Flaming Tiger, Burning Dragon:
Elements of Early Modern Vietnamese Military Technology

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Their main arm is a long lance, and they also carry some sabers, some fire lances, guns, cannons and sometimes have elephants. They have many standards in order to make a great display; they spread out their ranks, it is said, to allow the cannonballs and bullets to pass through; they charge the enemy with loud cries, and after they make their retreat they go to sleep. If one of the two parties can withstand the impact, the other will flee in disorder, and it will be arrogantly pursued. Their forts are surrounded by perches with soldiers... ...2

This was the nature of Vietnamese warfare as described by a European missionary in the 1790s. The description highlights many of the fundamental elements of early modern Vietnamese military technology and strategy that bear examination. Among other things, forts, elephants, cannons, and sabers, were all central to

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1 I am grateful for the constructive comments of two anonymous referees who suggested both further sources and useful refinements of the text. I also thank C. Michele Thompson for her editorial input during the revision process.

Vietnamese military technology and to warfare more generally. The only essential element of traditional technology missing from this description is that of navies and naval warfare. This article is designed as an introduction to some of the central features of traditional Vietnamese military technology, with some reference to tactics as well. I propose to examine the evolution of locally developed military technology and also the introduction and adaptation of technology from outside Việt Nam. I will first consider the importance of military training, before looking at various forms of technology: the use of fortifications and walls; weapons of various types, including artillery and those using fire in its more elemental form; naval warfare and related technology; the role of animals, including elephants and horses; and finally, miscellaneous devices related to military logistics, including transport, signaling and mapping.

Before I begin, some caveats. The survey I offer here is far from comprehensive. This is a topic to which several volumes could easily be devoted. Rather, it is hoped that this article will serve as an introduction to some of the more useful sources for research on this topic, and that it will stimulate more detailed English-language studies of particular elements in the history of early modern Vietnamese military technology. Secondly, this article largely glosses over an issue closely related to technology, namely its deployment through the tactics, ruses and stratagems that appear often to have been important factors in Vietnamese military triumphs. Indeed, while technology has played a critical role in the history of Vietnamese warfare, Vietnamese use of strategy and knowledge of topography have arguably been of even greater significance in determining the outcomes of many battles. The Vietnamese use of tactics and strategy, as well as ruses and various forms of ambush, thus bears examination in its own right.

For the purposes of this article I have chosen to end my examination in 1802, which marked the first year of the last Vietnamese dynasty, the Nguyễn [阮] (1802-1945). This is partly because the modern (post-traditional) era can be said to begin at that point, but also because there is already considerably more information available about the Nguyễn dynasty than about earlier periods. French scholars and colonial administrators commented extensively on elements of the Vietnamese military apparatus in the nineteenth century, and thus I have elected to examine the less frequently researched pre-Nguyễn dynasty period. In addition, this article leans heavily toward the eighteenth century, the period with which I am most familiar. With the Tây Sơn [西山] uprising (1771-1802) and its attendant wars, this was a time of extended and often brutal warfare, and as such constitutes a useful arena in which to examine different types of traditional military technology. It is also, not incidentally, the period for which the most extensive pre-1802 documentation and description exists.

Finally, it is important to note that although the Vietnamese have certainly endured an incredible amount of warfare at different times and confronting different enemies (sometimes themselves), warfare should not be viewed as the single defining element of Vietnamese historical identity, nor should this dimension of the Vietnamese past be somehow understood as an innate aspect of that
identity. Rather, it has been carefully constructed and reinforced by a variety of historiographical projects. Given their audience and objectives, it is not surprising that early court historians emphasized conflicts with China to reinforce ideas about Vietnamese independence. Later historians sought to dramatize the conflicts of the seventeenth century between the Trịnh and the Nguyễn. Most recently, twentieth-century historians have constructed a wide range of interpretations of the Vietnamese military past designed to reinforce particular political objectives. By considering warfare and related technologies in this article I am conscious of the fact that I may appear to be reifying the notion of Việt Nam as a society shaped, above all, by warfare. I hope that readers will recognize that this is but one element of the complex historical and cultural patterns of the Vietnamese people.

The Vietnamese and War

It is an unfortunate reality that warfare has played a conspicuous, if sometimes overemphasized, role in the history of Việt Nam. From early confrontations with the Chinese through to the bloody battles of the twentieth century, the Vietnamese people have repeatedly taken up weapons for a variety of reasons. These conflicts were often, but not always, with the Chinese, particularly prior to the thirteenth century. After a number of local uprisings against Chinese colonization, the origins of which date to the second century BC, the Vietnamese finally gained their independence in 939, when Ngô Quyền named himself king after having dealt a major defeat to the Chinese the previous year. Thereafter, there were numerous Chinese attempts to reconquer the Red River region, including three Mongol invasions in the thirteenth century, an invasion and subsequent twenty-year occupation by the Ming (1368-1644) in the early fifteenth century, and another invasion in the late eighteenth century by the Qing (1644-1911). Consequently, the Vietnamese had always to be on guard against their northern neighbor. At the same time, the Vietnamese repeatedly came into conflict with their southern rivals, the kingdom of Champa. The eleventh through fifteenth centuries saw a series of intermittent back and forth wars between the Vietnamese and the Chams, including a forty-year period of almost uninterrupted warfare between 1350 and 1390. During this period, Cham forces attacked the Vietnamese capital at Thăng Long (the site of modern-day Hà Nội) in

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3 In this article I will primarily use the term “Việt Nam” as a convenient, if imprecise, shorthand for a country that has borne different names describing geographical entities of various sizes and with various political centers.

4 Vietnamese independence is also sometimes dated to 967, a reference to the time when Dinh Bộ Lĩnh named himself the first Vietnamese Emperor. See Keith Taylor, *The Birth of Vietnam* (Berkeley: University of California Press, 1983), 280.
1371, then again in 1377, in 1383, and finally in 1390, an attack that resulted in the death of the Cham ruler, Chế Bồ Ngà. Even this did not bring an end to the Cham attacks, for these were resumed in the early fifteenth century to take advantage of the Ming invasion and occupation of Đại Việt. It was only the decisive campaigns of the new Lê dynasty (1427-1789), late in the fifteenth century, that brought a halt to this pattern of conflict.

In addition to clashes with neighboring states, the Vietnamese also endured numerous internal conflicts since the earliest days of their independence. These internal struggles included, most notably, contests between competing noble and royal clans, as well as countless numbers of popular uprisings of varying intensity. Indeed, the usurpation of the imperial throne by a noble family, the Mạc, in the early sixteenth century, commenced a period of almost continual internal strife that was to last until the French conquest in the middle of the nineteenth century. At times these internal conflicts were short-lived peasant rebellions, and at others, they constituted full-scale civil wars. In the course of the loyalist crusade against the Mạc in the sixteenth century, two competing noble families, the Trịnh and Nguyễn emerged as co-defenders of the Lê throne. When the two families had a falling out, the Nguyễn elected to move south to stake their claim to the frontier territories there. The Trịnh and Nguyễn subsequently fought a series of battles from 1627 to 1672, after which a cease fire produced a de facto boundary between the two sides. Each continued to claim loyalty to the Lê Emperor, even as the two families established autonomous political realms.

As the Nguyễn family expanded further toward the south, the campaigns against the remnants of the Cham state were revived. When the Nguyễn lords pushed even further toward the Mekong Delta in subsequent centuries, they also came into conflict with the Khmer state and lesser Khmer principalities existing in the delta region. These clashes with the Khmer led the southern Nguyễn rulers to become involved in protracted struggles among various court factions in what is today Cambodia, throughout the second half of the eighteenth century. This involvement was to last into the middle of the nineteenth century, when the Nguyễn dynasty (now ruling over all of Việt Nam) vied with the Siamese for control over the Cambodian political system. Indeed, the post-colonial period after 1954 saw a revival of the bitter contests over territory between the Vietnamese and Khmers, a contest that reached its zenith in the cross-border attacks of the Pol Pot regime and the eventual Vietnamese invasion of Cambodia in late 1978.

This Nguyễn southward expansion was encouraged in part by the stalemate with the Trịnh that developed after 1672, for the truce with their northern rival allowed the Nguyễn to look south. The truce also brought with it a measure of internal stability in both regions, which lasted into the beginning of the eighteenth

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century when it was shaken in both north and south. First, the Trịnh domains were rocked by a series of peasant uprisings that lasted from the 1730s into the 1770s. Among other things, these uprisings were a response to inept rule, onerous taxation, problems of land distribution and devastating famines. Then, just as the last of the northern peasant uprisings had been quelled, the most significant uprising in Vietnamese history up to that time emerged in the south. The Tây Sơn uprising was to last for more than thirty years, and embroil the entire country in bloody conflict. In the end, Tây Sơn armies almost entirely destroyed both the Nguyễn and Trịnh ruling families, forced the last Lê Emperor into Chinese exile and established their own regime. Warfare continued, however, between the Tây Sơn and one of the last survivors of the Nguyễn family, until the latter was able to vanquish the upstart rulers and establish his own dynasty, the (Restored) Nguyễn, in 1802. While the civil war had been brought to a halt, the harsh and frequently ineffectual rule of the Nguyễn provoked another round of peasant uprisings, which again were more or less continuous to the middle of the nineteenth century, when the French conquest began.

It should be clear from this brief recitation, that warfare has long been a reality of Vietnamese existence, a reality that prompted the Vietnamese to develop various types of military technology as well as to borrow or buy military materiel from abroad. What follows is a survey of some of the central elements of this technology, prefaced by a brief introduction to military training, an important element in the deployment of these various technologies.

**Military Training**

Technology was clearly instrumental to Vietnamese military successes, as will be described shortly, but well-trained soldiers and officers were also deemed to be of particular importance to military preparedness. Thus the Vietnamese sought to enhance the prestige and skill of their military officers by regularizing training and examination systems for military leaders at a very early stage. In 1225, the Trần dynasty (1225-1400) instituted an officer training school, designed to educate ranking military officials in contemporary strategy and tactics. A military examination system was also developed, paralleling the civil service examination that served to recruit civilian officials:

> The military mandarins also had to pass an examination that was rather a physical than an intellectual test. They had to carry two balls of lead, each weighing sixty pounds, over a distance of sixty yards; they had to prove their ability with different weapons such as swords and halberds. Only after

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they had passed these and similar physical tests were they subjected to an examination in military tactics, military history, and the institutions and history of their country.7

The training for later Trần military schools would very likely have relied on what was the most famous treatise on military tactics, weaponry and history to be written by a Vietnamese, Trần Hưng Đạo’s *Bình Thuận Lược* (Essentials of the Military Arts).

Trần Hưng Đạo 陳興道 (1213-1300) was a noted admiral and imperial confidant of the Trần dynasty, when it was confronted by a succession of invading Mongol armies in the late thirteenth century. Faced with an enormous Chinese force, the admiral urged Emperor Trần Nhân Tông 陳仁宗 to resist the Chinese, despite seemingly impossible odds. Trần Hưng Đạo’s subsequent guerrilla warfare, concluded with a celebrated naval battle on the Bạch Đằng river 白藤 in 1288, gave the Vietnamese a decisive victory. He later elaborated his views on the arts of warfare in his *Binh Thư Yếu Lược*, which is a comprehensive examination of all aspects of the military arts, from forging weapons, to protocol, to tactics, to the use of weapons, fortresses and navies. It draws heavily on Chinese texts of various types as well as popular lore and personal experience. Side by side with techniques for deceiving the horses of enemy troops, the text contains advice on reading the winds, the sun, the moon and stars, and other celestial bodies as a way of predicting various types of events, from rebellions to bad harvests.8 It is thus a compendium of Vietnamese understandings of their world and the relationship between nature and society, as well as an instructional manual for subsequent generations of Vietnamese soldiers. In addition to the *Bình Thuận Lược*, Trần Hưng Đạo also wrote another training manual, the *Vạn Kiếp Tôn Bội Truyền Thiếu 高秘傳書* (Book of the Secrets of the Military Arts Transmitted from the Vạn Kiếp), but this was reserved strictly for use by officers.9

During the Lê period (1428-1789), the Emperor, Lê Thành Tông 黎聖宗 (r. 1460-1497), himself issued a series of rules regarding training for the various branches of the Vietnamese military: naval forces, elephant forces, cavalry forces and foot soldiers. As the Emperor noted when issuing these rules, “Wherever there is a state, there must also be military training, and thus we should take ad-

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7 Ibid., 182.
vantage of the periods of leisure enjoyed by the peasants temporarily to put off unnecessary tasks ... to teach them about the rules for sitting and standing, advancing and retreating, about listening clearly to the signals of the gongs and drums, so that our officers are trained with respect to matters of shooting bows and arrows, and that they do not forget their military training ...”¹⁰ Moreover, as Lê Thành Khôi has pointed out, the Emperor decreed that “every three years there would be an examination to verify the results among the soldiers: those who did not attain the average [score] would be punished, while the others would be rewarded with silver and clothing.”¹¹ We also know that the Emperor personally supervised naval training exercises early in his reign in 1466 and 1467.¹² He furthermore accepted suggestions for different types of military training exercises, which he apparently monitored for their usefulness. In at least one instance, he punished officials who suggested training drills that proved to be less than successful.¹³

Later, when the Trịnh family (fl. 1545-1786) effectively governed in the north in the name of the Lê Emperor, its leaders established their own complex of military training schools and examinations. The first military school, reserved for the offspring of nobles and exam laureates, was opened in 1721. In 1724 a regular system of military examinations was established, in which tests were held every three years. The examination was composed of three parts. The first part required students to demonstrate their knowledge of an ancient Chinese military manual. The second part of the examination required students to show their horse-riding skills, as well as their ability to wield the sword, fighting pole and saber. The final part of the examination involved answering questions relating to military strategy. Different titles were granted to examinees depending on how far along they advanced within this tripartite structure. Those who passed this examination were eligible for a second examination, also composed of three parts of a similar nature. The successful candidates in this examination were eligible for a final examination held at the palace of the ruling lord. Those who were successful at this pinnacle of the examination system were called tạo sĩ, and considered to be equal to those who had achieve the doctoral rank—tiến sĩ—within the

¹¹ Lê Thành Khôi, 229-230.
¹³ Cuong Mục, vol. 1, 1030.
civil service examination system, which offered a similar, graded series of examinations.\textsuperscript{14}

The southern Nguyễn rulers (1558-1774), in the seventeenth and eighteenth centuries, paid far less attention to formalized military schools or examinations, contenting themselves with creating a small number of training schools for horseback riding and marksmanship.\textsuperscript{15} They also organized elephant training schools, which the rulers themselves, at least in the seventeenth century, supervised. The Chinese monk, Dashan 大汕, described such an elephant training drill in the 1690s, overseen by the Nguyễn ruler, in which elephants and soldiers were reviewed for their fighting ability.\textsuperscript{16} Indeed, the Nguyễn rulers in the heavily militarized south were closely involved in the various other military training programs relating to naval and army drilling as well.\textsuperscript{17} In 1642, noting that naval forces he encountered on an outing appeared poorly prepared, Nguyễn Phúc Lan 福瀾 (1635-1648) ordered that training exercises be organized in which local sailors would be schooled in rowing and firing artillery, with rewards going to those demonstrating particular skills.\textsuperscript{18} Yang Baoyun notes that Nguyễn Phúc Chu 福調 (1691-1725), made considerable efforts to ensure ongoing training for his troops, and personally inspected naval, cavalry, war elephant and artillery exercises.\textsuperscript{19}

The relatively informal training regimen of the Nguyễn was to change during their wars with the Tây Sơn regime (1771-1802). During this period, the surviving member of the ousted Nguyễn regime (and leader of the anti-Tây Sơn crusade), Nguyễn Ánh 福映, apparently established formal military training schools employing a European military instruction manual that had been translated into Chinese, and which focused on the deployment of artillery and military tactics. A formalized system of naval tactics was also introduced and the Nguyễn officers received instruction in the use of signaling.\textsuperscript{20}

\textsuperscript{14} This description is taken from Đặng Phượng-Nghi, Les institutions publiques du Viêt-Nam au XVIIIe siècle (Paris: École Française d’Extrême-Orient, 1969), 123-125.

\textsuperscript{15} Ibid., 125.


\textsuperscript{17} Li Tana, Nguyễn Cochinchina: Southern Vietnam in the Seventeenth and Eighteenth Centuries (Ithaca, NY: Cornell University Southeast Asia Program, 1998), 43.


Defensive Structures

Along with training their soldiers, Vietnamese regimes took considerable pains in the construction of citadels, forts, and ramparts to protect troops and civilian political centers in many different types of conflicts. Defensive structures have existed in Việt Nam since the first millennium BC, and possibly earlier. These were constructed on a variety of scales, from the thick bamboo hedges of the self-contained northern villages seeking to keep out bandits and tax collectors, to the large earth and stone ramparts designed to protect urban centers as early as the third century BC. The Chinese, during a millennium of control in Việt Nam, made no small contribution to the use of ramparts and citadels as defensive structures as well as administrative centers. In doing so they developed what has been called a “garrison state,” relying on well-protected military centers spread out across an occupied territory.21 In the course of anti-Chinese uprisings, and in later centuries after the northern colonizers had been driven out, Vietnamese military leaders and rulers built more ramparts of all types to defend their own capitals, as well as to protect the state apparatus against popular uprisings.

Yet we should be cautious in portraying Việt Nam as a land of fortresses and walls, for this was frequently not the case. Its fortifications were often built as short-term expedients in response to particular challenges: popular uprisings, threats to newly claimed political supremacy and the like. Although the evidence is sketchy and from a late period, what there is suggests that fortifications were not always a feature of the Vietnamese landscape. Alain Forest, in his 1998 article “La guerre et le militaire dans le Tonkin des Trinh,” cites numerous European descriptions of the Trịnh north in the seventeenth and first half of the eighteenth centuries as being virtually devoid of such structures. Political centers were open, with virtually no perimeter markers of any kind.22 It was apparently only after repeated threats to the Trịnh capital that such defenses were erected. Moreover, it appears that a similar situation obtained in the Nguyễn south. A Japanese visitor to the Nguyễn territories in 1642 reported that “The kingdom of Quinam has neither walled cities nor castles, so the king himself lives in an open plain.”23 Later in the same century, Dashan too observed that “There was no city wall, not


23 “Declaration of the Situation in Quinam Kingdom by Fransisco, 1642,” translated by Ruurdje Laarhoven, in Southern Vietnam under the Nguyễn: Documents on the Economic History of Cochinchina (Đàng Trong), 1602-1777, eds. Li Tana and Tony Reid (Singapore: ISEAS, 1993), 30. Hereafter Fransisco. Quinam or Quảng Nam was a name frequently applied to the entire Nguyễn kingdom, though it refers more accurately to the territories south of the Hải Vân pass.
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even close to the court, but many bamboos had been planted to serve as walls.”

Clearly, walled cities were not always permanent features of the Vietnamese landscape.

Despite the fact that there were times in which Vietnamese rulers chose not to barricade their political centers, it is clear that defensive structures have played important roles at various times and throughout Viêt Nam’s history. The earliest defensive structure for which evidence exists is the citadel of Cổ Loa 古螺 to the north of present-day Hà Nội. This consisted of an enormous set of ramparts laid out in a series of interconnected earthen mound spirals, which gave the city its name—Old Snail City. These ramparts, sections of which date from the third century BC, had a circumference of more than 7.6 kilometers, were three to four meters high, twelve meters thick and had a base that was 25 meters wide. The site was accessible by water via a river system and the walls were encircled by a system of moats that made transport around the city easy, while further discouraging attacks. Although relatively little is known about this site and its evolution, discoveries of enormous numbers of bronze artifacts, including arrow heads and axes, suggested that Cổ Loa had been under the control of a powerful military ruler in this period. The site continued to be viewed as useful, even after the Chinese came to dominate the region, for its fortifications were apparently built upon in the later Han period.

Even prior to attaining independence from the Chinese, the Vietnamese continued to use and expand the idea of defensive structures. At the beginning of the eighth century, a Vietnamese named Mai Thúc Loan 梅叔鸞 rose up against the Chinese and proclaimed a new kingdom, styling himself as the Black Emperor—Hắc đế 黑帝—possibly a reference to his dark complexion. To prepare his defense against the inevitable Chinese attempts to suppress his movement, he constructed as his political center a citadel of his own. This stretched for more than a kilometer along the banks of the Lam river 藍江 in Hùng Sơn (south of the modern city of Hà Tĩnh). He was soon defeated by a Chinese counter-attack, but the remains of his rapidly-erected citadel are still visible today, an indication of Vietnamese skill in the construction of such fortifications already in this early period.

In the first half of the ninth century, as the Vietnamese were growing increasingly restless under northern domination, the Chinese tried to consolidate their

24 Dashan, 55.
26 Lê Thành Khởi, 67.
27 Ưy Ban Khoa Học Xã Hội Việtnam, Lịch Sử Việt Nam, Tập II (History of Việt Nam, vol. 2) (Hà Nội: Nhà Xuất Bản Khoa Học Xã Hội, 1976), 70-72. This also includes a very useful map of the outlines of the citadel and its remains.
29 Lê Thành Khởi, 119.
position in the south by building defensive perimeters for their capitol at Đại La 大羅. Early in the century, a Chinese governor of Annam built a double-ringed citadel against increasing threats to the Chinese presence. Then in the 830s, one of his successors tried to construct a defensive system of hedgerows and palisades. These defensive efforts culminated in the project undertaken by the Tang general, Wang Shi 王式. As Keith Taylor notes:

He surrounded La-than with a high wooden palisade some five miles in circumference; it was built to last for decades. Outside the palisade, he dug a moat and filled it with flowing water; beyond the moat he planted a barrier of thorny bamboo.

The walls of this defensive structure are said to have been eight meters high, while those of a protective dike around the perimeter were themselves four and a half meters high and six meters thick. Only a few decades later, and after a period of extensive turmoil, yet another citadel was constructed at Đại La for a new capitol in the 870s. This citadel had seven-meter-high walls, was more than six kilometers in circumference and was further surrounded by a four-meter-high dike.

In the ninth century, Ngô Quyền 吳權, the first Vietnamese king—having driven out the Chinese—reoccupied the earliest known Vietnamese citadel structure at Cổ Loa, making it the capitol of his own brief reign. Shortly thereafter, a new citadel was constructed further to the south at Hoa-lư 花閭 near modern-day Ninh Binh, by Đinh Bộ Lĩnh 丁步領, who used it as his imperial center when he named himself Emperor in 968. This citadel comprised ramparts and defensive pits, and relied as much on the mountainous terrain as it did on man-made elements. Thereafter, the Lê and Trần dynasties returned the political center north to the banks of the Red River and the site of present-day Hà Nội, where a site just to the east of the earlier Đại La was used for the construction of a new citadel. The new citadel only surrounded the immediate palace grounds, however, leaving the rest of the city open.

In the late fourteenth century, Hồ Quý Lý 胡季犛 took power from the Trần and moved his capitol to a new location in Thanh Hóa 清化, quite far to the south of Thăng Long (present day Hà Nội). At the heart of this new administrative center he constructed a massive citadel, apparently in-

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31 Ibid., 241.
34 Ibid., 270.
35 Lê Thành Khôi, 141; Ước Bàn Khoa Học Xã Hội Việt Nam, 145.
36 Lê Thành Khôi, 145.
spired by Chinese designs of that period. The structure consisted of enormous earthen ramparts with large gates topped by hewn stones weighing as much as 16 tons. The walls of the citadel were 500 meters long on each side, and this central structure was surrounded by another earthen rampart serving as a perimeter wall.

As the Vietnamese were developing technologies of fortification, their southern neighbors and sometime rivals, the Chams were similarly constructing impressive citadels to defend against their Vietnamese foes to the north, as well as the Khmer to their south. Lê Thành Khôi has written that:

Their cities were protected by walls of brick, flanked by guard towers of stone. The citadel of Khu-tuc, constructed at the beginning of the 5th century, was in the form of a rectangle with a perimeter measuring 2,100 meters. This walls, with a height of 8 meters, were topped with wooden planks on which were raised towers, the highest of which were thirty meters above the ground. The city had three gates. The official buildings were all facing south and comprised more than 2,100 rooms. The population lived therein.

After the Chams were driven from their long-time capital at Indrapura late in the tenth century, they moved further south to found a new political center at Vijaya with its own powerful citadel. Many Vietnamese attacks against the Chams during the campaigns of the eleventh through fifteenth centuries ended in failure when confronted with Cham citadels. Indeed, it is testimony to the strength and durability of Cham citadels, that the eighteenth-century Tây Sơn government was to turn the still considerable remnants of the citadel of Vijaya (known as Đồ Ban in the Vietnamese records) into their own politico-military seat.

38 Parts of these walls and the entrances still remain, giving some indication of their size. See Lê Thành Khôi, photo between pp. 144-145.
40 Lê Thành Khôi, 107.
42 A brief description of Đồ Bàn can be found in Chiêm Thành Khảo (Researches on Champa), ms. A. 970, Viện Hán Nôm, Hà Nội. A more specific discussion of Đồ Bàn in the Tây Sơn era is contained in Phan Huy Lê, “Di tích thành Hoàng Đế,” (Ves-
Finally, in the period when the Nguyễn came to rule the southern part of the country, they built up their own defensive citadels against the threats posed by their Trịnh rivals in the north. Charles Chapman, an Englishman on a 1778 visit to Phú Xuân 富春 (then being occupied by the Trịnh, who had seized it in a 1774 campaign), provided a highly detailed description of one such structure:

The fortification is an oblong square, the greater sides extending, as near as I could guess, half a mile, the lesser, two thirds of that distance. It is formed by a retaining wall behind which a rampart of earth ten or eleven feet high was thrown up, with steps rising to a convenient level for the discharge of missile weapons. It had no embrasures, the guns being pointed through a kind of portholes (sic), made in the bottom of the retaining walls. The number mounted was about sixty, the largest nine pounders. For six or eight feet without the wall, short pointed bamboos from twelve to six inches long were driven obliquely into the ground; beyond these was a ditch, eight feet wide and as many in depth, fenced with bamboos growing which was succeeded by another space with pointed ones driven in the ground, and the whole encompassed by a low checkered bamboo rail.43

Although the Nguyễn began by constructing these more traditional types of citadels, they later began to adopt European approaches to citadel building. Specifically, the Nguyễn were aided by French advisors in designing and constructing new citadels incorporating elements of the Vauban style during their conflict with the Tây Sơn.

The first of these structures was erected in 1790 in the Sài Gòn area, then under Nguyễn control. While the new citadels were being built with the assistance of French advisors, the Nguyễn continued to use traditional design features. Thus, for example, as Alexander Woodside has pointed out, the Sài Gòn citadel was “designed Chinese-style as an ‘eight-diagrams city’ (bát quái thành), as an octagonal, lotus-shaped settlement with eight gates.”44 The Nguyễn court records of the nineteenth century described the citadel in the following manner:

43 This (untitled) account is by Charles Chapman, and has been reprinted in Alistair Lamb, *The Mandarin Road to Old Hue* (London: Archon Books, 1970), 109. Hereafter Lamb.

Construction of the citadel followed the pattern of the octagon, with openings for eight doors, and in the middle a palace; on the left-hand side was erected the Thái miếu temple, and behind the temple was a warehouse, and on the right-hand side was set up a bureau for manufacturing, and all around were grass thatched houses for the guards who would be staying there. In the middle of the field was erected a three story flag tower, on which was placed an octagonal observation post, where a flag could be raised in the daytime, and at night a torch lit to serve as a signal for all the soldiers. The eight gates of the citadel were all constructed out of laterite. Horizontally and vertically there were eight streets. From east to west their length was 524 meters, from south to north the (measurements) were the same, (while) the height was 5.2 meters, (and) the base was 30 meters. Around the outside of the citadel was a moat. The moat’s breadth was 42 meters, its depth was 5.6 meters, and there was a bridge crossing it to the north. The exterior circumference of the citadel was 3176 meters.

Another such citadel was constructed at Diên Khánh in 1793. This fort, sections of which still survive, was located inland and to the northwest of Nha Trang. It was to be the site of considerable struggle between the Tây Sơn and Nguyễn throughout the 1790s. Subsequently, citadels of this type were to dominate Nguyễn defensive structures of the nineteenth century, as the Vietnamese rulers adopted the European model in this respect.

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While the Vietnamese, and their Cham neighbors constructed a great many citadels, another important element of Vietnamese defensive architecture was the free-standing wall. Such structures were frequently erected with great rapidity, to meet immediate needs, while at the same time requiring relatively sophisticated engineering skills to adapt construction to topography. In the eleventh century, and facing an invasion by the Chinese, Lý Thường Kiệt erected an earthen wall along the southern bank of a river just north of Thăng Long to defend his capital. More than one hundred kilometers in length, the wall was several meters high and reinforced by bamboo spikes. Later, in the fifteenth century,
Vũ Hữu (1444-1530) and Dương Thế Vĩnh (1444-?) both scholars of the highest order, wrote a major treatise on the subject, Đại Thành Toán Pháp — Rules for the Calculating of Great Walls. This text, in addition to its practical military applications, constitutes one of the very few surviving pre-nineteenth-century Vietnamese treatises on mathematics.

During the Trịnh-Nguyễn civil war of the seventeenth century, defensive walls raised by the southern Nguyễn state were a central feature of the conflict. The most famous of these structures was a pair of long walls constructed as the primary Nguyễn defense against their northern rival. The more important of the two structures was the Đông Hải wall, constructed in 1631. When completed, it was 18 kilometers long and more than six meters tall. A second such structure, the Nhật Lý rampart, completed in the fall of 1630, was described by nineteenth-century court histories of the Nguyễn as follows:

The ramparts were four meters high, and the outside was supported by ironwood, while inside was earth, and this created five steps, where elephants and horses could walk, and it also relied on the mountains at its sides. Altogether it was twelve kilometers in length, and every four meters was placed a painted cannon, and at distances of twelve to twenty meters was placed a long artillery piece, and a large bore cannon. And the ammunition was stacked up like mountains.

In addition to these structures, the Nguyễn also had a series of smaller walls further to the south of the Đông Hải line. Collectively these ramparts were particularly valuable to the southern forces, which were in a defensive posture in five of their six wars with the Trịnh during the middle of the seventeenth century. The Trịnh forces never successfully breached these walls, and it was only the collaboration of Nguyễn officials during the upheaval of the 1770s that permitted the Trịnh to pass through the ramparts during their 1774 campaign against the Nguyễn.

**Traditional Weaponry**

Even as they developed defensive structures of various types, the Vietnamese naturally employed a broad range of offensive tools, and made early use of a wide range of weapons in their battles with the Chinese. These included both domestically-developed and Chinese-style arms. Bronze spears, swords and ar-
rowheads were used at a very early stage. Lê Thành Khôi describes the armies of
the semi-legendary king, An Dương Vương 安 阳 王 as featuring: “redoubtable
archers, using poisoned or flaming arrows [and] soldiers armed with lances,
spears, daggers, short swords, axes, and armor.”51 Excavations from bronze-age
sites in the north of the country, dating to the middle of the first millennium BC,
have revealed a great many artifacts that might have been used for military pur-
poses, including arrowheads, spear-points, bronze halberds, and battle axes of
various sizes.52 Of the weapons from this early period, among the most effective
were the bronze pediform axe and the crossbow. The former was apparently
evolved from the earlier rectangular stone axe, and was a particularly useful
weapon that could be used both for chopping and for thrusting.53 It was one of
many cast bronze weapons being produced in an area with very highly developed
bronze-working skills by around 500 BC.54 The crossbow was perhaps even
more lethal, capable of launching arrows (by means of a trigger mechanism) at
a very high velocity. Keith Taylor notes that this weapon, for which surviving
evidence is the trigger mechanism itself, was one that Austroasiatic peoples in the
south developed and that was later adopted to great effect by the Chinese.55
Clearly weapons technologies flowed both north and south during this early peri-

Each of these various types of traditional weapons played an important role in
battle, but it was the sword, as in many other cultures, that developed a special
mystical status. The most famous sword in Vietnamese history is that allegedly
presented to the Vietnamese military hero Lê Lợi 黎 利 by a turtle that emerged
from the depths of a lake in the capitol—Thăng Long. This sword was to be used
to rescue the nation from the Ming occupation of the early fifteenth century.
After victory had been achieved, the turtle resurfaced and requested the return of
the sword, which had now fulfilled its mission. The lake in the center of the old
part of Hà Nội today still bears the name Hồ Hoàn Kiếm 湖 還 剑—the Lake of
the Restored Sword.

Magical swords, similar to that used by Lê Lợi, played prominent roles at
other times of political crisis as well. Most notably, numerous references to such
weapons are found in the lore about the eighteenth-century Tây Sơn movement.
One tale from this period metaphorically describes the unifying power of the Tây
Sơn, reporting that the eldest rebel leader, Nguyễn Nhạc 黃 砥, found the blade
of a precious sword in the coastal plains and then discovered its matching handle

51 Lê Thành Khôi, 76.
52 Ủy Ban Khoa Học Xã Hội Việt Nam, 31-66. See also Trần Quốc Vương, “Physical
Prowess in Vietnamese Folk Arts,” The Việt Nam Forum 4 (Summer-Fall, 1984): 115-117.
54 See Charles Higham, The Archaeology of Mainland Southeast Asia (Cambridge:
in the interior highlands area. A variant of this tale states that Nhạc discovered
the sword’s blade embedded in a stone, and that he alone had the strength to
withdraw it. Then, on visiting a Bahnar highland village, he was presented with
an enormous fowl, which when opened revealed the matching handle. Once the
two pieces were joined they could no longer be separated. Of this same inci-
dent, the Nguyễn dynasty’s nineteenth-century account, the Đại Nam Liệt Truyện
Nhạc found a sword that he claimed was a spirit sword. He used this to delude
the people and many believed him. These and many similar tales make clear
the mystical importance that weapons could possess, and also linked weapons
specifically to heroic figures, either defenders of the nation against outside en-
emies, or defenders of the people against oppressive officials.

Although swords, long and short, one and two-handed, curved and straight,
were important weapons, other types of weapons also contributed to the Viet-
namese arsenal. Mention has already been made of the crossbow, which was
developed at a very early stage. Conventional bows and arrows were also com-
mon, frequently made more dangerous by setting ablaze the tips of the arrows.
Spears and other thrown weapons were also important, and were sometimes
wielded by cavalrmen. Among these was the “lao” a type of extra-long javel-
alin, made of a very hard wood and with an extra barb at the end. This weapon
was considered one of the most dangerous in the Vietnamese arsenal, useful for
fending off attacking enemy swordsmen from a distance. Finally, the Vietnam-
ese did also use much larger weapons, including catapults, which were intro-
duced by the Chinese and employed as early as 1059. All of these types of
weapons continued to be the central elements of the Vietnamese military arsenal
in subsequent centuries. They remained inexpensive and relatively easy to pro-
duce, and were readily wielded in rapidly moving military campaigns. Moreover,
even as the Vietnamese began to use firearms in their confrontations with the
Chinese and the Chams, the older technologies continued to predominate. Since
the new types of arms required considerable investment in their casting or pur-

56 Những Mвая Chuyेन về Tây Sơn (Some Tales about the Tây Sơn) (Qui Nhơn: Ty
Văn Hóa và Thông Tin Nghia Bình, 1979), 9-10.
57 Quốc Sử Quán Triệu Nguyên, Đại Nam Chính Biên Liệt Truyện (The Principle
Record of the Ranked Tales of Đại Nam), trans. Đỗ Mộng Khương and others (Huế: Nhà
58 See, for example, an illustration from S. Baron’s seventeenth-century visit to
Thăng Long, reproduced in Ứy Ban Khoa Học Xã Hội Việt Nam, 309.
59 Nguyễn Lương Bích and Phạm Ngọc Phung, Tìm Hiểu Thiên Tài Quân Sự của
Nguyên Huệ (Examinations into the Military Talents of Nguyễn Huệ) (Hà Nội: Nhà Xuất
Bản Quân Đội Nhân Dân, 1971), 52.
presented as part of the conference “Viet Nam: Beyond the Frontiers,” University of
California, Los Angeles, 11-12 May, 2001, 6.
chase, and training for their use, these were used to supplement, rather than to replace the older technology.

When was artillery technology first incorporated into the Vietnamese arsenal? The earliest recorded Vietnamese use of artillery appears to date to the fourteenth century. Hồ Quý Lý is said to have developed a formidable piece of artillery known as the súng thần cơ 神機 which hurled a variety of different sized cannonballs that could either kill soldiers or destroy structures. This was apparently not long after the first Chinese use of the same types of weapons. Sun Laichen has recently examined technology transfer between the Ming and the Vietnamese during the course of the Ming occupation of the first three decades of the fifteenth century. He argues that it was Ming artillery strength that allowed the Chinese to overwhelm Vietnamese defenses and occupy the country, and that it was this same Ming artillery that played an important role in the eventual Vietnamese defeat of the occupation army. Specifically, he argues that the Vietnamese were able to acquire Ming arms from defectors or captured troops, and to use these weapons as models for domestically manufactured versions. Gradually, under Lê Lợi’s command, the Vietnamese were able to build up a Ming-style arsenal that they were then able to direct against the Chinese forces. After the Lê victory, state workshops of the new dynasty, in addition to crafting bows and arrows, lances, and swords, also continued to produce copper cannons (hỏa đồng). Indeed, by the beginning of the sixteenth century, Tomé Pires was able to observe that the Vietnamese had “countless musketeers and small bombard.”

It was not, however, until the late sixteenth century and then into the period of the standoff between the Nguyễn and the Trịnh in the seventeenth, that artillery became a central element of Vietnamese military confrontations. In the latter half of the sixteenth century, the Nguyễn, apparently already had access to various types and sizes of cannons. The first Nguyễn leader in the south, Nguyễn Hoàng 阮潢, returned to the north in the 1590s for some time, to assist the Lê in

61 Uỷ Ban Khoa Học Xã Hội Việt Nam, 230.
62 Li Tana, 44.
64 See Lê Thành Khôi, 230. Though not all Vietnamese artillery pieces were made of metal. In the fifteenth-century wars against the Chams, the Lê navies apparently carried guns made of wood or long bamboo. In the eighteenth century, the Nguyễn, during their wars with the Tây Sơn, in at least one circumstance carved wooden “guns” that they armed with clusters of areca palm seeds to fire at the enemy troops.
fighting off a strong challenge from the Mạc family. In one battle with the Mạc, while the Trịnh were unable to breach the enemy ramparts, Nguyễn Hoàng, used “fire weapons and large cannons of all sorts” to destroy the enemy fortification and rout the Mạc forces. This suggests that in terms of artillery, at this early stage, the southern forces were considerably more advanced than their northern counterparts, despite the earlier Lê casting of artillery pieces. It also suggests the important role that artillery would come to play in siege warfare of the seventeenth through nineteenth centuries.

During the Trịnh-Nguyễn wars in the middle of the seventeenth century (1627-1672), each side depended heavily on artillery during their various campaigns. To assist them in fully equipping their armies, both drew on European expertise in the casting of armaments. A number of European trading companies were permitted to establish factories in north and south for the express purpose of supplying the Vietnamese with European-style cannons. In the north, the Dutch established trading factories in Phố Hiến in 1637, and soon thereafter in Thăng Long itself. They became important suppliers of artillery to the Trịnh throughout the seventeenth century. By the end of that century, Dampier was able to report that the Trịnh had in their possession at least 60 iron cannons, and several bronze ones, the largest of these weighing nearly 3.5 tonnes, and perhaps designed, as he noted, more for show than for actual combat use.

In the south, the Nguyên allowed the Portuguese to establish a cannon-casting foundry near Phú Xuân, the first some time before 1615, and the second in 1631. Although initially relying on weapons produced by European craftsmen, by the late seventeenth century and certainly in the eighteenth, the Nguyên had already become much more sophisticated at casting their own cannons. Consequently, the number of artillery pieces in their possession increased considerably. Pierre Poivre, visiting the southern court in the mid-eighteenth century noted the presence of more than 1,200 bronze cannons in the Nguyên ranks. It appears that the Nguyên cannons continued to be superior to Trịnh artillery during the conflict between the two sides, and the combination of Nguyên fortifications integrated with artillery pieces, was sufficient to prevent any Trịnh armies from penetrating the Nguyên defenses. Thus, although Trịnh forces appear to have had an overwhelming numerical advantage during these wars (100,000 troops to perhaps 50,000), the Nguyên were able to use their particular technological ad-

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67 Reid, 222-223.
68 Lê Thành Khôi, 263.
vantages to halt the Trịnh advances. Indeed, the strength of Nguyễn fire-power and their skill in wielding artillery at this time were both demonstrated in a 1643 encounter, during which their ship-mounted cannons completely destroyed a small Dutch fleet.

Despite wielding a formidable artillery arsenal in the seventeenth century, it seems that by the middle of the eighteenth century the Nguyễn had lost some of their knowledge of, and need for, these weapons. The wars with the Trịnh had ended in 1672, and for the next century the Nguyễn faced only minor challenges from peasant unrest and skirmishes with Cambodians in the Mekong delta region. When Europeans arrived in the middle of that century, they noted that the Nguyễn artillery had already fallen into very poor condition. Poivre, for example, while noting the large number of cannons in the possession of the Nguyễn, also reported that “the Cochinchinese take no notice, or are unaware, of what could make this artillery more useful. None of the cannons has got six shots to fire and most of the cannonballs are not of the right caliber.” Consequently, it is not surprising that when the Tây Sơn rose up in the 1770s, the Nguyễn did not have the artillery to respond to Tây Sơn attacks on their forts or cities, and apparently did not fire a single cannon against the rebel armies. Thus, finding themselves, at times, at a technological and resource disadvantage relative to the Tây Sơn, the Nguyễn were occasionally forced to improvise. For example, during some of the battles of the mid-1790s, it was reported by a European eyewitness that the Nguyễn supplemented their armaments with wooden mock cannons, painted black to deceive the Tây Sơn forces confronting them.

While the Nguyễn appear, by the latter part of the eighteenth century, to have lost their former artillery advantage, the Trịnh apparently had fairly strong artillery at this same time. When Charles Chapman visited Phú Xuân in 1778, he and his men became embroiled in a dispute with their Trịnh hosts, which degenerated into a brief but intense skirmish. For several days the Englishmen sat relatively helpless on their vessel, anchored in a bay near the capitol while Trịnh shore batteries pounded their vessel, using shot as large as nine pounds. Although the Englishmen were eventually able to escape, the sustained barrage put up by the Trịnh during this period argues for a relatively well-developed and readily deployed artillery technology in their hands during this period.

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71 Reid, 230.
72 See Poivre, 90. This article also includes a more extended commentary on Nguyễn military and artillery.
73 Li Tana, 46.
74 Archives of the Missions Etrangers Paris (hereafter MEP), vol. 746, 577, LeLaboussou to Boiret, 12 July, 1796.
75 See Lamb, 124-127.
Finally, while the Vietnamese clearly possessed and used larger artillery pieces during the fifteenth through eighteenth centuries, they also deployed soldiers wielding smaller handguns. Sun Laichen argues that the Vietnamese employed handguns, as distinct from larger cannons, as early as 1390, when such a device was used to shoot and kill the Cham ruler, Chê Bông Nga. The Lê subsequently expanded the production and deployment of handguns in addition to larger artillery pieces. By the seventeenth century, as Anthony Reid has pointed out, “muskets became a major item of trade,” and “Cochinchina made most effective use of them, organizing its entire adult male population along military lines.” Later, in the late eighteenth century, Chapman also reported that in addition to artillery pieces, the Vietnamese made use of handguns of various types. Visiting Trịnh-controlled Phú Xuân in 1778, he observed that the Vietnamese had “long matchlocks which had swivels and three-legged stands to fire them on.” These, the local military commander claimed, had been manufactured locally. Indeed, the Trịnh also had muskets by this time, and both sides were apparently recognized for having highly skilled marksmen.

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Although the Vietnamese were using guns and cannons by the fourteenth century, they continued to use fire in its more elemental form as an important weapon. Fire would have been, and has remained, a particularly powerful weapon in a country where virtually every structure, from palaces to simple houses, was constructed of wood. There were, of course, earth-reinforced ramparts of many types, but within those outer walls were military or political centers whose edifices would have been largely, if not entirely, constructed of highly flammable material. Fire also constituted a simple and cheap weapon that could be readily produced from materials at hand.

Weapons of fire were used very early by the Vietnamese, though how early is not entirely clear. The nineteenth-century Nguyễn history, Việt Sử Thông Giám Cương Mục 越史通鑑綱目, describes the Chinese use of fire weapons to destroy citadels in Vietnamese territory as early as 111 BC. Prior to the introduction of artillery, the Vietnamese almost certainly employed a variety of fairly simple fire weapons, including flaming arrows and spears, and other traditional weapons enhanced by the addition of flames. A considerable advance in this technology took place under the Lê regime when the Vietnamese developed an expanded arsenal of “flame throwers,” using a technology borrowed from the

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77 Reid, 225.
78 Lamb, 112.
79 Reid, 225-226.
80 Cương Mục, vol. 1, 106.
George Dutton: Flaming Tiger, Burning Dragon

Ming. Indeed, such devices were apparently being used in China as early as the tenth century. The Vietnamese were able to construct their own flame throwing devices in a variety of sizes, possibly fashioning them from heavy bamboo as in China. These would have used some form of incendiary oil, propelled from the tube with a plunger, a design that could have yielded several minutes of continuous flame.

The most numerous and vivid descriptions of the use of fire as a weapon are found during the Tây Sơn period of the last three decades of the eighteenth century. Although both Tây Sơn and Nguyễn forces made use of cannons, more frequent, and perhaps more effective, use was made of simpler weapons of fire that could be readily deployed by the large, often ill-trained armies fielded by each side. One rudimentary, but particularly effective, fire device of this period was used by the Nguyễn in a manner that rendered it one of the most feared weapons of its time. A Spanish missionary observer of the period gave the following description of the device:

[It is] a stick made of thorny wood, very abundant in the forests, on which they left the thorns, so that it was barbed like a fish hook ... where the upper part is coated with three or four layers of pine tar wrapping the leaves, to fashion it into a sort of taper (candle). When they wanted to use this weapon in battle, they would set the pine tar on fire, and then they would brandish it to the left and right, much like a holy water sprinkler; those who found themselves sprinkled with this seeming holy water would find themselves sent to the next world. They would use the thorny baton in throwing it at the enemy; a victim, caught like a fish on its numerous barbs, would see the impossibility of moving, and fall into the hands of his enemies, and there was no sort of garb that could defend against the barbs.

Another contemporary observer noted a similar Tây Sơn penchant for using fire-weapons. He wrote of the rebels that “their weapons were usually flaming arrows, or flaming poles at the top of which they had attached lances, and these were

83 Ibid., 40.
called flaming tigers—hỏa hổ 火虎. " During their 1789 war with the Chinese, the Tây Sơn forces continued to wield these “flaming tigers,” and although we do not have a precise description of the the manner in which it was employed, a Chinese general described it as a weapon designed to set fire to soldiers’ uniforms. During the same encounter with the Chinese, people living in the region of Khương Thuông-Dông Da, in Thăng Long, devised another type of incendiary weapon known as a fire dragon (rồng lửa 龙火). This was developed by creating the image of a dragon out of a type of local straw, then caulking it together with resin and soaking it in an oil. The completed structure was then set ablaze to drive off the Chinese, probably through a combination of the dramatic effects of the burning dragon and the flames themselves.

Also dating from the Tây Sơn period, we have references to what one Englishman called “fire boats” or “fire floats.” While we have no detailed description of this weapon, it was probably a type of dummy vessel set afire and launched toward enemy boats. Like other fire weapons, these had to be used with care, for it was a weapon that could quite easily spell disaster for those who used it. The Trịnh forces which came into conflict with Chapman’s mission in 1778 apparently used such a device, but rough waters prevented the rafts from harming the English vessel. Fortunately for the Vietnamese side, the burning rafts did not harm their own ships. The Nguyễn were less fortunate when they attempted to use burning rafts against the Tây Sơn in the rivers near Sài Gòn in 1783. A sudden powerful northern wind turned the burning devices back toward the Nguyễn, sinking many of their vessels and forcing their troops to flee.

This episode makes it clear that any time one wanted to use fire, attention had to be paid to weather patterns, and particularly the winds. The winds, when properly calculated, could render fire weapons particularly effective. Thus, for example, when Tây Sơn forces attacked the Nguyễn at Gia Định in 1783, the rebel armies sailed up the Sài Gòn River and took advantage of the rising waters and the accompanying tidal winds to shoot flaming arrows onto the Nguyễn holed up in the citadel. On the other hand, while winds might help speed one’s fire-arrows or flaming rafts toward the enemy, they might just as quickly turn against those employing such weapons, as the Nguyễn case cited previously so vividly demonstrated.

88 Lamb, 123.
89 Thực Lục Chính Biên, 46.
Finally, in this same period, a European advisor to the Nguyễn forces during their long struggles with the Tây Sơn suggested what would have been the first use of aerial bombardment in Vietnamese history. The French mercenary, Alexis Olivier de Puynamel (known to the Vietnamese as Ông Tin) recommended combining European technology with the more rudimentary weapon of fire to rain destruction on Tây Sơn forces holed up in a city that the Nguyễn were besieging. De Puynamel suggested that the Nguyễn employ a hot air balloon, which had been demonstrated to them around this time, and use it as a platform from which to drop incendiary devices on the interior of the besieged fort. Given the highly combustible materials used to construct buildings inside forts, as well as the likely stockpiles of gunpowder, the effect could have been devastating. The Nguyễn ruler apparently decided against this indiscriminate use of fire, for fear of alienating potential supporters inside the Tây Sơn compound. Although the weapon was not used, the Tây Sơn were clearly aware of the Nguyễn access to hot air balloons, and recognized the potential that such technology held for warfare.

**Water: Naval Issues**

Given the geographic realities that confront Viêt Nam, with its very long coastline and sometimes daunting inland mountains pressing toward this coast, as well as numerous and extensive river systems, it is hardly surprising that waterborne warfare would be a central feature of Vietnamese traditional military technology and strategy. Travel between regions of Vietnam was almost always far more rapid on water than on land, and the northern and southern river deltas were also readily traveled by boat. Moreover, Vietnam’s traditional enemies, the Chinese and the Chams, had considerable naval capabilities and used these in many of their attacks against the Vietnamese. Consequently, the Vietnamese had to develop a means to counter such attacks. They became remarkably effective naval fighters, and it is no great wonder that the most famous Vietnamese military battles of the premodern era were virtually all fought on water. These included defeats of Chinese navies on the Bạch Đằng river in the tenth and thirteenth centuries, the Tây Sơn riverine attacks on the capitols of Sài Gòn, Phú Xuân and Thăng Long in the 1770s and 1780s, and the decisive Tây Sơn defeat of a large Siamese naval fleet at the battle of Rạch-Gâm Xoài-mứt in 1785. Throughout this period, the Vietnamese combined defensive measures of various types with the offensive capabilities of naval vessels of varying sizes and designs.

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One of the earliest, and arguably the most famous, naval battle in Vietnamese history took place in the early tenth century, and involved a combination of innovative technology and military strategy. In 939, seeing the formidable Chinese fleet approaching his positions along the Bạch Đằng River, the Vietnamese admiral, Ngô Quyển responded by combining simple technology with his knowledge of local conditions. He planted a series of iron-tipped poles in the river, invisible under the surface of the water. He then lured the Chinese ships further into the river during high tide when they could pass over the unseen stakes. Witnessing the apparent retreat of the Vietnamese forces, the Chinese ships pursued them inland along the river. When the tide turned, Ngô Quyển launched a furious counter-attack that sent the Chinese ships into a hasty retreat. Unaware of the stakes in the river, the Chinese ships became impaled on the iron tips of these poles as they headed back toward the river mouth, and many vessels sank or were destroyed by the pursuing Vietnamese.\(^\text{92}\)

Subsequently, the use of simple but highly effective defensive naval technologies became an important element in Vietnamese warfare. In the thirteenth century, the Trần family, which was from a coastal riverine area, and relied heavily on its naval capabilities to defend its position and state, seized control of the throne from the earlier Lý (1010-1225).\(^\text{93}\) It is no accident, then, that the Trần were later able to fight off the formidable Mongol armies along the rivers of the northern region in the 1280s. Indeed, the Trần admiral, Trần Hưng Đạo, used precisely the same tactic involving metal-tipped, submerged poles in the Bạch Đằng River that Ngô Quyển had used to such great effect in the tenth century. Once again, the Chinese navy was lured into the river, and once again their ships were ignominiously impaled on the hidden spikes, leading to a decisive Vietnamese victory in 1288. Then, during the short reign of Hồ Quý Lý in the late fourteenth century, the Vietnamese also planted stakes along coastal waters and at approaches to inland capitals to guard against potential Chinese and Cham naval attacks.\(^\text{94}\) When the Nguyễn moved south in the sixteenth and seventeenth centuries, they too protected their own coastal waters by planting wooden stakes to block ports. They also introduced an innovation in naval defense in the form of iron chains that could be strung across narrow harbors and river mouths. These could be lowered or raised as necessary to control access to these waters, providing a much more dynamic, if somewhat cumbersome, means of coastal defense.\(^\text{95}\)

Indeed, as the Nguyễn moved further south, they greatly enhanced their naval resources and capabilities. To some extent this was dictated by terrain, for the central part of the country into which the Nguyễn family expanded in the six-

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\(^{92}\) Tài Thú, vol. 1, 146.


\(^{94}\) Nguyễn Văn Thái and Nguyễn Văn Mạnh, 135.

\(^{95}\) Yang Baoyun, 108.
teenth through eighteenth centuries, is the narrowest part of the country. In this region mountains often stretch down to the coast, creating isolated pockets of settlements, or at most are located only a few dozen kilometers inland. Under such circumstances travel by water was not only preferable, but was often an absolute necessity. Adjusting to their new environment, the Nguyễn became renowned for their naval readiness and skills. A 1774 map of Nguyễn territories indicated the existence of more than 1,000 military boats of various sizes posted in the northern sections of the Nguyễn realm.\(^{96}\) By the latter part of the eighteenth century, numerous contemporary observers noted that, while the Nguyễn were at best mediocre when it came to land battles, they were an extremely dangerous force on the coastal waters. When the Trịnh forces arrived in the south in 1774, largely by land, a local scholar warned the commander of the northern forces: “The Nguyễn troops are not acquainted with foot battles, only their naval forces are skilled. You have come here from afar, and I beg of you not to compete with them in their area of natural aptitude.”\(^ {97}\) This warning came despite the fact that the Trịnh navies had themselves been quite formidable in the seventeenth century, and had “included ... 15,000 sailors scattered on 500 well-painted galleys having three cannons, one at the head and two at the stern.”\(^ {98}\) As for these their vessels, “twenty-five rowers stood at each board, facing the head of the galley. The rest were fighting sailors.”\(^ {99}\)

Later, in the eighteenth century, and with the water-oriented Nguyễn forces as their enemy, the Tây Sơn armies regularly engaged the Nguyễn in naval confrontations. As unlikely as it might seem, the peasant wars of the Tây Sơn era were frequently decided by naval encounters, as well as by the mobility that boats provided to the armies of all parties. Both the Tây Sơn and their Nguyễn rivals had very large naval forces including hundreds of ships of various sizes, with the Tây Sơn side’s strength considerably enhanced by the assistance of a fleet of Chinese pirate vessels.\(^ {100}\) Each side achieved numerous naval victories during their confrontations. The Tây Sơn carried out successful naval attacks on the respective riverine capitols (or military headquarters) of the Nguyễn at Gia Định, the Trịnh at Phú Xuân and the Trịnh/Lê at Thăng Long between 1780 and 1786. In addition to these successes against domestic rivals, the Tây Sơn used their navies against external forces, most notably the Siamese. They used a combination of their naval strength and intimate knowledge of the riverine terrain in the Mekong Delta area to ambush a Siamese navy that entered the country to

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96 Ibid., 106.  
97 PBTL, 313.  
99 Ibid., 194.  
100 On the role of ethnic Chinese pirates in the Tây Sơn navies, see Dian Murray, Pirates of the South China Coast, 1790-1810 (Stanford: Stanford University Press, 1987), 34ff.
support the Nguyễn in early 1785. Having arrayed their troops in a pair of canals, Rạch-gầm and Xoài-mút, that fed into the Ba-lai river, the Tây Sơn navy lured the Siamese ships up the river, and then surrounded them at the designated ambush site. The Tây Sơn destroyed 95 percent of the 20,000-man Siamese army, dealing the Nguyễn a blow from which it would take several years to recover.¹⁰¹

Despite this and other important victories, the Tây Sơn were not always so successful in their naval engagements. Sometimes the Tây Sơn navies fell victim to the vagaries of weather conditions, while at others to the skill and firepower of their opponent. Several times during the campaigns of the 1770s, the Tây Sơn navies were in pursuit of Nguyễn forces, only to encounter major storms that either sunk their ships or pushed them off course, preventing them from catching the Nguyễn flotillas.¹⁰² Later, the Tây Sơn suffered two catastrophic naval defeats at the hands of the Nguyễn, in 1792 and 1800. Both times Nguyễn navies surprised the unsuspecting Tây Sơn forces at their major harbor of Thi Nại, near Qui Nhơn, and each time burned at anchor the major part of the Tây Sơn fleet. By 1800, a European visitor noted the presence of more than 1,200 ships in the Nguyễn navy in and around Sài Gòn.¹⁰³ Yet even in the face of major setbacks and the growing Nguyễn fleet, the Tây Sơn, with the ongoing support of the Chinese pirate fleet, continued to rebuild their navies and to challenge the Nguyễn to the very end of the conflict in 1802.

Because of their important naval component, the military campaigns of the Tây Sơn conflict, both in the 1770s and early 1780s, as well as the later campaigns of the 1790s, had rhythms that were dictated by the coastal winds, and were thus frequently referred to as the “Monsoon Wars.” Although each camp possessed large numbers of infantry troops, movement by sea was invariably more efficient than by land. Each side would attack when the prevailing winds favored the ready movement of their naval forces and transport vessels. Movement by sea, however, meant that without a completely decisive victory, neither side would typically be able to sustain its attacks or easily consolidate its victories. To extend one’s campaign, particularly against a distant target, was to risk missing the wind patterns that would enable a return to one’s base. Failing to use these winds in a timely fashion meant that one’s troops would be left extremely vulnerable to a subsequent counterattack. The 1790s saw several extended sieges of citadels that were probably prolonged precisely because the reliance on the winds made it difficult to provide adequate reinforcements or relief until the winds shifted once again. It was because of this wind-dictated pattern that Nguyễn progress in the wars was very slow. This was the despair of European

¹⁰¹ For details on this see the Thự Luc Chinh Biên, 57.

¹⁰² The Nguyễn suffered their own particularly disastrous encounter with the winds, possibly in 1800, when a storm dispersed the major part of the Nguyễn navy, blowing its ships as far as Hainan island and the Paracels, and forcing the Nguyễn to retreat from Qui Nhơn to their southern base. See Nouvelles lettres, vol. 8, 188.

¹⁰³ Barrow, 274.
advisors, who constantly chided Nguyễn Ánh for being overly cautious, while perhaps not fully appreciating the complexities of the monsoon-driven military logistics.104

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Specifically in terms of technology, it is quite difficult to generalize about the nature of Vietnamese naval vessels, particularly for the period prior to the seventeenth and eighteenth centuries. There are simply too few accurate descriptions of these boats. Furthermore, it is difficult to separate “Vietnamese” from “Chinese” technology during the period of Chinese domination, if such a distinction is worth making. No doubt Chinese naval technology being employed in their southern domains was influenced by local skills. Even before the arrival of the Chinese the Vietnamese were developing naval technologies in response to their aquatic environs. The very earliest depictions of what be considered indigenous Vietnamese naval technology are those found on bronze drums from the Đông Sơn culture of the first millennium BC. The designs on some drums reveal low-slung vessels, curved at the ends and rowed by two or more oarsmen, while another stood at the stern of the vessel to steer it. Others show quite clearly the presence of cabins as well as platforms from which archers could fire their weapons.105 Nguyễn Việt, in a 1983 study of Vietnamese naval warfare, speculated that boats of this early period ranged in size from three to ten meters, with the smaller vessels transporting between four and six people.106

Larger ships began to be developed in the first millennium AD. Keith Taylor describes “high-decked” warships as being part of the Chinese military force in Vietnamese territories in the early fifth century.107 Later, in the ninth century, Taylor notes that the Chinese had improved their southern navy to include ships propelled by twenty-three oarsmen, and manned by twenty-five soldiers and two cross-bowmen.108 The Vietnamese too began to construct larger vessels. Nguyễn Việt has conjectured that Vietnamese warships of the period from the early ninth to the late thirteenth century were up to 20 meters in length and 4 meters wide, with 32 rowers and 25 soldiers.109

Major innovations were then introduced in the late fourteenth century by Hồ Quý Lý, who had seized the throne from the Trần family. He developed a new type of military vessel divided into two decks, rather than the traditional single,

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105 Higham, 201.
106 Nguyễn Việt et al., Quân Thủy Trong Lịch Sử Chống Ngoại Xâm (Naval Troops in the History of Resisting Foreign Aggression) (Hà Nội: Nhà Xuất Bản Quân Đại Nhân Dân, 1983), 57.
108 Ibid., 226.
109 Nguyễn Việt, 78-79.
high-decked ship. The upper deck accommodated soldiers, while the lower deck was reserved for oarsmen who powered the craft.\(^{110}\) This double-decked design appears to have been unique to this period, or at least quite unusual, for descriptions of later Vietnamese naval vessels in the sixteenth and seventeenth centuries describe only single-decked ships. An early seventeenth-century Jesuit missionary engraving of a Nguyễn battleship, for example, shows it to be a single-decked vessel propelled by at least 25 oarsmen on a side, though it does not make clear precisely where soldiers stood or where cannons might be mounted.\(^{111}\) Dutch observers similarly reported that galleys in the middle of the seventeenth century featured 64 soldiers and a variety of mounted guns.\(^{112}\) When Pierre Poivre visited the south in the 1750s, he noted that larger Nguyễn vessels had between 40 and 60 oarsmen.\(^{113}\) Numbers on this magnitude were confirmed by Charles Chapman, who reported in 1778 that a Tây Sơn mandarin controlled “four gallies rowing between forty and fifty oars each.”\(^{114}\)

In addition to providing more precise indications of the size of Vietnamese vessels, by the eighteenth century European visitors to Việt Nam began to produce considerably more detailed description of the nature and construction of these ships. Thus, for example, in the late eighteenth century, a visiting Englishman gave the following description of some elements of Vietnamese boat-construction:

> That particular branch of the arts in which the Cochinchinese may be said to excel at the present day is naval architecture, for which, however, they are not a little indebted to the size and quality of the timber employed for the purpose. Their row-galleys for pleasure are remarkably fine vessels. These boats, from fifty to eighty feet in length, are sometimes composed of five single planks, each extending from one extremity to the other, the edges morticed, kept tight by wooden pins, and bound firm by twisted fibers of bamboo, without either ribs or any kind of timbers. At the stem and stern they are raised a considerable height, and are curiously carved into monstrous figures of dragons and serpents, ornamented with gilding and painting.\(^{115}\)

\(^{110}\) Nguyễn Văn Thái and Nguyên Văn Mừng, 135; see also Ủy Ban Khoa Học Xã Hội Việt Nam, 230.

\(^{111}\) The drawing is reproduced in an unpaginated appendix to Nguyễn Việt.

\(^{112}\) Li Tana, 41.

\(^{113}\) Poivre, 404.

\(^{114}\) Lamb, 103.

\(^{115}\) See Barrow, 318-319. Several decades earlier, Poivre offered a far less flattering description of Vietnamese naval design skills, noting of their vessels: “Ordinarily they take on a great deal of water due to the spread of wormholes and the ignorance of the Cochinchinese who know nothing of caulking.” See Poivre, 92.
Although this account describes civilian boats, it is likely that similar construction techniques were also employed in the crafting of military vessels. John Barrow, the author of this description, also noted the Vietnamese use of bulkheads in their larger cargo vessels, which, while allowing for the separation of various goods for transport, also protected the ships against sinking in the event that one section of the hull was breached.\(^{116}\) Another account by an earlier English visitor reported the following, specifically about military vessels he had seen in the possession of the Trịnh:

> The largest of these gallys was about fifty feet long and ten or twelve broad, the head and stern sharpening off to a point; they were armed with spears from fifteen to twenty feet in length and matchlocks some of which had large bores and turned upon swivels, with great quantities of power and balls made up in bamboo cartridges.\(^{117}\)

As all of these cases make clear, military vessels of the premodern period were typically powered by oarsmen, particularly for riverine battles, where their speed and maneuverability were indispensable. They could also be used quite effectively along coastal waters as well, for as Reid has pointed out, the Southeast Asian coastal waters were relatively sheltered.\(^{118}\) Sailing ships were more commonly used for moving along the coastal waters, where they were at the mercy of the prevailing winds of the monsoons. Some Vietnamese historians, such as Nguyễn Việt, have argued that ships of the northern Trịnh were better suited to river travel, while those of the southern Nguyễn were designed for better ocean mobility.\(^{119}\) Given the geography of each place, with the contrast between the river-laced northern plains and the frequently narrow coastal region controlled by the Nguyễn in this period, such a division in boat types would be a logical assumption. Việt concedes, however, that while the hypothesis makes sense, descriptions of the boats and surviving sketches by European observers are not precise enough to verify this speculation.

While the Nguyễn already had considerable naval capabilities in the eighteenth century, they were quick to recognize some of the advantages that came with the larger and heavier European vessels. Thus, they employed European mercenaries and vessels for their campaigns against the Tây Sơn beginning in the late 1780s. The Nguyễn were not content to rely solely on these borrowed European vessels. According to one account, sometime in the 1790s Nguyễn Anh purchased a European vessel, then had it dismantled, and the design copied so

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116 Barrow, 320.
117 Lamb, 123.
118 Reid, 229.
119 Nguyễn Việt, 295; also cited in Li Tana, 41.
that his craftsmen could produce three more identical vessels.\textsuperscript{120} The Nguyễn also drew on European technology and began to cover at least some of their vessels in bronze, making them more resistant to the small caliber guns typically mounted on enemy vessels, and most capable of successfully targeting Nguyễn boats. This would also appear to have constituted a psychological advantage, probably derived from the sight of cannonballs apparently bouncing off of the bronze-clad vessels. When the Tây Sơn Emperor Quang Trung \textsuperscript{121} rallied his troops in a 1792 edict, he acknowledge the impact of such vessels by commenting that “These ships of bronze ... of theirs are things that are strange, and they must be submitted for me to know (about them).”\textsuperscript{121} The Tây Sơn appear to have responded to the Nguyễn naval challenge, for by 1801 there were reports that the Tây Sơn navy included vessels with between 50 and 60 cannons mounted on them, marking a substantial increase in their firepower.\textsuperscript{122} For their part, the Nguyễn were mounting between 26 and 46 cannons on some of their locally-produced vessels.\textsuperscript{123}

Finally, even as they were copying the European ships, the Nguyễn appear to have been crafting much larger vessels of local design. A description of these larger ships, said to be developed to carry three hundred people, and comprising three decks, was provided by a Japanese shipwreck victim who spent several months in Nguyễn territory near Sài Gòn in late 1794 and early 1795:

\begin{quote}
These are ships in the Chinese style with masts of 36 parts. Each vessel is for three hundred people ... Several dozen halberds and lances are planted (as rails) and the bows are all of small dimensions and very strong ... The three levels of the ships are: the lower level, on which both the front and rear have eight large cannons; the middle level with three medium-sized cannons both in the front and rear; and the upper level with, in the front, sixteen guns with 20 Mục (55 gr) ball, and decorated barrels. These guns are placed on wheeled supports, which allows them to be aimed in all directions.\textsuperscript{124}
\end{quote}

From this it is clear that the Vietnamese continued to develop substantial naval capability independent of European influence, even as they had access to European advisors and technologies.

\textsuperscript{120} MEP 746, 871, LeLabousse, April 24, 1800; Barrow, 277.
\textsuperscript{121} Bissacherê, 173-175.
\textsuperscript{122} MEP 801, 857, J.B. Chaigneau to Barizy, March 2, 1801.
\textsuperscript{123} MEP 746, 874, LeLabousse, April 24, 1800.
Beasts of War: Elephants and Horses

To consider the Vietnamese traditional arsenal more fully, we must expand our scope to include other types of military resources, including that distinctive weapon of mainland Southeast Asia—the elephant. The elephant was one of the greatest Vietnamese military assets. Not only were elephants powerful and difficult to kill on the battlefield, but troops mounted on elephants could travel with great speed and had the advantage of being able to survey the battlefield from a vantage point considerably higher than that of their (typically) horse-mounted opponents. Moreover, an elephant could carry as many as four armed soldiers at a time, making it a formidable fighting element. Care for and training of elephants became a specialized branch of the Vietnamese military structure, and the ownership of elephants, like other weapons, was severely circumscribed by the state. Moreover, given the importance of the elephants, fiscal allotments for upkeep of elephants were precisely regulated according to their size. The importance of elephants in the Vietnamese military structure is revealed by the fact that some of the more prominent were given elaborate funerals upon their deaths.

The use of the elephant in battle is a defining characteristic of traditional Vietnamese military strategy, and an element that appeared very early in the ranks of Vietnamese armies. Already in the third century BC, Chinese armies noted the presence of these animals among Vietnamese forces. In the first century AD, the two Trưng sisters who rose up against Chinese occupation led their armies astride elephants. Subsequent Vietnamese military heroines likewise entered battle on the backs of pachyderms, including Triệu Áu in the third century and much later Bùi Thị Xuân in the Tây Sơn period. This is not to suggest that female generals were primarily responsible for maneuvering elephants into battle, for female generals appear to have been uncommon in Vietnamese history. Rather, the presence of elephants, as well as the participation (however infrequent) of women in Vietnamese armies, must be seen as distinctively Southeast Asian elements in the realm of traditional Vietnamese warfare.

Along with its obvious physical advantages, possession of this beast of war gave Vietnamese armies a substantial psychological advantage, particularly over Chinese soldiers, who, if mounted at all, rode on horses. In at least one encounter between elephant-mounted Vietnamese troops and horse-riding Chinese forces, but probably in many others as well, Chinese horses were intimidated at the sight and size of the Vietnamese elephants and stampeded into disarray. Although

125 Again, the participation of women on the battlefields of traditional Việt Nam lies outside the scope of this article, but is an important topic for further consideration despite the extremely limited availability of sources.

126 See Nguyễn Thu, Lê Quy Ký Sự (A Record of Events of the Precious Lé), trans. Hoa Bằng (Hà Nội: Nhà Xuất Bản Khoa Học Xã Hội, 1974), 123.
the Vietnamese gained a considerable advantage with their elephants, at times the Chinese were able to adapt to this threat. During the Ming invasion of the early fifteenth century, their forces were able to scare off the Vietnamese elephants by crafting lion masks for their horses to wear.\textsuperscript{127} During their next invasion, in the late eighteenth century, the Chinese similarly sought means to confront the southern pachyderms. Sun Shiyi 孫士毅 (1720-1796), the Qing general who led his troops into Viêt Nam to restore the last Lê Emperor, specifically warned his troops about Vietnamese war elephants: “When the southerners go into battle they frequently use elephants. Elephants are not indigenous to our country and in the past our soldiers, not acquainted with these creatures, turned and fled every time. They did not know that elephants, although very strong, are creatures of flesh and blood that cannot compete with our guns. If you see an elephant in battle, at a distance use guns and at close range, use swords. If you can wound them, they will flee.”\textsuperscript{128} This suggests that the psychological impact of Vietnamese war elephants affected not only Chinese horses, but their soldiers as well, and although the Chinese could develop antidotes to the Vietnamese war elephants, these were not always effective.

Visitors to Viêt Nam frequently commented on the role and imposing battle presence of these elephants. Samuel Baron, a Eurasian trader who traveled to the northern capital region in the late seventeenth century, reported that there were between three and four hundred elephants in the northern armies.\textsuperscript{129} The Chinese Buddhist monk, Dashan, who visited Nguyễn territories in the late seventeenth century, observed that “elephants have made many contributions to the victories achieved in the course of battles against Đông Kinh and Champa.”\textsuperscript{130} Somewhat later, during the Tây Sơn era, the rebel forces were able to use elephants to psychological, if not military advantage, by using boats to introduce them into their battles with the Nguyễn in the watery reaches of the Mekong Delta region. Elephants were not indigenous to this area, where lengthy canals and wide rivers made their movement impractical. Consequently, their presence in the ranks of Tây Sơn armies was a considerable shock to locally recruited soldiers, and probably a considerable surprise to other Nguyễn forces, acquainted with the creatures, but not expecting to find them in the marshes of the south. In any case, the Nguyễn in the far south were to begin to establish their own elephant corps, so that by 1800 their armies reportedly had 200 elephants of their own.\textsuperscript{131}

In addition to elephants, the Vietnamese also used other animals in a variety of military roles. Most notable among these were horses. Although elephants were regularly deployed by Vietnamese armies in all parts of the country, and provided physical as well as psychological benefits, the numbers found in any

\textsuperscript{128} HLNTC, 217.
\textsuperscript{129} Huard and Durand, 119.
\textsuperscript{130} Cited in Yang Baoyun, 106.
\textsuperscript{131} Barrow, 283.
given army were always measured only in the tens or hundreds. Many more soldiers traveled by horseback, when terrain and logistics permitted. Unlike elephants, horses were readily available, relatively easy to train, and far easier to feed. There are stories from both north and south about particular military leaders noted for their use of horses. The eighteenth-century northern rebel, Nguyễn Hữu Cầu, was alleged to have as an inseparable companion, a “spirit horse,” that he had been able to tame. Later, the Tây Sơn leader, Nguyễn Nhạc, was also cited for his way with horses, and when Charles Chapman visited his court in 1778, he specifically asked for the next European trade mission to send him a horse. Nhạc indicated that price was no object, as long as the horse was grey and had finely pointed ears.

Despite their long history of employing horses in warfare, Vietnamese deployment of cavalry forces left early European observers unimpressed. One early visitor in the later seventeenth century commented that the horses of the Nguyễn were chiefly for parade rather than military purposes. Another noted that “There is no cavalry, but some chiefs and their attendants, around 200 strong, ride on horseback armed with lances and sabres.” Moreover, when Poivre visited in 1749-1750, he noted that “there are ... horses, but stocky and poorly built, which are seldom used because of the uneven lie of the land and the many rivers and marshes which intersect it.” Even as he made this observation, the Nguyễn had already established a school for training their soldiers in horseback riding in 1700, and appear to have begun to treat their cavalry more seriously. Horses were an important factor in subsequent wars of the Tây Sơn period and particularly valued by the Nguyễn who were largely cut off from access to the preferred elephants. Indeed, in 1794, as the Nguyễn were battling the Tây Sơn, Nguyễn Ánh decreed that selling horses to foreigners would be a capital offense. The Nguyễn, short of elephants and horses during this time even took to using water buffalo to transport troops. At one point, their army was reported to have 6,000 men, comprising 24 squadrons, going into battle on buffaloes.

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132 Nguyễn Lê Thị, “Tìm Thêm dấu vết của Nguyễn Hữu Cầu” (Further Investigations into Vestiges of Nguyễn Hữu Cầu), Nghiên CSENS Lích Sử (Historical Research) 151, no. 7-8: 35.
133 Lamb, 100.
135 Francisco, 31.
137 Thuc Luc Chinh Bien, 187.
Technologies of Logistics, Armor and Signaling

Alongside the more dramatic military devices already discussed, existed less prominent, but equally important, technologies. These ranged from signaling devices and watch towers, to transportation aids and simple tools of various sorts. Though sometimes overlooked, these technologies must be viewed as playing crucial roles for Vietnamese armies and their commanders during the early modern period. These devices enhanced the capabilities of Vietnamese forces, but also constituted indispensable elements of Vietnamese military preparedness. Without the services of some of these minor technological capabilities, the Vietnamese would have been far less mobile, far less organized and indeed, much more vulnerable to enemy troops both internal and external.

Among these technologies of logistics were those related to the gathering and exchange of information, with signaling being particularly important. During the Tây Sơn wars, and probably well before that, the Vietnamese used a signal horn to send messages between scattered forces. It was described by one European observer as:

> a small instrument for giving war signals during the night or in the woods. Its sound is small, and yet it can be heard for nearly one league or more when conditions are right. It is only the commanders or some sub-commanders of the army who have the right to use it, and it is with this [horn] that they give the signals to attack or retreat ... The sound is produced by breathing in and out without tiring oneself.\(^{139}\)

In addition to this horn, another sounding device used to signal to soldiers was the gong, which the Nguyễn used to summon troops in certain areas.\(^{140}\) For sending messages over even greater distances, the Vietnamese used signal fires. These would sometimes be placed on coastal high points, where they could be seen by those awaiting the signal. The Tây Sơn armies used this method in their 1786 campaign against the Trịnh. After their troops had taken Phú Xuân, and their leader, Nguyễn Huệ had decided to advance the offensive against Thăng Long, the Tây Sơn advance naval forces moved up the coast to capture the Trịnh storehouses at Vị Hoàng. Once these had been captured, a signal fire was lit as a message to the rear forces that the preliminary attack had been successful, and that the second prong of the attack could be launched.\(^{141}\) For their part, the Nguyễn also used towers for signaling and as look-out sites. In the seventeenth century, they built a series of coastal watchtowers in preparation for anticipated

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\(^{139}\) MEP 701, 231, Bissachere to L’Etondal, 21 June, 1797. This horn is known in Vietnamese as a còi, and an illustration of one can be found in Huard and Durand, 119.

\(^{140}\) Ibid., 92.

\(^{141}\) Tạ Chí Đại Trương, 138.
attacks from the Trịnh.  
An even earlier use of observation watchtowers dates to the last years of the Vietnamese campaigns against the Ming occupation in the 1420s, when Chinese troops had been forced to retreat into fortified positions. The main Chinese citadel was at Đông Đô (東都—the Eastern capital), which the Vietnamese then besieged. Lying along a river, it was difficult for the Vietnamese to find a vantage point from which to observe movements within the Chinese fort. Then, in early 1427, the Vietnamese ingeniously built a floating tower, higher than the citadel walls, which they were then able to use in spying on enemy movements in the Chinese camp. In addition to these towers, other ancillary technologies related to besieging citadels developed during the same campaign. Vietnamese forces used an array of siege technologies learned from the Chinese including building earthen hills around the city to fire into it, tunneling into the city, and deploying assault carts. They also employed other technologies learned from the Chinese during earlier encounters including such devices as catapults and scaling ladders.

While signal and watch towers could be used to summon troops or observe troop mobilizations, other technologies directly supported the transport of these forces. Mention has already been made of the important role that naval transport played in moving armies across coastal waters, as well as the use of elephants, horses, and buffalo for movement across land. Armies could also, however, be moved rapidly with much simpler tools. In the late eighteenth century, the Tây Sơn armies gained a reputation for traveling overland at speeds that were virtually incomprehensible to their enemies. The primary technology that allowed them to do this involved using hammocks as movable bunks. In this arrangement, three soldiers would travel together as a team. Two men would carry the third soldier in a hammock suspended between them. The three would then rotate in shifts, taking turns sleeping in the hammock. In this manner, the Tây Sơn armies were able to travel virtually without stopping, for great distances. In one instance in 1786, Nguyên Nhạc apparently traveled from Qui Nhơn to Thăng Long, a distance of roughly 1000 kilometers in only ten days. This speed made the Tây Sơn appear almost supernatural to populations witness to their movements. According to one account, northern observers at the time said

142 Li Tana, 42.
143 Thực Lục Chính Biên, 79.
144 Lê Thành Khôi, 211.
145 Ibid., 13.
of Nguyễn Huệ: “Seeing him going north, going south, he has the appearance of a magical spirit. No one can comprehend it.”

In terms of mobility, another very important element of Vietnamese military technology was the construction of floating bridges using bamboo pontoons. Such bridges would typically be used to permit the rapid movement of troops across rivers, rather than waiting for ferryboats, which could move only small numbers of troops at a time. These floating bridges would be constructed quickly and in a temporary fashion to facilitate troop movement, rather than being erected as permanent structures. The Nguyễn and Tây Sơn made use of such structures in their campaigns in the Mekong delta region, where numerous rivers often made the movement of land troops extremely difficult or time-consuming. While highly useful for troop movement, such structures were also inherently vulnerable if they were not used properly or were insufficiently guarded. For example, there are several accounts that tell of such floating bridges being sabotaged, causing troops crossing them to fall into rivers and perish.

The Chinese troops that invaded Việt Nam in support of the Lê in 1788-1789 constructed such a bridge to move their own troops back and forth from the northern to the southern banks of the Red River. When the Tây Sơn counterattacked, and the Chinese troops attempted to flee across one of these bridges in their panic, the excessive weight of the fleeing troops caused the structure to collapse, drowning thousands of Chinese soldiers.

As they moved their troops to prepare for battle, the Vietnamese also sought to protect their soldiers on the battlefield, both through shields and armor. At the famous battle of Ngọc Hồi (near Hà Nội) in 1789, when the Tây Sơn armies of the Emperor Quang Trung (1788-1792) were fighting against the Chinese, the Vietnamese leader developed a new type of portable wall. He ordered his men to create large, mobile shields out of long wooden planks. These were then carried by ten men, who could carry the large shield with one hand and wield weapons with the other. Chinese efforts to rain down fire on the shields to set them ablaze were thwarted by wind conditions. In addition to such elaborate and specialized shields, Vietnamese troops almost certainly carried wooden shields into battle with them, much like their Chinese counterparts during this and other encounters. A seventeen-century engraving by a European visitor depicts northern troops carrying large, curved shields.

In the nineteenth century, the Vietnamese had shields of rattan as well as of steel, both of which types were probably in use in earlier periods as well.

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148 See, eg., Thúc Lực Chính Biên, 46.
149 HLNTC, 233.
150 From Baron, reproduced in Ủy Ban Khoa Học Xã Hội Việt Nam, 309.
151 Huard and Durand, 118, include illustrations of these types of shields.
The Vietnamese also used different types of protective armor, though virtually no specific information about this survives, and in most cases such armor was probably reserved only for military commanders. The average foot soldier in the traditional period wore little more than a simple tunic and trousers. Poivre left a description of the uniforms he encountered at the Nguyễn court in 1750, noting that their tunics had words on them indicating to which regiment a soldier belonged. Then in the 1790s, John Barrow provided a brief description of a Tây Sơn soldier, noting that “In general, a kerchief tied about the head, somewhat in the shape of a turban, a loose smock frock, with a pair of drawers, constitute the dress of a soldier ...” With regard to protective headgear, the Đại Việt Sử Ký Toàn Thư 大越史記全書 recorded that the helmet used by Vietnamese troops of the tenth century was square and made of leather, with the four sides sewn together, and that it was narrow in front and broad in the back. The same sources go on to note that this type of helmet continued to be in use into the Lê period (1428-1789). When Poivre visited the Nguyễn territories in 1750, he commented on the headgear he observed on Vietnamese soldiers. He described it as being made of a type of lacquered wood, which was decorated in silver paint. The form of these helmets he noted, “is like that of Flemish or Dutch hats, with the exception that the brim is of a uniform curvature, and that at the top of the hat is raised a type of ornament of the same material as the hat itself, and in a form somewhat like the head of a cane.”

Finally, in terms of logistics, brief mention must be made of the role that mapping played in Vietnamese warfare. Alongside more visible technologies, the capacity to produce maps must also be ranked as critically important to Vietnamese military endeavors. Without good maps, military campaigns would be guided by guesswork about often complex topographies. While military commanders could sometimes rely on informants with knowledge of local conditions, maps drawn up in advance were of considerably greater utility. Such maps were particularly important during campaigns against distant targets, such as the wars with the Chams to the south. During those wars the Vietnamese frequently found themselves fighting on terrain and under conditions with which they were not familiar, making maps all the more necessary. When the Chinese invaded Việt Nam in the late eighteenth century, they reportedly had no good maps of the Vietnamese terrain, were forced to rely on border merchants to guide them, and their subsequent defeat may partly be ascribed to their lack of good cartographic information.

152 Poivre, 375.
153 See Barrow, 284. This text contains an accompanying engraving depicting such an outfit.
154 Toàn Thư, vol. 1, 156.
155 Poivre, 375.
Unfortunately, Vietnamese cartography has still been little studied, though two good examinations of the topic do exist. The first is John K. Whitmore’s substantial article “Cartography in Vietnam,” which is part of the University of Chicago’s comprehensive History of Cartography series. Whitmore’s article provides a very useful and thoughtful survey of the Vietnamese tradition of mapping, and is well illustrated with representative maps. The second is Tâm Quach-Langet’s “La perception des frontières dans l’Ancien Viêtnam à travers quelques cartes vietnamiennes et occidentales,” which considers Vietnamese as well as early European maps, particularly as they depict Vietnamese boundary lines. Finally, although not an analytical study, there exists the indispensable reproduction of what has become known as the Hồng Đức Bản Đồ—Atlas of the Hồng Đức Period. A published version has been edited by Trương Bưu Lâm, and includes photographic negative reproductions of the major collection of traditional Vietnamese maps along with annotation and translations into modern Vietnamese. From these three sources, a brief outline of the Vietnamese cartographic tradition as it pertains to military usage can be made.

Although the earliest extant Vietnamese maps appear to date only to the sixteenth century, we know from other sources that maps were produced as early as the late eleventh century, when Lý Thương Kiệt produced a map of the boundary with Champa as part of his ongoing campaigns against the southern state. A century later saw the compilation of a more extensive atlas of coastal and frontier regions, the Nam Bắc Phiên-dời Địa Đồ—Atlas of the Boundaries to the North and South. The surviving maps from this early period are frequently tied to military campaigns. Lê Thánh Tông used maps of Champa during his campaigns in the 1470s, and when his maps proved inadequate for the purposes of the campaign, he relied on local advice for producing more accurate ones. These and others were itinerary or route maps, specifically to be used in directing the movement of troops over particular terrain. They indicated the locations of bodies of water and mountains, as well as known bridges, ferries, and structures of various types. Somewhat later, the Trịnh developed maps of the northern Cao-bằng region in the late 1660s, as part of their campaign to oust the Mạc from their border redoubt.

157 I distinguish cartography here from geography, the latter of which has been much more extensively studied by both Vietnamese and European-language scholars.
160 Whitmore “Cartography,” 480.
161 Ibid., 490.
162 Ibid., 487.
To the south, the Nguyễn rulers in the sixteenth through eighteenth centuries, and even the short-lived Tây Sơn dynasty all had maps of various types that clearly served military purposes. The Nguyễn compiled their Bình Nam Đồ (Maps of the Pacification of the South) at some point in the mid-seventeenth century, possibly in 1654. These maps depict fortifications, troop strengths and traversable rivers. The Tây Sơn map, identified by Whitmore, dates to 1798 and bears the name Đại Mann Quốc Đồ—Map of the Country of the Great Barbarians. This map depicts not only Vietnamese territory, but other parts of the interior mainland as well, included indications of the number of days travel required to move from point to point. It is, as Whitmore notes, the only pre-nineteenth-century map of which we know that includes coverage of countries outside Viêt Nam. Given that the Tây Sơn armies had campaigned in the Lao territories in the early 1790s it is not surprising that they would have developed a map to assist them in these campaigns, no doubt supplemented by information gathered during their travels in the interior. This map like those used by earlier rulers since the eleventh century, was a very important element of Vietnamese technology as it related to success in warfare.

Conclusion

This survey hopefully makes clear, that the Vietnamese made extensive use of a combination of rudimentary and more sophisticated military technology in the period prior to 1802. Most notably, they took advantage of terrain and water to give their armies advantages over external enemies. Ramparts and citadels as defensive structures were an early and ongoing aspect of the Vietnamese approach to military strategy and technology, and were central to Vietnamese military planning. The use of fire, both in its elemental form and in artillery, was also of great significance in a region where the use of wood as a construction material made incendiary devices particularly effective. Naval warfare was among the most important elements of Vietnamese military strategy during this period, as reflected in the many notable naval encounters described in the historical record. In some instances, even popular uprisings, like that of the Tây Sơn, relied heavily on naval forces throughout their campaigns, as monsoon patterns dictated the rhythms of these military confrontations. Furthermore, elephants, those peculiarly important beasts of traditional warfare in mainland Southeast Asia, were another important component of the Vietnamese approach to warfare, both in domestic conflicts and against the Chinese, where they provided an important psychological advantage to the Vietnamese. Finally, Vietnamese armies benefited from a

163 Ibid., 493
164 Ibid., 496.
range of less dramatic, but equally important, logistical technologies from pontoon bridges and signaling towers to battle shields and campaign maps.

This article constitutes merely an introduction to some elements of traditional Vietnamese military technology. While much ink has been spilled about the wars in Việt Nam during the twentieth century, little attention has yet been given, particularly by American and European scholars, to military events and technology of earlier periods. Substantial work remains to be done, and between the Vietnamese historical record, the increasingly important archeological materials, and the accounts of foreign visitors, both European and Asian, there is a wealth of source material on which to base further studies. Hopefully this article will help stimulate efforts in this direction, and perhaps not merely studies of Vietnamese military technology, but indeed of Vietnamese technology in other fields as well, from architecture and agriculture to music and pottery.

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George Dutton: Flaming Tiger, Burning Dragon


