The "Military Revolution," 1560-1660--a Myth?

Author(s): Geoffrey Parker

Source: *The Journal of Modern History*, Jun., 1976, Vol. 48, No. 2 (Jun., 1976), pp. 195-214

Published by: The University of Chicago Press

Stable URL: https://www.jstor.org/stable/1879826

The "Military Revolution," 1560–1660—a Myth?*

Geoffrey Parker
St. Salvator's College, University of St. Andrews

"The sixteenth century constitutes a most uninteresting period in European military history," wrote Sir Charles Oman in 1937, and no one then dared to disagree with him. Today, however, few historians would endorse his verdict. The early modern period has come to be seen as a time of major change in warfare and military organization, as an era of "military revolution." This shift in historical perspective is mainly the work of one man: Michael Roberts, until recently Professor of History at the Queen's University of Belfast. His inaugural lecture, entitled "The Military Revolution, 1560–1660" and delivered at Belfast in January 1955, was an undisguised manifesto proclaiming the originality, the importance, and the historical singularity of certain developments in the art of war in post-Renaissance Europe. Now most inaugural lectures, for better or worse, seem to fade into the seamless web of history, leaving little trace; yet Professor Roberts's inaugural is still quoted time after time in textbooks, monographs, and articles. His conclusions, as far as I know, have never been questioned or measured against the new evidence which has come to light in the twenty years or so which have elapsed since he wrote. Such an examination is the aim of this paper.[1]

Roberts's "military revolution" took place between 1560 and 1660 in four distinct areas. First and foremost came a "revolution in tactics": certain tactical innovations, although apparently minor, were "the efficient cause of changes which were really revolu-

* This article is based on a paper given at King's College in the University of London in November 1974, as one of a series of lectures on "War and Society" organized by Mr. Brian Bond and Dr. Ian Roy. Both made helpful suggestions about the preparation of this study, as did Dr. Peter Burke, Mrs. Angela Parker, and Profs. John Hale, H. G. Koenigsberger, and John Shy. I am grateful to all of them. Last, but certainly not least, I would like to thank Prof. Michael Roberts for his help over many years and for encouraging me to publish this article.

[1] M. Roberts, *The Military Revolution, 1560–1660* (Belfast, 1956), reprinted in a slightly amended form in *Essays in Swedish History* (London, 1967), pp. 195–225, with some additional material on pp. 56–81. For examples of how the "military revolution" has been accepted by other scholars, see G. N. Clark, *War and Society in the Seventeenth Century* (Cambridge, 1958); and again in *New Cambridge Modern History*, vol. 5, *The Ascendancy of France; 1648–1688*, ed. F. L. Carsten (Cambridge, 1964), chap. 8. Compare the approach of C. W. C. Oman, *A History of the Art of War in the Sixteenth Century* (London, 1937).

[*Journal of Modern History* 48 (June 1976): 195–214]

tionary."[2] The principal innovation in the infantry was (he claimed) the eclipse of the prevailing technique of hurling enormous squares of pikemen at each other in favor of linear formations composed of smaller, uniform units firing salvos at each other; likewise the cavalry, instead of trotting up to the enemy, firing, and trotting back again (the *caracole*), was required to charge, sabers in hand, ready for the kill. According to Roberts, these new battle procedures had far-reaching logistical consequences. They required troops who were highly trained and disciplined, men who would act as cogs in a machine; and the cogs had to learn how to march in step and how to perform their movements in perfect unison—they even had to dress the same.[3] Individual prodigies of valor and skill were no longer required. Of course all this training cost money; and, because the troops had acquired their expertise at the government's expense, Roberts claimed that it was no longer economical for armies to be demobilized when the campaigning ended: the trained men had to be retained on a permanent footing. The new tactics, he argued, thus gave rise inexorably to the emergence of the standing army, and the first to pioneer these tactical reforms—and therefore one of the first to create a standing army in Europe—was Maurice of Nassau, captain-general of the army of the Dutch Republic.[4]

A "revolution in strategy" formed the second major strand of Roberts's thesis. With the new soldiers, it proved possible to attempt more ambitious strategies: to campaign with several armies simultaneously and to seek decisive battles without fear that the

[2] Roberts, *Essays*, p. 217.

[3] On the whole, troops did not dress alike in most armies until the later seventeenth century. It was the 1650s before the English and Swedish armies adopted uniform; the French did not do so until the 1660s. Before that, troops dressed as they (or their commanders) wished, carrying only distinguishing marks such as a feather, a scarf, or a sash of the same color to mark them out from the enemy. Not surprisingly, there were a fair number of cases of units from the same army attacking each other in the confusion of battle. For the introduction of uniforms, see C. Nordmann, "L'Armée suédoise au XVIIe siècle," *Revue du nord* 54 (1972): 133–47 (esp. p. 137); L. André, *Michel le Tellier et l'organisation de l'armée monarchique* (Paris, 1906), pp. 339–42; and G. Parker, *The Army of Flanders and the Spanish Road, 1567–1659: The Logistics of Spanish Victory and Defeat in the Low Countries' Wars* (Cambridge, 1972), pp. 164–65.

[4] On the reorganization of the Dutch army by Prince Maurice and his cousin William-Louis, see W. Hahlweg, "Aspekte und Probleme der Reform des niederländischen Kriegswesen unter Prinz Moritz von Oranien," *Bijdragen en Mededelingen betreffende de Geschiedenis der Nederlanden* 86 (1971): 161–77; and M. D. Feld, "Middle-Class Society and the Rise of Military Professionalism: The Dutch Army, 1589–1609," *Armed Forces and Society* 1 (August 1975): 419–42. Both authors stress that, although classical precedents were closely studied by the Nassau cousins (especially outstanding successes like the battle of Cannae in 216 B.C.), their relevance to military conditions in the Netherlands was also carefully evaluated.

inexperienced troops would run away in terror. Gustavus Adolphus of Sweden, victor of the Breitenfeld and conqueror of Germany, certainly put these new strategic concepts into effect; according to Roberts, he was the first.

A third component of the military revolution theory was a "prodigious increase in the scale of warfare in Europe" between 1560 and 1660. The new strategy, Roberts pointed out, required far more troops for its successful execution: an articulated force of five armies operating simultaneously according to a complex plan would need to be vastly more numerous than a single army under the old order. Fourth and finally, this prodigious numerical increase dramatically accentuated the impact of war on society. The greater destructiveness, the greater economic costs, and the greater administrative challenge of the augmented armies made war more of a burden and more of a problem for the civilian population and their rulers than ever before.

These four assertions form the kernel of the military revolution theory. There was, of course, a great deal more—the development of military education and military academies,[5] the articulation of positive "laws of war,"[6] the emergence of an enormous literature on war and war studies,[7] and so on—but the four essential ingredients of the theory were tactics, strategy, army size, and overall impact. Have these assertions been modified in any way by recent research?

In the first place, it has become clear that the choice of the year 1560 as the starting point of the military revolution was unfortunate. Many of the developments described by Roberts also characterized warfare in Renaissance Italy: professional standing armies, regularly mustered, organized into small units of standard size with uniform armament and sometimes uniform dress, quartered sometimes in specially constructed barracks, were maintained by many Italian states in the fifteenth century. Machiavelli's oft-quoted jibe about the

[5] There were a few centers of instruction like the *academia militaris* of John of Nassau at Siegen (1617–23), and courses of obvious military utility, such as mathematics and fencing, were added to the curricula of a number of colleges and schools; but, when one remembers the central place of war in seventeenth-century society, the lack of more formal education in military matters is somewhat surprising.

[6] Roberts has commented on the proliferation in the seventeenth century of studies on the "law of war" (*Essays*, pp. 216–17); the basic principles, however, already affected the conduct of wars in the Middle Ages; see M. H. Keen, *The Laws of War in the Late Middle Ages* (London and Toronto, 1965).

[7] In England alone between 1470 and 1642, a total of at least 164 English and 460 foreign books was published. See M. J. D. Cockle, *A Bibliography of Military Books up to 1642* (London, 1900; reprint ed., 1957); and H. J. Webb, *Elizabethan Military Science: The Books and the Practice* (Madison, Wis., 1965).

campaigns of the *condottieri*—that they were "commenced without fear, continued without danger, and concluded without loss"—was unfair and untrue. The armies of Renaissance Italy were efficient and effective; and the French, German, Swiss, and Spanish invaders had to adopt the methods of the *condottieri,* both in attack and defense, before they could make real headway against them. To a remarkable degree, as we shall see, the character of early modern European warfare, even down to its vocabulary, came direct from Renaissance Italy.[8]

There is no doubt, however, that Maurice of Nassau and his cousin William-Louis made some important tactical innovations in the army of the Dutch Republic. They reduced the size of their tactical units and increased significantly the number of officers and under-officers; they increased the number of musketeers and arque-busiers (the "shot") in each unit; and they introduced the classical technique of the "countermarch," whereby successive ranks of musketeers advanced, fired, and retired to reload in sequence. The last was certainly new, but, until the introduction of a more accurate musket which could also be swiftly reloaded, the countermarch was of limited practical value.[9] Moreover, Maurice's other tactical innovations, described by Roberts, derived at least some of their "revolutionary" character from a rather unfair portrayal of the "pre-revolutionary" warfare of the earlier sixteenth century. The Spanish army in particular, which Roberts used as a foil to the tactical reforms of Maurice of Nassau, was a force of impressive military efficiency. By the 1560s Spanish infantry on active service was normally made up of small, uniform companies of between 120 and 150 men, grouped into *tercios* (or regiments) of between 1,200 and 1,500 men.[10] The Spanish infantry normally contained a heavy

[8] On the influence of the Italian wars upon Europe's military history, see P. Pieri, *Il Rinascimento e la crisi militare italiana,* 2d ed. (Turin, 1952); and M. E. Mallett, *Mercenaries and Their Masters: Warfare in Renaissance Italy* (London, 1974), esp. chaps. 7 and 9. The points at which the European "military revolution" tended to follow Italian precedents are indicated *seriatim* in the notes below; see n. 20 for the linguistic inheritance.

[9] The countermarch was devised by William-Louis of Nassau, and a diagram showing what was involved was sent to Count Maurice on December 8, 1594; see a facsimile of this on p. 6 of J. B. Kist's commentary to J. de Gheyn, *The Exercise of Armes,* facsimile ed. (New York, 1974). Feld has claimed that the countermarch turned an army into "a unit of continuous production" and the soldiers into some sort of assembly-line workers and that this constituted a major tactical improvement. In theory, this is true; but, as noted above, in practice there were serious technical limitations (see Feld, n. 4 above. This important and interesting article was kindly brought to my attention by P. D. Lagomarsino of Dartmouth College).

[10] It is incorrect to say that "a Spanish army of 12,000 men would have four units" (Roberts, *Military Revolution,* p. 7). Although Roberts omitted this passage from the

concentration of shot—it was the duke of Alva who pioneered the introduction of musketeers into every company in the 1550s—and in the 1570s there were at least two companies which consisted solely of shot in every *tercio* on active service.[11] Throughout the Spanish army, as elsewhere, the basic tactical and administrative unit was the company: men were raised, trained, and paid in companies, not in regiments and not as individuals. Although the Spanish army had no larger formal tactical units like the brigades or battalions of the Swedish army, it was Spanish practice to group a number of experienced companies together for special assignments to form a task force, known as an *escuadrón*, which might number anywhere between 600 and 3,000 men, depending on the task to be performed.[12] This flexible, informal arrangement for the infantry proved highly satisfactory. The Spanish cavalry, too, was impressive in action. It comprised mainly companies of light horse, each numbering between 60 and 100 troopers, some of them lancers and some of them mounted gunmen (*arcabuceros a caballo*). In battle, as at Gembloux in 1578, their intervention was decisive; at other times they policed the countryside with ruthless efficiency. Dressed in turbans like the Turkish light horse, whose tactics they successfully emulated, the Spanish cavalry was as feared and as formidable as the *tercios*.

Spain's more permanent armies were also distinguished by a sophisticated panoply of military institutions and ancillary services. In the Netherlands and Lombardy, at least after 1570, there was a special military treasury, an elaborate and autonomous hierarchy of judicial courts, a well-developed system of medical care—with a permanent military teaching hospital, mobile field-surgery units, and resident doctors in every regiment—and a network of chaplains under a chaplain-general covering the entire army.[13] Some, if not all,

---

revised edition of his paper, he still overestimated the size of the Spanish units on active service (*Essays*, pp. 59–60, 62). It now appears that the Swedish army also did not have regiments of uniform size (Nordmann, p. 137, n. 23) and that there was no fixed ratio of pike to shot in the army of Gustavus Adolphus—it all depended on the availability of weapons at the time of recruitment.

[11] Take, e.g., the peacetime muster of the four Spanish *tercios* in the Netherlands, held on May 12, 1571: there were fifty companies (an average of twelve per *tercio*) and 7,509 men (an average of 150 men—nine of them officers—per company). Of the 7,509 men, 596 (9 percent) were musketeers and 1,577 arquebus men, a total of 30 percent "shot" ("Relación sumaria de los soldados que se pagaron," *legajo* 547, fol. 99 *bis*, Estado, Archivo General, Simancas).

[12] The *escuadrón* was also a common tactical unit in the Dutch army, *eo nomine;* see J. W. Wijn, *Het Krijgswezen in den tijd van prins Maurits* (Utrecht, 1934), p. 424. For the Swedish equivalent, see A. Åberg, "The Swedish Army, from Lützen to Narva," in *Sweden's Age of Greatness, 1632–1718*, ed. M. Roberts (London, 1972), p. 282.

[13] Parker, pp. 167–72, and the sources there quoted. It seems that Spain and

of this administrative superstructure was also to be found attached to the permanent Spanish forces in Naples and Sicily. Sixteenth-century Spain also had a complex training scheme for its men. In the words of an envious English observer of 1590, "Their order is, where the Warres are present, to supplie their Regiments being in Action with the Garrisons out of his dominions and provinces; before they dislodge, *besonios* supply their place; raw men as we tearme them. By these means he traines his besonios and furniseth his Armies with trained Souldiers."[14] From at least the 1530s Spanish recruits were sent initially not to the front line but to the garrisons of Italy or North Africa, where they learned the rudiments of arms drill and combat discipline for a year or two before leaving for active service. Their places were then taken by another generation of recruits.[15] It was an extremely efficient system, and it helps to explain the remarkable military caliber, reputation, and track record of the *tercios*. It was they, after all, who routed the "new model" Swedish army at Nördlingen in 1634.

Lest this should seem like special pleading from a starry-eyed student of Spanish history, one could point equally effectively to the Austrian Habsburgs, who introduced much the same system for their permanent armies on the Croatian and Hungarian border with the Ottoman empire during the 1570s.[16] And, if even that were not enough, there are the military organizations of France, England, and the Italian states during the fifteenth century: all developed permanent standing armies which were highly trained; seasoned in garrisons before they went to the front; capable of fighting in linear formations as well as in columns or squares; organized into small, self-contained tactical units; and controlled by a special military

Sweden were far ahead of the field in the provision of religious care for their troops. There were even Jesuit priests aboard the Dunkirk privateers after 1623 (see E. Hambye, *L'Aumônerie de la flotte de Flandre au XVIIe siècle* [Louvain, 1967]), and every soldier aboard the Spanish Armada of 1588 received a leaden medallion with the Virgin on it (several of these have been found by nautical archaeologists excavating the Armada wrecks off Ireland). The Swedish army in Germany had an "ecclesiastical consistory" under an almoner-general, and every soldier was issued with a Lutheran prayer book (Nordmann, p. 136).

[14] Roger Williams, *The Works of Sir Roger Williams*, ed. J. X. Evans (Oxford, 1972), p. 15. See the confirmation of Sir Francis Bacon in 1624 that "the great Secret of the Power of Spaine . . . will be found, rather to consist in a Veterane Army (such as vpon several Occasions and Pretensions, they haue euer had on foot, in one part or other of Christendom, now by the space of (almost) sixscore yeares) than in the strength of the Dominions and Prouinces" (*Certaine Miscellany Works* [London, 1629], quoted in Williams, p. cxli).

[15] Parker, pp. 32–35.

[16] G. E. Rothenburg, *The Austrian Military Border in Croatia, 1522–1747* (Urbana, Ill., 1960), chaps. 3–5; and E. Heischmann, *Die Anfänge des stehenden Heeres in Oesterreich* (Vienna, 1925), passim.

administration.[17] The simple fact is that, wherever a situation of permanent or semipermanent war existed, whether the Hundred Years' War of the later Middle Ages or the Thirty Years' War of the seventeenth century, one finds, not surprisingly, standing armies, greater professionalism among the troops, improvements in military organization, and certain tactical innovations. Gustavus Adolphus in the 1620s and Maurice of Nassau in the 1590s were forced to overhaul their armies dramatically because of the disastrous defeats which their predecessors had suffered in the preceding years. For inspiration, it is true, they turned in part to classical writers like Frontinus, Vegetius, and Aelian; but, like other rulers, they also turned to other more successful military practitioners, especially to the generals of Spain. Three of the best English military writers of the reign of Elizabeth—William Garrard, Humphrey Barwick, and Sir Roger Williams—had all served in the Spanish Army of Flanders for several years and held up its practices as examples to others.[18] The war in the Low Countries was a seminary in which many of the great commanders of the German Thirty Years' War and the English Civil War were formed.[19] It is no accident that a large part of the military vocabulary of northern Europe should have come from Spanish.[20]

[17] R. A. Newhall, *Muster and Review: A Problem of English Military Administration, 1420–1440* (Cambridge, Mass., 1940); P. Contamine, *Guerre, état et société à la fin du moyen âge: Etudes sur les armées du roi de France, 1337–1494* (Paris and The Hague, 1972); C. T. Allmand, *Society at War: The Experience of England and France during the Hundred Years' War* (Edinburgh, 1973); and Mallett (n. 8 above).

[18] Garrard served in the Burgundian regiment of the baron de Chevreux in the Netherlands for fourteen years; Williams served in the Spanish *tercio* of Julian Romero from 1574 until 1578; Barwick mentions his Spanish service but does not indicate how long it lasted. All three put their experience to good use in their writings: see Webb, pp. 44–50. There was, of course, a vigorous debate throughout most of the sixteenth century between the "Ancients" (who believed that Greece and Rome had provided exemplars to be copied in all spheres save religion) and "Moderns" (their opponents, of whom the three writers above are examples). See also Hahlweg (n. 4 above).

[19] See F. Redlich, *The German Military Enterpriser and His Workforce*, 2 vols. (Wiesbaden, 1964), 1:157–62, for examples.

[20] Sir Roger Williams stressed the point to readers of his *Discourse of Warre* (1590): "Some will condemnde mee for my strange names of fortifications, they ought to pardon me: for my part, I knowe no other names than are given by the strangers, because there are fewe or none at all in our language" (*Works*, p. 41). In the Netherlands, Simon Stevin's manual of fortification, *Stercktebouwing* (Leiden, 1594), carried foreign military terms in the margin with an explanation in the text; while a popular account of the Dutch Revolt, Emanuel van Meteren's *History of the Low Countries* (The Hague, 1612), contained a special glossary of foreign military words ("Vreemde krijghs-vocabulen"). In every modern army, many of the current officers' titles ("captain," "sergeant," etc.) and some of those now obsolete (e.g., "reformado," an officer who is temporarily without a unit to command) appear to have

The Dutch, however, did make a distinctive contribution of their own. Maurice of Nassau and his cousin were convinced of the need for standardization and uniformity in their forces. In 1599 they secured funds from the States-General to equip the entire field army of the republic with weapons of the same size and caliber. At about the same time, Count John II of Nassau began work on a new method of military training: the illustrated manual. He analyzed each of the different movements required to manipulate the principal infantry weapons, gave each of them a number, and prepared a series of corresponding drawings to show what was required. There were fifteen drawings for the pike, twenty-five for the arquebus, and thirty-two for the musket. In 1606–7 the whole scheme was recast—now there were thirty-two positions for the pike and forty-two for each of the firearms—and a sequence of numbered pictures was engraved and published under Count John's supervision: Jacob de Gheyn's *Wapenhandelinghe van roers, musquetten ende spiessen* [Arms drill with arquebus, musket and pike] (Amsterdam, 1607). The book went rapidly through numerous editions in Dutch, French, German, English, even Danish; there were pirated and plagiarized versions; there were many subsequent attempts to produce rival manuals (of which the best were Johan Jakob von Wallhausen's *Kriegskunst zu Fusz* of 1615, Henry Hexham's *Principles of the Art Militarie* of 1637, and Jean de Lostelneau's *Mareschal de bataille* of 1647). The sudden popularity of the new genre of military textbook is explained by the tactical changes of the sixteenth century. The evolution from monolithic, massed pike formations to articulated combinations of pike and shot, which made a more elaborate hierarchy of ranks necessary, placed an increasing burden on the junior officers and underofficers. They became the crucial links between the army commanders and the small tactical units; they had to control, discipline, and drill their men. It was to answer their needs that de Gheyn and the rest produced their drill books. The situation depicted in a picture of a company of the Amsterdam militia in 1625, painted by W. van den Valckert, must have been fairly typical: the captain is shown standing with de Gheyn's *Wapenhandelinghe* actu-

come from Spain or Italy to France, the Netherlands, and England (see J. Herbillon, *Eléments espagnols en wallon et dans le français des anciens Pays-Bas* [Liège, 1961]). It seems likely, however, that many of these military terms came first to Spanish from Italian (J. Terlingen, *Los Italianismos en español desde la formación del idioma hasta principios del siglo XVII* [Amsterdam, 1943]). There is no full analysis of the Spanish words loaned to Flemish and Dutch, although there is a sketchy introduction by C. F. A. van Dam, "De Spaanse woorden in het Nederlandsche," in *Bundel . . . aangeboden aan Prof. Dr. C. G. N. de Vooys* (Groningen, 1940), pp. 86–103.

ally open in front of him, trying to work out what to do next! The Dutch may not have invented the "revolution" in tactics, but they certainly invented the best way of coping with some of its effects.[21]

There is thus room for doubt concerning the novelty of the tactics and the standing armies introduced by Prince Maurice and King Gustavus. There is also some question about the originality of Gustavus's strategy. Again, Roberts starts with a damaging critique of the practice of sixteenth-century generals: "The sterility of warfare in Europe, in the time of Prince Maurice, is the accurate measure of the strategic thinking of the age." And in another passage, "Strategic thinking withered away; war eternalized itself."[22] Now the crucial influence on the evolution of strategic thinking in the sixteenth century was the appearance of an entirely new type of defensive fortification: the *trace italienne,* a circuit of low, thick walls punctuated by quadrilateral bastions. In the course of the fifteenth century it became obvious that the improvements in gun founding and artillery had rendered the high, thin walls of the Middle Ages quite indefensible. A brief cannonade from the "bombards" brought them crashing down. The reason why the kingdom of Granada fell to the Christians so easily in the 1480s, when it had resisted successfully for seven centuries, lay in the fact that Ferdinand and Isabella were able to bring a train of almost 180 siege guns against the Moorish strongholds.[23] The English possessions in France were likewise reconquered in the 1430s and 1440s largely by Charles VII's artillery; at Castillon in 1453, the big guns even won a battle. The initiative in warfare now lay with the aggressor, and, not surprisingly, by 1500 every major European state possessed a powerful artillery park for use against its neighbors or

[21] Van den Valckert's painting of Captain Burgh's militia company hangs—like Rembrandt's more famous picture of the company of Captain Hans Banning Cocq, done in 1642—in the Rijksmuseum, Amsterdam. There is a reproduction of the portion which clearly shows de Gheyn's book on p. 37 of Kist's commentary to de Gheyn. Kist establishes beyond all doubt the influence of Johan II of Nassau on the composition of the *Wapenhandelinghe* (pp. 14–15), and he describes the measures taken in 1599 to standardize armament in the Dutch army. For a little more information on the first English edition of de Gheyn, see Anna E. C. Simoni, "A Present for a Prince," in *Ten Studies in Anglo-Dutch Relations,* ed. J. A. van Dorsten (Leiden and London, 1974), pp. 51–71.

[22] Roberts, *Military Revolution,* p. 7, and *Essays,* p. 202.

[23] M. A. Ladero Quesada, *Castilla y la conquista del reino de Granada* (Valladolid, 1967), p. 127. For a general assessment of the importance of artillery to Europe, see C. M. Cipolla, *Guns and Sails in the Early Phase of European Expansion, 1400–1700* (London, 1965). However, the demise of the old-style castles did not occur overnight. In many areas where artillery could not easily be brought in, medieval fortifications retained their value. See H. M. Colvin, "Castles and Government in Tudor England," *English Historical Review* 83 (1968): 225–34.

against its dissident subjects. Military architects in Italy, where siege warfare was most common, were the first to experiment with new techniques of fortification which might withstand shelling; and Professor John Hale has traced the evolution of the bastion defense in Italy from about 1450, when it made its first appearance, until the 1520s, when it was fully fledged. It was a development which "revolutionized the defensive-offensive pattern of warfare," because it soon became clear that a town protected by the *trace italienne* could not be captured by the traditional methods of battery and assault. It had to be encircled and starved into surrender.[24] The French military writer Fourquevaux declared in 1548 that towns whose fortifications were more than thirty years old, that is, which were built before the age of bastions, hardly deserved to be called fortifications at all. "We must confesse," echoed Sir Roger Williams, "Alexander, Caesar, Scipio, and Haniball, to be the worthiest and famoust warriers that euer were; notwithstanding, assure your selfe, . . . they would neuer haue . . . conquered Countries so easilie, had they been fortified as Germanie, France, and the Low Countries, with others, haue been since their daies."[25] There was therefore a scramble among the great powers to build the new "miracle" defenses wherever there existed a risk of attack: in Lombardy, in Hungary, in the Low Countries, along the south coast of England, and elsewhere.

As it happened, these areas were all large plains—"continental islands," to use the language of Fernand Braudel—where a few great towns dominated the countryside. Whoever controlled the towns controlled the countryside; and therefore in all these areas war became a struggle for strongholds, a series of protracted sieges. Battles were often irrelevant in these areas unless they helped to determine the outcome of a siege. Even total victory on the field did not necessarily compel the well-defended towns to surrender: they could continue to resist, as did St. Quentin after the famous battle in 1557, or as the towns of Holland and Zealand were to do after 1572, either until they were starved into submission or until the enemy gave up through exhaustion.[26] Naturally, since the *trace italienne*

[24] J. R. Hale, "The Early Development of the Bastion: An Italian Chronology, c. 1450–c. 1534," in *Europe in the Later Middle Ages*, ed. Hale, J. R. L. Highfield, and B. Smalley (London, 1965), pp. 466–94.

[25] G. Dickinson, ed., *The "Instructions sur le faict de la guerre" of Raymond de Baccarie de Pavie, Sieur de Fourquevaux* (London, 1954), p. 85; and Williams, p. 33.

[26] Parker, pp. 7–11 and nn. thereto. The same was true for many of the wars of the Middle Ages. The Hundred Years' War was, according to a recent study, "characterized more by sieges than by any other form of martial exercise" (Allmand, p. 7; see also pp. 6–9, 104–22).

was introduced in those areas most likely to be fought over, and since most of the fighting of the sixteenth century did in fact take place there, it is true to say with Roberts that most generals, like Maurice of Nassau, "had no ambition whatever to fight battles." This proves only that they had a sound grasp of strategic realities. But whenever wars happened to occur in areas where the *trace italienne* was absent—in Italy before 1529, in central France during the religious wars, in the British Isles, or in Germany—then battles were both frequent and important: Pavia in 1525, Mühlberg in 1547, Ivry in 1590, and so on. It was even possible in such areas to operate a conscious *Vernichtungsstrategie*.[27] It was also true that, where bastions were absent and battles more frequent, cavalry was more prominent: on Europe's steppe frontier, for example, with the cossacks and stradiots, or during the civil wars in Germany and England, with the furious charges of Pappenheim, Prince Rupert, and Cromwell's Ironsides. But even in these theaters of conflict, battles were seldom "decisive," in the sense that they brought the war to an immediate end. Neither the Breitenfeld, nor Lützen, nor Wittstock, nor Jankow—four resounding victories for the "new-model" Swedish army—terminated the Thirty Years' War. The two battles of the war which came nearest to achieving "total" victory were, as it happened, won by Spanish "old-style" forces: the White Mountain in 1620 and Nördlingen in 1634.

The generals of the seventeenth century, like their predecessors, were compelled to respect the dictates of military geography. When in 1632 the imperial army under Wallenstein retreated into the Alte Veste, a specially prepared stronghold near Nuremburg, Gustavus Adolphus was compelled to expend a great deal of time, men, and money in trying to starve them out. And in the end he failed. In France, Vauban diligently erected a chain of modern defenses all around the sensitive and exposed frontiers of the country. Coehoorn did the same in the United Provinces. These fortifications of the later

[27] See the policy of Sir Humphrey Gilbert, commander of Queen Elizabeth's forces in Ireland in 1579 and a veteran of the Low Countries' Wars: "He further tooke this order infringeable, that when soever he made any ostyng, or inrode, into the enemies Countrey, he killed manne, woman, and child, and spoiled, wasted, and burned, by the grounde all that he might: leavyng nothing of the enemies in saffetie, which he could possiblie waste, or consume. . . . The killing of them by the sworde, was the waie to kill the menne of warre by famine, who by flight oftentymes saved them selves from the dinte of the sworde" (Thomas Churchyard, *Generall Rehearsall of Warres* [London, 1579], quoted in J. T. Johnson, *Ideology, Reason, and the Limitation of War: Religious and Secular Concepts, 1200–1740* [Princeton, N.J., 1975], pp. 141–42. Johnson points out that this is an early application of the counterrevolutionary doctrine that "if revolutionaries live among the people like fish in water, the way to kill the fish is to dry up the water").

seventeenth century, vast star-shaped complexes which kept the besieging artillery out of range of its prey, continued to be of strategic importance until the 1860s. Wherever they existed, they made battles irrelevant—and therefore unusual. Throughout modern time as in the Middle Ages, military geography shaped strategy.[28]

There is thus some doubt about the significance of both the tactical and the strategic aspects of Roberts's military revolution. But there is absolutely no doubt about its third constituent: the growth in army size. Between 1530 and 1710 there was a ten-fold increase both in the total numbers of armed forces paid by the major European states and in the total numbers involved in the major European battles. Table 1 demonstrates the inflation in armies—

TABLE 1
INCREASE IN MILITARY MANPOWER, 1470–1710

Date	Spanish Monarchy	Dutch Republic	France	England	Sweden	Russia
1470s	20,000	. . .	40,000	25,000	. . .	. . .
1550s	150,000	. . .	50,000	20,000	. . .	. . .
1590s	200,000	20,000	80,000	30,000	15,000	. . .
1630s	300,000	50,000	150,000	. . .	45,000	35,000
1650s	100,000	. . .	100,000	70,000	70,000	. . .
1670s	70,000	110,000	120,000	. . .	63,000	130,000
1700s	50,000	100,000	400,000	87,000	100,000	170,000

SOURCES.—For figures on Spain, Ladero Quesada, p. 159; Parker, *The Army of Flanders*, p. 6; and H. Kamen, *The War of Succession in Spain, 1700–1715* (London, 1969), pp. 59–60 (for metropolitan Spain only). For the Dutch Republic, F. J. G. Ten Raa and F. de Bas, *Het Staatsche leger, 1568–1795*, 6 vols. (Breda, 1911–18), vol. 1, passim. For France, Contamine, *Guerre, état et société*, pp. 313–18; F. Lot, *Recherches sur les effectifs des armées francaises des guerres d'Italie aux guerres de religion (1494–1562)* (Paris, 1962), pp. 135–88; André, pp. 271–328; and H. Méthivier, *Le Siècle de Louis XIV* (Paris, 1962), p. 68. For England, C. G. Cruickshank, *Elizabeth's Army* (Oxford, 1966), passim; C. Firth, *Cromwell's Army* (London, 1962), pp. 34–35; and R. E. Scouller, *The Armies of Queen Anne* (Oxford, 1966), chap. 3. For Sweden, M. Roberts, *The Early Vasas: A History of Sweden, 1523–1611* (Cambridge, 1968), pp. 399–404; and Nordmann, pp. 133–47. For Russia, *New Cambridge Modern History*, (Cambridge, 1964) 5:577. R. Bean, "War and the Birth of the Nation-State," *Journal of Economic History* 33 (1973): 203–21, provides some further figures on the size of various "national" armies from A.D. 1 to A.D. 1599 (p. 210).

[28] Military geography also affected military theory. It is true that Londoño, Valdes, Escalante, and the other Spanish writers of the period who dealt with war said very little about battles; but this was because after 1559 Spain fought very few wars in which battles were necessary. At least two of the wars in which she was engaged were little more than extended guerilla actions: in new Galicia and in Chile. It is therefore no surprise to find that the first European manual of guerilla warfare was written by a Spaniard, Bernardo de Vargas Machuca, who had fought long years in Chile. His *Milicia de las Indias* of 1599 described jungle warfare with operational units of twenty or thirty men under a *caudillo* (leader) who knew not only how to lead and how to fight but also how to cure sores and wounds inflicted deep in the forest (most of his remedies involved the use of tobacco as a painkiller), which vegetable seeds to take on the march to sow over the winter and harvest in the spring, and so on. The Indians of Chile never fought battles, Vargas Machuca observed, because they had learned from bitter experience that they always lost them! For an account of the similar guerilla war on the northern frontier of Spanish

which was paralleled in navies—and the rise in combatants is obvious when one compares battles like Pavia (1525) and Nieuwpoort (1600), with 10,000 combatants on either side, and a battle like Denain (1710), with 100,000 men per side.

If, however, we can accept Roberts's assertion about military manpower growth, we cannot *a priori* accept his explanation of it. It cannot stem, as he thought, from the tactical and strategic innovations of Maurice of Nassau and Gustavus Adolphus: first, because these modifications were not so new; second, and more important, because the rapid and sustained growth in army size predated them. The Emperor Charles V had 55,000 men at the siege of Metz in 1552, long before Maurice was born, and the Spanish Army of Flanders already numbered 86,000 men in 1574, when the prince was only six years old. There were, in fact, certain other tactical changes which cleared the way for the "prodigious increase" in army size.

For most of the Middle Ages, the principal arm in any military force was the heavy cavalry, made up of fully armed knights on horseback, three hundredweight of mounted metal apiece, moving at speed. The knights were clumsy, expensive, and scarce; but they were capable of winning great victories: Antioch (1098), Bouvines (1214), and Roosbeke (1382), for example. There were also, however, disastrous defeats, especially in the fourteenth and fifteenth centuries, when it was discovered that a heavy cavalry charge could regularly be stopped either by volleys of arrows or by a forest of pikes. Later it was found that pikemen could be used offensively to charge other groups of pikemen, once the mounted knights had been impaled and disposed of. The victories of the Swiss infantry against Charles the Rash of Burgundy in the 1470s wrote the lesson large, and in the Italian wars the infantry component in every army became steadily more numerous and more decisive. Charles VIII's army in 1494 comprised about 18,000 men, half of them cavalry; Francis I's army in 1525 comprised some 30,000 men, one-fifth of them cavalry. The number of horsemen had decreased both absolutely and relatively.[29] This shift in emphasis from horse to foot was crucial for army size. Whereas there was a limit to the number of knights who could manage to equip themselves and their horses ready for a charge, there was none to the number of ordinary men

America, see P. W. Powell, *Soldiers, Indians and Silver: The Northward Advance of New Spain, 1550–1600* (Berkeley, 1969).

[29] Lot (cited in table 1 n.), pp. 21, 56. Even where cavalry continued to play a decisive role in battles, as in the French religious wars, its character and composition (as well as its tactics) were entirely different from those of the fifteenth-century *gendarmerie*. See R. Puddu, *Eserciti e monarchie nazionali nei secoli XV–XVI* (Florence, 1975), pp. 35–36.

who could be enlisted and issued a pike, sword, and helmet. A pikeman's basic equipment cost little more than his wages for a week, and in some cases even this paltry sum could be deducted from the soldier's pay.

Thanks to the triumph of the pikemen, therefore, it became possible for governments to recruit, arm, and train an unlimited number of men. The road to unrestrained military increase lay wide open. But it only lay open. There was nothing in all this which actively *compelled* an army to augment its numbers. Indeed, over fifty years were to pass between the final defeat of Charles the Rash in 1477 and the first major increase in army size in the 1530s, an increase necessitated by the vast number of men required to starve out a town defended by the *trace italienne*. After this period of growth came four decades of stagnation: there was no further increase in army size until the 1580s. No government could dream of bringing larger concentrations of troops into action, for the simple reason that none possessed the organization necessary to mobilize, pay, and supply such a force. By the middle of the sixteenth century, there were only ten cities in all of Europe with a population in excess of 60,000. Before the promise of the Swiss achievement could be fully realized, before the threshold of medieval army size could be crossed, there had to be important changes in the financial and administrative resources of the European states.[30]

The growth of military manpower depended not only on internal factors like tactics but also on a number of extrinsic factors, totally unrelated to the art of war itself. Perhaps four can be identified as critical. In the first place, there clearly had to be governments capable of organizing and controlling large forces. It is interesting to note that the major waves of administrative reform in western Europe in the 1530s and 1580s and at the end of the seventeenth century coincided with major phases of increase in army size.[31] On the one hand, the growth of a bureaucracy was necessary to create larger armies; on the other, it was necessary to control them. The rapid numerical expansion of the early seventeenth century forced some decentralization: governments used entrepreneurs to raise their

[30] Bean (cited in table 1 n.) advanced a similar argument but failed to provide convincing evidence. See the telling discussion of Bean's article by D. Ringrose and R. Roehl in *Journal of Economic History* 33 (1973): 222–31.

[31] J. Vicens Vives, "Estructura administrativa estatal en los siglos XVI y XVII," in *XIe congrès international des sciences historiques: Rapports*, vol. 4 (Stockholm, 1960), pp. 1–24; I. A. A. Thompson, "The Armada and Administrative Reform," *English Historical Review* 82 (1967): 698–725; G. N. Clark, *The Seventeenth Century*, 2d ed. (Oxford, 1961), chaps. 6, 7; and J. A. Maravall, *Estado moderna y mentalidad social*, 2 vols. (Madrid, 1972), passim, esp. 2:513–85.

soldiers, sailors, and (in the case of the Mediterranean states) their galley fleets. It has been estimated that between 1631 and 1634 there were some 300 military enterprisers raising troops in Germany alone, ranging from Albrecht von Wallenstein, duke of Friedland and imperial commander-in-chief (who raised entire armies under contract) to minor gentry from Switzerland and the Tyrol (who raised single companies or even single squadrons). It was the same story in most areas of Europe, even in countries like Spain, where troop raising had been a jealously guarded royal monopoly in the sixteenth century.[32] However, it is important to note that, in all Europe, only Oliver Cromwell managed to emulate the generals of Rome or the *condottieri* of Italy and wrest political power from his civilian employers. Elsewhere, if we except the Ottoman empire with its janissaries, governments always maintained a close rein on their commanders and kept their armies under constant surveillance. War departments proliferated in every country, squeezing out military entrepreneurs and other middlemen and establishing a direct link with every soldier in the army. Detailed records of the troops began to be kept, so that the only surviving historical trace for hundreds of thousands of men in early modern times is their army pay sheets.[33]

The numerical expansion of armies was also dependent on certain elementary technological improvements. In order to supply 50,000 men (and camp followers) on the march, it had to be possible to concentrate enough ovens to produce 50,000 loaves of bread a day; enough water, wine, and beer had to be concentrated for them all to drink; and there had to be enough carts and horses to carry their baggage (which might amount to half a ton per man!) and enough tents, beds, or shelters to accommodate at least the officers.[34] Only in the later sixteenth century did it become possible to meet these basic human needs on a grand scale. Another elementary technological frontier to be crossed concerned roads. It was not possible to move large concentrations of troops at speed before the seventeenth century because there were no roads outside Italy which were

[32] The classic account of the organization of war by military middlemen is Redlich (n. 19 above). For military contracting in sixteenth-century Spain, see, I. A. A. Thompson, *War and Administrative Devolution: The Military Government of Spain in the Reign of Philip II*" (London, in press).

[33] For some uses to which these copious military records can be put, see, for the sixteenth century, Parker (n. 3 above); for the eighteenth century, A. Corvisier, *L'Armée française de la fin du XVIIe siècle au ministère de Choiseul: Le Soldat*, 2 vols. (Paris, 1964); and, for the nineteenth century, E. Le Roy Ladurie and P. Dumont, "Quantitative and Cartographical Exploitation of French Military Archives, 1819–1826," *Daedalus* 100 (Spring 1971): 397–441.

[34] For some examples from the Army of Flanders, see Parker, chaps. 2, 3.

capable of carrying a large army, its supply train, and its artillery. In the sixteenth century, even on a route used regularly by troops, like the "Spanish Road" from Lombardy to Luxemburg, it was necessary to build new causeways in the mountains and across marshes and to construct special bridges over rivers and streams for every military expedition—once every two years on an average—because, after the troops had passed, everything was allowed to revert to its former state.[35] Only in the later seventeenth century did governments see the need, and possess the means, to construct and maintain permanent military highways: Charles XI of Sweden and Louis XIV of France led the way during the 1680s. In the eighteenth century roads even began to be used as a vehicle for imperialism, as they had once been by the Roman, Chinese and Inca empires, with General Wade's network of military roads, laid out mainly between 1726 and 1767, to tame the Scottish highlands.

However, for all this one needed money, and here we come to two other, and perhaps more important, extrinsic limits to military growth. First, there had to be a certain level of wealth in society before heavy and prolonged military expenditure could be supported; second, there had to be ways of mobilizing that wealth. It would seem that between 1450 and 1600 the population of Europe almost doubled, and in some areas it more than doubled; and there is little doubt that, over the same period, there was a notable increase in the total wealth of Europe. After about 1660 both population and wealth began to increase again. This new prosperity was tapped everywhere by taxation, either indirectly through excise duties upon consumer goods or directly by a variety of levies on land, capital, and (very rarely) income. Government revenues increased everywhere in the sixteenth century, delving ever deeper into the pockets and purses of the taxpayers. However, no government could pay for a prolonged war out of current taxation: the income which sufficed for a peacetime establishment could in no way prove equal to the unpredictable but inevitably heavy expenses of a major campaign. The state therefore had to spread the costs of each war over a number of peaceful years, either by saving up in anticipation (as Queen Elizabeth did before she decided to make war on Spain in 1585) or

[35] Ibid., chap. 3. However, for a reminder that roads were not the only brake on military mobility, see J. Milot, "Un Problème opérationnel du XVIIe siècle illustré par un cas régional," *Revue du nord* 53 (1971): 269–90: Milot argues that, until 1700 at least, tactics dictated that armies on active service had to march as a single formation (which might be 50,000 strong). No existing road network could cope with a horde like that, and most of the troops had to plough their way through trees and scrub just like their predecessors in earlier centuries.

by spending in advance the income of future years with the aid of loans from bankers and merchants. With a small army this might not be such a great problem—France appears to have financed her Italian wars from 1494 until 1529 with few ill effects[36]—but in the sixteenth century the problem was very different because, apart from the growth in numbers and the greater duration of wars (which of course increased the overall cost), there was also the "price revolution," which meant that it cost far more to put a soldier into the field in 1600 than it had in 1500. This fact naturally did not escape the notice of contemporaries: "If comparison were made between the present cost to His Majesty [Philip II] of the troops who serve in his armies and navies and the cost of those of the Emperor Charles V [his father], it will be found that, for an equal number of men, three times as much money is necessary today as used to be spent then."[37] Written in 1596, this was, if anything, an underestimate; but it was indisputable that each war cost more than the preceding one and that for Spain, involved in so many long-enduring conflicts, the progression was particularly alarming (see fig. 1).

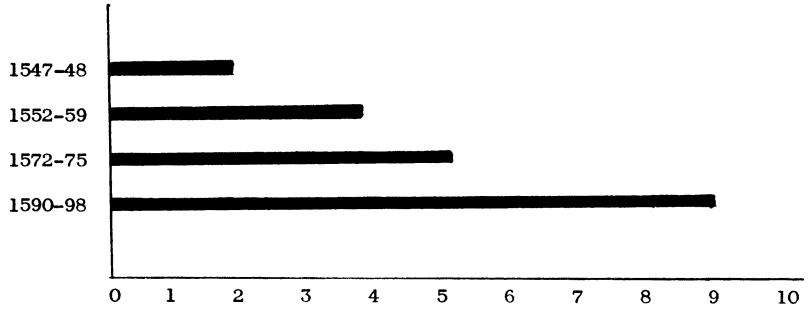

FIG. 1.—Average annual cost of Spain's foreign wars (in millions of florins). The source for this figure is Parker, *The Army of Flanders*, pp. 134, n. 2; 287.

Fortunately for Habsburg imperialism, the Spanish crown was able to draw on a relatively efficient financial system which enabled it to borrow (or "anticipate") the revenues of up to ten years in advance and, by brutal treatment of its lenders, to keep the interest rate down to 7 percent or less. But even this did not produce all the money required for wars, and many of the troops were left unpaid, some-

[36] P. Contamine, "Consommation et demande militaires en France et en Angleterre, XIIIe–XVe siècles" (paper delivered at the Sesta Settimana di Studio, Istituto Internazionale di Storia Economica, Prato, May 3, 1974), pp. 26–27.

[37] Esteban de Ibarra, Spanish secretary of war, memorandum dated December 15, 1596, Additional Manuscript 28,373, fols. 129–30, British Museum, London (my translation).

times for months and sometimes even for years. As a result, Spain's soldiers regularly mutinied for their pay; and mutiny became almost an institution of military life.[38] However, it was an institution shared with other armies. The Dutch army was periodically paralyzed by mutinies in the 1580s, as was the Parliamentary army during the English Civil War (especially in 1644 and 1647). Many units of the Swedish army in Germany mutinied in 1633, dissipating the prestige won by the victories of the Breitenfeld and Lützen, and again in 1635, encouraging the German Protestants to make peace with the Habsburgs. The fact that the second mutiny was called an "alteration," the term invariably used by the Spanish mutineers to describe their activities, betrayed the parentage of the practice.[39] The perennial problem for the Swedish, the Spanish, and indeed every government in wartime was money. In the words of an English adviser to the Dutch Republic during their war with Spain: "The matter of greatest difficulty [in war] . . . is in proportioning the charge of the warres and the nombers of the souldiers to be maynteyned with the contribucions and meanes of the countreys."[40] It was, above all else, the financial resources of a state which held down the size of its armed forces. If too many troops were engaged, or if they were engaged for too long, mutiny and bankruptcy resulted.[41]

It was the Dutch who first perfected techniques of war finance capable of sustaining an enormous army almost indefinitely. The cost of the war with Spain from 1621 until 1648 steadily increased (from an average of 13 million florins in the 1620s to an average of 19 million in the 1640s), but there was not a single mutiny or financial crisis. On the contrary, in an emergency, the Dutch Republic could

[38] G. Parker, "Mutiny and Discontent in the Spanish Army of Flanders, 1572–1607," *Past and Present* 58 (1972): 38–52.

[39] For the mutinies of the Parliamentary armies during the 1640s, see Firth (cited in table 1 n.), chaps. 12, 14; J. S. Morrill, "Mutiny and Discontent in English Provincial Armies, 1645–1647," *Past and Present* 56 (1972): 49–74. For Swedish mutinies during the 1630s, see *Rikskansleren Axel Oxenstiernas skrifter och Brevväxling, förra avdelningen* (Stockholm, 1894), vol. 8, nos. 169, 170, 244, 293–95 (letters of Oxenstierna to field commanders, March 6, April 22, and May 15, 1633), and pp. 682–83 (memorandum sent by Oxenstierna to the Swedish *råd*, May 13, 1633, about the "confoederatio" of the army); and *Senare avdelningen* (Stockholm, 1893), vol. 6, nos. 145, 146, and 149 (letters of Marshall Johan Banér to Oxenstierna, October 29 and 30 and November 5, 1635, about the "alteration" organized and led by "der sämptlichen officieren von der gantzen armée." There were, of course, numerous mutinies by Swedish troops before the reforms of Gustavus Adolphus: see Roberts, *The Early Vasas*, p. 258; and Nordmann, p. 135.

[40] Thomas Wilkes, "Declaration" (July 22, 1587), in *Correspondentie van Robert Dudley, graaf van Leicester*, ed. H. Brugmans, 3 vols. (Utrecht, 1931), 2:402.

[41] On the financial organization of the European states during this period, see the brief survey of G. Parker, *The Emergence of Modern Finance in Europe, 1500–1730* (London, 1974), pp. 38–67.

raise a loan of 1 million florins at only 3 percent in two days.[42] The key to this effortless financial power was, in part, the enormous wealth of Amsterdam, which by 1650 was the undisputed commercial and financial capital of Europe; but it was equally the good faith of the Dutch government, which always paid interest and repaid capital on time. This combination enabled the Dutch to raise an army and go on fighting, whatever the cost, until they got their own way: something no previous government had been able to do.[43] It was not long before others followed. Soon after the accession of William of Orange in 1689, "Dutch finance" was adopted in England. The foundation of the Bank of England, Parliament's guarantee of all government loans, and the organization of a sophisticated money market in London made it possible for a British army of unprecedented size—90,000 men—to fight overseas for years; while in France the credit network of Samuel Bernard and other Swiss bankers financed Louis XIV's later wars.

Thanks to all these improvements, by the first decade of the eighteenth century the major wars of Europe involved some 400,000 men on each side, and major battles involved up to 100,000.[44] It therefore comes as something of a surprise to find that the major conflicts of the 1760s and 1780s involved no more, that there was no further growth in army size until the French Revolutionary wars. In the eighteenth century, as in the fifteenth, it seems that the military power of the various European states had reached a threshold. Further economic, political, technological, and financial advances would be required before this new threshold could be crossed in the 1790s.

However, the revolution in military manpower between 1530 and 1710 was extremely important. It certainly had all the significant consequences which Roberts attributed to it: it made war impinge more upon society; it increased the authority of the state (partly at

[42] "Raad van staat," bundels 1499, 1500 ("Stadt van oorloghe"), Algemeen Rijksarchief, The Hague; the loan of 1664 was noted by V. Barbour, *Capitalism in Amsterdam in the Seventeenth Century* (Baltimore, 1950), p. 81.

[43] Contemporaries were aware of this: "In the wars of Europe these last four score years and upwards . . . we find that the Estates of the United Provinces have paid their armies better than any other prince or state; this makes the mercenary soldier run to their service and capacities them to make great levies in a very short time" (Sir James Turner, *Pallas Armata* [London, 1687], p. 198.)

[44] In France it would seem that one man in six was called to the colors during the war of the Spanish succession: Corvisier, 1:65. The calculation of "military participation ratios" before 1700 is extremely hazardous, since neither the exact size of the armed forces nor the total population is known with any certainty, and there is also the problem of "foreign" troops serving in "national" armies. For these reasons, the figures presented by Bean (table 1 n.), p. 211, are unconvincing.

the expense of the citizen); it accentuated social mobility; and it undoubtedly retarded the economic development of most participants (although it stimulated that of many neutrals).[45] In addition, it certainly helped to precipitate the numerous confrontations between governments and the governed which are commonly referred to as the "general crisis" of the seventeenth century. The "prodigious increase in the scale of warfare" alone merits the title of "military revolution" which Roberts bestowed upon it twenty years ago.

It has been suggested that the half-life of major historical theories is roughly ten years; and the fates of Trevor-Roper's "general crisis," Elton's "Tudor revolution," and Porshnev's "popular uprisings" seem to bear this out. By this standard, Roberts's "military revolution" has lasted well. Hitherto unchallenged, even this extended examination has failed to dent the basic thesis: the scale of warfare in early modern Europe was revolutionized, and this had important and wide-ranging consequences. One can only conclude by wishing the theory and its author many more years of undiminished historical life.

[45] See G. Parker, "The Costs of the Dutch Revolt," in *War and Economic Development*, ed. J. M. Winter (Cambridge, 1975), pp. 49–71.