Kaveh Farrokh
Langara College
e-mail: manuvera@aol.com
https://orcid.org/0000-0001-5732-2447

An Examination of Sassanian Siege Warfare (3rd to 7th centuries CE)

Summary: This article examines Sassanian siege warfare and technology in the domains of ballistae, 'scorpions', catapults, and battering rams. Sassanian siege warfare necessitated the use of protection/shielding for personnel (combat troops, engineers, laborers), mounds, mining, scaling of walls, as well as the digging of ditches and trenches. Archery barrages played a seminal role in support of siege operations. The *arteshtārān* (lit. warriors; mainly *paighan* infantry, archers, and *savārān* cavalry) and *pil-savār* (elephant warriors/riders) would undertake combat operations with manual labour provided by peasant recruits. Battle elephants could also be used in siege operations (for example at Nisibis, 350 CE). The environmental element of water was utilised (for example during the sieges of Nisibis, 337 or 338 CE and 350 CE). Incendiary factors could also be weaponised in siege operations. In summary, Sassanian siege warfare capabilities appear to have achieved proficiency levels equivalent to contemporary Roman armies.

Keywords: *spāh*, siege warfare, Sasanian empire, Rome empire, Roman siege warfare

The Parthians never developed siegecraft for the capture of enemy cities and fortresses,[1] in contrast to the Sassanians who were highly proficient in siege warfare.[2] It is generally agreed that Sassanian siege technology was largely borrowed from the Romans,[3] an academic perspective shared with mainstream Iranian military

1 Tacitus 1876, XV, 4; Justin 1853, XXXXI, 2.7.

2 Maurice 1984, XI.1; see also analyses by: Lukonin V.G. 1993 (1372), 94 and Pazoki N. 1995 (1374), 42–55.

3 Diakonov I.M. 1967 (1346), 424.

https://doi.org/10.18778/3071-7779.2024.2.01 — **received:** 03.04.2024 — **verified:** 21.10.2024 — **accepted:** 19.11.2024

7–27

funding information: not applicable — **conflicts of interests:** none — **declaration regarding the use of GAI tools:** not used
ethical considerations: the authors assure of no violations of publication ethics and take full responsibility for the content of the publication
the percentage share of the author in the preparation of the work is: [KF 100%]

historians.[4] Nevertheless, the Romans were apparently caught by surprise when Shapur I successfully besieged Dura-Europos in c. 256 CE. Evidence for the Sassanian siegecraft at Dura-Europos is provided by the discovery of wooden and iron-head projectiles that would have been fired by powerful ballistae, as well as mining and counter-mining operations.[5] It is not unlikely that Shapur's forces would have also used other heavy equipment such as siege towers. The Sassanians not only utilised captured Roman equipment but also succeeded in indigenously manufacturing their own siege machinery. Information on Sassanian-built siege machinery is available in the *Ayin-Nameh*[6] with portions of this translated from Middle Persian to Arabic by Ibn Qutayba Dinawari (828–885 CE) after the fall of the Sassanians as well as Ammianus Marcellinus[7] and Procopius[8] from the Classical era written at the time of the Sassanians. Sassanian siege technology had progressed so significantly by the late 3rd and 4th centuries CE, that according to Oates and Oates, the Romans had been forced to construct: '[…] more elaborate systems of fortification […] [Roman – K.F.] fortress cities began to play a more dominant role in frontier strategy.'[9]

The sophistication of Sassanian siege warfare against the Romans by the 4th century CE was to be seen in their sieges against Roman-held cities such as Nisibis (350 CE),[10] Amida (359 CE)[11] and Singara (360 CE).[12] Sassanian siege technology may be categorised into the following categories: (1) ballistae, (2) 'scorpions,' (3) catapults, (4) mobile towers, and (5) battering rams. The Sassanians also utilised a sophisticated system of mounds, mining, and scaling of walls, as well as the construction of trenches and ditches for capturing cities and fortresses, with field troops provided with protection shielding during siege operations. The *arteshtārān* (lit. warriors; mainly composed of *paighan* infantry, archers, and *savārān* cavalry) and *pil-savār* (also: *pil-bān*; elephant warrior/riders) corps were tactically integrated into the *spāh*'s siege operations, with their operations coordinated in tandem with the functions of siege artillery and engineering works (e.g. tunnelling, mounds, etc.). The Sassanians had also developed methods of utilising waterways and incendiary weapons for prosecuting their sieges. Non-combat methods such as espionage, subterfuge, and the dispatch of envoys or messengers were also utilised in the context of siege warfare. This article examines the various

4 See for example: Jalali I. 2004 (1383), 83.

5 Farrokh K. 2017, 256–257.

6 As cited by Inostrancev C.A. 1926, 16.

7 Ammianus Marcellinus 1986, XIX, XX, XXIII, XXIV.

8 Procopius of Caesarea 1914, I.17, II.17, 26, 27.

9 Oates D., Oates J. 1959, 208.

10 Farrokh K. 2017, 259–260.

11 Farrokh K. et al. 2018, 103–114.

12 Farrokh K. 2017, 261–262.

domains of Sassanian siege warfare with respect to the array of Sassanian siege machinery, engineering works, the role of combat units, protection systems, and the use of water and incendiary systems, as well as non-combat strategies.

Ballistae

A key siege engine utilised by the *spāh* was the *kashkančir* (Middle Persian: ballistic weapons) which could vary in size and power. The *kashkančir* would be used to launch ballistae which would be of the 'arrow' or 'missile' type with shafts of wood construction.[13] *Kashkančir*-launched ballistae were directed against enemy walls, gates, and towers, as well as besieged enemy troops.[14] There was also another ballistic weapon known as the *čarx* which was essentially a very large bow (or crossbow?) used for launching very large arrows (or missiles) the size of big spears into enemy cities and fortresses, and which could also be used on the battlefield against enemy troops.[15] The *čarx* and its effects appear to be reported by Ammianus Marcellinus in his account of Shapur II's siege of Amida in 359 CE:

> They [Shapur II's besieging army – K.F.] shot out heavy wooden javelins with great rapidity, sometimes transfixing two of our men at one blow, so that many of them fell to the ground severely wounded, and some jumped down in haste from fear of the creaking engines, and being terribly lacerated by the fall, died.[16]

Although Ammianus describes the power and effectiveness of the above weapon, he unfortunately provides no details as to the actual sizes and weights of the ballistae and how these were launched. In general, classical sources fail to provide any statistical data on the engineering, capabilities, and operations of Sassanian siege weaponry. As per the *Lexicon of Arms and Armor from Iran*, the string of the weapon was drawn by means of a wheel operated by two personnel.[17] Iranian military historiography also makes note of a multi-arrow weapon, which consisted of very large bows of metal construction installed upon a carriage-type vehicle.[18] In front of the bows was a metal sheet with holes for arrows. This weapon was designed for all of the arrows to be fired simultaneously. In a sense, this design is similar to the future design of the Renaissance-era 12-barrelled gun of Leonardo Da Vinci (1452–1519). What remains unclear is if this multi-arrow weapon was operated against the Romans and,

13 Jalali I. 2004 (1383), 51, 85.

14 Matufi A. 1999 (1378), 221.

15 Khorasani M.M. 2010, 137.

16 Ammianus Marcellinus 1986, XIX, V, 6.

17 Khorasani M.M. 2010, 137.

18 Matufi A. 1999 (1378), 444.

if so, when such a system was developed. Such systems were tactically well suited against the large numbers of invaders from Central Asia who would appear in force from the 4th century CE, as it could be used to fire into the ranks of large numbers of Central Asian horse archers and lancers. However, this multi-arrow weapon could also support the barrages of other siege weapons during sieges against the Romans. Notably, Iranian engineers continued to develop ballistae after the fall of the Sassanian empire to the Arab Muslims in the 7th century CE.[19]

Catapults

The *Shahname* epic, composed approximately three centuries (late 10th to early 11th century) after the fall of the Sassanian empire to the Arab Muslim invasions, describes (in new Persian terminology) two types of catapults: the *aradeh* and the *manjeniq*.[20] The *Lexicon of Arms and Armor from Iran* describes the *aradeh* as: 'a small catapult that throws stones and is smaller than a *manjeniq*.'[21]

The *Shahname* describes the *aradeh* as being placed over walls,[22] raising the possibility that Sassanian engineers constructed some type of wall, barrier, or platform to station these weapons upon, to then fire their ordinance against the enemy during a siege. The New Persian and Arabic term *aghrab* [23] (lit. scorpion) appears to be about Iranian *aradeh*-type weapons. These are described as built-in various power capabilities and sizes, for launching stones (most likely shaped like cannonballs) against enemy gates, walls, towers, and defending personnel during sieges.[24] Despite their names having the same meaning, the *aghrab* was a different weapon than the Roman *scorpio. The scorpio* was a ballistic system for launching missiles, more suited for targeted sniping than for the heavy destruction of enemy fortifications during sieges. Nevertheless, the militarily ingenious Romans were certainly capable of making applications of their *scorpio* for sieges as well. Further complexity is provided by Ammianus Marcellinus himself, who describes the Roman *scorpio* of the 4th century CE as being virtually the same weapon system as its Sassanian counterpart: '[operating – K.F.] with their iron slings, hurling huge round stones.'[25]

In this regard, the Sassanian weapon appears to have been borrowed from Roman technology; however, what Marcellinus describes was most likely a different weapon

19 Bradbury J. 1998, 255–256; Matufi A. 1999 (1378), 221.
20 Matufi A. 1999 (1378), 215.
21 Khorasani M.M. 2010, 101.
22 Matufi A. 1999 (1378), 215.
23 Jalali I. 2004 (1383), 51.
24 Jalali I. 2004 (1383), 51.
25 Ammianus Marcellinus 1986, XIX, VII, 7.

than the Roman *scorpio* missile launcher. The *manjeniq* is defined by the *Lexicon of Arms and Armor from Iran* as a: '[...] catapult; instead of shooting an arrow, these machines threw giant stones by flinging them using a wheel.'[26]

The ordinance propulsion systems of the *manjeniq* and *aradeh* were different. As noted above, the *manjeniq* used a wheel (like the *čarx*) and the *aradeh* used slings (somewhat like the *aghrab)*. It would appear that the *manjeniq* and *aradeh* were used in combination[27] for launching rocks of various sizes for different objectives during a siege. One possibility is that the *manjeniq* was used for launching heavier rocks against enemy gates, towers, walls, and other structures, and the *aradeh* was used for propelling smaller rocks against enemy troops.[28]

Battering Rams

The Sassanians made remarkable use of battering rams in their sieges of Roman-held cities and fortresses.[29] Sassanian battering rams were built in various sizes, possibly calibrated concerning the hardiness of different structures (e.g., walls, gates, towers, etc.) encountered during sieges.[30] The effectiveness of Sassanian battering rams can be seen, for example, during the siege of Bezabde in 360 CE. Having unsuccessfully attempted to shatter Bezabde's walls with their standard rams, the Sassanians are described by Ammianus Marcellinus as having deployed their on-site 'superweapon':

> One battering-ram was higher than the rest [...] it led the way in the attacks on the wall with mighty blows, and with its terrible point, it dug into the joints of the stones till it overthrew the tower. The tower fell with a mighty crash [...] then, a safer entrance having been thus found, the multitude of the enemy poured in with their arms.[31]

Ammianus Marcellinus' description of the battering ram's 'terrible point' would indicate that the Sassanians had achieved a high level of metallurgical engineering. Interestingly Ammianus Marcellinus also reports of an older Sassanian-built battering ram left by the Sassanians at Antioch which is described as having had a '[...] projecting iron head, which in shape was like that of a ram.'[32] While this does not imply that all Sassanian battering rams were of this particular design, the ram's head would have

26 Khorasani M.M. 2010, 225.
27 As cited by Matufi A. 1999 (1378), 215.
28 Farrokh K. 2017, 247.
29 Yildirim E. 2012, 462.
30 Farrokh K. et al. 2018, 54.
31 Ammianus Marcellinus 1986, XX, VII, 13.
32 Ammianus Marcellinus 1986, XX, XI, 15.

had to be designed in a manner consistent with a projectile or missile-head type design in order to achieve more effective penetration against enemy structures.[33] Notably, the *Ayin-Nameh* manual instructs the users of the Sassanian battering ram to target their blows at the weakest identified areas of an enemy wall, gate, etc.[34]

In the later Sassanian era, Procopius describes Sassanian 'battering towers'[35] not unlike those of the ancient Assyrians. Sassanian archers aboard the vehicle could direct their fire against besiegers seeking to disable the ram by means such as pouring hot substances, firing flammable missiles at the ram and/or vehicle, etc. Roman defenders, however, would prove especially resilient, as evidenced in reports of Roman defenders having broken off the heads of rams by dropping timbers during the Sassanian siege of Amida in 502 CE.[36]

Mobile Towers

The tradition of mobile towers for use in siege warfare dates to very ancient times in the Near East, long before the Sassanians. Mobile towers (with battering rams as well as ports for archers) were used by the Assyrians as early as the late 9th century BCE (Fig. 1, 2).[37] A testimony to the high level of Assyrian military engineering, the top level of Assyrian mobile tower-battering rams also had a gate that could be lowered onto the enemy's parapet.[38] This would allow combat troops in the tower to cross it and engage defending enemy fighters ensconced in the fortress walls.

Like the ancient Assyrians before them, Sassanian engineers constructed highly effective mobile towers.[39] Specifically constructed to match the height of the enemy's defensive walls, these platforms would greatly enhance the efficacy of archers firing from ports within the mobile tower against the enemy sheltering in their compounds.[40] While Sassanian mobile towers were reportedly constructed of metal,[41] it is unknown whether the metal acted as armour protection for a wooden base or chassis.

33 Farrokh K. 2017, 250.

34 As cited by Inostracev C.A. 1926, 16.

35 Procopius of Caesarea 1914, I, 7.

36 Procopius of Caesarea 1914, I, 7.

37 See, for example, the late Assyrian relief (dated to c. 865–860 BCE) depicting a mobile tower with archers onboard and a battering ram assaulting an enemy city during a siege (Source: British Museum, Northwest Palace of Nimrud, Room B, Panel 18. Museum no. 124536). Another example is seen in the Lachish reliefs depicting King Sennacherib's (r. 705–681 BCE) siege of the Judean city of Lachish (c. 701 BCE) (British Museum, Lachish Reliefs, Object 21 (Nineveh. South-West Palace. Room XXXVI, panel 7. Museum no. 124906).

38 Ransford S. 1975, 16, 19.

39 Jalali I. 2004 (1383), 84.

40 Imam-Shushtari S.M.A. 1971 (1350), 87.

41 Ammianus Marcellinus 1986, XIX, VII, 2; XX, V, 1.

Fig. 1.
Tower with archers onboard and a battering ram assaulting an enemy city during a siege. British Museum, Northwest Palace of Nimrud, Room B, Panel 18. Museum no. 124536 (Source: https://pl.wikipedia.org/wiki/Armia_asyryjska#/media/Plik:Assyrian_Attack_on_a_Town.jpg)

Fig. 2.
Siege of the Judean city of Lachish, c. 701 BCE. British Museum. Lachish Reliefs. Object 21. Nineveh, South-West Palace, Room XXXVI, panel 7. Museum no. 124906 (Source: https://fr.wikipedia.org/wiki/Siège_de_Lakish#/media/Fichier:Capture_of_Lachish_-_ramps_and_battle_engines.jpg)

The use of metal for the construction of the entire machine (frame and chassis) was most likely not the case given the excess weight this would impose for transportation as well as propulsion power required during sieges. Metal armour applied over a wooden chassis would certainly have enhanced the protection of personnel within the vehicle being subjected to enemy fire. Sassanian battle towers could also be placed next to mounds in order to enhance the latter's protection against the countermeasures of the besieged defenders.[42] Much like the Romans, the Sassanians also displayed military ingenuity with their siege engines. For example, they installed ballistae on their towers to direct the fire of their missiles from an elevated position towards enemy troops operating from a lower position.[43] Nevertheless, despite their formidable capabilities, Sassanian mobile towers were vulnerable to Roman counter-siege technology. This was demonstrated at Amida (359 CE) when the city's Roman defenders destroyed Sassanian mobile towers with heavy stones propelled by *scorpiones*.[44]

Reconnaissance and Siege Warfare

As Sassanian siege technology and tactics continued to evolve during the Sassanian era, reconnaissance strategies were also utilised and adapted to enhance military performance. More specifically, before engaging in the siege of a city or fortress, the Sassanians would engage in reconnaissance to assess the strengths and weaknesses of the enemy's military architecture. This helped to calibrate and maximise the effectiveness of siege machinery such as battering rams and ballistic platforms against enemy gates, walls, etc.[45] Reconnaissance could also reveal information on the enemy's blind spots such as weakly defended entranceways in their fortifications which could be infiltrated without detection by Sassanian warriors and siege engineers.[46]

The *Arteshtārān* in Siege Warfare

The Sassanian military doctrine with the *arteshtārān* during sieges was based on a three-phase strategy:[47] (1) encircling the enemy's city or fortress, (2) operationalising siege engines (catapults, battering rams, ballistae, etc.) against the enemy city or fortress, and (3) launching assaults by the *paighan* and *savārān*. The first and third phases, however, could also involve the elephant corps as discussed further below. The first phase (encirclement) bore two objectives: (1) the prevention of any means

42 Jalali I. 2004 (1383), 83.

43 Ammianus Marcellinus 1986, XIX, VII, 5.

44 Ammianus Marcellinus 1986, XIX, VII, 7.

45 Inostrancev C.A. 1926, 16.

46 Pazoki N. 1995 (1374), 50.

47 Lukonin V.G. 1993 (1372), 94.

for the enemy to escape and (2) the prevention of supplies and/or relief forces from entering the compounds of the encircled enemy. With the completion of encirclement, the second phase would be implemented with the activation of siege engines, notably catapults, scorpions, ballistae, and battering rams. Simultaneously the local commanders could engage in the possible construction of engineering works (e.g., mounds, tunnelling, etc.) as well as the use of incendiary weapons (discussed further below). The objective would be to wreak destruction against the outer structures of the enemy's fortress or city, notably gates, walls, towers, etc., as well as to cause havoc in the interior compounds such as storage facilities, living quarters, etc. The third phase would be characterised by the *paighan* advancing with their large shields towards the enemy's gates and walls. This operation, especially in its initial phases, was also meant to provide additional intelligence for the field reconnaissance on the state of the enemy's fortifications conducted prior to the onset of operations. The objective was to again gather as much information as possible on potential weaknesses in the enemy's military architecture, notably any areas that could be exploited for collapse and/or ingress into the interior compounds. Once the *paighan* reached the enemy's walls, ladders would be leaned on these for scaling by support personnel (or other seconded *paighan* troops). While the Sassanians made prodigious use of ladders to scale walls during sieges,[48] it is less clear as to what the possible dimensions and types of ladders the Sassanians used with respect to the various types of fortification walls they would have encountered during sieges.[49] Once the ladders were secured upon the enemy's walls, the *arteshtārān* would then attempt to scale them to access the enemy's parapets to engage the besieged defenders. This was an exceptionally challenging and hazardous task given the exemplary close quarter combat skills of Roman troops as well as their array of techniques for repelling attackers with implements such as naphtha as well as archery. If the parapets could be infiltrated and secured, this would allow the *paighan* to establish assaults further into the interior of the enemy's compounds.

If the walls of the fortress or city could be shattered by the siege engines, the *arteshtārān* would certainly attack through this exposed sector to then fan out into the interior of the enemy compounds. Protection for the advance of the *paighan* (and dismounted *savārān*) corps toward the enemy's walls was entrusted to the foot archers responsible for delivering massive barrages to neutralise the besieged enemy's archers. The assaults of the *savārān* were also dependent on the support of the barrages of the archers.[50] The efficacy of the archers was enhanced when firing from mobile towers as well as mounds, being able to direct more accurate fire at closer

48 Ammianus Marcellinus 1986, XIX, 5.6.

49 Farrokh K. 2017, 252.

50 Lukonin V.G. 1993 (1372), 94.

ranges from more elevated platforms. Archers could also be utilised in a 'commando fashion' as seen during the siege of Amida (359 CE) when a select team of seventy archers from the royal guard infiltrated (with the assistance of a Roman deserter) the city's southern walls.[51] These archers then fired until they ran out of ordnance, resulting in them being cut down by the Roman defenders.

Fig. 3. Cavalry forces engaged in the siege of the fortress. *Anikova Plate*. Russia. (The State Hermitage Museum, St. Petersburg. S-46. Photo: Wikipedia.org)

It is possible that the Sassanians coordinated the operations of their siege machinery with the assaults of their *arteshtārān* to maximise their chances of breaking through into the enemy's fortresses and cities. In this respect, cavalry played a major role in the *spāh*'s siege operations. An indication of this is provided by a Sassanian-style engraved *Soghdian* metalwork plate (dated from the 9th to the 10th century CE) depicting

51 Ammianus Marcellinus 1986, XIX, 5.5–6.

cavalry forces engaged in the siege of an enemy fortress (Fig. 3).[52] Ammianus Marcellinus reports of the deployment of the *arteshtārān* and their allies at Amida (359 CE):

> […] gleaming bands of horsemen filled all places which the eye could reach, and the ranks, advancing at a quiet pace, took the places assigned them by lot. The Persians beset the whole circuit of the walls. The part which faced the east fell to the lot of the Chionitae, the place where the youth so fatal to us was slain, whose shade was destined to be appeased by the destruction of the city. The Gelani [Gilani – K.F.] were assigned to the southern side, the Albani guarded the quarter to the north, and to the western gate were opposed the Segestani [Sakaistani – K.F.], the bravest warriors of all.[53]

King Shapur II himself led cavalry assaults against the enemy's gates.[54] He was most likely either positioned with his elite royal cavalry guard, possibly the *pushtighbān* (New Persian: *pushtibān)* to the north (in proximity to the Caucasian Albanian cavalry).[55] It is also possible that the king was positioned with the elite *savārān* corps to the south of the city, in proximity to the Gilan *paighan* corps.[56]

The war elephant corps, known as the *pil-savār* or *pil-bān* corps, had the advantage of having an elevated platform for archery in addition to the elephants' natural tough hides. During the siege of Nisibis in 350 CE, Sassanian war elephants are described as being armoured,[57] supporting attacks of the *savārān* and Sassanian combat infantry.[58] During that siege, the vulnerabilities of war elephants soon became apparent – the counterstrikes' of Roman missiles caused a number of the wounded beasts to sink into the muddy terrain and caused others to panic, stampeding the Sassanian ranks, which resulted in very heavy casualties.[59] The disaster at Nisibis (350 CE) led the *spāh* to implement the precautionary measure of having a dagger fastened to each elephant driver's right hand: the driver (or mahout) would slay the beast by severing its vertebrae in case it went out of control during siege operations.[60] Shapur II's siege of Amida in 359 CE describes lines of Sassanian war elephants 'loaded with armed men' facing the city's western gates[61] making them situated in proximity to the *Sakaistan* contingent.

52 Hermitage Museum, St. Petersburg, S–46.
53 Ammianus Marcellinus 1986, XIX, 2.2–3.
54 Ammianus Marcellinus 1986, XIX, 1.5–6.
55 Farrokh K. et al. 2018, fig. 10.
56 Farrokh K. et al. 2018, 106.
57 CH 1832, 537, line 13.
58 Julian 1932a, 2.64b–2.65c.
59 Charles M.B. 2007, 315–316.
60 Ammianus Marcellinus 1986, XXV, 1.15.
61 Ammianus Marcellinus 1986, XIX, 2.3.

Shielding of Personnel during Siege Operations

The Sassanians made use of wicker screens which may have been based on the standard *paighan* field infantry wicker shield to protect their troops during siege operations.[62] Reportedly up to five rows of such shields could be placed around a city or fortress.[63] A key question is whether the Sassanians adopted the Roman testudo formation, as the Sassanians were quick to adopt their enemies' effective military methods and technologies. Had the testudo formation been adopted, a besieging Sassanian *paighan* infantry unit would have (in Roman fashion) locked their shields for mutual protection (front, sides, above their heads, and rear) as they deployed towards the enemy's walls and gates. Sassanian infantry engaged in sieges also used what has been described by Raspopova as: 'a siege shield made of slats.'[64]

The above type of shield was used for advancing closer to the enemy's gates or walls. The purpose of course could be for various objectives such as scaling the enemy's walls, or escorting military engineers tasked with digging mines or implementing other types of measures against the enemy's fortifications. Sandbags and sand-filled buckets were also useful for erecting shielding and even protective walls for besieging troops, engineers, and other support personnel.[65] Sandbag walls were also highly useful for masking (at least in part) the activities of engineers engaged in digging tunnels or mines into the enemy's inner compounds. Sandbags were highly effective in filling segments of water-filled moats protecting the enemy's fort or city.[66] This activity was dangerous as besieging troops could easily direct their archery fire against Sassanian personnel attempting to fill the moats with sandbags.

Another interesting category of shielding equipment involved mobile vehicles. Combat troops (*paighan*, *savārān*, etc.) moving toward the enemy's fortification gates and/or walls, as well as personnel operating mobile siege machinery such as battering rams, were protected by 'mobile cabs.'[67] It is not clear how these vehicles would be propelled. Most likely there were personnel dedicated to pushing the vehicle from the inside compartment. If pack animals were used, it is unclear how these would have been used to propel the vehicle as harnessing them in standard carriage-horse fashion would have exposed them to the enemy's archers.

While lack of information as to the actual dimensions and construction of these mobile vehicles poses challenges in their accurate reconstruction, it would be safe to assume that at the very least they were meant to protect against enemy archery.

62 Ammianus Marcellinus 1986, XX, VII, 6.

63 Ammianus Marcellinus 1986, XX, VII, 2.2.

64 Raspopova V.I. 2006, 84.

65 Imam-Shushtari S.M.A. 1971 (1350), 87.

66 Imam-Shushtari S.M.A. 1971 (1350), 87.

67 Inostrancev C.A. 1926, 50.

Questions remain, however, as to how robust they would have been, especially against counter-siege methods such as the pouring down of heated liquids by enemy defenders as well as the latter's use of heavy stones and flammable devices. Islamic-era sources refer to two different Sassanian mobile vehicles, *dabbabat* and *darraga.*[68] The *dabbabat* is explained as a more powerful vehicle than the *darraga*, and made of wood construction with hide used for its covering. The *dabbabat* was the standard mobile vehicle for protecting besieging combat troops as well as mobile siege equipment such as battering rams. Mobile vehicles in general could of course be used to bring combat engineers towards the enemy's walls or gates.

Mounds

In addition to its use of siege engines, the *spāh* (like the Romans) utilised the building of mounds (or artificial hills) near the enemy's walls, engineering of mines, and scaling or climbing of walls. Mounds provided Sassanian siege armies major advantages in archery and the landing of troops into the enemy's fortress or city.[69] With respect to archery, mounds built at a higher elevation than the walls/parapets of the defenders would allow archers (like their counterparts in mobile towers) to fire their missiles with more accuracy and at closer distances against besieged personnel. The second advantage of mounds was their utility in their use as platforms for fighters to invade the enemy's walls or parapet positions. Mounds, however, were vulnerable to Roman countermeasures. An example of this occurred during Edessa's siege in 543 CE by Khosrow I when the city's defenders destroyed a large mound by fire that had been built by besieging Sassanian forces.[70]

Mining and Burrowing

The *spāh* was also highly effective at burrowing and tunnelling in its sieges.[71] This often involved digging underneath the enemy's walls to create a tunnel for Sassanian troops to break into the enemy's fortress or city.[72] In practice, the Sassanians would attempt to dig several tunnels to provide as many entrance routes into the enemy's fortress as possible. This would allow Sassanian warriors to emerge unexpectedly from several directions within the fortress to then overwhelm the enemy. Experts themselves at siege warfare, the Romans were often able to engage in countermeasures against

68 Jahiz (-al) O. 1950 (1329); Inostrancev C.A. 1926, 50–52; Tafazzoli A. 1993, 194–195; Matufi A. 1999 (1378), 221; and Khorasani M.M. 2010, 101, 225.

69 Moghtader Gh. 1968 (1347), 35.

70 Greatrex G., Lieu S.N.C. 2002, 113.

71 Inostracev C.A. 1926, 16.

72 Jalali I. 2004 (1383), 83.

the Sassanians, such as rushing troops to block opened tunnels or even collapsing the tunnels. A key example of such a scenario occurred at Khosrow I's (r. 531–579 CE) siege of Dara in 540 CE when the Romans were able to block a Sassanian mining operation that had penetrated into the eastern side of the city.[73] Dara fell to Khosrow I's second siege in 572 CE as the Romano-Byzantines failed to repel Sassanian siege operations. More specifically, the Sassanians were able to burrow through a nearby hill in a successful endeavour to cut off the city's water supply.[74] It is ironic that the Sassanians also used Roman siege engines seized earlier at Nisibis to capture Dara in 572 CE.[75] The commander of the operation to capture Dara in 572 CE was Bahrām Čōbīn (Chobin), whose victory resulted in his elevation to the post of *ādurbādagān-spāhbed*[76] facing the empire's north and northwest (*Ādurbādagān*, Media Atropatene, corresponding with the historical Azerbaijan in Iran's northwest).[77] The Romano-Byzantine Emperor Justin II (r. 565–578 CE) reputedly went insane due to the shock of the news of Dara's fall to the Sassanians.[78]

Ditches and Trenches

Sassanian siege works often made very efficient use of ditches and trenches. One highly effective tactic was to dig a trench around the enemy fortress and then fill it with wood sprayed with incendiary materials.[79] The wood in the trench would then be set on fire, surrounding the enemy fortress in flames. There were four overall advantages afforded by flaming trenches:[80] (1) as fires rage, siege artillery (ballistae and catapults) would unleash their barrages of heavy missiles and large stones, (2) flames could provide excellent cover for Sassanian engineers working to dig tunnels and mines under the enemy's fortifications, providing an ingress into the enemy's fortress, (3) the fires around the fortress would make it difficult for the besieged enemy to launch counterattacks, and (4) the flames could assist in undermining the morale of the besieged enemy. Once a section of the fortifications had been breached, Sassanian engineers would put out that section of the fire in front of that breach. Then the heavy infantry and *savārān* would be massed to push through the breach and engage the enemy inside the fortress.

73 Greatrex G., Lieu S.N.C. 2002, 106. Procopius notes that the Sassanians dug from one of their trenches at a much deeper level, which is why the Romano-Byzantine defenders failed to notice this at first (Procopius of Caesarea 1914, II, 13).

74 Whitby M. 2013, 446.

75 Howard-Johnston J. 2010, 54.

76 Gyselen has observed with respect to this post that the term abāxtar (north) was in general not used due to its perceived adverse implications, as the north was believed to be the domain of demonic entities (Gyselen R. 2005).

77 Shahbazi A.Sh. 1988, 514–522.

78 Whittow M. 1996, 86.

79 Saket S., Yahaqhi M.J. 2010 (1389), 26.

80 Farrokh K. et al. 2018, 58.

Sassanian ditches could be especially dangerous, as these were often filled with lethal iron traps.[81] This of course was highly effective at preventing besieged enemy troops from trying to launch surprise attacks against the Sassanian forces outside of the city or fortress. By the same token, Sassanian negligence in laying traps would be exploited by the Romans. A stark example of this occurred during Shapur II's siege of Amida in 359 CE, when a Gallic cavalry corps in Roman service launched a deadly raid outside of the city against the Sassanian camps.[82] Ditches or trenches surrounding a city or fortress could also be filled with water depending on tactics deemed necessary by local Sassanian commanders. Water was in fact used as a weapon of war during sieges as discussed in the following section.

Weaponisation of Water

The use of water as a weapon of war may be traced as far back as Achaemenid times.[83] The first recorded instance of the Sassanians' use of water as a military weapon is a reference to Shapur II's (r. 309–379 CE) first siege of the Roman-held city of Nisibis (Nusaybin, in modern-day Mardin province, Turkey) in 337 or 338 CE. In this engagement, Sassanian engineers harnessed the power of the Mygdonius River (modern-day Jaghjagh River, a tributary of the Khabur River in Syria and Turkey) with the construction of dykes or dams. Having then massed sufficient levels of water, the dykes would be opened in order to have this propelled against the fortification walls of Nisibis.[84] Sassanian military hydro-engineering is described in some detail by Theodoret:

> Shapur stopped up the course of the river which flowed past the city, and when as vast an amount as possible of the accumulating water had piled up behind the dam he [Shapur II] released it all at once against the walls, using it like a **tremendously powerful battering-ram**. [emphasis – K.F.] The wall could not withstand the force of the water, and indeed, badly shaken by the flood, the whole stretch of that side of the city collapsed.[85]

Sassanian engineers applied two physics principles: they harnessed the potential energy (PE) of the stored water and then released the power of that water (kinetic energy, KE) towards a specified target.[86] This principle of course was known in ancient times for agricultural purposes, such as the use of flowing water for wheel mills to

81 Inostracev C.A. 1926, 50.

82 Ammianus Marcellinus 1986, XIX, VI, 4–5, 7–9, 11.

83 Pazoki N. 1995 (1374), 44.

84 Pazoki N. 1995 (1374), 44–47.

85 Theodoret 1977–1979, I, 11–12.

86 Farrokh K. 2023.

grind wheat into flour. Dodgeon and Lieu have observed that the water at Nisibis must have attained an 'enormous height' in order for it to achieve the necessary pressure (or potential energy) before its discharge (conversion to kinetic energy) as a battering ram.[87] The understanding of the mathematical relationships between potential and kinetic water pressure by also calculating velocity, elevation, ground friction, or resistance against the released water, etc., would indicate that, like their Roman counterparts, the Sassanian engineering corps were well versed in geological and mechanical physics principles. However, as Theodoret's descriptions lack statistical data (e.g., the height of the dam, amount of water stored, etc.), questions may be raised as to whether such operations would have been possible during the 4th century CE. In this regard, military operations weaponising waterways are reported five centuries prior to the Sassanian era in relation to Chinese emperor Qin Shi Huang's (259–210 BCE) campaigns in Northern China.[88] In addition, the Sassanians are reported as having again used the waters of the Mygdonius 12–13 years later in c. 350 CE as a military weapon in another siege of Nisibis. In this operation, the waters of the Mygdonius were channelled into a very large ditch that had already been dug around the city. This resulted in Nisibis becoming surrounded by a large water ditch, which certainly prevented the defenders from sending out raiding parties to attack the besieging Sassanian forces. The actual intent of the Sassanian *spāh* was to again utilise the water of the Mygdonius, albeit in an unexpected fashion, against Nisibis. As described by Julian:'[…] he [Shapur II – K.F.] besieged it by bringing up **ships with engines on board** [emphasis – K.F]. This was not the work of a day, but I believe of almost four months.'[89]

In this case, an environmental element – the waters of the Mygdonius – was again being used as a weapon of war in support of battleships equipped with siege artillery such as ballistae, catapults, and scorpions that would be used to attack the city. It is not clear how the ships had been transported by the Sassanians to the site. One possibility is that these had been brought forward in disassembled kits for ease of transport and were then reassembled and launched on the artificial water-ditch at Nisibis. The siege batteries themselves may also have been brought forward as components or kits and were then mounted upon the ships' decks. The ships themselves were probably not altogether large, as when the siege got underway Nisibis' defenders are reported by Julian as: 'from the wall they hauled up many of the ships.'[90]

From the above descriptions, it may be surmised that these vessels were most likely not altogether large, but given the lack of details as to the dimensions of the

87 Dodgeon M.H., Lieu S.N.C. 1991, 384, footnote 6.

88 Evidence has surfaced of Iranian-Chinese contacts dated to the reign of Emperor Qin Shi Huang (see: Watts J. 2006). This raises the possibility that Iranian engineering may have known of Chinese hydro-engineering technology before the Sassanian era with the spāh then having weaponised this for its military campaigns.

89 Julian 1932b, 11–13.30.

90 Julian1932b, 11–13.30.

ships, it is not possible to arrive at more specific descriptions as to their sizes. Another possible source of information would be data with respect to the depth and width of the channels that had been dug around the city, as this would allow for estimates as to the sizes of the ships and their siege artillery; however, the available classical sources do not provide information in this domain either. What is clear is that the Roman defenders of Nisibis inflicted heavy casualties on the Sassanians' 'siege battleships.' The Romans' use of 'fire darts' and large stones hurled using their own defending catapults was especially effective.

Incendiary Weapons

The *spāh* often deployed incendiary weapons both in sieges and when besieged. An example of the latter is the case of besieged Sassanian troops at Petra (550–551 CE) reportedly having thrown pots of naphtha, pitch, and sulfur against the siege engines of Romano-Byzantine forces.[91] The Sassanian delivery of incendiary weapons during sieges may be broadly classified into two categories: (1) the use of ballistae for the delivery of flammable ordinance (e.g., naphtha) against the enemy city or stronghold's outer structures (gates, walls, towers) and (2) the use of archery for the delivery of incendiary arrows into the interior of the enemy's city or stronghold. The primary purpose of ballistae that delivered incendiary ordinance was for the flammable substances to degrade significantly the outer structures of the enemy's stronghold.[92] Ideally, the intensity of high-temperature fires could even result in the structural collapse of the enemy's walls, towers, gates, etc. In practice, the enemy's structures would be sufficiently degraded for the Sassanians to collapse them with their other siege weapons, such as ballistae, battering rams, etc.

Foot archers (on the ground or in mobile towers) could deliver arrows with flammable materials (e.g., naphtha). These incendiary arrows would be fired from composite bows at half-draw[93] to avoid 'flame out.' The primary role of archers firing incendiary arrows was to deliver these into the interior of the enemy city or fortress towards storage areas (e.g., food, fuel, supplies, etc.) and houses with the intent to set their roofs of straw or wood on fire.[94] A successful incendiary assault would force at least a portion of the defenders to put out the fires breaking out in their compounds, thus undermining and distracting them from their combat against the Sassanians.

91 Elton H. 2018, 326.

92 Jalali I. 2004 (1383), 83.

93 Miller R., McEwan E., Bergman C. 1986, 191.

94 Farrokh K. 2017, 61.

The Sassanian general Bahrām Čōbīn reportedly deployed engines capable of delivering incendiary ordinance during his campaigns against the Turco-Hephthalite invasion of the Sassanian Empire's northeast marches in 588 CE.[95] These appear to have been new weapon systems – ballistae propelling large arrows or 'missiles' (possibly a large-bow or *čarx* system?) fitted with naphtha-filled projectiles.[96] There may have been smaller versions of this weapon, but the paucity of data precludes any definitive conclusions. One possible indication of such a weapon are reports of Bahrām Čōbīn's archers having used *napht-andazan* (lit. naphtha hurlers/throwers) weapons against the war elephants of the Turco-Hephtalities, who then ran amuck into the lines of their own ranks.[97] In practice, these were deployed in concert with regular arrows shot at the Turkish pachyderms.[98]

Concluding Notes

The Sassanians were highly adept at sieges,[99] and the *spah*'s proficiency and success in siege warfare was indicative of three proficiencies:

1. Command and organisation: Sassanian siege warfare entailed a sophisticated system integrating the operations of the *arteshtārān* with siege machinery and engineering works, as well as utilising water and incendiary systems as siege weapons.
2. Engineering systems: the *spāh* had developed a sophisticated system of engineering capable of (a) producing complex siege machinery, (b) field engineering works (i.e., tunnelling, mounds, trenches), and (c) the weaponisation of environmental elements (water) as well as incendiary systems for siege warfare. These three domains would indicate significant proficiencies in mechanical and civil engineering.
3. Logistics: the Sassanians were capable of efficiently transporting and deploying complex siege machinery systems to battle theatres. These may have entailed breaking larger systems into 'kits' or components to then be reassembled for deployment in the war theatre. This would have been consistent with the high levels of Sassanian proficiency in logistics and the transportation of supplies over long distances.[100]

In summary, the Sassanians appear to have matched the Romans in siege warfare capabilities. As noted by Syvänne: '[…] the Sasanians possessed expertise in siege warfare and were in some ways even more effective in that than the Romans.'[101]

95 Safa Z. 1990 (1369), 16.

96 Tavajohi S. 2008 (1387), 9.

97 Mayor A. 2022, 259.

98 Reza E. 1995 (1374), 113.

99 Wilcox P. 1999, 33; Sauer E.W. et al. 2017. 2017, 241.

100 Farrokh K., Karamian Gh. 2016, 332–339.

101 Syvänne I. 2021, 7.

Siege warfare proved to be a major feature of Roman and Sassanian warfare along their frontier marches, with the *spāh* conducting such operations into the late Sassanian era (early 7th century CE) as seen with the sieges and captures of Dara (603 CE)[102] and Jerusalem (614 CE)[103] as well as the unsuccessful siege of Constantinople (626 CE).[104]

References

Iconographic source

British Museum. London

Mobile tower with archers on board during the siege of a town by Ashurnasirpal II's army (c. 865–860 BCE). British Museum. Northwest Palace of Nimrud. Room B. Panel 18. Museum no. 124536

Siege of the Lachish (c. 701 BCE), British Museum. Lachish Reliefs. Object 21 (Nineveh, South-West Palace), Room XXXVI. panel 7. Museum no. 124906

Hermitage Museum. St. Petersburg

Museum no. S-46

Published works

Ammianus Marcellinus 1986. *The later Roman Empire*. W. Hamilton (trans.), London.

Bradbury J. 1998. *The Medieval Siege*. Suffolk.

CH 1832. *Chronicum Paschale*. L. Dindorf, B. Niebuhr (eds), Bonn.

Charles M.B. 2007. *The rise of the Sassanian Elephant Corps: Elephants and the later Roman Empire*. "Iranica Antiqua" 42, 301–346.

Diakonov I.M. 1967 (1346). *Tarikhe Iran Bastan*. Tehran.

Dodgeon M.H., Lieu S.N.C. (eds), 1991. *The Roman Eastern Frontier and the Persian Wars (Ad 226–363). A Documentary History*. London–New York.

Elton H. 2018. *The Roman Empire in Late Antiquity: A Political and Military History*. Cambridge.

Farrokh K. 2017. *The Armies of Ancient Persia: The Sassanians*. Barnsley.

Farrokh K. 2023. *Observation of the Role of Climate and Geography in the War Planning of the Sasanian Spāh (Army)*. "Hunara: Journal of Ancient Iranian Arts and History" 1(1), 61–70, DOI: https://doi.org/10.22034/hunara.2023.170549.

Farrokh K., Karamian Gh. 2016. *The logistics and support system of the Sassanian army at war*. "Faslnameye Payam Baharistan" 26, 332–339.

Farrokh K., Khorasani M.M. 2020. *Die sassanidische Infanterie*. "Pallasch: Zeitschrift für Militärgeschichte. Organ der österreichischen Gesellschaft für Heereskunde" 71, 25–35.

102 Greatrex G., Lieu S.N.C. 2002, 184.

103 Sebeos 1999, 115–116, 69.

104 Roberts J.M., Westad O.A. 2013, 329.

Farrokh K., Maksymiuk K., Sánchez-Gracia J. 2018. *The Siege of Amida (359 CE)*. Siedlce.

Greatrex G., Lieu S.N.C. 2002. *The Roman Eastern Frontier and the Persian Wars Part II (AD 363–630)*. London–New York.

Gyselen R. 2005. *Spāhbed*. In: *Encyclopedia Iranica*. https://www.iranicaonline.org/articles/spahbed. Available on-line: January 8, 2020.

Howard-Johnston J. 2010. *The Sassanian strategic dilemma*. In: H. Börm, J. Wiesehöfer, (eds), *Commutatio et contentio. Studies in the Late Roman, Sasanian, and Early Islamic Near East*. Düsseldorf, 37–70.

Imam-Shushtari S.M.A. 1971(1350). *Tarikhe Shahryari dar Shahanshahiye Iran*. Tehran.

Inostrancev C.A. 1926. *The Sassanian military theory*. "The Journal of the CAMA Oriental Institute" 7, 7–52.

Jahiz (-al) O. 1950(1329), *Taj*. H. Nowbakht (trans.), Tehran.

Jalali I. 2004 (1383). *Arteshe Iran dar Asre Sassanian*. Kerman.

Julian 1932a, *Orationes*. J. Bidez (ed.), Paris.

Julian 1932b, *L'Empereur Julien oeuvres Completes* 1, *2e Partie Discours De Julien Cesar*. J. Bidez (ed.), Paris.

Justin 1853. *Epitome of the Philippic History of Pompeius Trogus*. J.S. Watson (trans.), London 1853.

Khorasani M.M. 2010. *Lexicon of Arms and Armor from Iran: A Study of Symbols and Terminology*. Tübingen.

Lukonin V.G. 1993 (1372). *Tamadone Iran-e Sassani*. E. Reza (trans.), Tehran.

Matufi A. 1999 (1378). *Tarikh-e-Chahar Hezar Sal-e Artesh-e Iran: Az Tamadon-e Elam ta 1320 Khorsheedi, Jang-e- Iran va Araqh*. Tehran.

Maurice 1984. *Strategikon*. G.T. Dennis (trans.), Pennsylvania.

Mayor A. 2022. *Greek Fire, Poison Arrows, and Scorpion Bombs*. New Jersey.

Miller R., McEwen E., Bergman C. 1986. *Experimental Approaches to Ancient Near Eastern Archery*. "World Archaeology" 18(2): *Weaponry and Warfare*, 178–195.

Moghtader Gh. 1968 (1347). *Pasdaran Shahanshahiye Iran dar Advare Mokhtalefe Tarikh*. Tabriz.

Oates D., Oates J. 1959. *Ain Sinu: A Roman Frontier Post in Northern Iraq*. "Iraq" 21(2), 207–242.

Pazoki N. 1995 (1374). *Shivehaye Qale-giri dar Nabardhaye Iranian*. "Markaze Tahghighate Kamputeriye Oloom e Eslami" 9, 42–55.

Procopius of Caesarea 1914. *History of the Wars Books I & II*. H.B. Dewing (trans.), Cambridge.

Ransford S. 1975. *War Machines Land: from the Primitive Weapons of Stone Age Man to Rocket-Assisted Grenades*. London.

Raspopova V.I. 2006. *Soghdian arms and armour in the period of the great migrations*. In: M. Mode, J. Tubach (eds), *Arms and Armour as Indicators of Cultural Transfer: The Steppes and the Ancient World from Hellenistic Times to the early Middle Ages*. Wiesbaden, 79–85.

Reza E. 1995 (1374). *Iran va Torkan dar Roozegare Sassanian*. Tehran.

Roberts J.M., Westad O.A. 2013. *The History of the World*. Oxford.

Safa Z. 1990 (1369). *Bahram Chobin az Tarjomeye Tabari*. Tehran.

Saket S., Yahaghi M.J. 2010 (1389). *Arayeshe Sepah va Fonoon e Razmi dar Doreye Sassani va baztabe aan dar Shahnameye Firdowsi*. "Faslnameye Elmi va Pazhoheshi Kavoshname" 20, 9–32.

Sauer E.W., Nokandeh J., Pitskhelauri K., Rekavandi H.O. 2017. *Innovation and stagnation: military infrastructure and the shifting balance of power between Rome and Persia*. In: E.W. Sauer (ed.), *Sasanian Persia: between Rome and the Steppes of Eurasia*. Edinburgh, 241–267.

Sebeos 1999. *The Armenian History Attributed to Sebeos*. R.W. Thomson (trans.), Liverpool.

Shahbazi A.Sh. 1988. *Bahrām VI Čōbīn*. In: *Encyclopaedia Iranica* 3. fasc. 5, 514–522.

Syvänne I. 2021. *Military History of Late Rome 457–518*. Yorkshire & Philadelphia.

Tacitus 1876. *The Annals*. A.J. Church, W.J. Brodribb (trans.), London.

Tafazzoli A. 1993. *A list of terms for weapons and armour in Western Middle Iranian*. "Silk Road Art and Archeology" 3, 187–198.

Tavajohi S. 2008 (1387). *Golulehaye atashin dar meydan-e jang*. "Nashriye Kargaran-e Sanat-e Naft-e Iran" 394, 9.

Theodoret 1977–1979. *Historia Religiosa I*. P. Canivet, A. Leroy-Molinghen (trans. and eds), Paris.

Watts J. 2006. *'Foreigner' helped build Terracotta Army*. "Guardian Newspaper". June 28. https://www.theguardian.com/world/2006/jun/28/china.jonathanwatts. Available on-line: November 8, 2024.

Whitby M. 2013. *Siege Warfare and Counter-Siege Tactics in Late Antiquity (ca. 250–640)*. In: A. Sarantis, N. Christie (eds), *War and Warfare in Late Antiquity. Current Perspectives*. Leiden, 433–459.

Whittow M. 1996. *The Making of Byzantium: 600–1025*. Berkley.

Wilcox P. 1999. *Rome's Enemies* 3: *Parthians and Sassanid Persians*. Oxford.

Yildirim E. 2012. *Şapur'un 359 Yılındaki Amida Kenti Kuşatmasında Roma ve Parth Ordularının Kullandıkları Silahlar*. "Uluslararası Sosyal Ara tırmalar Dergisi" 5(23), 455–475.