

# HISTORICAL NOTES

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CHALLENGING ENTRENCHED POSITIONS

## Catapulting Cadavers A Medieval Practice of Biological Warfare?

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The *HISTORICAL NOTES* working paper series contains passages from an ongoing, wide-ranging research project into the history of chemical and biological warfare whose story starts out with the question when our ancestors began manipulating poison. The research project focusses less on the discussion of individual incidents than on identifying and characterising social, cultural, political and scientific trends that helped to shape narratives of chemical and biological weapon use through human and civilisational evolution. It also aims to critically review our present-day (re-)construction and understanding of past events.

Being research in progress, the working papers do not necessarily reflect future conclusions. As part of the overall effort, new sources of information may be found. Or work on other parts of the project may lead to new insights or uncover trends and linkages between historical trends. As a result, certain sections may require revision.

From this perspective, I welcome and encourage questions, comments or criticism on the *HISTORICAL NOTES*.

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The Mongol siege of Caffa in 1346 is closely associated with the spread of the plague epidemic to continental Europe and northern Africa. A major Genoese trading post in the Crimea, its citizens escaped via the Black Sea and the Bosphorus, eventually bringing the Black Death to Mediterranean ports from where it spread inland or onward to coastal cities in west and north Europe, eventually reaching even Iceland. Bad as the medieval pandemic was, its transfer to the Mediterranean basin some authors have attributed to an act of warfare: the catapulting of plague-ridden corpses into Caffa.

If historically correct, the deed would amount to one of the first cases of biological weapon use. Its consequences would have been huge: up to a third of the European population may have perished in the pandemic. The Black Death, as the plague outbreak became known later, is a historical fact. In the early 2000s scientific disagreement emerged as to whether the *Yersinia pestis* bacterium caused the pandemic. However, this debate is less relevant to whether the Mongol siege of Caffa played an instrumental role in the pandemic's westward expansion. Contemporary conceptions of contagion existed notwithstanding ignorance about disease-causing microbes.

Until today, no contemporaneous eyewitness accounts of events inside Caffa have surfaced. A narrative written in 1348 by the Genoese notary Gabriele de Mussi was discovered in the university library of Breslau (today: Wrocław in Poland) in 1842. It described how the Mongol besiegers disposed of diseased bodies by hurling them with catapults over the city wall and the population fled to Italy. Although originally thought that de Mussi was among the escapees, it was later established that he had not left his hometown of Piacenza near Genoa, where he witnessed the arrival of the plague in Italy. To 19th-century historians, de Mussi's chronicle basically resolved the debate on the provenance of the plague from the east and its arrival in Europe via the Black Sea. Given he likely got his information from returning traders, de Mussi's location was unimportant in this respect. While historians noted the catapulting of bodies, they did not further comment on it because the incident was not at the centre of their interest.

Not until the early 20th century did the separate, emerging branch of military history pick up on the possible role of Mongol artillery in the pandemic. As de Mussi remained the only source, authors established the plausibility of the allegation by focussing on three areas, namely the availability of the military technology capable of launching cadavers over city walls, the commonality of catapulting cadavers in medieval siege warfare, and the geography surrounding Caffa that precluded the natural introduction of the plague into the city by rats. Although those researchers initially assumed de Mussi's presence in the Crimean trading post, later they determined like the 19th-century historians that his location did not materially affect their focus of interest, namely the claim of early biological warfare. However, establishing the plausibility of certain circumstances that might have enabled a certain event to take place still does not prove that the event happened.

The first *HISTORICAL NOTES* looked at de Mussi's chronicle and investigated its relevancy to the historical debate into the origins of the Black Death, on the one hand, and the emergence of the biological warfare allegation, on the other hand.<sup>1</sup> This issue looks deeper into the claim that the catapulting of human or animal corpses was a fairly common practice in medieval warfare aiming to provoke disease outbreaks in besieged castles or cities.<sup>2</sup> European, Muslim and Asian literary sources mention the use of body parts and cadavers as artillery projectiles without suggesting that it ever became conventionalised as a method of combat. Passages may point to a singular incident or describe a small barrage. Overall, the sparsity of references suggests a rare practice.

The opportunity to project body parts or whole cadavers depended on then available weapon technology. A future issue of *HISTORICAL NOTES* will discuss the evolution and characteristics of medieval artillery, but two types of trebuchet are central to the present discussion, namely the mangonel or traction trebuchet using rope pullers, and the counterweight trebuchet relying on gravity for dropping the counterpoise. All descriptions of hurtling body parts before the 14th century concern heads of decapitated individuals. This is essentially an expected situation because of the limited throw weight of mangonels. With one exception, no narrative suggesting the projecting of complete corpses precedes the start of the Hundred Years' War in 1337. By then, counterweight trebuchets were attaining their maximal destructive power.

This working paper forms part of a chapter on chemical and biological warfare from the Middle Ages until the end of the 18th century in a broader ongoing historical study.

## Medieval practice of catapulting body parts

A narrative dating from the siege of Jerusalem in 1099 related by both Peter Tudebode, a priest from Poitou who took part in the first Crusade, and Albert of Aachen (Albericus Aquensis, fl. 1100), a historian of that Crusade, illustrates the difficulty of launching a human body. Crusaders attempted to fling a Muslim spy alive into the city with a petrera (a stone-throwing device, probably a mangonel). As his bonds broke, the man fell well short of the walls and was badly injured. Another attempt using a mangonel broke the man's neck after a short trajectory.<sup>3</sup> His weight was too much for a traction trebuchet. Michael Fulton asserted in his PhD dissertation that, assuming the spy weighed about 70 kilogrammes, the body could have never left the sling of a traditionally configured traction trebuchet with a pull weight of around 600 kilogrammes (the equivalent of eight to ten men).<sup>4</sup> He contrasted this event with the lobbing of severed heads over the walls during the siege of Nicaea (today Iznik in Turkey) early in the first Crusade (14 May-19 June 1097). The mass of the human head would have required a release velocity of at least 20 metres/second at an angle of 45 degrees to clear a wall of 10 metres high and achieve a

maximal horizontal range of about 40 metres. The traction trebuchet could not have been placed farther than 20 metres from the wall,<sup>5</sup> an indication of the limited range of mechanical artillery at the time. In his subsequent book, Fulton postulated that with a larger crew and combined pull weight of around 1,000 kilogrammes, the spy could have traversed 40 metres or perhaps slightly more at a lower angle.<sup>6</sup> The contemporaneous story from the first Crusade basically confirms the quasi-impossibility of lobbing a human body across city walls with a mangonel.

It is therefore surprising to encounter a reference of a whole animal being hurled over a city wall before the 1300s. Kalervo Huuri cited in *'Zur Geschichte des mittelalterlichen Geschützwesens aus orientalischen Quellen'* (1941) a Byzantine source from the 19th century describing the operation of a heavy artillery piece, in which the artillerymen placed a donkey in the sling on the orders of their commander. Pulling the ropes, they then let the poor ass fly through the air towards the 'asses' (i.e. the enemy). Noting that an adult donkey weighs about 120-200 kilogrammes, Huuri commented that the animal would have been 'something monstrous as payload for antique torsion artillery'.<sup>7</sup> (Torsion artillery derived its energy from the twisting of ropes and saw its earliest use in the 4th century BCE. Huuri noted the ambiguity of the terminology and thought that 'twisted ropes' probably referred to 'pulling ropes'.) Despite his scepticism and the description of the incident being part of a poem to report back to the Byzantine emperor, Huuri allowed for the possibility that the passage might represent one of the first mentions of a counterweight trebuchet. He also pointed to an Arab source from about a century later describing a mangonel-like artillery piece operated by 1,200 pullers that could throw 90 kilogrammes.

US medievalist Paul Chevedden, who during the late 1990s and early 2000s wrote extensively on the evolution of trebuchet technology, accepted the passage's plausibility based on the Arab source cited by Huuri and a study published in 1869 asserting that early in the 11th century, Emperor Basil II (958-1025) launched stone-shot weighing between 111 and 200 kilogrammes.<sup>8</sup> Contrary to Huuri, Chevedden named the location, recounting that a Byzantine trebuchet 'hurled a live ass over the walls of Chandax (today: Heraklion) to the starving Muslim inhabitants inside' during the reconquests of Crete in 960-961.<sup>9</sup> He interpreted these descriptions as further evidence supporting his theory of the hybrid trebuchet, a transitory artillery weapon combining rope-pull and gravity technology.<sup>10</sup>

There is reason for caution, however. Human or animal cadavers are not aerodynamic even with limbs tied tightly together. Their mass and increased drag relative to a spherical stone projectile of similar bulk would have required a siege engine with considerable throw weight. The earliest unambiguous narratives of counterweight trebuchet use relate to battles fought about 200 years after the siege of Chandax. Yet, it would take another century before these siege engines acquired their hugely destructive power against defensive walls. The trebuchets that appeared during the High Middle Ages (ca. 1000-1250)

potentially had that capacity, bearing in mind that other factors, such as height or distance from the walls, equally determined the feasibility of hurling corpses. However, since trebuchets were amongst the most valuable siege engines, no field commander would likely risk exposing them to counter-artillery fire or incendiary weapons by emplacing them too close to city walls. This severely limited opportunity for catapulting bodies until the most powerful trebuchets arrived.

Alternative suggestions seem implausible. There was a physical limit on the number of pullers to operate a mangonel, making a team of 1,200 all but improbable. Historians have also contested Chevedden's hybrid trebuchet concept. In consequence, reports of catapulted human or animal cadavers predating the 14th century are inconceivable. Last use of the trebuchet in a European war was during the siege of Rhodes in 1480.

## Claims of medieval practice

Despite recent suggestions of a common practice in siege warfare, medieval chroniclers identified only three battles during which beleaguers slung whole bodies towards the defenders. The siege of Caffa in 1346 is the most-cited event because of the association of thrown plague-infected corpses with the spread of the Black Death to Europe. The other two occurrences are the sieges of Thun l'Évêque in north-west France (1340) and Karlštejn Castle, located southwest of Prague (1422). A much later incident reportedly took place at Reval (today: Tallinn) in 1710 when Russian troops drove out the Swedish defenders after allegedly having launched plague casualties into the town. Only the beleaguering of Thun l'Évêque thus predated Caffa.

Events at Caffa will be the subject of a separate working paper. The present issue of *HISTORICAL NOTES* addresses the three other reported incidents. It aims to establish how common the practice of launching cadavers was, what their impact on the outcome of sieges were, and whether distribution of disease was a military objective.

### Thun l'Évêque (1340)

Competing claims to the throne of France between the English House of Plantagenet and the French House of Valois led to a long series of military engagements known as the Hundred Years' War (1337-1453). Philippa of Hainaut had become Queen of England after her marriage to King Edward III in 1328. Over 30 years later, around 1361, Jean Froissart (ca. 1337-ca. 1405), a native of Valenciennes in the County of Hainaut, entered into some form of service at her court aged 24. There he began chronicling the Hundred Years' War. Extensive travelling through Europe enabled him to collect first-hand accounts and other information for *Les Chroniques*. After Queen Philippa's death in 1369,

Froissart enjoyed the patronage of other aristocracy. His work covered the conflict until the final year of the 14th century.

*Les Chroniques* contains a brief passage evoking the catapulting of animal corpses, including horses, into the castle of Thyne Levesque (today Thun l'Évêque). The Duke of Normandy led the military excursion, and thus continues an early 16th-century English translation:

[...] and so departed from Cambray, and came before Thyne, on the ryver of Lescalt, in the fayre playne medowes toward Ostrenan. The duke caryed with hym out of Cambray and Doway, dyverse great engyns, and specially vi. and made them to be reared agayne the fortres, so these engyns dyd cast night and day great stones, the which bete downe the roffes of the chambers, halles, and towres, so that they within were fayne to kepe vautes and sellars. Thus they within suffred great payne, and captayns within wer sir Rycharde Lymosyn, Englysshe, and two squyers of Heynault, bretherne to therle of Namur, Johanne ana Thyerry; these thre that had the charge, sayd often tyme to their company, Sirs, surely one of these dayes therle of Heynalt wyl come agaynst these Frenchmen, and delyver us with honour, and ryd us out of this paryll, and shal can us great thanke, that we have kept this fortres so longe. The ingens without dyd cast in deed horses, and beestes stynking, wherby they within had greatfer dystres thane with any other thyng, for the ayre was hote as in the myddes of somer: the stynke and ayre was so abomynable, that they consydred howe that finally they coude nat long endure. Than they toke advyse to desyre a truse for xv. dayes, and in that space to sende and advertyse syr John of Heynalt, who was ruler of the contrey in therles absence, and without that he dyde socour them in that space, to yelde up the fortres to the duke. This treaty was put forth and agreed unto. [...]<sup>11</sup>

The passage comprises three parts, namely the laying of the siege, consideration of surrender by the besieged, and the possible contribution of the catapulted animal corpses to that consideration.

The first part holds an unmistakable reference to six pieces of siege artillery. Beyond the suggestion that those 'great engines' were 'diverse', it contains no information to identify their types. The unabated launching of projectiles day and night combined with the description of the destruction of the roofs of chambers, halls and towers rather than castle walls suggest deployment of mangonels operated by rotating teams of pullers. As already noted, traction trebuchets lacked the capacity to hurl a projectile with the mass and poor aerodynamic profile of a horse. Therefore, the reference to 'dead horses and stinking animals' in the third part of the passage presupposes the presence of at least one counterweight trebuchet. By 1340, year of the siege of Thun l'Évêque, counterweight trebuchets had acquired the power to hurl projectiles of great mass over a considerable



distance. Notwithstanding, plausibility is no proof of presence of such a counterweight trebuchet.

Whereas the early 16th-century translation of *Les Chroniques* appears to be the classic reference for scholars writing in English, several French versions of Froissart's work exist. Among them, four distinct editions differ from each other not just in spelling, grammar and annotation, but also in the way the respective editors organised the text in chapters and paragraphs or rendered medieval phrases into more modern French. As Froissart is known to have drafted several versions of the first volume of *Les Chroniques*, the respective editors may have thus worked from different original sources. Searches on specific words indicated variations in content and one consulted version even lacked any reference to the siege of Thun l'Évêque.<sup>12</sup> The handwritten manuscript available online from the *Bibliothèque nationale de France* likewise seems silent on the beleaguering.<sup>13</sup> The editions that do describe the siege are all more recent than the English translation, the oldest one having been first published about 50 years afterwards. Together, however, they expose greater technical precision and other contextual details.

An edition reviewed and corrected by Denis Sauvage de Fontenailles en Brie and Roy Henri deuxième de ce nom based on different copies was published in Paris in 1574. The corresponding sentence describing the siege engines differs strikingly from the English translation:

Là fit le Duc charrier grande foison d'engins, de Cambray & de Douay: & en y eut fix moult grans (le Duc les fit lever devant la forteresse) lesquels engins gettoyent, nuit & jour, grosses pierres & mangonneaux: qui abbatoient les combles & le haut des tours des chambres & des sales: [...] <sup>14</sup>

It differentiates sharply between many big engines that propelled large stones day and night, on the one hand, and mangonels that brought down roofs, tops of towers, rooms and halls, on the other hand. Here Froissart thus specifically mentioned traction trebuchets and correctly described the type of damage they could cause. In a note in the margin, the editors confessed to their unfamiliarity with 'mangonels' and speculated whether the term related to artillery, bombards and cannons mentioned later in the book. This remark could explain why the 16th-century British translator referred to the broader '*diverse* great engines'.

An early 19th-century edition of *Les Chroniques* redacted by J. A. Buchon also mentions mangonels and clarifies in a footnote that these are stone-throwing machines:

[...]; et fit le duc là amener et charger six grands engins (machines) de Cambray et de Douay, el les fit dresser et asseoir fortement devant la forteresse. Ces engins (machines) jetoient nuit et jour pierres, et



mangonneaux à grand'foison, qui enfondroient et abattoient les combles des tours, des chambres et des salles [...] <sup>15</sup>

While maintaining the differentiation between the two types of projectors, Buchon also cited the figure of 'six' found in the English translation but seemed to exclude the mangonels from that number.

The Belgian historian and politician Baron Kervyn de Lettenhove drew on a manuscript held in the library of the Vatican for his 1863 edition. <sup>16</sup> In the Vatican version the relevant passage is organised differently with much text between the setting up of the siege artillery and its use against Thun l'Évêque, which is juxtaposed with the catapulting of dead animals. Of interest is the clause preceding the departure of the Duke of Normandy not found in the 16th-century versions:

Avoecques tout ce, li Cambrisien fissent en grant haste oeuvrer et carpenter enghiens et bricoles pour jeter au chastiel et abatre les tois et les manandies, et se départi un jour li dus de Normendie en grant arroi de Cambrai et s'en vint mettre le siège devant Thun-l'Évesque, [...] <sup>17</sup>

It described how the artisans – apparently carpenters and stone masons – from Cambrai rushed to build the siege artillery and projectiles to throw at the fortress and destroy roofs and housing. The excerpt may suggest the construction of counterweight trebuchets, which were generally too big to transport. The more plentiful and smaller mangonels rarely attracted such attention in medieval chronicles.

Baron Kervyn de Lettenhove's edition of *Les Chroniques* reproduced the deliberations on whether to surrender the castle of Thun l'Évêque in a separate chapter and in dialogue form. <sup>18</sup> The passage describing the destruction inflicted by the artillery and hurling of animal corpses inserted a moment of reflection in the dialogue, thereby separating consideration of surrender and decision-making.

A ces paroles se contentoient et apaisoient li Hainnuier, et se tenoient tout sus lor garde en atendant lor signeur, et li sièges se tenoit devant Thun-l'Évesque et avoient li François sys grans enghiens jettans à la forterèce, ce qui moult les greva, car avoecques tout ce que la poissance et continuance des enghiens avoient abatu les tois et effondré les planciers des tours et moult adamagiés les murs, leur jetoient chil de l'oost à lors enghiens, pour euls empunaiser, mors chevaus et mortes bestes. Ce lor faisoit à un avenant plus de mal que les pierres. <sup>19</sup>

The continuous operation of the big siege machines caused considerable damage: roofs had been destroyed, the floors in towers had collapsed, and walls were badly damaged, on top of which the besiegers also hurled dead horses and dead animals to poison the

castle occupants, a change that caused more harm than the stones. The remainder of the reflective passage evoked the psychological duress suffered by the besieged. The collapsed floors within towers and badly damaged walls are new details suggestive of counterweight trebuchets.

The different editions of Froissart's *Chroniques* thus leave sufficient indications to reasonably conclude that in 1340 the besiegers deployed counterweight trebuchets against the castle of Thun-l'Évêque. This conclusion is based on the explicit differentiation between 'big engines' and mangonels, on the one hand, and descriptions of the construction of the 'big engines' and types of destruction caused by their projectiles, on the other hand. Two of the consulted editions point to the presence of six pieces of siege artillery. According to Buchon's edition, the number unambiguously pertained to counterweight trebuchets. The English translation, the earliest of the four reviewed editions, mentions no mangonels. As indicated, it is possible that, like the editor of the 16th-century French version, the English translator was unfamiliar with 'mangonneaux' and therefore inserted the indistinct 'diverse' before 'great engines'. At the same time, he only recounted destruction typical of rope-pull trebuchets. Whereas Baron Kervyn de Lettenhove's edition based on the Vatican manuscript mentions neither mangonels nor numbers, it describes destruction consistent with that from projectiles thrown by counterweight trebuchets.

Despite the nebulosity surrounding the siege of Thun l'Évêque, operation of six pieces of heavy mechanical artillery to bombard the castle appears credible. Medieval chroniclers tended to omit references to weapons and their usage they considered common knowledge, which could account for the lack of references to mangonels in several versions of Froissart's *Chroniques*. This conclusion thus accepts the presence of minimal technological prerequisites for tossing large animal carcasses over defensive walls. In addition, six counterweight trebuchets operating together would in principle have allowed for a rate of fire to lob several beasts into the castle within the time span of a few hours. Still, two other questions require a clear answer. Did events take place as narrated by Froissart? And would the described actions classify as biological warfare in contemporary understandings of disease propagation?

The narrative testifies to great psychological distress, an expected consequence if one can imagine the noises of an operating trebuchet and the crescendo whiz accompanying approaching projectiles. With loud sounds the carcasses would crash into roofs, walls and streets propelling body parts in all possible directions and leaving bloody splatter everywhere. With swift clean-up impossible and if summer conditions were as hot as described, an unendurable stench would soon have penetrated every nook and cranny in the castle. Given their overall miasmatic understanding of disease, the occupants would have feared inescapable death from poisoning or infection ('empunaiser') while sheltering from the bombardment. A negotiated surrender might have therefore appeared the better solution to them.

Except for the edition based on the Vatican manuscript, the French printed versions follow a structure similar to that in the English translation: consideration of surrender comes after the description of the siege and bombardment with stone projectiles and precedes the reference to animal corpses. The Vatican manuscript places the bombardment and the projection of carcasses together after the deliberation whether to capitulate. It is also the only version that does not mention the hot summer conditions. Whereas the Vatican edition uses both the stone and animal projectiles to explain the necessity for surrendering the castle, the earlier books leave the reader with the impression that raising the animal projectiles serves to justify surrender rather than to paint a picture of siege operations. Did Froissart allow himself poetic licence to excuse the surrender for posterity? This reading might explain why the besieged successfully negotiated a 15-day truce to allow a relief force to reach Thun l'Évêque, which contradicts the dreaded health emergency posed by the stench from corrupting catapulted animals (in hot summer weather).

At this point the investigation into whether Thun l'Évêque suffered some crude form of biological warfare has reached its limits. Nobody besides Jean Froissart appears to have chronicled the catapulting of dead horses and stinking animals over the castle walls. Siege engines hurling horses was not a common experience for contemporaries. In consequence, such methods of warfare would have received wider attention. The history page on the website of the City of Thun l'Évêque is the only other source that describes the siege along Froissart's lines, adding that 'this very original bombardment continued without a pause for days until the besieged garrison was decimated by pestilential diseases and on the point of surrender'. A later paragraph suggests that cholera had decimated the defenders. The article has no references.<sup>20</sup>

Barely three years old in 1340, Froissart was not a primary witness to events. During his many travels across Europe, he may have collected memories from first-hand witnesses or written narratives. For the first volume of *Les Chroniques*, which includes the period of the siege of Thun l'Évêque, he also relied on the works of other authors and borrowed extensively from Jean le Bel (ca. 1290-1370). In his introduction to the English translation, William Paton Ker identified le Bel as 'the real author of the greater part of the First Book' of *Les Chroniques*.<sup>21</sup> Contrary to Froissart, le Bel witnessed from nearby the early battles of the Hundred Years' War, including the siege of Thun l'Évêque.<sup>22</sup> However, he mentioned neither siege engines nor propelled dead animals. Instead, the besieged sought to negotiate a truce, a ruse that enabled them to escape from the fortress via a secret passageway and the nearby river.<sup>23</sup>

Absent any corroborating narrative, the claim of early biological warfare remains unsubstantiated. Even had events passed as reported by Froissart, it appears improbable that the besiegers intended to spread disease deliberately. The carcasses would have worsened the terror the besieged were already experiencing from the constant artillery fire. The bursting carcasses and subsequent all-pervasive stench from decaying organic spatter

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would have, in the minds of the castle occupants, poisoned the air and thus carried disease. Still, dread of miasma did not prevent them from seeking a 15-day truce to allow relief to reach the fortress. The narration therefore does not suggest biological warfare despite the prevailing conception of disease.

### Karlštejn Castle (1422)

Four years after the execution for heresy of the Czech theologian and religious reformer Jan Hus in July 1415, the Hussite wars broke out that pitted his followers against the combined Catholic forces of the Holy Roman Empire, the papacy and several European monarchs loyal to the pope. During the conflict the Hussites fragmented and different factions either fought against each other or faced each other on the battlefield as some moderate parts of the movement occasionally aligned themselves with the Catholics against the radical fundamentalists. A peace agreement was not reached until 1436.

In May 1422 Hussite formations and Polish troops under Žygimantas Kaributaitis (Sigmund Korybutovič in Czech or more commonly, Coribut), a Lithuanian prince appointed governor of Bohemia and Prague, laid siege to the castle of Karlštejn (Carolstein or Karlstein), whose construction on a rocky crest 30 kilometres southwest of Prague had been finished in 1365. Historians appear puzzled about this military move because of the fortress's seemingly limited import to the outcome of battles at that time. Although one of the few strongholds still in the hands of opposing forces, its location was rather isolated.<sup>24</sup>

Korybutovič failed to capture the castle despite a months-long siege. Apparent frustration explains why he reportedly resorted to a form of biological warfare. According to a detailed history of the Hussite movement, Antoine de Varillas described how he had all the corpses of his own soldiers killed by the besieged and tumbrels of muck catapulted over the walls:

La seule chose qui jette le desespoir dans l'ame des Héros assiegez, sçavoir le desespoir de recevoir du secours, ne diminua rien de son courage ni de sa prevoiance, il repoussa tous les assauts qui lui furent livrez, & Coribut ne le pouvant surmonter par la force, fit jetter dans la place assiegée par le moien des machines tous les corps morts des Soldats que les assiegez lui tuoient, & pres de deux mille tombereaux d'ordures. L'excessive puanteur y fit tomber les dents à la pluspart des defenseurs, & ébranla tellement celles des autres qu'elles ne se conserverent que par l'adresse d'un riche Apoticaire de Boheme qui fit couler à force d'argent dans Carolstein des remedes & des preservatifs contre ce mal qu'on y souffroit: mais les assiegez n'eurent pas plûtost évité cet inconvenient qu'ils furent prests de succomber sous un autre: il n'y avoit point d'eau dans la Place, & celle que beuvoient les Soldats sortoit d'une fontaine qui n'en estoit pas beaucoup éloignée; les assiegez la conservoient par le moien d'un Fort qui la commandoit, & ce fut contre ce

même Fort que les assiegeans dresserent six effroiables machines qui lançoient une infinité de pierres à la fois.<sup>25</sup>

According to the narrative, most defenders lost their teeth due to the excessive stench, which also weakened (loosened) those of the remainder. Remedies provided by a rich pharmacist from Bohemia preserved those teeth.

Just like the account of Thun l'Évêque is the only mention of catapulting animal carcasses into a besieged fortification during the Hundred Years' War, no other description of the practice of projecting corpses appears in de Varillas' two-volume chronicle of the Hussite movement and wars. Few sources describe the siege of Karlštejn with some detail and none that do not rely on de Varillas support the account. Another major study on the Hussite wars published by Franz Lützow in 1914 omits the human cadavers, but confirms the ordure:

The besieging army, irritated by this obstinate defence, resorted to some of those strange devices which were customary in mediaeval warfare. The commanders caused large stink-pots and baskets containing ordure to be thrown by slings into the fortress, hoping thus to cause contagious diseases within the citadel. They were to a certain extent successful. The chroniclers tell us that the defenders of the Karlštyn were attacked by a mysterious malady which caused all their teeth to fall out. This method of forcing the garrison to surrender, however, also failed.<sup>26</sup>

Neither stinkpots nor excrements were uncommon projectile payloads in the Middle Ages. Lützow questions the 'somewhat improbable tale' of the pharmacist and leaves 'the full responsibility' to a 'contemporary chronicler'.<sup>27</sup> Only, like Froissart, de Varillas was not a contemporary chronicler: he published his work two and a half centuries after the events.

Another source refers in passing to the alleged incident. The Oxford Encyclopedia of Medieval Warfare and Military Technology claims that the corpses and barrels full of dung flung by trebuchets never hit the target, which the entry identifies as 'castles wells'.<sup>28</sup> Unless a typographical error ('walls'), it seems improbable to expect that mechanical artillery could have lobbed human bodies or barrels into wells. Buildings, walls and other structures inside the castle compound would have made the approach angle all but impossible. The account of hurling of dead soldiers is therefore highly improbable.

Notwithstanding, the story received some basic credence because of a reference to 'four of the largest siege machines available'.<sup>29</sup> However, by then gunpowder and cannon had made their entry as siege machines. As described by Lützow:

The Hussite army brought a considerable amount of artillery, according to the ideas of the time, and among them four large pieces of ordnance. The names

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of three of these, the “ Prazska,” “ Jaromerska,” and “ Rychlice ” (the “rapid”), have been preserved. The Praguers had also brought a considerable number of catapults, or large slings, which appear to have done more damage than the guns.<sup>30</sup>

The individual naming of the largest artillery pieces corresponds with medieval practice. However, the cited text also distinguishes clearly between cannon and what look like references to counterweight trebuchets. During the first half of the 15th century mechanical artillery typically had destructive power greater than cannon. While the earlier quote from de Varillas ends with reference to six ‘dreadful machines that hurled limitless number of stones simultaneously’, the sentence is contextually far removed from the mention of catapulted dead soldiers.

The volumes of ordure slung over the walls was considerable. De Varillas’ reference to ‘tombereaux’ (tumbrels) most likely translates as ‘cartloads’, an old indication or unit of volume. Lützow’s mention of ‘baskets’ may be a more accurate depiction of the projectiles’ nature. The descriptions combined with contemporary hygienic standards and presumed living conditions under a medieval siege make faecal-oral transmission of zoonotic pathogens through direct contact with humans or faecal contamination of fingers, food and water sources highly likely.<sup>31</sup> According to de Varillas, the besieged had to rely on a single fountain for water, another indication of a likely point of infection. Besides the close physical proximity of many filthy persons, faeces or infectious material in the water or unclean drinking cups might have contributed to the transmission of disease. Loose teeth, however, seem inconsistent with the typical gastro-intestinal symptoms following such contamination. Rather, they indicate severe malnourishment.

In summary, de Varillas’ assertion that Korybutovič had his troops catapult dead soldiers into Karlštejn Castle cannot be confirmed. Like Froissart, he was not a contemporaneous witness of events, yet is the sole literary source of the claim. Many months of insalubrious sanitary conditions in the starving fortress inevitably led to disease among the besieged. Dung hurled over the walls undoubtedly increased the already present risk of infection from faeces left scattered by the besieged in the months before such bombardment began. While during the Middle Ages faecal matter as payload for siege artillery projectiles was not uncommon, the causal link to loose teeth nevertheless seems improbable. Ultimately, the tactic had little impact because the defenders did not surrender the fortress. A truce reached before the end of the year halted, at least temporarily, hostilities.

### Reval (1710)

Treating the siege of Reval (today: Tallinn) against the backdrop of possible biological warfare at Caffa may appear anomalous. Even though events took place over two centuries after the end of the Middle Ages, the alleged role of the plague outbreak in the



outcome of combat operations fits better in the present discussion on projecting cadavers as biological weapons.

In September 1710 Sweden surrendered Reval to the Russian besiegers, which it later confirmed in the Treaty of Nystad (today: Uusikaupunki, southwest Finland) that formally ended the Great Northern War (1700-21) between both empires. That summer a plague epidemic was raging in the Baltic Sea area and reached as far down as Chernigov and Kiev in Tsarist Russia (today: Chernihiv and Kyiv, Ukraine). It affected Russian military operations and following the first reports in May 1710 of cases among troops blocking Riga, Tsar Peter the Great ordered the army to pull back behind a sanitary cordon across the Dvina River. He dispatched a certain Dr Christian Wiel to supervise anti-plague measures, whom he considered an expert in 'putrid diseases' as well as medicines. He also ordered the isolation of sick soldiers. Field Marshal Boris Sheremetev, Russian commander in the Baltic area, eventually reported the loss of 9,800 men to plague between May and the end of December 1710. Riga fell on 3 June. Sheremetev estimated that 60,000 people inside the city had succumbed to the epidemic, although the figure probably included those who had died in combat or from starvation and other afflictions like typhus. The disease reportedly claimed an additional 40,000 dead in Reval and its hinterland. While the exact numbers are uncertain, they were sufficiently high for Tsar Peter to levy additional recruits to compensate for the losses to plague.<sup>32</sup>

Several studies on biological warfare published since the early 1970s point to the possibility (and express doubt) that Sweden may have lost Reval because of the Russians catapulting plague victims into the city. They refer to then regularly updated briefing brochures on chemical and biological weapons by the *Försvarets forskningsanstalt* (FOA, Swedish National Defence Research Institute).<sup>33</sup> However, given that by the 18th century cannon and other firearms had replaced mechanical artillery, it is difficult to imagine how bodies might have been hurled towards their target. More recent research has demonstrated that the Russian army was still advancing towards Reval when the city reported its first plague victims.<sup>34</sup>

Relying extensively on a trove of contemporaneous reports, letters, diaries and other documents from Estonian, German, Russian and Swedish archives, Ulf Sundberg constructed a detailed chronology of the Great Northern War and the beleaguering of Reval.<sup>35</sup>

The city lay under Russian siege from approximately 10-11 August until its surrender 49 days later, on 28-29 September. By then, plague was already spreading wide and fast. It struck Riga, besieged by Russian troops since the start of June, not later than the 11th. As the disease spread through the Baltic region over the next weeks, it overcame several Swedish garrisons who surrendered cities to the Russian attackers. Travelling north from Riga, the epidemic reached the island of Ösel (today: Saaremaa, located to the southwest of Reval) by 12 July.<sup>36</sup>



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A month later, on 11 August, Reval registered its first plague case. Shortly before, a Russian advance guard had reached the city and proceeded to block the canal upon which Reval depended for its drinking water. A well in the city, the only resource still available to the population, had no clean water. For the remainder of the month the Russians reinforced their numbers outside the city walls. At the end of August, they moved closer to the walls and began bombardment with cannon and mortar fire. After completing construction of their batteries, the artillery opened up against the city on 22 September, almost a month and a half after the first units had arrived outside Reval.

Meanwhile, plague was spreading. The vice governor of Estonia, Friedrich Pattkull reported on 8 September that the ravaging disease was killing 30 to 50 men of the garrison daily. Swedish Lieutenant Colonel Fromholdt Rutenschiöld reported on 15 September that in the two weeks since his arrival in Reval, the garrison had lost 1,234 men. According to Tsar Peter's diary, plague exacted a heavy toll on Russians too.<sup>37</sup>

Sundberg mentions neither instances of Russians catapulting bodies across the city walls nor any type of siege artillery they could have used for such purpose. But Rutenschiöld wrote down in his report on the siege and fall of Reval that the Russians were responsible for the epidemic. The city well took its water from a lake around which Russian units had set up camp and he believed that they could have poisoned the water by dumping bodies into it. He claimed proof when oxen dropped dead after having drunk from the lake. Pattkull clearly did not take the assertion seriously. The city doctor, having been summoned to explain the disease, did not name it but contended that cold winds from the north were responsible.<sup>38</sup> Notwithstanding, given that the water in the city well was soiled (and probably known to be unhealthy), its consumption out of necessity may have contributed to the spread of different types of infection.

No evidence supports claims that the Russian army deliberately spread plague by either catapulting infested bodies into the city or poisoning the water source of the city well. As observed in the discussion of the sieges at Thun l'Évêque and Karlštejn, no other similar incidents during hostilities have been suggested. In this instance, the narrative appears to have emerged in the 1960s.

## Conclusion

While de Mussi was a contemporary to events that brought the Black Death to Europe, archival research in his hometown proved that he had not left Piacenza before or during the siege of Caffa.<sup>39</sup> No other contemporaneous narrative or later historical research have repeated his descriptions of Mongols catapulting plague victims into the Crimean trading post.

A single source not an eyewitness to reported events also seems to lie at the heart of all other assertions of medieval artillery lobbing humans or animals into besieged places. The story of a live ass being catapulted into Chandax in the 10th century, some 300 years before the siege of Caffa, drew on recited contents of a poetic report to the Byzantine emperor and conjecture on technological advancements. Jean Froissart was too young to have seen corpses fly across the castle walls at Thun l'Évêque. His chronicle moreover relied extensively on Jean le Bel's first-hand narratives, but the latter lack descriptions of the practice. Antoine de Varillas wrote down the history of the siege of Karlštejn Castle over two and a half centuries after the facts. While there are separate mentions of slinging faeces into the place, references to dead soldiers as artillery projectiles remain unsupported. Allegations of biological warfare during the siege of Reval also surfaced over two centuries after events, but detailed study of the progression of the plague epidemic points unambiguously to a natural origin.

Despite assertions that events in Caffa were not unexceptional because of medieval practice to hurtle animal or human corpses into besieged fortifications, available empirical evidence fails to support those claims of early biological warfare. Whereas sometimes contemporaneous and independent accounts confirm the projection of body parts during a beleaguering, extreme allegations, such as the catapulting of whole human or animal carcasses over castle or city defences, always relied on a single source who was not a primary eyewitness. Finally, incidents with projected cadavers never seem to have occurred during the wars, campaigns or individual sieges in which they were reported.

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## Notes

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