whole perimeter at once. In the whole period of the reconquest of Italy by the empire, there is no evidence that the Goths were able to take serious advantage of the existing fortifications to hold onto their rule, or to remove their enemies from them once established.

The year 568 saw the arrival in the Italian peninsula of another Germanic

[1] Procopius, *History of the wars*, v: 409 (book viii, xxxv).

[2] Ibid., iii: 379–93 (book vi, xi–xii) (attack on Ariminium).

[3] Ibid., iv: 205–13 (book vii, vi) (siege of Naples, 543); 229–31, 253–7 (book vii, ix) (siege of Dryus (Otranto)); 245 (book vii, xi) (destruction of the walls of Pesaro and Fano); 361 (book vii, xxiv) (shortage of artisans). See also Marcellinus comes, *Chronicon*, 105–7.

people, the Lombards, whose rule was rapidly to cover most of the region, leaving the Byzantines restricted to southern coastal cities and Ravenna and a precarious protectorate over Rome, which was in practice ruled by the popes. They provide us with evidence for the development of siege warfare in the following century and beyond, until the Franks finally put an end to Lombard rule in the north of Italy in 774. Paul the Deacon has left an invaluable record of their history.

It seems as if the new arrivals were not much better adapted to the methods involved in capturing fortified places than the Goths they supplanted, but at least they record some successes gained in attacking them. In 600/601, the Lombards recaptured rebellious Padua "when fire was thrown into it".[1] How was this achieved? Perhaps it was incendiary devices projected from catapults, but we are not told. A little later (603), King Agilulf captured Cremona after breaking down its walls with rams ("cum arietibus").[2] In about 610, the Avars invaded and devastated north-east Italy and defeated the Lombards, who proceeded to take refuge in Cividale and other fortresses "whose position was impregnable".[3] This was the same response to military weakness as thwarted the Franks a few years earlier.

Paul indicates then that the Lombards at least were able to take advantage of the strong places they had taken over to ward off attacks from other barbarian armies. There is some further evidence to support this written account. The country they had occupied had been at war for a long time, and during this time rival commanders had reverted to destroying existing walls to deny them to their enemies. Furthermore, there were parts of Italy where there were very few fortified cities in the first place.[4] The Lombards, it seems, did not leave their defence to the existence or strength of the already standing Roman walls alone, although they did take advantage of these where they existed.[5] To guard their lands from attack from the north, they built a range of fortifications. Paul is unhelpful in describing them, using terms such as *castrum* and *castellum*. To him it would have been obvious what was meant; to later readers it gives no idea what kind of fortifications they were. A site has been excavated at Ibligo-Invillino in the north-east.[6] It stands on a high hill in a flat plan, overlooking a Roman road and a crossing of the river Tagliamento. The hilltop, rearing 55 metres above the valley, is 650 metres by 100 metres. The *castrum* occupies 200 × 100 metres. Its excavators say that, between both earlier and later occupation evidence (late Roman and Venetian), there is a stone tower that is either late Roman or Lombard. Although this is

[1] Paulus diaconus, *Historia Langobardorum*, 23 (book IV, chap. xxii); *History of the Langobards*, 167.

[2] Paulus diaconus, *Historia Langobardorum*, 28 (book IV, xxviii); *History of the Langobards*, 171.

[3] Paulus diaconus, *Historia Langobardorum*, 37 (book IV, xxxvii); *History of the Langobards*, 180.

[4] Procopius, *History of the wars*, III: 69 (book V, vii), notes the absence of fortifications in the south of the country: "their towns had from old been without walls". See also Pani Ermini, "Città fortificate e fortificazione delle città", 194–204.

[5] D Harrison, *The early state and the towns*, 67–73; Schmiedt, "Le fortificazioni altomedievali in Italia", 906–18.

[6] Fingerlin, Garbsch and Werner, "Gli scavi nel castello di Ibligo-Invillino", 58–130.

a site reported by Paul, this only means that the Lombards used it, not that they built it. There is no evidence of a curtain wall, and the dating seems precarious. Elsewhere, at Castelsegnio (north-west of Milan), a site dating originally to the fourth century has been excavated. It had late-Roman walls and towers, following the line of the hilltop, and a cistern and a church, with a village below. It is said that the church is seventh century, therefore Lombard.[1] All in all, the present level of evidence makes it hard to demonstrate that the new conquerors, although they had to base their control in the existing cities, added very much to what they found, but rather took advantage of what was there, both in the cities and in the *castra* they found in the countryside.

The Lombards were in conflict, both on their northern frontiers and on the south, with the Byzantine emperors.[2] As the seventh century progresses, Paul gives us evidence of a new siege weapon. In 663, the Byzantines threw the head of a Lombard leader into the city they were attacking with a "machine of war called a *petraria*, which commonly we call *mangola*".[3] By the end of the century, the Lombards were themselves using an array of siege weaponry, as in 701 King Aripert attacked Bergamo, "storming it without any difficulty with battering rams and other machines [*manculis*]".[4] This new weapon represented the first significant change in siege warfare and its techniques since the end of the western Roman empire, and for its origins it is necessary to turn our attention to the east and retrace our steps.

The Byzantine empire

The western successor states to Rome added little to what they had taken over, and witnessed significant regression in the level of culture and skills. In the east, there was no break in the continuity of imperial rule. Although the capital was no longer in Rome, the Roman empire continued to exist. It represented the only significant power in the whole of the eastern Mediterranean, the Balkans, Asia Minor, the Middle East, and (after Justinian's reconquest), North Africa. For the same reason, it faced opposing powers in all directions. Justinian directed an attempt to regain the empire's lands in the west. Belisarius restored Roman rule by crushing the Vandal kingdom in Africa with astonishing speed, and came quite close to reinstating imperial rule in the whole of Italy. But there were other enemies too, more powerful than any in the west, of which the Persian empire was the most significant. Meanwhile, control of the Balkans was always prone to disruption by successive waves of new barbarian invasions. Rich although it was by comparison with the barbarian states described already, the

[1] Christie, *The Lombards*, 177–8.

[2] Paulus diaconus, *Historia Langobardorum*, 147 (book v, viii). Compare *Vita Barbati*, 558.

[3] Paulus diaconus, *Historia Langobardorum*, 148 (book v, viii); *History of the Langobards*, 219–20.

[4] Paulus diaconus, *Historia Langobardorum*, 171 (book vi, xx); *History of the Langobards*, 265.

calls on the empire's resources to pay for Belisarius' conquests, and the defences of those conquests, were enormous. To consolidate their hold on what they had gained required a vast building programme. As evidence for this we have, again, the writings of Procopius, and can test his statements against the surviving buildings that have been studied. Between them, it is possible to deduce the specifications for fortifications thought necessary by the Byzantines in the sixth century and beyond. As a general rule, it will be seen that these fortifications were smaller, and built to more modest dimensions, than their predecessors. A number of reasons for this can be advanced. Resources were probably lacking to construct anything more ambitious, and in the case of towns, it looks like the populations they needed to shelter were smaller. At the same time, in some parts of the empire, the threat came from barbarians who lacked sophisticated siege techniques. Against such enemies, the kind of design called for by Vegetius was deemed unnecessary.

The walls of Constantinople

Naturally, there were exceptions. Constantinople stood above all other cities in the Roman world, not least in the strength and magnificence of its triple, concentric land walls with their numerous projecting towers and ditches. These had been built by the emperor Theodosius (405–50). The inner rampart was 12 metres high and five thick, the towers rising a further five metres above that. An open space of 13.5 metres stood between this and the outer wall, four metres high and two thick, of arcaded construction. A further open space, 15 metres wide, led to the ditch, six to eight metres deep and 19 wide, with low walls on each side. The walls were built of regular limestone blocks. The towers had tall, vaulted lower floors supporting platforms from which the defence could be carried out.[1] The immense resources put into their construction were to be put to the test repeatedly, and repaid their builder's care, as will be seen. But the other defences inherited by Justinian were not so strong.[2]

The problem with using Procopius as evidence is that he may well have exaggerated the weaknesses of the pre-existing fortifications in order to enhance the reputation of his emperor. For example, in the east, he says, Justinian fortified the town of Daras (now Dara), which had previously been a village, whose low walls built without mortar would have fallen easy prey to the Persians, who would raise mounds and assault Daras with "all manner of engines". The emperor therefore heightened the walls, had arrow slits inserted into the battlements, and raised the towers to three levels. He dug a moat and built outworks on the weakest side, where the soil was "suitable for mining".[3] However, another source says that

[1] See Krischen, *Die Landmauer von Konstantinopel*, I, and Meyer-Plath and Schneider, *Die Landmauer von Konstantinopel*, II, for a detailed survey of the whole work and of the later additions.

[2] For a summary survey, see Lawrence, "A skeletal history of Byzantine fortification", 180–81; Ravegnani, *Castelli e città fortificate*, 31–2.

[3] Procopius, *Buildings*, 376 (book VI, chap. xxxvii). The term for engines here is *elepolei*, which in other contexts suggests a siege tower.

the town had been founded by the emperor Anastasius in 507, "surrounded with strong fortifications".[1] At Sucidava (Corabia) on the north bank of the Danube, the work of this period was limited to the addition of a circular angle tower built entirely from reused materials to the fortress first constructed by Constantine.[2]

However, there is a consistency to Procopius that must at least contain some truth. On the same Mesopotamian frontier as Daras, Constantina (formerly Antioch-in-Mesopotamia, now Viranşehir) had a wall so low "that it could be scaled with a ladder", and the towers were so far apart that they could not cover the wall in between. The wall was held together with mud and was only one metre thick. The towers ordered by the emperor were again of three storeys and each one represented a *castellum*, an interesting choice of term to describe it. At Martyropolis (Silvan or Miyafarkin between the river Tigris and Lake Van), so weak that it had surrendered to the Persians in 502 without even an attempt at defence, Procopius recorded that Justinian ordered a second stone wall built a metre in front of the existing one, and the gap between the two filled in with rubble to create a defence now three metres thick, and then doubled the three-metre height.[3] These, then, were substantial works, and the reason they needed to be was that the Persians were formidable enemies. It is hard to check the accuracy of Procopius against present remains: carbon dating of a "Justinianic" fort near Thermopylae in Greece gave a much earlier date of around 450.[4] That is not to say that the works against the Persians were not carried out at the emperor's order, but at Palmyra in the Syrian desert, an important city on a junction of trade routes on the frontier, he tells us that the emperor strengthened the defences. Today, what remain are the lower courses of a typical late-Roman wall originally ordered by Diocletian, now under restoration.[5] However, at Caesarea in Palestine, excavation located what seems to have been a fortress significantly strengthened at the time of Justinian, with strong projecting semicircular towers added (and surviving to a height of five metres), with an external diameter of around ten metres, built as part of the conversion of the theatre into a fortress attached to the town wall.[6] Inscriptions confirm that Justinian was also responsible for the work done to reinforce the third-century defences of Miletus in 538, where, speed being of the essence, much of the building material was plundered from the baths and temples of the classical

[1] Evagrius scholasticus, *Ecclesiastical history*, 376 (book III, chap. xxxvii). This version is supported by Zacharias of Mitylene, who says Daras was to serve as a base and arsenal against the Arab tribes, and the emperor sent engineers to lay it out, and stonecutters and masons, and ordered the bishop to see to its construction, which took two or three years: Zacharias, *The Syriac chronicle*, 166 (book VII, chap. vi).

[2] Tudor, "Sucidava", *Dacia* 5–6 (1938), 402; 7–8 (1941), 363.

[3] Daras: Procopius, *Buildings*, 98–109 (book II, i); Constantina: ibid., 133–5 (book II, v); Martyropolis: ibid., 189–91 (book III, ii).

[4] Mentioned ibid., 2–15, 23 (book IV, ii). See Cherf, "A Justinian fortification near Thermopylae"; Cherf, "Carbon 14 and Prokopios' *De aedificiis*".

[5] Procopius, *Buildings*, 177 (book II, xi). See Burns, *Monuments of Syria*, 162–3.

[6] Wiemken and Holum, "The joint expedition to Caesarea Maritima", 12–40; Ringel, *Césarée de Palestine*, 50–51.

city. The gates were converted into citadels, and a castle was constructed directly on the baths, where the walls are three metres thick.[1]

In North Africa, the local neighbouring population (the Moors) was less likely to engage in full-scale siege warfare, and the Byzantine defences accordingly were less strong. Pringle has published a survey of those that remain, while Gsell has studied those within present-day Algeria.[2] Procopius' account is rather sketchy, by comparison with the detail he offers of other building works carried out at Justinian's order. However, he does point out that many walls had been pulled down by the previous regime (the Vandals) and that the emperor's intent was to restore many cities to full defensive capability. At Leptis Magna (Lebida), the city was now apparently largely empty, and the desert had encroached. The emperor ordered that the "the circuit wall (be) built up from the foundations", but covering a much smaller area than before.[3] Carthage was provided with a whole new curtain wall, the old one having "fallen down", and a moat was dug that had not existed previously, the existence of which has been confirmed by excavation. On the north side of the city, where the ditch was shallower, were found remains of two projecting rectangular towers sited close enough to support each other. Within the city, he ordered the construction of a monastery, which was itself walled, making it "an impregnable fortress."[4] This is not the only reference to Byzantine fortifications of monasteries during this period — the famous Sinai Desert monastery of St Catherine's was walled at this time. On the frontiers with the Moors, fortresses (*thouria* in Greek) were built in large numbers, in each of which were stationed garrisons of soldiers. Procopius records a long list of places that received similar defences and garrisons, including Septum (Ceuta), whose Roman walls had apparently been neglected by the Vandals.[5]

A number of interesting questions are raised by this account. How strong were the defences? What was the strategic purpose, if any, of the large number of fortifications? Where did the garrisons come from? Who continued the task of maintenance? An attempt has been made to answer these.[6] Town walls have been located at 23 of the 37 identified cities. The garrisons were made up of regular imperial frontier soldiers, but it was not possible to work out how large these garrisons were. It appears that the walls were put up to protect the wealthiest areas, and to provide a base for the garrisons. They did not represent a defensive barrier, but rather were located where existing settlements were,[7] although the remains confirm Procopius' indication that the sixth-century sites were smaller than their predecessors. It could be, however, that the walled area represented a response to the military needs of the government rather than enclosing the whole popula-

[1] Gerkan, *Die Stadtmauern*, 114–17.

[2] Pringle, *The defence of Byzantine Africa*; Gsell, *Les monuments antiques de l'Algérie*.

[3] Procopius, *Buildings*, 375 (book VI).

[4] Procopius, *Buildings*, 381 (book VI). On the excavations, see Coyne, "The fortifications of Byzantine Carthage", 52–3.

[5] Procopius, *Buildings*, 389–91 (book VI).

[6] Pringle, *The defence of Byzantine Africa*.

[7] Ibid., 83, 89, 98.

tion. However, the maintenance of the defences was the responsibility of the city itself. Many other sites, moreover, were simple garrison forts, as little as 40- or 50-metre-sided rectangles with four corner towers.

Since the Byzantine fortifications were built from new, and presumably by engineers brought by Belisarius' army from other parts of the empire, it might be expected that the architectural style would be similar, although obviously influenced by the availability of local building materials. It is also argued that the Moors' lack of siegecraft accounts for the absence of some of the features noticed in Byzantine defences against, for example, the Persians.[1] The walls of the forts are between 1.4 and 2.6 metres, rather less wide than those in the east, but the core was made of concrete, which was stronger than rubble so allowed the wall to be both taller and thinner without being weaker. However, thinner walls would have surely created problems in deploying artillery, which may therefore have been restricted to the towers. The only surviving sixth-century tower is quite small. The common design is a rectangular plan and usually rectangular towers. Walls were up to ten metres high, with towers rising one story higher. No trace has been found of ditches (apart from that specifically mentioned at Carthage). In several sites, there were inner redoubts of small dimensions.[2] Five different designs of gateways have been identified, with portcullises in the larger ones.[3] It has been suggested that an innovation in Byzantine technique here was the use of bent gate passages, adding to the obstacles facing an enemy who had gained entry.[4]

All in all, this survey of Byzantine works in Africa strongly suggests that, leaving aside resource problems on which we have no information, the scale of the work was tailored fairly carefully to cope with the likely threat from the Moors, and in particular in recognition that these foes did not have siege artillery and were not conversant with means of breaking through a wall such as movable battering rams.

Finally in this survey of Byzantine fortresses of the fifth and sixth centuries, the vulnerable Danube frontier calls for some examination. Having been the beneficiary of a great deal of attention, as they faced repeated attacks from the east and north, the Balkans and the provinces south of the great river also received significant new building under Justinian, confirmed not just by Procopius but also by inscriptions and excavations. Numerous town defences were improved, those of several cities such as Serdica (Sofia) receiving an outer wall (*proteichisma*) or thicker or higher walls, confirmed at Serdica by an inscription. At the same time, in line with work being done elsewhere, the walled areas were often reduced, gateways narrowed, and towers had their interiors filled in to turn them into solid bastions.[5] Similarly in Dalmatia, Salona (near Split) had triangular towers added to the Theodosian defences in the sixth century, presenting a dense array of towers

[1] Ibid., 132.

[2] For example, at Tipasa, Kenchir Guessès (now Hennchir Gasses) and 'Aïn el Bordj (Tigiris): Gsell, *Les monuments antiques de l'Algérie*, II: 359–63.

[3] Pringle, *The defence of Byzantine Africa*, 155–61.

[4] Foss and Winfield, *Byzantine fortifications*, 7.

[5] Biernacka-Lubańska, *The Roman and early-Byzantine fortifications*, 218–20.

on the landward side, where the walls were around four metres thick and included much reused spolia.[1] Further south, excavations at the site of the major classical city of Butrint suggested a new circuit of walls around the lower city had been added in the fifth century. They were up to two metres thick, so a very substantial defence. They might also, however, have been of medieval date.[2]

Alongside traditional methods of building fortifications, the Byzantine empire inherited the long Roman tradition of siegecraft. They did not remain tied to old texts, however, and possessed a long line of writers producing manuals taking account of new realities, such as the change in the nature and composition of the armies, and the changing range of enemies. At the end of the sixth century, the emperor Maurice put his name to a new manual, the *Strategikon*[3] composed at some time between 573 and 628. The treatise devoted a whole section (book x) to siege warfare. Many of the precepts were traditional, but there was considerable stress on siege weapons, both for attack and defence. Walls should be protected by breastworks, sacks filled with straw and sand to protect against stones. Rams and other wall-breakers were to be resisted with sacks of stones. Siege towers could be resisted with fire- and stone-throwing catapults. The stone thrower (*petrobolos*) was clearly distinguished from the *ballista*, which could be used as a weapon in the field as well. The machines were operated by specialists.[4] The context does not make it possible to decide whether the artillery was still the *onager* or whether the new, more powerful and simpler weapons which arrived at this time were adopted by the Byzantines straight away. Since the army would have a long tradition of using the former, it might be judged that this was more likely to be in regular use.

Persian wars: Amida to Jerusalem, 502–614

From the third century the Roman empire had its wars with the Persians. Both were sophisticated practitioners of siege warfare and fortification building. "There have been and now are great numbers of engineers in both countries."[5] The Persians' repertoire was on display when they attacked Amida (modern Diyarbakır), a frequent target in the frontier zone. In 502/3, they built a mound against the wall, the defenders responding first by trying to heighten the defence opposite, then by digging a hole in their own wall to get at the base of the mound, into which they tunnelled. When the Persians brought a battering ram up their mound to attack the new wall, which being newly erected crumbled quickly, the defenders collapsed the whole structure from the inside. While besieging the town, raiders were sent against Edessa (Şanlıurfa), where the population hurried to dig ditches and repair the walls, and the old decayed gates had to be removed and blocked with stone; they were unable to replace the gates because they did not have enough

[1] Wilkes, *Dalmatia*, 359–62, and fig. 16 (plan).
[2] R Andrews et al., "The late antique and medieval fortifications of Butrint", 127–31.
[3] Maurice, *Das Strategikon*. See also Aussaresses, *L'armée byzantine à la fin du VI^e siècle*.
[4] Maurice, *Das Strategikon*, 337 (book x, chap. i), 343–5 (book x, iii).
[5] Procopius, *History of the wars*, v: 157 (book VIII, xi).

iron. Cutting down all the foliage outside, and destroying all the buildings that could shelter the Persians, the Edessans successfully deterred a siege.

Back at Amida, the Persians had rebuilt their mound, using stones, timber, and sacks of hair and linen in order to speed up the work. The defence then turned to a giant stone thrower able to hurl blocks weighing 135 kg, which killed many attackers and smashed their battering ram. (The reference in this account must be to the *onager*.) The Persians were considering abandonment when, one night, the guards got drunk and Persian soldiers climbed in by ladder and captured the town. The emperor's forces attacked Amida the following year, using three siege towers. Collecting artisans from the neighbouring towns and villages, the commander set about digging a mine. However, on its first firing, only the outer portion of the wall collapsed. The canny Persian defenders managed to fill their ditch with water, so that they could identify future mining by the trickle away of the water. They held on until, with cannibalism luridly reported in the town, a truce was arranged between the two empires.[1]

The unfortunate city was attacked again in 512 "with fierce assaults of sharp arrows and with battering rams which thrust the wall to overthrow it, and penthouses [*testudines*] which protected those who brought together the materials for the besiegers' mound and raised it up and made it equal to the height of the wall". Their attack lasted three months, but Amida held out. This was because winter weather caused the bow strings to "relax", bundles of rushes hung down from the walls cushioned them against the rams, and the defenders mined under the mound and brought it down. In the end, the Persians got in when treacherously admitted through an aqueduct, and carried out a massacre.[2] In 531, they attacked Martyropolis, which was a base for the Byzantines to threaten Persian territory, and tried to mine it, but were thwarted by the arrival of winter.[3] The Byzantine siege and ultimate capture of Petra in 551 (on the Black Sea frontier near Batumi, Georgia) revealed their skills in wall building and undermining, and in this case the construction by allied barbarians of a portable ram, as the slope did not allow deployment of the traditional kind. The defenders used prodigious quantities of naphtha to try to burn the rams,[4] but the besiegers overcame resistance by breaking through when another portion of the wall was undermined, and a change of wind direction caused the flaming weapons to burn down the Persian structure from which they were being thrown.

As the sixth century turned into the seventh, the two empires found themselves engaged in a massive, long-lasting, and bloody struggle, which was to have disastrous effects in Asia Minor and Byzantium's middle-eastern provinces, was to briefly threaten Constantinople itself, and as a longer term consequence was to leave both empires seriously weakened in the face of a threat of which they were still unaware: Islam.

[1] All from Joshua the Stylite, *The Chronicle*, ed. and trans. Wright, 37–65. The writer was from a monastery near Edessa. See also the new translation by Trombley and Watt.

[2] Zacharias, *The Syriac chronicle*, 153–4 (book VII, iv).

[3] Ibid., 228 (book IX, vi).

[4] Procopius, *History of the wars*, V: 157–71 (book VIII, xi).

In 587, the emperor invaded the Persian domain, and "arrayed his siege engines and machines" against a stronghold on a rock, in Arzanene on the frontier (approximately Batman province, Turkey). The Persians hung robes over the wall to "mitigate the hardness of the discharges" but to no avail, and the place was captured.[1] Two of his commanders tried to take by surprise Matzaras (Maserti) but the defenders responded "now with stones, now with catapults". The wall however was of dry-stone construction, and the Romans were able to mount it by driving in spikes. The defenders pushed the parapet of the wall, "weakened by the Roman bombardment", onto the climbers. After three tries the place was captured.[2] In 573/4, the Persians had attacked Daras, whose rebuilding by the Byzantines Procopius had described, and surrounded the town with "mounds and ramparts". They diverted the water supply, constructed siege towers, and brought up siege engines,[3] including catapults that were mounted on the mound (or two mounds, according to one account), which was higher than the town walls. They finally took it by storm after a siege of five months. The garrison withdrew into the citadel, which was attacked by the same method of preparing a mound and also using stone-throwing catapults.[4] In 604, they captured the place after a very long siege. Clearly, the protection Justinian's engineers had devised against mining more than half a century earlier was not sufficient, as the source, an Armenian bishop, says that the breach was made by mining.[5] It is clear from these accounts that a full range of siege weaponry was deployed by both sides on Byzantium's eastern frontier. The references to a wall being weakened by a bombardment is strange. There is no evidence that the *onager* was capable of damaging a properly constructed wall, and the *ballista* was definitely an anti-personnel weapon. The clues perhaps lie in the statement that the wall was of dry-stone construction. Perhaps, although there is no evidence, it was also quite thin, although it still seems peculiar that the defenders could, or would, actually push over the very parapet designed to protect them from their opponents' missiles. However, there is another reference to a wall crumbling under bombardment in the account of the Byzantine capture of Ocras, a fort opposite Martyropolis, from the Persians in 591.[6]

Later, the Persians themselves were to take the offensive and to drive into the middle east and Asia Minor. In 614 they captured Jerusalem, and the horror produced by their desecration of the Christian holy places ensured that there are a number of contemporary accounts of the event. First the Persian army, having defeated the Byzantines, swept through Syria, easily taking many places (perhaps by offering the kind of safe conduct offered to Caesarea). Arriving before Jerusalem, they tried first of all to take it by direct attack, but were thwarted by

[1] Simocatta, *The History*, 68–9 (book I, chap. xviii).

[2] Ibid., 69–71 (book I, xviii).

[3] Ibid., 1–2 (book I, xi).

[4] Evagrius, *Ecclesiastical history*, 435 (book V, x). The further detail comes from the Syrian *Chronicle of* AD *1234*, trans. Chabot, 160–61 (chap. lxvi), who talks of the "balistas quae magnos lapides proiciebant".

[5] Sebeos, *Histoire d'Héraclius*, 57 (chap. xxi).

[6] Evagrius, *Ecclesiastical history*, 460 (book VI, xv).

a vigorous defence (with "hails of stones") after the inhabitants had overruled the patriarch, who wanted to accept a Persian offer. They then resorted to siege weapons, including *mangana*, and after twenty days the walls were broken and the city was stormed and sacked.[1] The sources agree that the walls were thrown down, and the implication is either that the Persians had acquired unprecedently powerful stone-throwing artillery, or else the artillery was part of a sustained attack involving also other forms of attack. The reference to "mounds" and towers suggests that the besiegers were not relying on a single method of attack, and the very abbreviated and versified form of these accounts, along with the (slight) delay in their composition after the events, must leave unresolved the precise nature of the artillery used by the Persians. Had they already adopted the new artillery first seen in the west at Thessaloniki twenty or thirty years before? Bishop Sebeos, writing in Armenia a generation later but clearly using a different (and now lost) source for this story, reports that the Persians had sapped the foundations and demolished the walls after nineteen days. The detail given is consistent with our other evidence for Persian siegecraft,[2] suggesting a particular expertise in the complex skills of sapping and mining.

Siege of Constantinople, 626

A dozen years later, the war was brought to the walls of Constantinople itself. In 626, the great city was subjected to the first of a number of serious attacks that were to threaten it, always unsuccessfully, until 1204. On this occasion, the Persians had crossed Asia Minor and were established on the southern shores of the Bosphorous. The really serious attack, however, was to be launched from the European side, by their allies the Avars. Again, there is an unusually rich survival of contemporary accounts, which allows for a fairly detailed reconstruction of the events of that momentous year.

The Avars were relatively recent arrivals from the east, who had established themselves in central Europe at the head of a large empire, in which were to be found also many Slavonic tribes. Certainly they had a fairly high technical level: among other things, they have been credited with the introduction of the stirrup.[3] The *Strategikon* had noted them among new opponents whose ways had to be learnt. Until their elimination by Charlemagne, they were a significant force in the

[1] Sophronius, *Vers sur la prise de Jérusalem*, 141–2 (an elegy composed around 620–28, in Greek); Strategios of Mar Saba, *Prise de Jérusalem par les Perses*, 154–5 (French trans. of Arabic version of an originally Greek text), *La prise de Jérusalem par les Perses*, II: 13–14 (Latin trans. of Georgian version of the same text), "Antiochus Strategos' account of the sack of Jerusalem", 506–7 (English trans. of Georgian version). The author of the latter text is identified only as "a holy monk" of Mar Saba in the Arabic version; the Georgian version names the author as "Strategios" in the text and as "Antiochus Strategios" in the superscription, but the identification of Strategios with Antiochus of Mar Saba is uncertain; see *Clavis patrum graecorum*, nos. 7842–3.

[2] Sebeos, *Histoire d'Héraclius*, 68 (chap. xxiv).

[3] Szádeczky-Kardoss, "Der awarisch-türkische Einfluss auf der byzantinische Kriegskunst", 64–70.

region. In 626, a vast Avar host (at least according to the Byzantine contemporary account) advanced on Constantinople. Fortunately for the Roman empire, the Persians played a rather wait-and-see game on the Asian side; had they mobilised ships, the city would have been in trouble. As it was, the emperor Heraclius (r. 610–641) left a strong garrison (12,000 men), provisions, a fleet, and detailed instructions about strengthening the defences. This involved strengthening the bases of the walls (presumably against mining or sapping) and erecting projecting barriers in front, which would have the effect of obstructing rams or siege towers. A large supply of artillery weapons was also called for, both dart and stone throwers.[1] He himself remained outside the city with an army on the Asian side, and would later carry out a victorious campaign to expel the Persians from Byzantine territory.

Two detailed contemporary accounts survive of the Avar attack and its ultimate defeat. Arriving on 29 July after spending a month assembling their forces at Adrianople, two days later they drew up their force along the whole 5.7-kilometer length of the outermost wall, but concentrated in the middle sections. The *Chronicon Pascale* says that initially there were a few siege engines and mantlets, but the next day they "stationed a multitude of siege engines close to each other . . . so that those in the city were obliged to station very many siege engines within the wall". The Avars "bound together [the] stone throwers and covered them outside with hides".[2] The whole third day was spent in a duel of artillery and archery. Our other contemporary source then reports that on the fourth day, they arrayed siege towers (*helepolei*) made of wood, which had been prefabricated and brought to the siege on carts. A request to surrender having been turned down, the assault then began in earnest. It lasted until the tenth day, during all which time the attackers used their full array of weapons to press an attack, with a "multitude of projectiles" hurled by the catapults. Crucially, on this day, the Byzantine fleet won a victory over the boats prepared by the Avars, thus preventing any risk of their linking up with the Persians. Finally, the defenders mounted a sortie and succeeded in burning the Avar towers, mobile wooden shelters, and catapults.[3] The *Chronicon Pascale* suggests a slightly different ending: the Avars finally gave up their attempt, and themselves burnt their siege equipment before withdrawing. While on the one hand it is true that if the Avars had brought their equipment very close to the walls, it would have been vulnerable to a sortie, on the other hand if it really did stretch most of the length of the city's land defences, it is difficult to see the garrison being strong enough to risk a sortie on such a wide front. However, what is significant here is that despite the size of the Avar army and its possession of what must have been an immense siege train (despite the probability of the sources exaggerating it in order to greater glorify the defence), organised and prepared

[1] The instructions are given in Georgius Pisida, *Bellum Avaricum*, ll. 266–79; Italian trans., *Panegirici epici*, 270–71.

[2] *Chronicon paschale*, 173–9.

[3] Theodorus syncellus, *L'homélie sur le siège de Constantinople en 626*, pp. xix–xxxv, 20–33. There is an excellent account of the whole siege in Howard-Johnston, "The siege of Constantinople in 626".

even to the extent of prefabricating the towers, they were able to make no dent in Constantinople's defences, never it seems even getting close enough to try to create a breach. Nor was their artillery powerful enough to do the job.

Thessaloniki — a new weapon?

The Avar artillery was not of the old *onager* type with its limited size and impact, suited for anti-personnel use but unlikely to harm any effective fortifications. The evidence is that, instead, they introduced to the west a new design of weapon, although not of their own creation, which would remain the standard design until the twelfth century when it would be superseded by the counterweight trebuchet. The habit has become established of calling this new weapon a traction trebuchet, although this word was unknown to contemporaries. It combined the features of being easier to build and maintain with the potential for propelling much larger projectiles. We have a rare privilege for this period, an actual description of the weapon that leaves no doubt as to what it was. However, nothing can ever be this straightforward, and the source is replete with problems of its own. The collection of homilies known as the *Miracles of Saint Demetrius* was not composed with the aim of being a history, let alone a technical treatise. They were written to demonstrate the miraculous interventions of Thessaloniki's native saint in protecting the city from harm. Their (many) editors suggest that they are a jumble of real historical events (the chronology being checked against other sources) and Demetrius' miraculous doings. Likely to have been penned by Bishop John in around 620, they cover two failed sieges of the city, in 586 or 597 and again in 617/8.[1] The gap between the two events must raise questions about the accuracy of the record of the earlier, and the possibility of anachronisms creeping in. But the bishop claims to be an eyewitness to both, and from the perspective of studying the siege techniques, it is not critical whether descriptions of one siege are jumbled with the other.

Thessaloniki was an attractive target for invaders seeking loot, the second city of the empire but one whose situation was perilously exposed to attackers who had already established themselves to the north. It was therefore also well defended. It is suggested that the walls were erected in 380, but it has also been argued that this happened in response to the Huns in the 440s, when the seating blocks from the hippodrome were cannibalised for the foundations. The walls stretched for eight kilometres and were of strong construction, now varying in thickness from 2.2 to 4.6 metres (as a result of later strengthening), and with some forty square or rectangular towers, although continuous use has obscured exactly what was there when the Avars approached (Plate 1).[2] It would seem also that there was, at

[1] We rely heavily on *Les plus anciens recueils des Miracles de Saint Démétrius*. See also Barišić, "Les Miracles de St. Démétrius comme sources historiques". On the date of the first attack, see Vyronis, "The evolution of Slavic society", 381–2.

[2] Evans, "The walls of Thessalonika"; Tafrali, *Topographie de Thessalonique*, 59–112; Hetherington, *Byzantine and medieval Greece*, 202. There is a plan of the fortifications in Eustathius, *The capture of Thessaloniki*, p. xxiii.

least in part, a lower outer wall about twelve meters in front. Given these defences, no attacker could expect an easy picking, and would need to come prepared. The *Miracles* allow a reconstruction of what happened. The Avars and Slavs arrived without warning, and attempted an assault by escalade, using ladders brought with them. The Saint allegedly materialised to come to the city's rescue, hurling down the ladder, and the enemy withdrew. The Avars then ravaged the country but found it unable to provide the means of sustaining them. They then attacked using "*helepolei*, iron rams, stone throwers and 'tortoises' [movable sheds with protected roofs] covered with cow and goat skins". Under cover of a bombardment of great stones they got close to the outer wall to attack the foundations with picks and levers. They attacked one of the gates with a ram, but took fright and fled, burning their own machine. The defenders then sallied, apparently from the inner toward the outer wall, and, protected by the wall, sapped under the "tortoises".[1]

The next day they appeared with stone throwers. This weapon apparently deserved a detailed description, because unlike the others used on the previous day, the writer must have assumed that his readers would be unfamiliar with it. The catapult, the account of which has been translated from the Greek several times, was quadrangular, with a wide base but narrowing towards the top, using large iron rollers to which were fixed timber beams "similar to the beams of big houses", having at the back a sling, and at the front thick cables, enabling the arm to be raised and lowered, and which threw "enormous blocks into the air with a terrifying noise".[2] Despite the shock no doubt induced by such a new machine, the defenders succeeded in destroying it with a flaming arrow, perhaps from a *ballista*. Undeterred, the attackers returned the next day with more engines, this time protected with fresh skin coverings. The defenders protected their battlements by hanging absorbent material in front of them. The bombardment lasted for hours. However, although the Avars may have known how to construct these machines, their calculations were not so good when it came to operating them: hardly any of the stones actually reached the wall, whereas the defenders' stones (shot from what we are not told) caused casualties among those serving the stone throwers. Only one Avar stone hit, and this apparently demolished the top of the rampart down to the walkway. Unsuccessful therefore despite their new technology, the Avars gave up and withdrew after seven days.[3]

Returning in 617 or 618 for another try, the Avars again brought to bear a wide range of equipment, and refugees from their advance warned the citizens that "a single stone from their engines would ruin the wall". Their stone throwers were higher than the interior wall, they had wheeled rams, rolling ladders, high wooden towers, and engines throwing fire. Once again, Thessaloniki called upon miracles wrought by its saint to ward off the threat, although the account also acknowledges the help of more mundane defences. The siege tower collapsed when moved, and the tortoises were capsized with hooks let down from the wall. Sailors

[1] *Les plus anciens recueils des Miracles de Saint Démétrius*, 1: 117, 122, 139–40, 146.

[2] Ibid., 143. Also translated in DeVries, *Medieval military technology*, 134. The subject is also treated exhaustively in various publications by Chevedden (see bibliography).

[3] *Les plus anciens recueils des Miracles de Saint Démétrius*, 1: 151–9.