Mosasaurs

*Interactions between armies and ecosystems in the Meuse Region, 1250-1850*

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PART III: PATHOGENS

6. Army Health

INTRODUCTION

On 5 July 1847 the French Chamber of Representatives became the scene of an important debate, concerning peacetime mortality in the French armed forces. The parliamentarian Desjobert started the discussion by arguing that the death rate in the military in peacetime significantly exceeded that of comparable age groups in the general population. Other parliamentarians, including a general, denied the claim. The debate eventually ended inconclusively, but serves as a powerful symbol that contemporaries were well aware that armed forces lost far more men to environmental factors, mainly diseases, than to enemy action.687

There is a consensus among historians that warfare not only caused important health issues, including the spread of epidemics, but also stimulated significant changes in medical practices, from wound treatment to inoculation. Because of this perceived dialectic relationship, the narrative of progress, the slow ascendency of 'modernity', is particularly strong in studies about the history of military medicine.688 It notably builds on the assumption that medieval armies did not take basic measures of disease prevention and lacked well-educated medical practitioners. This anecdote reveals that nineteenth-century armies still had to cope with serious health issues.689

The study of military health has a long history since it is rooted in the writings of army doctors themselves, who examined past occurrences of epidemics as early as the eighteenth and nineteenth century. By the First World War the connection between warfare and epidemics had become firmly established.690 Exchanges between medical and environmental history, however, are a far more recent phenomenon. Historians have traditionally placed major emphasis on European troops in tropical contexts, environments to which they proved particularly vulnerable, and ship crews on long sea voyages. Hospitals and wounds have also benefited from far more attention than mechanisms of disease

687 Discours prononcés par M. Desjobert.
689 Gabriel and Metz, A History, vol. 1, 205-210, vol. 2, 143-154; Garrison, Notes, 85-97; Vollmuth, Die sanitätsdienstliche Versorgung, 117-118. For a different view, see Geltner, 'In the Camp and on the March'.
690 Heizmann, ‘Military Sanitation’; Hirsch, Geographical and Historical Pathology; Kerkhoff, Over de geneeskundige verzorging; Prinzing, Epidemics.
The findings of battlefield excavations have in fact become increasingly important for the study of military medicine in historical contexts during the last decades. The current chapter questions this idea of progress by considering the changes in the ways army members sought to conserve their health within a larger spectrum of ecological interactions. The term 'pathogens', disease-producing microorganisms or materials, refers to the lowest level in ecological systems, that between species and individual organisms. Rather than assume that medieval armies remained apathetic towards epidemics and that soldiers became increasingly aware of the importance of disease prevention during the Renaissance or subsequent centuries, it considers whether changes in the organisation of armies themselves made them more vulnerable to ecological pressures. Significant medical developments eventually occurred, but these changes might have been more evolutionary than revolutionary, and could furthermore have been brought about by a steadily deterioration of army health over time.

The main theoretical framework underpinning military health practices throughout the 1250-1850 period remained in effect that of Hippocrates and Galen. The Greek physician Hippocrates (fifth-fourth century B.C.) is traditionally credited with formulating the idea that pestilential or corrupt air (miasmas) produces disease for the first time in a European context. The Roman doctor Galen (second century A.D.) considerably expanded this theory and connected susceptibility to 'bad air' to the balance of humors in the body. The four humors are black bile, yellow bile, phlegm, and blood. According to humoral theory any imbalance in these four substances can cause disease. In order to remain healthy, one had to maintain equilibrium between the six non-naturals (air, motion and exercise, sleeping and waking, food and drink, excretion and passions/emotions) for these influenced the four humors. It is worth noting that the Greek physician Dioscorides' De materia medica (first century A.D.) also remained the main work on pharmaceutical matters until the influx of new exotic medicines from the late fifteenth century onwards gradually made it obsolete. He probably served in the Roman army.

Furthermore, there was strong continuity in the functions attributed to divers kinds of medical practitioners. From the High Middle Ages until the early nineteenth century strict divisions existed between physicians on the one hand and surgeons on the other. Physicians were mainly concerned with disease, or their patients’ interior health, and followed a university education. Surgeons by contrast set bones and dressed wounds; a trade most of

[691] Curtin, Disease and Empire; Leufink, Harde heelmeesters; McNeill, Mosquito Empires; Mitchell, Medicine; Mounier-Kuhn, Chirurgie de guerre; van Meerbeeck, ‘Service sanitaire’.
[693] Colombier, Précépentes; Haneveld and van Royen, Vrij van zichtbare gebreken, 132; Jouanna, Greek Medicine, 121-136; Grainger, Historia Fiebris Anomalae Batavae, 55; Howard, Napoleon's Doctors, 201-202; Kerckhoffs, Hygiène militaire, 60-7; Pringle, Observations, 81-87.
[694] Jouanna, Greek Medicine, 119-136; Riddle, Dioscorides, 2-4.
them learned as apprentices. Aside from physicians and surgeons, there were also barbers or barber-surgeons, skilled in shaving and bloodletting. This provided them with a basic knowledge of wound treatment. The first pharmacists appear in the Meuse Region in documents from the fourteenth century, when they are denoted as traders in herbs and spices. Attaching medical practitioners, invariably surgeons or barber-surgeons, to specific military units only became general practice during the sixteenth century. Physicians, university-educated surgeons, and pharmacists, served as members of a ruler's or commander's household (an army's 'general staff') during the Middle Ages. They continued to do so during the early modern period, but were from the sixteenth century onwards also attached to military hospitals. The majority of medical practitioners actually present with armed forces in the field would therefore have been surgeons and barber-surgeons.

This chapter starts with the best-known aspect of army health: armies as a public health hazard. First, it will study the environmental influences armed forces had to confront on a daily basis: weather and climate. The subsequent two sections concern respectively morbidity within armies, and armies as spreaders of disease. These move beyond simplistic arguments about army members’ lack of proper hygiene by considering the importance of lesser known diseases, malaria and ophthalmia, and animal as well as human health. Finally, the section on biological warfare adds an important element of intentionality to the debate. Because armed forces were so susceptible to epidemics, spreading disease could become a decisive war tactic.

The second part, on the military body, builds on the aforementioned links between armies and pathogens. It will relate changes in armies themselves to disease vulnerability. For that reason it contains three main themes: the ideal military recruit, changing ideas about military identity, and army diet. It enquires to what extent aesthetic norms and concerns about social status corresponded to practical considerations, such as someone's physical strength, in the choice for a particular type of recruit, horse, food and punishment. These notions could aggravate army members’ vulnerability to pathogens or lay the basis for disease prevention.

The third part addresses how army members sought to prevent the spreading of disease. This further emphasis on prevention means a move away from the traditional stress on hospitals or doctors, and the caring for combatants who are already weakened to the extent that the can no longer function properly (e.g. wound treatment). It instead studies the central role of fortifications as a crucial place of disease prevention as well as very practical hygiene

695 The diversity of herbs and spices mentioned as supplies for a military expedition in the accounts of Dordrecht from 1285-1287 (see 6.2.3) suggestes that this city might already have had a pharmacist at its disposal. Guislain, 'A la recherche'; Mitchell, Medicine, 12-15; Wittop Koning, 'De apotheek'.
696 Howard, Napoleon's Doctors, 5-18; Kerkhoff, Over de geneeskundige verzorging, 49-59; Vollmuth, Die sanitätsdienstliche Versorgung.
measures taken by combatants themselves. These pave the way for a final segment on the role of armies in the diffusion of natural knowledge.

6.1. ARMIES AS A PUBLIC HEALTH HAZARD

6.1.1 Weather and Climate

Reading the ego documents left by army members, particularly those written by private soldiers, provides a stringent reminder of the omnipresence of inclement weather and climate. These environmental influences had a major, but in historical studies somewhat neglected, effect on military health. While armed forces certainly took seasonal fluctuations seriously one should not go so far as to assume that they never campaigned before late spring and always stopped fighting in late fall. The emphasis on weather and climate is important because it places armies' well-known vulnerability to disease in perspective. It shows that military health concerns cannot be limited to hygiene awareness (see figure 6.1).

Figure 6.1 Army column in a storm. Painting from 1778 by Dirk van Langendijk (MD, inv. nr. 00013240).

Hendrik Conscience, a young volunteer with the Belgian army in 1831, still vividly remembered in 1858 how he spent his first night in the open field and that he immediately fell sick. While earlier centuries might lack the prevalence of such personal testimonies, they

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are by no means absent. The French poet Eustache Deschamps wrote down his experiences as early as the fourteenth century (see 2.1). An anonymous gunner from Utrecht who fought with the imperial army during the 1554 campaign in the Meuse valley mentioned in his journal that on the night of 26 October three soldiers froze to death when standing guard. The French engineer de Vauban included a note in his account of the 1692 siege of Namur that the trenches were constantly full of water because of the incessant rains.698

Chronicles and fiscal accounts can be very informative as well and provide a more detached perspective. Melis Stoke's chronicle, dating to the early fourteenth century, specified for instance that the city of Haarlem lost its warship in the Meuse estuary during a storm. The prior of Saint-Jakob's hospital in Tongres, on the other hand, corroborated the observations of the aforementioned gunner when he noted that imperial troops passed by in 1552 'with running noses and with chattering teeth, and many were very sick and died like dogs.'699 In November 1585 the town of Weert had to accommodate twenty-six Spanish soldiers coming from the Bommelerwaard with frozen feet. For several of these men help came too late.700

The ways that armies sought to protect themselves from environmental pressures might seem mundane, but they fulfilled a crucial role in health conservation. The construction of huts, made from straw and wood, sometimes with linen and possibly moss added, remained common on campaign up to the nineteenth century. Such huts appear on late medieval miniatures, seventeenth-century sketches or paintings, and photographs of the camp of Beverlo (see figure 6.2).701 Tents would of course have been preferable, but were also quite expensive. They were consequently restricted to noble retinues and urban militias. According to the accounts of Dordrecht from 1283-1287 the tents of the urban militia were washed and then stored in a church.702 It is only towards the end of the seventeenth century that using tents became the norm. The Prussian marshall von Natzmer, who served in the Dutch army in


700 This would have shortly before Dutch troops breached the dikes and isolated the Spanish infantry on an island in the Meuse (see figure 4.10). Klaversma, Weert tussen 1062 en 1602, 217.

701 Desbrière, Chronique critique, 50; De Cauwer, Tranen van bloed, 171; de Solenne, La Charge du Marechal des Logis, 21; Dinges, ‘Soldatenkörper’, 77; Liebe, Der Soldat, 56; Martin and Russon, Vivre sous la tente, 196-200; Parker, The Army of Flanders, 139-140; Richer, Abrégé chronologique, 212; Spans, ‘Legerkampen’, 171-173; Weuts, Het kamp van Beverlo, 18-20.

702 Burgers and Dijkhof (eds.), De oudste stadsrekeningen, 10, 23, 24, 44-46, 55, 57, 63, 72; de Groot, Stadsrekeningen, 1408, f. 10; Hoeckx et al. (eds.), Kroniek van Molius, 196-197; Laurent, Aachener Stadtrechnungen, 64, 291; Martin and Russon, Vivre sous la tente, 184-196; van Doorninck (ed.), De tocht van Jan van Blois 1362, 213
the 1670's, recalled in his memoirs that he still had to construct such huts and that they needed to be of uniform appearance, even though they were broken down again the very next day.\footnote{AEL, Etats, inv. nr. 3007 Fortifications diverses, Instructions regarding the defense of the lines around Liège in the 1690’s; Dibbetz, \textit{Het Groot Militair Woordenboek}, 300, 613; Melder, \textit{Korte en klare instructie}, 72-73; von Adlersfels-Ballestrem (ed.), \textit{Memoiren}, 12.}

The issuing and repairing of clothing and shoes should be seen in a similar light. The accounts of the city of Aachen specify that it paid a shoemaker to repair the footwear of citizens taking part in military expeditions during the fourteenth century.\footnote{Laurent, \textit{Aachener Stadtrechnungen}, 278, 279, 281.} More than four hundred years later (1788) a list of recruits of the regiment Royal Liégeois, assembled in Liège before their march to their new garrison in Givet, reveals that several of these men not only received a money bounty but also a new pair of shoes.\footnote{CDMRA, Ancien Régime, inv. nr. II/20.} The most common measure taken to preserve horses' wellbeing was likewise the repairing or replacing of horseshoes. In 1378 the prévôt of Chiny rewarded a village farrier for shoeing the horses of his followers, mobilised fief holders. This force, sufficiently large since this task took eight days, apparently did not

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure62}
\caption{Sketch of a Dutch encampment in the Southern Netherlands, 1675, by Josua de Grave (1643-1712) (RA, RP-T-00-142).}
\end{figure}
include a farrier. From the sixteenth century onwards farriers appear regularly on muster rolls, which suggests that their enlistment became standard practice around this time.706

Guards and sentries were even more vulnerable to the elements, as suggested by the accounts of the high bailiff of Montfort from 1397-1398. These mention that the fortress's sentries received wool or fur trimmed cloaks. City accounts likewise include references to the construction or repairing of guardhouses, which would later be made famous in the paintings of the Dutch Golden Age.707 The accounts from the city of Geldern (1387/1388) even mention the making of arrow slits in one of these. They must have been common in fortresses as well, for the chronicler Petrus Treckpoel claimed that a gunner shot down the guardhouse from the main tower during the siege of the fortress of Reydt near Mönchengladbach (1464), so that the feathers of the sentinel's bed ‘flew around as if it has snowed’.708 Eighteenth-century garrison regulations were more specific and ruled that a soldier would only have to stand guard for two hours at a time, or one hour during the winter months. Weather and climate clearly retained a major influence on army health throughout the 1250-1850 period.709

6.1.2 Susceptibility to Pathogens

The emphasis on environmental pressures is imperative, because it places the spread of actual epidemics in perspective. Given the traditional image of medieval armies as being too ill equipped to enforce basic hygiene standards, one would expect references to the latter to be bountiful. In practice relatively few sources explicitly comment on epidemics, or fear thereof, in an army context before the late fifteenth or sixteenth century. Emond de Dynter's description of Duke Antoine of Brabant's failed attempt to besiege Dordrecht in 1418 did not remark on anyone falling ill, but he did admit, nonetheless, that citizens from Dordrecht took members of the ducal household prisoner when they returned by boat because of sickness.710

Chroniclers might not have felt the need to write about epidemics because of their prevalence, but late medieval fiscal accounts, which provide evidence about all kinds of


707 Archiv Haus Welbergen, inv. nr. 754; Accounts city of Goch 1626-1677, f. 63; SLC, Archief Gemeente Grave, inv. nr. 217, f. 7v., 46r., 122r., 133r., 193v., 227r., inv. nr. 218, f. 15 v., 52 r., 72v.-73v. (transcripts Rien van den Brand); Gentenaar and Huppertz, ‘Personeel en werkzaamheden’, 202; Marchal, Inventaire, 264; Marwede, Die Befestigung, 39; Renes and Wessels, ‘Loen ende Werck’, 113; Rosen, Soldiers at Leisure; van Doorninck (ed.), De tocht van Jan van Blois 1362, 200, 236.


709 NA, Raad van State, inv. nr. 2079, Orders 31/11/1715; 22/12/1716; inv. nr. 2081, 8/1/1739; SHD, GR, 2Xy09 Germain Vincent dit Parisien; Reglement en orders Maastricht (1786), art. XXXVI; Bovy, Promenades, vol. 1, 76-77.

710 De Dynter, Chronique, vol. 3, 806-808.
expenses made during military campaigns, also give no indication that massive numbers of men or animals were struck down by disease. One of the few explicit references to disease dates to 1406: when the high bailiff of 's Hertogenbosch mobilised fief holders to ride to Vilvoorde, he had to leave nine horses, of a force totalling about one hundred and fifty, behind because of divers illnesses.\footnote{711} Historical research regarding medieval military medicine has neglected to point out that unambiguous references to epidemics or epizootics come from very specific contexts, unrepresentative for warfare in general: sieges and extended campaigns in different environmental contexts (e.g. the crusades).\footnote{712} The poet Jan van Heelu for instance did not comment on the presence of disease during John I of Brabant's campaigns between the Meuse and Rhine in the 1280's, but devoted several lines to nine prominent knights killed by an epidemic during the Aragonese Crusade (1284-1285); apparently even the duke himself had to fear for his life.\footnote{713} This inclusion of the Aragon campaign is significant because Jean de Meun's famous criticism that the armies of Latin Christendom lacked the basic hygiene of their Byzantine and Muslim counterparts in his 1284 translation of Vegetius, also originates in such experiences.\footnote{714}

Many historians of medicine thus assume that since armies in recent centuries suffered from epidemics, these must have been at least as commonplace in medieval times. Such a belief does not take changes in armies or warfare into account, or the fact that some diseases may have evolved significantly over time. This issue is further complicated by the difficult identification of specific illnesses in a historical context. Sixteenth and seventeenth-century chronicles or ego documents that comment on epidemics in a military context often refer to any epidemic disease as 'plague'.\footnote{715} Sick soldiers do appear regularly in prints and paintings, but these images rarely allow an identification of specific diseases (see figure 6.3). A detailed breakdown of mortality causes for 4232 soldiers from the Jemappes department (Belgian Hainaut) in 1798-1814, based on billets for hospital admittance, shows that 64,4 percent died from 'fevers', without further specification.\footnote{716} These are just afflictions that caused someone’s death. The association between venereal disease and soldiers became well established during the major outbreak of syphilis in the 1490's. It reached the Meuse Region by 1497-1498 at the latest. Up to the nineteenth

\footnote{711} ARB, 137.01, inv. nr. 12991. See also van Doorninck (ed.), De tocht van Jan van Blois 1371-1372, 32, 62, 63, 76-77, 87.
\footnote{712} Bradbury; The Medieval Siege, 83; Martin and Russon, Vivre sous la tente, 226-228; Mitchell, Stern and Tepper, ‘Dysentery’; Prinzing, Epidemics, 12-15.
\footnote{713} Boffa, ‘Les soutiens militaires’, 17-18; Willems (ed.), Rymkronyk, 102-104.
\footnote{714} Richardot, Végète et la culture militaire, 167-168;
\footnote{715} Burschel, Söldner, 258-268; de Graaf, Oorlog, 498-500; Leboutte, ‘D'Austerlitz à Liège’, 442-445; Mitchell, Medicine, 209-219; Mitchell, ‘Retrospective Diagnosis’.
\footnote{716} In the case of horses, glanders, a bacterial infection, proved to be highly lethal. Darquenne, La conscription, 244-268; van Wissekerke, Van kwade droes tot erger, 295-309, 322-324.
century exact distinctions between syphilis and other venereal diseases remain vague, however. According to overviews of hospital admittance for Napoleonic soldiers in the 'Belgian' departments more than one in five patients was admitted because of a venereal disease. Statistics of 'syphilis' published around the middle of the nineteenth century indicate that it affected more than ten percent of the French, Dutch and Belgian army. In the Dutch navy approximately one fourth of the personnel suffered from such ailments.

Figure 6.3 Etching of the Dutch army besieging the castle of Namur, 1695, by Jan van Huchtenburg (1646-1733) Note the soldier in the foreground lying next to his horse and the dogs feeding on a cadaver (RA, RP-P-OB-77.339).

What the sources do show is that the vulnerability of army members to diseases was not a simple reflection of their hygiene awareness, or a lack thereof. The fear of marshes and 'marsh fevers' is expressed as early as the fourth century A.D. in Vegetius' famous treatise on military matters, which served as the main military handbook throughout the Middle Ages.

These 'marsh fevers' might refer to one or several diseases, but it is likely that they included malaria, spread by mosquitoes of the Anopheles genus. The parasites of the Plasmodium genus, which actually cause malaria, are not native to the North Sea area, but became established there in Antiquity or the early Middle Ages, possibly because of the Roman army. The disease remained endemic in the northern part of the Meuse Region, the Meuse-Rhine estuary

717 Burschel, Söldner, 260; Garrison, Notes, 108-109; Parker, The Army of Flanders, 143; Schmitz-Cliever, 'Pest und pestilenzialische Krankheiten', 135.
718 Haneveld and van Royen, Vrij van zichtbare gebreken, 184-185; Hirsch, Geographical and Historical Pathology, vol. 2, 70.
719 Vegetius, De Re Militari, Book III.
and the Campine, until the late nineteenth or even twentieth century.\textsuperscript{720} It was quite rare in other areas, although death certificates from the civilian hospital in Maastricht suggest an outbreak among the garrison in 1808.\textsuperscript{721}

The example of malaria demonstrates that military health encompassed larger interconnections with ecological systems. The death of massive numbers of British soldiers who campaigned in the Campine during the Austrian War of Succession (1740-1748) for example, led to two major publications on army health by John Pringle and Jacob Grainger. Both connect epidemics of intermittent fevers among British soldiers to the marshes or inundations near Heusden and 's Hertogenbosch.\textsuperscript{722} These floodings were just a temporary phenomenon, but since military defence in the shape of individual fortifications and the Hollandic Water Line necessitated that large stretches of land remained waterlogged they also preserved an ideal habitat for mosquitos in a long-term perspective. The government of Charleroi did in fact note in 1795 the difficulty of removing stagnant water from the fields inundated by the garrison.\textsuperscript{723} British soldiers would have been especially vulnerable because they came from a different disease environment and had no or little built-up resistance. One hundred years later the infamous 'fevers of Beverlo' kept medical circles in Belgium occupied. The publications of these doctors connected the 'miasmas' coming from marshes near the camp with summer heat, in other words circumstances that allow members of the \textit{Anopheles} genus to thrive. In this case the assembly of soldiers from all over the country to train in a wilderness context had unintended results.\textsuperscript{724}

The relative scarcity of information on epidemics in a medieval military context is therefore not just related to the nature of the sources, but also to army members' growing vulnerability to disease. Armies grew in size (with forces of tens of thousands of people becoming more common), their members were drawn from a larger area than before, and were more likely to move into different disease environments. It is hardly a coincidence that references to epidemics spread by armed forces increased from the late fifteenth century onwards. Because soldiers regularly switched garrisons they kept getting exposed to different pathogens. Imperial troops coming back from the Hungarian front in 1566-1567 brought the


\textsuperscript{721} Maassen, ‘Lijst’, 89.


\textsuperscript{723} Parmentier, \textit{Pays de Charleroi}, 92; van Mastrigt, \textit{Willemstad Prinsheerlijk}, 197.

\textsuperscript{724} Delameillieure, 'Het kamp van Beverlo', 92-93; Devos, ‘Malaria’, 210-214, 218.
'Hungarian Disease' or typhus, spread by lice, to Western Europe. The Danube region served as a reservoir for spreading typhus during subsequent centuries as well.\textsuperscript{725}

Another illuminating example of this internationalisation is the spread of ophthalmia in the early nineteenth century. Blindness was not unknown in military contexts, but chronicles rarely specify why a certain individual became blind. Jacques de Hemricourt, for example, mentioned the participation of two blind noblemen at the battle of Donmartin (1325), one of whom was even knighted before the battle.\textsuperscript{726} In 1799-1801, however, trachoma, a disease endemic in many parts of Egypt, infected invading French soldiers on a massive scale. This bacterial infection was highly contagious and is traditionally seen as the main cause for ophthalmia epidemics that affected European armies in subsequent decades, but became especially virulent in the Netherlands and Belgian military. In 1826 almost ten percent of the soldiers in the Netherlands army suffered from this ailment.\textsuperscript{727} Morbidity rates in medieval armed forces might have been far lower than traditionally assumed, while a relative growth in army size would have made their early modern counterparts more vulnerable to disease.

6.1.3 Spreaders of Disease

The chronological changes observed within armies themselves were mirrored in their relations with society at large. From the late sixteenth century onwards, chronicles and parish records increasingly referred to a general perception that armies spread disease. In 1553 the mayor of Bouvignes wrote to his counterpart in Namur: 'Where the Spanish infantry has stayed, people die quickly'. The parish records from Burtscheid near Aachen likewise specified in 1629 that someone died from the 'Hungarian or military disease' (typhus).\textsuperscript{728} The expressions 'camp fever' and 'army fever' are also significant in themselves.\textsuperscript{729} The medieval evidence by contrast is far more ambiguous, the lasting connection between syphilis and soldiers being the major exception. This section therefore examines the significance of armed

\textsuperscript{725} The work of Lucas Antonius Portius, regarding the conservation of soldiers' health in camps (\textit{De militis in castris sanitate tuenda}) published in 1685 based on his experiences in the Imperial army in Hungary, was translated in French in 1744, not coincidentally during the Austrian War of Secessio. Agoston, 'Rivers, Forests and Forts', 77-78; Garrison, \textit{Notes}, 130-131; Kroener, 'Kriegsgurgeln, Freireuter und Merodebrüder' , 59; Prinzng, \textit{Epidemics}, 22-24; Schmitz-Cliever, 'Pest und pestilenzialische Krankheiten', 132-135, 139-140; Zinsser, \textit{Rats, Lice and History}, 266-277.

\textsuperscript{726} Bellwald, 'Das Augenleiden'; Masson, 'La guerre', 435, 437.


\textsuperscript{728} Jacquet-Ladrier, 'Les épidémies de peste', 125; Schmitz-Cliever, 'Pest und pestilenzialische Krankheiten', 150-151.

forces' unintentional spread of pathogens in early modernity, actual biological warfare will be the subject of the next section.\(^{730}\)

In order to evaluate the perceived association between armies and the spread of disease, a distinction has to be made between armed forces' direct and indirect impact. The former will be studied first. The people and animals that composed an army could simply spread disease simply by transporting pathogens in their bodies over hundreds or even thousands of kilometres: from one theatre of war to the next. A councillor's act from Couvin, dating to 1598, indicates that the citizens prepared to resist the entrance of troops suspected of bringing disease with force of arms. The town of Tilburg similarly paid a soldier suspected of carrying 'the plague' in 1603 so he would move on to a neighbouring village.\(^{731}\) Troops led by the count von Mansfeld and Johan von Werth brought respectively typhus and the plague to the Meuse Region in 1622-1625 and 1636.\(^{732}\)

Especially devastating would have been those instances where epidemics and epizootics struck more or less simultaneously. Winand Mengels, a farmer living near Maastricht, wrote in his chronicle that the French army started to suffer from a disease with symptoms that resemble those of dysentery in 1747-1748. The villagers attributed the unknown disease to the eating of unripe fruit, but then they started to suffer from it too.\(^{733}\) To make matters worse, the invaders also brought a cattle disease with them. The French army was more a reliant on oxen and mules as draught animals than its opponents because horses were more difficult to procure (see 5.2). A similar epizootic struck the Prince-Bishopric of Liège in 1711-1714, and it is quite possible that in this case too warfare was the crucial factor. The parish priest of Sibret, in the Duchy of Luxemburg, likewise declared in 1656 that an epizootic struck flocks of sheep in 1636, the very year that Imperial troops invaded the area, so that there were almost none left.\(^{734}\)

The relative growth in the size of armed forces would have facilitated this spread of epidemics and epizootics. In the Middle Ages soldiers often lodged in inns or taverns, as shown by fourteenth-century accounts. The Roman of Heinric and Margriete van Limborch,

\(^{730}\) The infamous Black Death would certainly have made assembling armies and waging warfare more difficult, for example by the relative impoverishment of families living nobly, but armies do not seem to have had a significant role in its spread through the Meuse Region. Hans Ditrich has in fact recently suggested that the role of the siege of Caffa (1346) in the spread of Yersinia Pestis to Europe, is overstated. Ditrich, ‘The Transmission’.

\(^{731}\) Couvin, 1976 (Transcript Généamag); Verschure, Overleven, 286.


\(^{733}\) De Harzé, ‘Manuscrit’, 275; Mengels, Chronyk, 46-47, 55-62.

from the same period, tells us that one of the protagonists had difficulty finding a room because the city where he stayed was filled with soldiers.\textsuperscript{735} From the sixteenth century onwards individual soldiers had to be billeted in private houses due to lack of space. Seventeenth-century court records from Namur reveal that some inhabitants even reserved a room for exactly this purpose.\textsuperscript{736} Massive building programmes during the eighteenth and nineteenth century eventually ensured that soldiers lived in barracks and received care in military hospitals, but this only applied to garrison cities. In 1779 imperial soldiers returning to the Austrian Netherlands from the Bohemian front, the Bavarian War of Succession (1778-1779), thus spread dysentery along their marching routes. The aforementioned ophthalmia quickly spread to Belgium's civilian population in the 1830's because military doctors send infected soldiers home, expecting they would recover faster this way.\textsuperscript{737}

The caring for sick or wounded soldiers remained in fact to a large degree the responsibility of the general population, especially those of large urban environments, which had the infrastructure to organize hospitals or could provide access to existing ones.\textsuperscript{738} The city of Huy obtained permission in 1690 and 1691 to assemble sick soldiers in a hospital located far way from the city centre. Apparently some citizens already died as a result of contamination and the soldiers' waste increased the chance that epidemics would spread. During the siege of 1695 the Carmelites of Namur likewise cared for wounded soldiers and buried the deceased in their garden (a practice attested archaeologically at Tongres).\textsuperscript{739}

Another and far more obscure threat to public health would have been noise pollution. Incessant loud noises are not pathogens, but they do affect the health of humans and animals through stress. The garrison orders of Namur specify for example that the governors instructed drummers to master their instrument in secluded locations: the city walls in 1716 and 1717 and outside the gates in 1761. Prohibitions regarding the needless discharging of guns, after coming back from guard duty and drill, or at New Years Eve, were quite common as well. Especially instructive is an order from 13 September 1716 in which the governor of Namur made known that he was very displeased that his soldiers discharged their guns in the city and the castle after coming back from drill. He considered this 'not appropriate for soldiers, but for peasants coming back from a fair'. He threatened future offenders with

\textsuperscript{735} van Aken (ed.), Book V, v. 967-968.
\textsuperscript{738} de Cauwer, \textit{Tranen van bloed}, 183-184; Engelen, ‘Stokkem in de grote Europese oorlogen’, 228-229; Kerkhoff, \textit{Over de geneeskundige verzorging}.
having to run the gauntlet. The regulations for the garrison of Dinant pronounced a similar ban as early as 1578. The origin for both sources of pollution lies indeed in the Middle Ages: the accounts of Dordrecht reveal that drummers accompanied the urban militia as early as 1286-1287, and the city of Maastricht paid a certain Henrics in 1399 because ‘he could shoot with the thunder’.

Armies’ indirect role in the spreading of disease was more ambiguous, but at least as significant. In ecological terms an army of several thousand people functioned as a city on the move, a city that proved to be particularly demanding in terms of food and shelter and infringed on other people's entitlements. The spread of epidemics would at the very least have been stimulated by the destruction or confiscation of crops and general impoverishment. On 28 September 1794 for instance the governor of Grave instructed its citizens to procure provisions for two months or leave the city, in preparation for the coming siege. By 12 December many citizens had ran out of food and asked the governor to distribute some from the military depots. The governor argued that the two-month limit only applied to the actual investment of the city, which started on 20 October, and refused to accede to their demands. The freezing of the water in the moats finally forced him to surrender on 30 December.

Fear in itself further deteriorated the health of those unfortunate enough to be living in warfare-affected areas (see 4.2). The accounts of the prêvôt of La Marche, in the Duchy of Bar, from 1636 speak of villagers dying in the woodlands where they had sought refuge. In that same invasion year, the high bailiff of Stokkem gathered testimonies from villagers and the parish priest from Oppeeten who hid for weeks in ditches, hedges, forests, marshes, stables and barns after the taking of their schans (fort). The city council of ’s Hertogenbosch had to warn its citizens in 1794 not to stay in their cellars for days on end, for fear of bombardments, because of the resulting stench. Quentin Outram has in fact argued that the worst wartime mortality crises happened when relations between armies and societies at large deteriorated into violence with flows of distress migration as a result.


741 Bormans, Lahaye and Brouwers, Cartulaire, vol. 4, 181-183, 347; Burgers and Dijkhof (eds.), De oudste stadsrekeningen, 52; Fruin, De oudste rechten, vol. 1, 183; Koreman, De stadsrekening, 131.


The perceived relationship between armies and epidemics was, however, not clear-cut. Armies did not inevitably bring disease and epidemics occurred in peace as well as wartime. Historical studies have repeatedly emphasized the role of weather and climate as significant factors in explaining disease patterns. It is indeed suggestive that the French king Charles VII ordered his troops to retreat from Luxemburg to Bar in the 1490's to avoid 'the plague'. The aforementioned Imperial forces led by von Mansfeld and von Werth did not come from just anywhere, but respectively Bohemia and the Palatinate, areas especially heavily affected during the Thirty Years War. The autobiography of the Prussian soldier Laukhard, who fought in the 1792 campaign against France, serves as a reminder of how a combination of adverse weather and terrain, the Argonne, could break even an army famous for its Reinlichkeit, with dysentery outbreaks and flea infections as a result. From the late fifteenth century armed forces affected the health of both human populations and their animals in a negative way through the direct spread of pathogens and by increasing their susceptibility to disease.

### 6.1.4 Biological Warfare

While the previous sections assessed armies' vulnerability to the weather, epidemics, and their involuntary spread of pathogens, this section considers to what extent armies deliberately sought to affect their opponent's health without the use of arms. Biological warfare is defined here as the use of pathogens or toxins of biological origin to affect human, animal or plant health in a warfare context. The study of biological warfare in a historical context is far from unproblematic because it has a strong connotation of being an unethical, or at least unconventional, way to fight. It presents a methodological problem insofar as the very success of these tactics often depends on secrecy. Most of the sources examined here therefore indicate a fear of biological warfare, rather than unambiguous evidence of intention.

One of the most common elements presented in historical studies of biological warfare is the throwing of human or animal corpses into a besieged fortress. This was a gruesome, but probably relatively rare, alternative to a far more common tactic: throwing excrement. The chronicles of de Dynter and Froissart both mention that a besieging force led by the duke of Brabant threw cadavers into the city of Grave during the siege of 1388. Urban militias from Liège besieging Argenteau in 1347 by contrast threw stones, earthen pots with melted iron, and burning metal to the fortress and when this did not have the desired

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746 Gutmann, War and Rural Life, 156-163; Jakob, Bruyères, 119; Marchal, Inventaire, 24; Outram Quentin, 'The Socio-Economic Relations of Warfare', 162-164.
747 Laukhard, Leben und Schicksale, vol. 3.
748 Frischknecht, ‘The History’; Mayor, Biological and Chemical Warfare, 28-29; Thalassinou et al., Biological Warfare Plan.
749 de Dynter, Chronique, vol. 3, 124, 625-626; Froissart, Chroniques, vol. 13, 160-161;
effect, brought the contents of cesspits from the city of Liège to the fortress to pollute the
defenders' water. The chronicle of Jean de Stavelot also remarks that when troops from Liège
besieged Bouillon between December 1406 and January 1407 they defecated into barrels in
order to throw these into the fortress and soil its cisterns and water supply. Fortifications
located on a hill would have been very vulnerable to such tactics because they rarely had
direct access to a stream.

A chronicler from 's Hertogenbosch on the other hand wrote down that many citizens
believed that the defenders of Tiel had fired poisoned projectiles during the storming of that
city in 1528 because many of their injured died. The militiamen had brought the wounded
to cloisters and hospitals, where many women helped to take care of them. Whether the
defenders really used poison is unclear, but this remark does reveal something about the
quality of health care at that time and the chances of recovery. Poisoned projectiles were
certainly used in medieval Europe, in hunting as well as warfare. Many sixteenth-century
surgeons also believed that gunpowder wounds were poisonous, but this chronicle does not
say so explicitly.

Sudden and apparently inexplicable deaths could easily be attributed to poison. Reginbald Möhner, for instance, a chaplain of an imperial regiment serving in support of the
Spanish crown in 1651, left an account of his experiences, marching from Austria to the
Spanish Netherlands, before invading the kingdom of France and eventually turning back.
According to his testimony the regiment entered a village near the Sambre, where one soldier
found milk in an abandoned house, drank it, and immediately fell dead. The soldiers
 discovered, or assumed, that the milk was poisoned and the commander gave the order to
burn all abandoned houses from then on. In 1831 Dutch soldiers were likewise anxious that
their Belgian opponents had poisoned the food and water supplies. Poisoned herbs were
effectively used in wolf hunting, and it would have been relatively easy to apply such
knowledge to warfare as well. In May 1714 the commander of Namur even received complaints that officers and soldiers threw drugs or poison in the Meuse to kill the fish.

Meanwhile, gunpowder continued to be associated with poison well into the
seventeenth century. Many artillery manuals gave practical information to their readers on

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how to make 'poisonous' or 'stink' bombs, but it is unclear to what extent gunners actually applied this advice. During the siege of 's Hertogenbosch in 1629 a soldier of the garrison claimed that the besieging Dutch troops shot bombs that spread a terrible smell. Others even spoke of bombs filled with antimony. The governor was worried enough to order the inspection of unexploded bombs. Nothing unusual was found, but several citizens still claimed to have noticed a strong scent of camphor. Camphor was sometimes mixed into gunpowder, especially for fireworks or incendiary bombs, and could very well have given these projectiles a different appearance. Its use in itself was not new. Fiscal accounts of the duke of Brabant mention the purchase of camphor for the making of gunpowder as early as 1411.\textsuperscript{756}

The French engineer de Vauban, who would certainly have mentioned the use of poisoned projectiles, was visibly more concerned with traditional miasmas. He wrote in his journal of the siege of Namur in 1692 that ten or twelve dead horses, lying near the front of the covered way, hindered the final attack on the castle more than the fire of the besieged did. However, every time the wind turned, they had their share of stench. He clearly implied that the garrison wanted to disrupt the besiegers, but other issues might have played a role as well.\textsuperscript{757} The chronicle of the Sint-Geertruidsklooster in 's Hertogenbosch recorded that during the siege of 1629, after horses taken as booty started to eat tree leaves for lack of fodder, the gunners drove them into the moat towards the enemy lines; some drowned in the process. Simply slaughtering and eating the horses could have been an alternative, but in western Europe strong taboos existed against the eating of horseflesh, which effectively ensured that this became a very exceptional measure.\textsuperscript{758} Even though the sources rarely provide definite proof of intention, it is clear that premodern armed forces were well aware that their enemies might try to spread disease among them.

6.2 VULNERABLE BODIES

6.2.1 Selecting the Perfect Recruit

Military vulnerability to disease cannot be understood without taking changing notions about human and animal bodies into account. Army commanders perceived some bodies as being more suitable for military service than others. These views, and changes therein, had a major influence on army members' susceptibility or resistance to pathogens. In 1818, doctor Georg

\textsuperscript{756} De Cauwer, \textit{Tranen van bloed}, 225; Martinetz, \textit{Vom Giftpeil zum Chemiewaffenverbot}, 35-49; van Werveke, \textit{Die Erwerbung}, 11.

\textsuperscript{757} The covered way is the terrain between the glacis, the open lands near a fortress, and the moat. Vauban, \textit{Journal}, 161.

\textsuperscript{758} Felsenhart, 'L'invasion', 349; Patist, \textit{het beleg}, 46-47, 49, 64; van Bavel et al., \textit{De kroniek}, 343; Wittmann, 'Verhandeling', 118.
Heinrich Ritter summarised a notion prevalent among officers as follows: ‘a soldier must be as strong as iron, and be able to withstand anything, without experiencing any negative consequence’. In practical terms this means looking into selection criteria for combatants, and their horses, rather than armies at large. As argued in the previous chapter, there is little information available about so-called camp followers because of the unofficial nature of their presence. The requirements listed by Vegetius in his De Re Militari (fourth century A.D.) will be taken as a starting point because this work remained an authoritative military manual throughout the Middle Ages and subsequent centuries.

Vegetius specified that recruits had to be enlisted as adolescents, that they had to be tall, strong, and had to come from the countryside. Rural dwellers were in his opinion accustomed to all kinds of weather and used to hard labour. There is another criterion, so obvious that neither Vegetius nor most other military writers bothered to comment on it: a combatant has to be male. While traditional gender divisions in an army context are well known, this criterion is not as evident as it might seem. Only service as a paid, and thus officially recognised, combatant, was strictly forbidden. Women who served as soldiers invariably did so as 'men'. This makes their identification difficult, but not impossible. Jan van Ryckenroy from Roermond for example wrote in his chronicle that in 1589, after the taking of the fortress of Bleijenbeek, a girl was discovered among the enemy dead, and John Stedman, a captain in the eighteenth-century Dutch army, noted in his diary that a Swiss regiment in Maastricht chased away two soldiers: man and wife. The identity of the latter was only discovered because she became pregnant.

The presence of women among soldiers reflects a far more practical issue: to what extent did commanders subject potential recruits to a physical examination before enlisting them? They undoubtedly mustered their men, but unambiguous evidence for the involvement of surgeons is only available from the eighteenth century onwards. Even at that point, one can question the thoroughness of the physical examination: a Prussian lieutenant from Geldern brought a surgeon from Rekem to trial in 1781 because one of his non-commissioned officers had paid him to examine a recruit reportedly suffering from a fracture. The surgeon declared the man suitable to serve, but when the unit's surgeon inspected the recruit again upon arrival he found the fracture.

759 Ritter, ‘Verhandeling’, 32. See also Vollmuth, Die sanitätsdienstliche Versorgung, 187.
760 Allmand, ‘Vegetius’ De re militari’; Richardot, Végèce et la culture militaire.
761 Vegetius, De Re Militari, Book I.
762 Thompson (ed.), Journal, 103-104; van Ryckenroy, Kroniek, 239. See also Blythe, ‘Women in the Military’; Dekker and van de Pol, Vrouwen in mannenkleren, 24-25, 33-35, 105-107; Desbrière, Chronique critique, 140; d'Outremeuse, Ly myrure des histors, vol. 6, 258, 262; Gaier, Art et organisation, 175; Leestmans, Soldats, 180-181; Lynn, Giant of the Grand Siècle, 343-346.
Figure 6.4 Muster list of soldiers recruited by the count de Berlaymont for the bishop of Liège. Several are nicknamed Jonck Bloet, one has adopted the name Verloren Kint, and another the alias 'Hellfire' (Hellebrant).

Not only is the nature of a recruit's examination unclear, there are actually relatively few sources that provide unambiguous evidence about a combatant's background. Rulers compiled lists of soldiers as early as the late thirteenth century, but before the late seventeenth or early eighteenth century few of these lists mention anything other than the soldier's name and
function. Some of these names, or rather nicknames, do give some indication of soldiers' backgrounds, however. Muster lists of infantry units raised for the bishop of Liège in the 1550's show for instance that many soldiers adopted nicknames such as Jonck Bloet ('Youngblood'), 't Kint ('The Child'), Jonck Hart ('Youngheart') and variations (e.g. Verlorenkint- 'Lostchild') which suggests young unmarried males, possibly teenagers (see figure 6.4).  

Military personnel records become more detailed over time, and by the eighteenth century typically wrote down information such as soldiers' birthplace, age, height, trade, and features in order to reduce fraud. Some captains claimed pay for soldiers that were no longer present with the unit, or did not exist, and incorporated untrained men (so-called passe-volants) in the ranks to pass reviews. These eighteenth-century lists confirm that most soldiers enlisted in their late teens or early twenties. It is quite possible, however, and indeed suggested by the study of skeletal remains and the age of a handful of Burgundian soldiers written down in a court record from 1469 (see 4.3), that medieval combatants were on average somewhat older because they had to provide their own equipment. Still, most served when in their twenties or thirties. This reflects a basic biological reality that most males are fully-grown around the age of twenty. From the age of thirty, muscle strength tends to decrease. These indications should be treated with caution, however, since different ways of army organisation would have entailed a different type of recruit. Furthermore, as military personnel records make clear, it was an individual's capability to serve that really mattered, not official instructions about age.

Similar remarks could be made about army horses. Given that a horse is only fully grown after four years, military regulations from the eighteenth and nineteenth century specified that units could only take horses between the ages of four and seven. Reviews from Dutch cavalry regiments from the early 1780's mention that thirteen- or fourteen-year-old horses were replaced as 'too old', 'sick' or 'worn out'. A mass grave of at least sixty-five horse skeletons, from the French siege of Maastricht in 1794, contains the remains of animals which were between three and sixteen years old when they died, the majority being between

764 AEL, Etats, inv. nr. 2965 Muster lists of infantry companies raised in 1552.
765 Bois, Les anciens soldats, 133-140; Corvisier, L'armée française, vol. 2, 615-637; Corvisier, 'La société militaire'; Leestmans, Soldats, 22; Ruwet, Soldats, 64-66.
766 DeVries, 'Teenagers'; Poncelet, 'Le combat', 278-293.
767 The Jourdan-Delbrel Law (5 September 1798), which introduced conscription in the French Republic, stipulated that males could be conscripted from the age of twenty to twenty-five. Colombier, Préceptes, 149-152; Govaerts, 'Fire-eaters'.
768 NA, 1. 01.19, inv. nr. 1945, 1946. Reviews and reports of Dutch cavalry regiments, 1780's.
the ages of four and twelve. Even though one horse had not yet reached the age of four, it was as one of the largest individuals found.\textsuperscript{769}

The height of this horse is significant, because it relates to Vegetius' criterion that recruits had to be tall, even though this was of less important than strength. Jacques de Hemricourt, who wrote a treatise on the nobility from Hesbaye in the fourteenth century, called Godedefroid, lord of Harduemont, ‘the smallest knight in the Prince-Bishopric of Liège, but a brave knight, and a great and strong captain’. The phrasing of this sentence suggests that Hemricourt considered men of small stature to be generally unsuitable for military service.\textsuperscript{770}

More or less detailed height estimates only become available from the eighteenth century onwards, when personal records started to note a soldier's height more or less accurately. A systematic comparison between these eighteenth-century soldiers and Napoleonic conscripts proves that these men were significantly taller than the average male, even though many enlisted when not fully grown. This lowering of average heights in nineteenth-century conscription forces was primarily aimed to incorporate as many men as possible into the army, but also reflected more pressing health and tactical issues (see figure 6.5).\textsuperscript{771}

A larger body needs more nutrients to keep functioning, or in other words: has less stamina. Medieval commanders might already have favoured taller combatants, but eighteenth-century notions about the ideal military body had evolved to such an extent that height in itself, rather than strength or another ability, became the primary criterion for admission into elite units.\textsuperscript{772} Even though more practically minded officers gradually became more assertive in voicing their criticism towards the end of the century, prejudices died hard, as demonstrated by the personnel records of the Jagers de Sternbach, a 'hunter' unit founded at Maastricht in 1785. This corps, which had to select recruits for stamina rather than height, included men prematurely discharged from other Dutch units, possibly on physical grounds, as well as men officially too small to join the army. Some were only 1.57 metres tall, while the official minimum height was 1.67 m. Of course, being too small was in itself not always a sufficient reason to be rejected, especially if one was expected to grow; almost half the recruits for Dutch infantry regiments in the same period who originated from the Dutch-speaking part of the Bishopric of Liège did not reach the minimum height. Still, when the

\textsuperscript{769} Geisweit van der Netten, \textit{Algemeen Samenstel}, 114-115; Loonen and van de Graaf, ‘Het massapaardengraf van Borgharen’, 31-38.
\textsuperscript{770} de Hemricourt, \textit{Le Miroir des Nobles}, vol. 1, 117.
strength of the unit was reduced a few months later, these men were the first to be discharged.  

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Figure 6.5 Satire on the lowering of the minimum length required for military enlistment, early nineteenth century. The recruit says to the sergeant (a member of a grenadier unit, which included some of the tallest men in the army) that he will be a perfect light infantryman (voltigeur) (Aron, Dumont, and Le Roy Ladurie (eds.), Anthropologie du conscrit français).

Commanders did not just select recruits because of their height, but also because of their background. It is unclear to what extent medieval captains heeded Vegetius' preference for rural dwellers. Urban militias became in fact more important during the High Middle Ages because they were better organised and armed than their rural counterparts. Many so-called men-at-arms (heavy cavalrymen with two horses) cannot be considered as rural combatants either, since they switched regularly between urban and rural contexts, often by owning houses in a city as well as the countryside.  

774 The aforementioned muster lists of the bishop of Liège's army in the sixteenth century likewise indicate a dominance of urban recruits, but most came from relatively small settlements such as Tongres or Valkenburg rather than Liège itself. Many rural recruits would also have enlisted in urban contexts, as Jean Chagniot's detailed study of eighteenth-century Paris as a recruitment centre suggests.  

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773 NA, Raad van State, inv. nr. 1968 Stamboek van het korps jagers van het Land van Overmaze van luitenant-kolonel de Sternbach, 1785-1786; Govaerts, ""Fire-eaters"".

774 Govaerts, ""Mannen van Wapenen"".

775 AEL, Etats, inv. nr. 2965; Chagniot, Paris et l’armée, 313-335.
Eighteenth-century personnel records likewise reveal an overrepresentation of urban recruits, especially from garrison and/or larger cities, but it is significant that elite units (cavalry, artillery, and miners) counted a larger number of rural dwellers in their ranks or were even primarily composed of men born in the countryside. These records thus suggest that high status units, who could pick their members, did adhere to the criteria already listed by Vegetius. The arguments of the Belgian colonel de Thierry in 1835 confirm this. He published a small report in response to claims about excessive horse loss in the army, declaring that his men had little affinity with horses and did not know how to take proper care of them. The colonel therefore strongly advised to refrain from admitting certain recruits to the cavalry in the future: urban dwellers top the list. The preference for recruits from rural backgrounds was therefore not limited to physical stature as such, but included a whole range of skills that officers associated with this origin.

In ideal circumstances new arrivals would indeed not have been recruits at all, but veteran combatants. During the parliamentary debate mentioned at the beginning of this chapter, a general responded to the alleged high mortality of the French armed forces by arguing that recruits drove up the death rates. Hans Jakob von Grimmelshausen, the author of the famous novel Abentheuerliche Simplicissimus Teutsch, wrote of recruits of the Walloon regiment de Merode in the Thirty Years War of whom large numbers could be seen resting below hedges alongside the road. He also noted that the verb marauding (marode) in German derived from the name Merode. His observation is etymologically incorrect, the word derives from the French maraude, but significant from the perspective of health conservation because it associated pillaging with green troops that could not keep up. The French doctor Jean Colombier (1736-1789), who wrote an authoritative treatise on military health in the late eighteenth century, argued that there was nothing worse than to enlist children. They were useless to the army and almost all died. Both practical and aesthetic considerations could clearly exert influence on the selection of combatants to a more or lesser degree.

6.2.2 Physique as Military Identity

Notions of an ideal military body went further than the selection of specific types of recruits. They also encompassed intrusions into the chosen human and animal bodies themselves.


777 Colombier, Préceptes, 33; de Thierry, Mémoire. 5-15.


779 von Grimmelshausen, Der Abentheurliche Simplicissimus Teutsch, Book 4, Chapter 13.

780 The data published by André Corvisier on the basis of personnel records indicate that mortality among recruits was actually higher than among veterans. Colombier, Préceptes, 124, 148; Corvisier, L’armée française, vol. 2, 686-689; Leestmans, Soldats, 86; Parrott, The Business of War, 158-160, 172; Shively Meier, Nature’s Civil War, 122-125.
These measures originated both in the need to construct and maintain a specific 'military' identity, distinct from that of other social groups, as well as issues of discipline and control. They are of crucial importance within the context of this chapter because of their potential detrimental effects on army health.

Medieval fiscal accounts provide quite detailed information on the horses lost by combatants, as argued in chapter five, but do not mention whether the owners made deliberate changes to the horses' appearance. They mention for instance horses with a 'long' or 'short' tail. These descriptions are significant because eighteenth- and early nineteenth-century military forces often cut their horses' tails for aesthetic reasons. In a similar manner, if medieval accounts indicate gender, it is invariably 'stallion' (hengst). This should not be taken to imply that the unnamed horses were geldings or mares. The medieval word hengst had a more general meaning than its modern equivalent and might have been used as a synonym for 'warhorse'.

Medieval noblemen in fact expressed a strong preference for stallions, and even considered riding a mare humiliating. Eustache Deschamps lamented the loss of his horse in the 1388 Ardennes campaign and wrote that if the duke of Bar did not provide him with another one he would have to stay home or ride a mare, jack, or jenny. Albertus Magnus, who wrote an authoritative encyclopedia on animals in the thirteenth century, stated that a warhorse had to be a stallion because he is more aggressive than a gelding. Despite this widespread belief, the use of geldings did become more common from the fourteenth century onwards, possibly due to influence of armed forces from Eastern Europe (the French and German words for a gelding are respectively hongre- Hungarian, and Wallach- Wallachian). The eldest explicit reference to a gelding (hongre) in a military context comes from a 1347 account from Namur regarding a group of noblemen who were wounded near Calais. The horse in question belonged to a servant.

By the late seventeenth century the use of geldings and mares had become the norm in light cavalry regiments, a kind of unit that, significantly, was closely associated with armies from Eastern Europe. A review of a dragoon company headed by captain de Thiribi, part of the army raised by the bishop of Liège in 1692, gives an exceptional description of both soldiers and their horses: of the animals for which gender is provided, seven were geldings and eighteen mares. A note at the end of the list specifies, however, that the animals

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781 ARB, 137.01., inv. nr. 12990, 12991; Arkenbout, Frank van Borselen, 199; Herborn and Mattheier (ed.), Die älteste Rechung, 62-64; Martens van Sevenhoven, ‘Een betalingsordonnantieboek’; Renes and Wessels, ‘Loen ende Werck’, 127-128; van Doorninck (ed.), De tocht van Jan van Blois 1362, 124, 125, 127, 133; van Wissekerke, Van kwade droes tot erger, 344-347.
782 Contamine, ‘Le cheval noble’; 1705; Deschamps, Oeuvres, vol. 5, 121-122.
denoted as 'horse' were all geldings, which brings the total number of geldings to twenty-one.\textsuperscript{785}

During the eighteenth century the French army went a step further and even issued prohibitions against the use of stallions. The archetypical army horse remained without doubt male, as at least seventy percent of the horses found at the 1794 mass grave of Borgharen near Maastricht could be identified as such, but the gelding had replaced the stallion. This development is noteworthy because it implies that military forces preferred the discipline and obedience that castrating implied above a stallion's natural aggression. The choice for geldings is a very practical one: a stallion will fight other stallions for dominance of 'the herd', especially if mares are present as well. A troop of geldings, with or without a few stallions among them, is easier to control, a trait that could make a great difference during warfare. Still, not everyone agreed with this reasoning. The Dutch officer Geiswett van der Netten, who wrote several influential books on horses and cavalry service in the early nineteenth century, was a strong opponent of gelding. He argued that it affected the horses' health and energy. \textsuperscript{786}

The soldier's body similarly became subject to aesthetic criteria, the height preference having been mentioned earlier. For eighteenth-century Dutch military courts the cutting of one's hair even served as proof that the defendant had planned his desertion. The infantry regulations of 1772 stipulated that a soldier had to wear his hair in a tail of no less than sixty centimetres. If his own hair was not long enough, he had to use extensions made from horsehair. The French doctor Colombier criticised these practices because they caused pertinent health issues on campaign, by increasing the chances of retaining parasites such as lice and ensuring that the hair remained permanently wet after a rainy day. Soldiers of the French Republican army simply abolished the practice and cut their hair short in the 1790's. Other armed forces followed suit.\textsuperscript{787}

The second main element in the forging of a military identity was corporal punishment. Medieval commanders did use the death penalty in exceptional circumstances, but normally punished malefactors through fines, which is a more indirect form of corporal punishment, because it affects someone's economic base.\textsuperscript{788} This evolution can be illustrated through a comparison between two sentences for the same punishment: one medieval, the other early modern. The \textit{prévôt} of Bouconville in the Duchy of Bar condemned a sentinel

\textsuperscript{785} AEL, Etats, inv. nr. 2966, Liste de la compagnie capitaine de Thiribi du régiment monsieur général mayeur de Jaymaert.
\textsuperscript{786} Loonen and van de Graaf, ‘Het massapaardengraf van Borgharen’, 35; van Wissekerke, \textit{Van kwade dros tot erger}, 95, 342-344.
\textsuperscript{788} Geltner, \textit{Flogging Others}, 21-23;
who fell asleep while guarding this fortress to a fine of sixty sous in 1411. Three hundred years later, in 1717, the commander of Namur sentenced two soldiers to running the gauntlet up and down twice: one had left his guard post, the other had fallen asleep.\footnote{789 NA, Raad van State, inv. nr. 2079, Orders 25/2/1717; Huntebrinker, ‘Fromme Knechte’ und ‘Gartetenfel’, 240-248; Marchal, Inventaire, 201.}

The general adoption of more direct forms of corporal punishment, notably caning, took place in the first decades of the sixteenth century, and was not limited to armies as such. Corporal punishment became an inseparable element of a military identity, however, not only because military forces continued to use these direct forms long after other social groups abandoned them, but also because they gave their own interpretation to these punishments. Soldiers retained a strong connection to nobility throughout the medieval and early modern period, and perceived being touched by an executioner or his assistants as dishonourable. For this reason soldiers carried out punishments themselves, unless the offender was considered unworthy to continue serving.\footnote{790 This does not mean that corporal punishment was unproblematic. The commander of Namur made known to his men on 28 March 1740 that they had to hit properly during the subsequent running of the gauntlet. Those who neglected their duty would have to run the gauntlet themselves. NA, Raad van State, inv. nr. 2081, 28/3/1740; Dorreboom, ‘Gelijk hij gecondemneert word mits deezen’, 126-127, 132, 190-196, 208, 236-237; Geltner, Flogging Others, 63-65.}

These notions caused a major divergence between the military, as an organisation, and other types of armies that continued to function. When the governor of Roermond found a citizen absent from his guard post in 1656, he punished him in the proper military way: with a beating. The latter responded by taking his gun and threatening to shoot him. The city council resolved the situation by imprisoning the guard for a few days, but asked the governor to refrain from beating its citizens in the future. When French troops started to expand the fortifications of Dinant in 1690-1691, the governor issued a proclamation that soldiers who entered the parapets or banquetts of the walls and/or soiled them risked corporal punishment. Citizens on the other hand only risked a fine.\footnote{791 Bormans, Lahaye and Brouwers, Cartulaire, vol. 6, 251-252; van Beurden, De handelingen, 125.}

The taking of an offender's freedom, which increasingly replaced caning from the eighteenth century onwards, was an important development within the context of army health because of the nature of the places in which he had to stay. In medieval contexts this was typically a tower, gate or the basement of the town hall, for the simple reason that these were enclosed spaces with someone present to guard him; typically a sentinel or gatekeeper. Imprisonment mainly served to hold people temporarily and oblige them to pay. The amount of comfort would depend on a prisoner's wealth, given that one had to pay one's own costs of imprisonment.\footnote{792 ARB, 137.01, inv. nr. 2784; Boonen, ‘De Maaseiker wallen’, 62-64; Bormans, ‘Table des régistres’, 279; Bormans, Lahaye and Brouwers, Cartulaire, vol. 2, 116-117; Dorreboom, ‘Gelijk hij gecondemneert word mits deezen’, 196-208; Fruin, De oudste rechten, vol. 1, 184; Geltner, The}
Even though these medieval fortifications lost much of their defensive value in subsequent centuries, they often continued to serve as prisons. This is why the medieval Saint-Victoire tower in Givet has still been preserved (see 3.1). More importantly, now imprisonment did become a punishment in itself.\footnote{793} The order book of the aforementioned corps de Sternbach noted that a sergeant was put into 'the hole' for neglecting his patrol duty. The garrison orders of Namur also referred to a certain prison as 'the hole'. Colombier again provides a valuable perspective when he observed that there is no good reason to use an underground space as a \textit{cachot}, since it is detrimental for the prisoners' health.\footnote{794} The regulations of the French non-commissioned officer from 1811 did in fact make a distinction between three different forms of confinement, from simply imprisonment in one's own room to the \textit{cachot}, where a soldier had to sleep on a straw covered floor and only received water and bread. A prisoner could not be kept in the \textit{cachot} for more than four days.\footnote{795}

Figure 6.6 Dutch militiamen (schutters) suffer from the mice and fleas in their barracks, 1830's (MD, inv. nr. 00104106).

\textit{Medieval Prison}, 1-10; Gentenaar and Hupperet, 'Personeel en werkzaamheden', 188; Koreman, \textit{De stadsrekening}, 148; Laurent, \textit{Aachener Stadtrechnungen}, 236; Moreau, \textit{Bolwerk der Nederlanden}, 12, 16; van den Brand and Manders, \textit{Vesting 't Gennepenhuys}, 101; Villa-Sébline Nicole, \textit{La sénéchaussée}, 138-139.


\footnote{794} NA, Raad van State, inv. nr. 2057, Garnisoensorderboek, 20/2/1786; Colombier, \textit{Préceptes}, 87-88.

\footnote{795} \textit{Le guide des sous-officiers}, 277-286.
The third and final element in the forging of a military identity was the building of barracks. The building of large houses to accommodate soldiers dates back the sixteenth century. At that point, however, it was very much for lack of any other suitable housing. From the late seventeenth and especially eighteenth century onwards governments all over the Meuse region initiated building programmes to provide garrison cities with barracks. This was primarily a control issue: housing soldiers in barracks made desertion far more difficult. Only seven percent of the soldiers from the Dutch-speaking part of the Prince-Bishopric of Liège who deserted from the Dutch army between 1770 and 1795 ran away from their barracks, compared to thirty-five percent quartered in private households.

Complaints about barracks' health hazards were commonplace, both in publications of military physicians and reports of military engineers (see figure 6.6). In concordance with prevailing medical theories most criticised the humidity and lack of air circulation. The French engineer de Vauban planned the construction of what could be considered one of the longest barracks in Europe at that time, in Givet alongside the Meuse River in 1680 (almost 430 metres). After an inspection in 1691 he noted that it was difficult to pass through the area because he encountered manure everywhere. He thus gave instructions to ensure that they were regularly cleaned from then on. The fact that the commander of Namur likewise instructed his officers in 1716 to keep the barracks dirt-free, suggests that this had not yet become standard practice. One hundred years later the worst problems occurred in barracks not located near a stream, such as those of Rocroi. The latrines built next to the main wall in 1832 apparently produced such strong 'memphitic and pestilential vapours' during the summer months that the neighbours claimed that it was impossible to live there, even when all the doors and windows remained locked. The need to forge a specific military identity came at the cost of the soldiers' own health.

6.2.3 Food and Nutrients

As significant as the selection of army members and further intrusions into their bodies were, the most important aspect of the military body remained proper nourishment. This derived

797 Based on a database of 199 deserters, originating from the Dutch speaking part of the Prince-Bishopric of Liège who served in the Dutch army between 1770 and 1795. Govaerts, "Fire-eaters".
800 NA, Raad van State, inv. nr. 2079, Orders 12/10/1716; inv. nr. 2081, Generale Orders, art. 14; inv. nr. 2081, 8/11/1738, 5/4/1741, 15/10/1741; *Orders en reglementen Maastricht (1749)*, art. XXI; *Reglement en ordres ’s Hertogenbosch (1770)*, art IX; Barbe, ‘Rocroy, ville de garnison’, 107, 115-116.
logically from the widespread adoption of Galenic theory, which classified food and drink as one of the six non-naturals (see above). During the Middle Ages dietary advice was typically written down in regimens of health. A good example is Adam of Cremona's regimen from the early thirteenth century, written for emperor Frederick II when he planned to go on crusade. Despite this work's apparent connection to a military campaign, it would have been of fairly limited use in an army context, since it rarely addresses health problems specific to a group of people and animals, not to mention one that has warfare as its primary objective.

While the importance of food for health preservation was well established, the actual food and drink consumed shows significant change over the course of five centuries, even though the methods of food preservation remained largely the same. The main object of this section is therefore to study how differences in nutrition intake relate to broader developments regarding army health.

Medieval fiscal accounts are surprisingly detailed and in many ways even more informative than sources from subsequent centuries. The accounts kept by the city of Aachen regarding its expenses during the siege of the fortress of Dyck in 1383 for instance, allow a reconstruction of the food eaten on a particular day of the week. The basic food was bread, beer and meat, mostly poultry, with fish (herring and to a lesser extent salmon and river fish), eggs and/or cheese mostly reserved for fast days. Parsley, garlic, beans, mustard, general vegetables (moes), oil, wine, milk and game, the latter as gifts from the bishop of Cologne, are also mentioned.

Such a menu might very well have been unrepresentative for other medieval armies. Froissart effectively criticises the army of the duke of Brabant, and its urban component more specifically, on two occasions (the battle of in Baesweiler in 1371 and the siege of Grave in 1387-1388) for being too fond of good food and wine. While Froissart was probably trying to find a scapegoat for these defeats, he could still be appealing to a more general perception of well-supplied urban militias. Fiscal accounts from rulers and high bailiffs indicate, however, that the food supplies of late medieval citizen armies were similiar to that of contemporary armed forces.

Medieval accounts in fact provide clear patterns as far as nutrition is concerned: cooks prepared food in large cauldrons, alcoholic beverages (beer and/or wine) were the norm, and the food was quite rich in meat (poultry, cattle, sheep, pig, game), fish (herring, cod, pig, carp, salmon), diary products (cheese, butter), eggs, bread and herbs or spices.

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803 Laurent, Aachener Stadtrechnungen, 276-286. On the eating of fish, see especially van Dam, ‘Feestvissen en vastenvissen’.
804 Boffa, Warfare, 188; Froissart, Chroniques, vol. 13, 22-23, 163.
(mostly parsley and to a lesser extent mustard). Fruits and vegetables were relatively rare, cooked peas and almonds, onions, garlic and general moes being the most common. Calculating the exact nutrient intake of an average combatant would be very debatable because the accounts rarely specify quantities or provide an accurate head account, but it does seem to have been quite liberal. The accounts of Dordrecht from 1285-1287 include exceptionally rich supplies, many of which would have served as medicine as well as food in the strict sense of the word, including stomachicum, cinnamon, ginger, pepper, nutmeg, saffron, clove, sugar, anise, golden rod, Indian pepper and galangal. This list is exceptional and directly related to the wealth of the city at the end of the thirteenth century, but also draws attention the connection between food and medicine.

The diet of early modern soldiers pales by comparison: provision of meat and bread (or its alternatives: biscuits and rice) could more or less be guaranteed, but fish, eggs, dairy products and vegetables became much rarer or even disappear from the menu. This might be related to changing religious beliefs, since many soldiers no longer respected fast days from the sixteenth century onwards, but the French doctor Colombier explicitly stated in 1775 that most privates did not have enough money to buy fish or eggs. Furthermore, because armies grew larger over time, provision of even the most basic food could become problematic: from the late sixteenth century onwards soldiers received a specific form of bread, the so-called commission or munition bread, which was rather coarse and made of a mixture of rye (two thirds) and wheat (one third), but could be supplied by contractors at relatively short notice. Drinking water also became relatively more important.

Hendrik Conscience and Jan Teunisse, antagonists in the Ten Day's Campaign (1831), both recounted that because of the scarcity of water in the Campine they were reduced to drinking dew and muddy water from wagon tracks. The latter claimed it affected the soldiers' eyesight.

This rising importance of water could explain why dysentery became one of the most important scourges of armies. Seventeenth-century soldiers responded to this threat by mixing.

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806 The apparent absence of honey, which did have a significant role in medieval medicine, from the accounts is noteworthy. Burgers and Dijkhof (eds.), De oudste stadsrekeningen, 39-41, 47-49, 52-53, 59-77; Krug, ‘The Wounded Soldier’.


809 Conscience, De omwenteling, 110-111; Teunisse, Onderdaan in Oranje’s oorlog, 78.
vinegar or olive oil with water before drinking or cooking. This method is still attested during the Napoleonic Wars, which suggests that it was a widespread and continuous practice. The medical qualities of wine were already well known in the Middle Ages and it is quite possible that combatants drank wine and beer rather than water for health reasons as well as taste.

Figure 6.7 'Camp volant', painting by Jean-Antoine Watteau (1684-1721), early eighteenth century (Moscow, Pushkin State Museum of Fine Arts).

Not only did soldiers' diet change, the way food was prepared changed as well. Instead of cooks and large cauldrons, Walter Morgan, an officer of the Dutch army, already depicted a soldier tending to a cooking pot on his drawing of the taking of Roermond (1572). The French painter Jean-Antoine Watteau, who made numerous portrayals of soldiers on campaign in the early eighteenth century, even made it the centrepiece of one of his works (see figure 6.7). Women following the army would also have had an important role in food preparation, the main issue being that a multitude of small cooking pots replaced the large cauldrons of medieval armies. These pots served to cook soup to which soldiers added meat and any herbs or vegetables they could buy or scavenge. The mess or ordinaire, firmly established by the

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810 Burschel, Söldner, 259; de Brack, Avant-Postes, 366; Haneveld and van Royen, Vrij van zichtbare gebreken, 180-184; Monbrun, Considérations, 12; Ritter, 'Handeling', 28, 63-65; Rogers, Soldiers' Lives, 94-95; Rorive, Les misères de la guerre, 381.
811 The accounts of Aachen also include payments for wine given to two men of the contingent who lost a brother or friend during the siege of Reifferscheid (1385). Laurent, Aachener Stadtrechnungen, 289.
812 Caldecott-Baird (ed.), The Expedition in Holland, 74-75.
eighteenth century, involved groups of up to ten or twelve men who pooled their income to buy food together.\textsuperscript{813}

Since regulations rather than fiscal accounts or individual testimonies constitute the main evidence for the food supply of early modern forces, it is possible that differences with medieval armies were in practice much less pronounced. There would also have been a significant distinction between life in garrisons or quarters and in the field, but even when on campaign the diet of soldiers might have been richer than the regulations indicate. So-called sutlers or vivandier(e)s had an important role in military supply and many paintings depict them selling divers items, including food, to soldiers. Plundering would have been a much-used alternative when official supplies did not suffice.\textsuperscript{814} A councillor's act from Sautour (1643) lists the possessions of a cavalryman from the garrison of Givet killed in a skirmish with the local militia. These include a loaf of bread, an apple, a pear and a small axe (presumably to cut wood). The fact that the councillors went through such trouble to record the deceased's possessions suggests that they feared retaliations by the soldier's comrades.\textsuperscript{815}

The information provided by medieval fiscal accounts can also be quite difficult to interpret, for these documents rarely mention exactly which food was supplied to specific members of an army. During the 1411 campaign in Luxemburg, for instance, a merchant from Namur supplied the duke of Brabant's army with three barrels of tuna fish and two of seal.\textsuperscript{816} These were clearly intended for the duke's own table, as were eight barrels of river fish. The 'many people of arms' who stayed at Virton on the other hand received only one barrel of river fish, but large quantities of cod. The high bailiff of 's Hertogenbosch did not include eight barrels of old herring, destined for the defenders of the fortress of Middelaar in his 1387-1388 accounts, because when one of the barrels was opened the herring turned out to be so rotten that nobody would eat from it, nor could it be sold. It was thrown into the Meuse instead.\textsuperscript{817} In this way, one might argue that this comparison between the diet of medieval and (early) modern armies is unfounded because evidence for the latter is biased towards the subordinate ranks, non-commissioned officers and privates.\textsuperscript{818}

\textsuperscript{813} Colombier, Précépêtes, 50-53, 61; van Doorninck (ed.), De tocht van Jan van Blois 1362, 112.
\textsuperscript{814} RHCL, 07.E01, inv. nr. 2 Receuil des pièces relatives au siège de Maestricht dans l'an 1748; Burschel, Söldner, 231-241; Cardoza, Intrepid Women; De Cauwer, Tranen van bloed, 175; de Graaf, Oorlog, 361; Leestmans, Soldats, 195; Lynn, Giant of the Grand Siècle, 108-114, 122-124; Redlich, 'Der Marketender'; Rooms, De organisatie, 209-210; Rorive, La guerre de siège, 228-238; Sabron, De oorlog, vol. 2, 77; Spaans, 'Legerkampen', 176; Teunisse, Onderdaan in Oranje's oorlog; van Bavel et al., De kroniek, 335; van Eyck, Kroniek, 85-86, 135-136, 142, 150, 152, 159; Viltart, 'S'alimenter', 266-273.
\textsuperscript{815} Sautour, 6933, Act 3/1/1643 (Transcript Généamag).
\textsuperscript{816} Seals were classified as fish in the Middle Ages and could therefore be eaten on fast days.
\textsuperscript{817} ARB, 137.01, inv. nr. 2784; van Werveke, Die Erwerbung, 8.
\textsuperscript{818} The Prussian soldier Friedrich Christian Laukhard recounted for example that some officers managed to ward off the worst effects of dysentery in 1792 by buying goats and drinking their milk. Bacha (ed.), La chronique, 435; Laukhard, Leben und Schicksale, vol. 3, 129.
Still, combatants of high social status, such as men-at-arms, were far more common in medieval armies than commissioned officers in early modern military forces. In other words: the diet of the average combatant changed markedly from the fifteenth and/or sixteenth century onwards because the social status of soldiers declined significantly in the same period (see 5.3). The master hunter of the duke of Bar stayed more than a month in the lordship of Souilly near Verdun in 1402 so he would be able to supply his master's army, which was besieging the fortress of Dudelange, on the Bar-Luxemburg frontier, with game. Four years later the prévôt of this fortress supplied wine for the flasks of the duke's horsemen. These actions derive logically from the noble status of men-at-arms. Noblemen expected to eat the same food they would have consumed when staying in their own households. The similarity of the evidence regarding meat and fish consumption in fiscal accounts of military expeditions with the animal bones found during the excavations of medieval castles is striking.

In this context the outbreak of scurvy, a disease generally associated with ship crews on long sea voyages and armies under siege, in the garrison of Givet in 1847 deserves particular attention. Aside from the traditional emphasis on miasmas and the corresponding measure of transporting the sick soldiers from their barracks adjacent to the Meuse to the fort of Charlemont, located on higher ground, the official report emphasized discrepancies between different units. Apparently, the cuirassiers counted only a single sick soldier even though they occupied the same barracks as their infantry comrades. Doctor Scoutetten, the author of the report, therefore suggested that the higher pay of these men, the direct descendants of medieval men-at-arms from a tactical if not social viewpoint, shielded them from a sudden rise in food prices, as military pay remained constant. This case is not only noteworthy because it confirms the importance of socio-economic status for discrepancies within armed forces, but also because it demonstrates that scurvy struck a modern army, which supposedly would have benefited from three hundred years of medical progress, in peacetime. Rather than an evolution of gradual improvement, military health as exemplified by the soldiers' food intake, seems to have declined over time.

6.3 DISEASE PREVENTION

6.3.1 Miasmas and Fortifications

The previous section proposed that armies' vulnerability to disease can be seen in conjunction to evolving notions about the military body and how it should be fed. This section builds on that reasoning by studying more explicit mechanisms of disease prevention in an army context. Fortifications constitute a logical start given their central role in long-term interactions between armies and ecosystems. The traditional image of the polluted medieval city has come under increasing criticism in the last decade with a growing number of historical studies demonstrating that waste disposal and hygiene standards were of major concern to medieval urban authorities. Still, this emphasis of the cleanness of the medieval city also overlooks that such an organisation came at the cost of the outskirts.822

![Figure 6.8 Drawing of the city walls of Maastricht, by Josua de Grave, 1670 (RA, RP-T-1946-63).](image)

Because comparatively few people lived here, fortifications became the place par excellence for waste disposal (see figure 6.8).823 In 1439 one of the towers protecting Wijck (Maastricht) for instance was apparently so filthy that no one would stand guard there.824 Fortifications

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824 Moreau, Bolwerk der Nederlanden, 95, 106, 123.
were hardly unique in this regard since every abandoned building or uninhabited structure was susceptible to be used in such a way. The restrictive nature of the fortifications at the edges of a settlement would have reinforced such practices, however, as archaeologists found two cesspits from the sixteenth century in the arches of the city wall of 's Hertogenbosch. When the city of Maaseik was struck by an epidemic in 1575 the city council likewise ordered the two gravediggers to work only at night and remain in a tower during the day. In eighteenth-century Sedan public slaughterhouses, latrines and collection points for waste disposal were all located alongside the walls to keep them away of the city's centre.825

The effects of this pollution had a major influence on the introduction of domesticated carp (Cyprinus carpio f. domestica) in Western Europe from the late thirteenth century onwards. Carp are able to survive in slow or stagnant, low oxygen water with much vegetation, such as moats or ponds. They swim to the surface to breath and feed on bottom- or plant-dwelling animals. This made them a valuable alternative for native river fish, which were becoming increasingly rare at that time as a result of pollution, overfishing and the use of smaller streams for milling and other activities (e.g. the disappearance of catfish, salmonids).826 The city accounts from Mons provide some of the oldest references, as they mention the restocking of the moats with eight hundred and fifty carp in 1324 and another two thousand and four hundred in 1327.827

Still, even carp would not have survived long in polluted water so the maintenance of basic hygiene standards in the fortifications became a vital issue. Significantly, these efforts retained a close association with the conservation of the fortifications themselves (see 3.1).828 The city council of Aachen for instance rewarded watchmen in 1385 for removing manure, and their colleagues in Dordrecht commanded citizens to clean the moats in 1509 in order to prevent fires and the bad air that could cause the plague. The city council of Rotterdam also supplied two chamber pots to the members of shooting guilds who guarded the walls in 1556-1557.829

Military organisations were, because of their close connection to fortifications, even more concerned with hygiene standards. Eighteenth-century garrison regulations emphasized

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825 Boonen, Ziekten en genezers, 8-9, 76-77, 87; Dardart, 'La rue à Sedan', 85, 185-186, 188-189, 191-192; van Haaster, Archeobotanica, 22-23.
826 Hoffmann, 'Environmental Change'; Deligne, 'Carp in the City', 285-295; Lentacker, Van Neer and Plumier, 'Historical and Archaeozoological Data', 87-90; Thomas, 'Hygiène', 270-279; Van Neer and Ervynek, Archeologie en vis, 39-44.
829 Fruin, De oudste rechten, vol. 1, 347-348; Laurent, Aachener Stadtrechnungen, 299; Pick, 'Verplichtungsurkunden', 236-238; Unger and Bezemer, Oudste stadsrekeningen, 239.
that sentries had to keep their post clean and prevent anyone from relieving himself or otherwise soil its surroundings. These directives had to be enforced with very practical measures: the officer of the guard simply did not let a soldier off guard duty until his post was dirt-free. Citizens who transgressed either risked losing their hats or having to clean up their mess themselves. A respectable person wore a hat when going outside, which made its taking a symbolic punishment. In 1811 a military engineer stationed in Sedan warned the city council about the water in the fortress' moat, which had become stagnant. The citizens had to close off their access to the moat, in the form of latrines, sewers etc., or the military would carry out the necessary adjustments themselves.

Armed forces might have had the advantage that they could always resort to violence, or threats, if other measures failed. This connection to violence, however, questions the very character of military control, for soldiers themselves also contributed to the range of (semi)illegal activities associated with fortifications by organising duels. One might in fact wonder how effective military regulations actually were. The water in the moats was hardly considered healthy, as de Vauban specified in his journal of the siege of Namur that on 25 June 1692, towards the end of the siege, the defenders cooked water drawn from a cistern in the castle's moat before using it to make bread. The castle's wells had become unusable at this point; one due to a direct hit by artillery fire and the other because a soldier had fallen into it and drowned. This pond dates back to at least the fifteenth century and served to collect rainwater running down from the plateau. The eighteenth-century garrison of Rocroi, on the other hand, had a special ramp leading to the moat so the horses could drink there. This would also have increased the chances of the water becoming polluted.

Ultimately even military commanders could not escape the fact that fortifications remained the most obvious place for waste disposal, first of all for the very men who guarded the fortifications. The medieval accounts of Grave from the late fifteenth century mention

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830 According to an anecdote published by Aernout van Overbeke at the end of the seventeenth century professor Daniel Heysnius made water near a guardhouse and had to pay the soldiers to get this hat back. Archiv Haus Welbergen, inv. nr. 754 Accounts city of Goch 1626-1677, f. 81; NA, Raad van State, inv. nr. 2078, Orders Castle of Namur, art. 12, Orders for the guards, art. 8, 20, 21; inv. nr. 2079, Orders 4/4/1714; 1/9/1715; 12/2/1716; 12/10/1716, 24/10/1716, 22/1/1717; inv. nr. 2081, Orders 19/08/1738, 10/11/1738; inv. nr. 2087 Orders 27/8/1761; Ordonnance du roi (June 25, 1750), art. CLXXII, CCLXXXI; Reglement en ordres 's Hertogenbosch (1770), art. VII, XLVII; Reglement en ordres Maastricht (1786), art. XXXIV, XXXV, XXXIX; Bormans, Lahaye and Brouwers, Cartulaire, vol. 6, 251-252;


832 AEL, Echevins de Liège, inv. nr. 286, 750; Biemans, August van Bonstetten, 55; de Keralio, Lacuée and Servan, Encyclopédie méthodique. Art militaire, vol. 2, 222-226; van der Heijden and Sanders (eds.), De levensloop, 85.


834 NA, Raad van State, inv. nr. 2081, 25/2/1740; RHCL, 07.E01., inv. nr. 1 Guarmisoensboek, January 1774; SAT, Resoluties, inv. nr. 1, f. 65r.; Caminada-Voorham, Loevestein, 92; Genicot (ed.), Les
payments for the repair of privies in front of, or near, the gates and at the guardhouses, and those of Venlo from 1409 refer to a privy on one of the towers.\textsuperscript{835} The fact that archaeologists regularly recover hundreds of animal bones from fortress moats is revealing in itself. The French governor of Maaseik also ordered the construction of latrines on the city walls in 1673 as prevention against disease, and in 1794's Hertogenbosch gravediggers buried the garrison's dead in one of the bastions or outlying forts for lack of other spaces. Dead horses were interred in the drill square near the citadel.\textsuperscript{836} Armed forces had a significant role in efforts to improve general hygiene in and near the fortifications because of their close connection to these spaces, but their attempts never fully succeeded.

6.3.2 Improving General Hygiene

Disease prevention did not stop with maintaining fortifications. Commanders also put considerable effort into making sure their subordinates upheld certain standards of cleanliness. While historical studies about military medicine place much emphasis on the fact that medical treatises starting with Arnald of Villanova's famous regimen on military camps, \textit{the Regimen Almarie}, discuss hygiene precautions such as examining the quality of the water or burying the dead properly, it is quite unclear whether this reflects an increasing awareness of disease prevention.\textsuperscript{837}

Villanova wrote his treatise towards the end of the year 1309 or the beginning of 1310, when travelling towards king Jaume II of Aragon, whose army besieged the city of Almeria. This rather short work has drawn the attention of historians because it represents a new kind of medical literature, one that specifically addresses the needs of an army, but the advice it contains seems to have had no practical effect on the course of the siege. The \textit{Regimen Almarie} is a fascinating text because it is based on Villanova's own experience and common sense, but for the medical practitioners present with the Aragonese army it might have contained little new information. Despite relatively rich source material, including written permissions to leave the army for health reasons, there is no indication that disease was a serious problem for the besiegers.\textsuperscript{838}

As far as the Meuse Region is concerned, we are fortunate to have access to an exceptional eyewitness testimony of army life in the High Middle Ages. The abbot of Saint-Trond accompanied a mounted army of about two thousand horsemen marching down the

\textit{Tours}, 181-187; Laurent, \textit{Aachener Stadtrechnungen}, 330; Renes and Wessels, 'Loen ende Werck', 112; van Mastrigt, \textit{Willemsstad Prinsheerlijk}, 120.
\textsuperscript{835} SLC, Archief Gemeente Grave, inv. nr. 218, f. 73 v., 82v., f. 117, 159v., 172r., 173r.; de Groot, \textit{Stadsrekeningen}, 1409, f. 29.
\textsuperscript{836} Boonen, 'De Maaseiker wallen', 82-83;Mommers, 'De gezondheidstoestand', 75.
\textsuperscript{837} Garrison, \textit{Notes}, 94-95.
Meuse valley in 1107 to join the emperor at Verdun, and left an account of his experiences in his institution's chronicle. The monk apparently thought that he would be able to lodge in a house every night and was absolutely horrified to see his new travel companions pitch camp in the open field. He complained that the stench of the horses' manure and the waste left by the men ‘who did not remove themselves very far from them (his servant and himself) to relieve themselves’ made him vomit sometimes, and grumbled about the insects that plagued him day and night, probably horseflies as well as mosquitos. At first glance this evidence fits into the traditional image of a medieval army which neglects to take even the most elementary health precautions. Yet the abbot also mentioned that the milites and squires set up tents for the nobles, constructed huts for themselves and their horses, and camped in a shadow-rich environment near a stream. In other words: they followed health precautions also prescribed in Vegetius' *De Re Militari.*

The role played by the Aachen urban militia in the sieges of the fortresses of Dyck and Reifferscheid in 1383 and 1385 provides another excellent example because the richness of the city's accounts can be complemented by six letters the contingent's commanders wrote during the latter siege to the rest of the city council. None speak of the presence of disease, but they do mention essential health precautions such as payments to clean the tunics of moths, for the making of tents and the repairing of shoes. It is also clear that one physician and two surgeons, with attendants, were present. The accounts indicate that the 1385 continent totalled more than one hundred men, perhaps even close to two hundred, since they do not specify the number of servants and other support personnel. The urban militia lost a few combatants, but to enemy action rather than disease.

This is hardly the only evidence regarding the existence of basic hygiene in medieval army camps. Honoré Bonet's 'Tree of Battles', a prescriptive work on the conduct of war dating to the 1380's, specified that an army's marshall had to look after the sick and wounded and make sure they got better. His recommandations that an army should encamp in a place with enough wood and water, not too close to the sea or mountains, and not in terrain that runs the risk of being flooded, derived directly from Vegetius, but the advice that the marshall must also take care that no one bathes in the drinking water of the horses because that affected the latter's eyesight, was original. The fiscal accounts of Albert of Bavaria, Count of Holland, specify that a certain Haestgen vander Vuyr received a payment of one schild on 8 July 1393 because he supplied 'soap that one needed in the army' (*diemen inden heer*

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839 *Foetor enim fini equorum et hominun, non longe a nobis ad secessum declinantium, paene me cotidie enccabat, crebro perurgens ad vomitum.* The term *miles*, plural *milites*, refers here to a mounted warrior who was of subordinate status, compared to actual nobles. The transformation of these groups into 'knights' is still the subject of major debates. de Borman, *Chronique*, 102-103.

840 *Laurent, Aachener Stadtrechnungen*, 61; 89-95, 277, 278, 279, 281, 292, 296.

841 *Bonet, L'arbre des batailles*, 96-97.
behoefde). His troops besieged the house (castle) of Altena at that time. One of the versions of the English military ordinances, dating to the early fifteenth century, also commanded that offal from slaughtered animals in camps had to be buried to prevent infections. These were health precautions essentially similar to those taken by seventeenth- and eighteenth-century armed forces.

Figure 6.9 Fifteenth-century miniature, made in the Burgundian Netherlands, representing the siege of Narbonne by Charlemagne's army. Note the horseman charging at the quintaine on the left, and the foot soldier in the middle, who seems to be digging a drainage ditch next to the imperial tent (BRB, ms. 9068 Les Croniques et conquests de Charlemaine, f.73.).

Archeological research might be far more informative in this regard. Excavations in Bouge, a village next to Namur on the east bank of the Meuse, found remains of fireplaces, left by three separate army encampments. The oldest of these camps dates to the late fifteenth or early sixteenth century, and included a shallow ditch measuring thirty metres in length, three metres in width and about one metre in depth to the east of the hearths' location. The authors of the report suggested that it might have served as the camp's limit. Another, and far more intriguing option could be that this ditch had a role in the camp's waste desposal or water drainage, possibly serving as (one of) the camp's latrine(s). A second excavation, at Frameries

842 A schild is a golden coin minted in the County of Holland. The amount of soap bought cannot have been large, for the count also paid two men who brought him cherries on multiple occasions one schild each. De Boer, Faber and van Gent (eds.), De rekeningen I 1393-1396, LX-LXII, 124.
near Mons, discovered the remains of shallow ditches, about five and a half metres long, in an army camp from the early modern period (late 16th-18th century). These might have prevented rainwater from flowing into the tents (see figure 6.9), but they also contained food waste and charcoal. A final interesting detail from Bouge is the discovery of a post-fifteenth-century skeleton buried rather hastily in a ditch rather than a grave.845

Burying corpses in fact remained a responsibility largely left to local inhabitants or the family and friends of the deceased rather than army members in general, even though the number might be counted.846 This would have created major problems when large numbers of bodies were involved (see figure 6.10). According to the chronicler Jean de Stavelot, the miasmas of the dead at the battlefield of Othée (1408) forced the Burgundian army to relocate to adjacent villages. The soldiers did, however, retrieve the bodies of leading noblemen, and brought those to Maastricht to be interred.847 It is possible that the corpses, initially buried in mass graves, were reinterred in 1410, when a chapel was constructed on the battlefield with a large cemetery around it. It is worth noting that the village might have suffered from an epidemic in the immediate aftermath of the battle.848

Subsequent centuries saw no significant change in this regard. Ambroise Paré wrote in his treatise of military surgery that he wanted to leave the battlefield of Saint-Quentin (1557) because of the stench of the wounded and dead. He also remembered numerous flies that rose up from the humidity of the bodies and the heat of the sun, and which would render the air pestilent and spread the plague wherever they settled.849 His experiences were not that different from the farmer Winand Mengels, who visited the battlefield of Lafeld (1747) after the fighting had ended. He was particularly horrified to see his fellow villagers rob the dead and wounded instead of helping them. The corpses, deprived of all their belongings, were eventually buried in mass graves.850 The Dutch army might have passed a regulation in 1673 that all filth, carcasses and other foul-smelling matter had to be removed from the roads on which the soldiers marched, but it is quite unclear if this regulation was ever enforced.851 The above-mentioned mass grave of horses near Maastricht, buried in a siege trench, as well as a

845 Authom and Denis, 'Exploration'; Denis, 'Frameries'; Siebrand and Collette, 'Namur/Bouge', 276-277.
847 de Stavelot, Chronique, 119.
850 Mengels, Chronyk, 39-46. See also de Cauwer, Tranen van bloed, 180-182; Klaversma, Weert tussen 1062 en 1602, 207; Lhoist-Colmon and Gabriel, ‘La colline’, 40; Martin, Une guerre de trente ans, 206.
851 Kerkhoff, Over de geneeskundige verzorging, 73.
skeleton of a soldier who died at one of the sieges of Namur indicates that many bodies were interred in existing ditches or wherever they fell.\textsuperscript{852}

![Figure 6.10 Removal and burial of corpses in a mass grave. The martyrdom of Saint-Maurice, early sixteenth century. Missal Receuil Liturgique de Bilzen, BRB, ms. 9786-90, f. 99.](image)

The large numbers of horses many armies brought with them could aggravate these problems, given the volume of waste produced by a horse. The newly established journal of French military medicine, for example, attributed an epidemic affecting the garrison of Sedan in 1776-1777 to the location of the barracks' wells. These had to be built next to a depository for horse manure in order not to hinder military exercises.\textsuperscript{853} Most contemporaries, however, perceived horse waste as an asset rather than a problem, for it had a key role as fertilizer in agricultural societies. French regulations from 1750 stated that the \textit{majors des place}, staff officers in a military garrison, could dispose of the manure of cavalry regiments as well as the contents of the latrines providing that they ensured that the buildings were not damaged.\textsuperscript{854}

\textsuperscript{853} Rambaud, 'Observations sur la fièvre putride et maligne'; Hall, ‘The Changing Face’, 266.
As for soldiers, maintenance of basic hygiene quickly became connected to simply taking care of one's equipment. The famous military manuel of Johann Jakob von Wallhausen, published in 1615, already mentioned that the Kapitän d'armes, a non-commissioned officer responsible for a company's arms, had to take care of his unit's sick. The regulations issued by the colonel of the Horion regiment to his men in 1757, a unit raised in Liége for French service, indicate a focus on neatness, but also show that the colonel was mainly concerned with the image his men presented to the general public. The soldiers had to wash their hands and faces regularly, and powder their hair. Sixty years later captain von Bonstetten wrote in his diary about inspections of his men's laundry, food, feet and underwear. At that point basic hygiene had clearly become incorporated into the military's range of disciplining mechanisms.

The role of military discipline becomes far more ambiguous if one considers prohibitions regarding swimming or bathing. The governors of the eighteenth-century garrison of Namur forbade their soldiers to swim or bathe in the Sambre or the Meuse alongside the city from the training grounds near the Bulet gate until beyond the training grounds of the Saint-Nicolas gate. In 1760 the commander even instituted special patrols to ensure that his orders were respected. The garrison regulations of Maastricht mention similar prohibitions for the Meuse between Maastricht and Wijck. The inclusion of specific places near these cities' centres is of major significance. Military commanders would likely have recognised the value of these activities, but they did not want naked soldiers splashing around where citizens could see them. Officers banned smoking for similar reasons not only near gunpowder storages, but also on the street or when on guard duty. The ashes had to be deposited in ashrays.

In specific circumstances the military might actually have spread basic health standards among society at large. The mutineers of the Spanish Habsburg army who occupied Weert in 1601-1602 for instance ordered the mayors to remove filth from the streets and repair the gutters under the city walls. The town council also had to make sure that the guardhouses were regularly cleaned. The military concern with keeping the immediate environment of guard posts dirt free would in fact not only have benefited fortifications, but

855 NA, Raad van State, inv. nr. inv. nr. 2078, Orders Castle of Namur, art. 3, 4, 5; inv. nr. 2087, 10/8/1759; inv. nr. 2088, 13/6/1771; Le guide des sous-officiers, 254-256, 270-271, 300; Unter-Officier-Reglement, 193-194; Barbe, ‘Rocroy, ville de garnison’, 109; De Harzé, ‘Manuscrit’, 262; Dinges, ‘Soldatenkörper’, 83; Kerckhoffs, Hygiène militaire, 172-177; Poswick, Histoire, 175, 177; Teunisse, Onderdaan in Oranje’s oorlog, 127.
857 NA, Raad van State, inv. nr. 2078, Orders for the commander of the guards on the Medianée, art. 4, 5; inv. nr. 2081, Generale Orders, art. 14, 24; inv. nr. 2087, 14/6/1759, 10/6/1760; Reglement en orders Maastricht (1786), art. XXXV.
858 Biemans, August von Bonstetten, 111; de Brack, Avant-Postes, vol. 1, 112-113; Kerckhoffs, Hygiène militaire, 174-175; Poswick, Histoire, 197, 199.
also urban centres since soldiers guarded important locations, such as the town hall or markets. A letter from a civilian recruiter for the French regiment Royal Liégeois in Maaseik (1789) even specifies that he bought a recruit new spats and had his linen washed before sending him to the officer in charge of recruiting. Conversely, the garrison commander of Namur had to remind his men in 1760 to respect the city's regulations to keep the streets clean. In this way the legislation passed by military and urban authorities was complementary rather than conflicting.

Women present with the army also played important, and generally gender specific roles. Medieval and sixteenth-century armies had special functionaries tasked with both organizing the camp followers and maintaining basic hygiene; the king of the 'ribauds' and the 'whore's sergeant' (Hurenweybel). The former performed all sorts of menial tasks for rulers or city councils and also supported armies on campaign. The latter had to ensure that the 'Tross' or camp followers, did their duty, which included cleaning the camp's latrines. The regulations of the eighteenth-century garrison of Namur likewise stipulated that soldiers' wives had to clean the barracks on Wednesdays and Saturdays, when drummers beat the order around one p.m., and cantinières were still expected to help treat the wounded in the nineteenth-century French army.

Military quarantine measures were far more far-reaching, however, than the traditional association of women with prostitution. A soldier serving in the Spanish garrison of Namur testified before the provincial court that he had spontaneously offered his help to carry sick soldiers who had arrived in the city in 1689. When his officers learned about this, they beat and forbade him to approach these sick again. The Dutch navy on the other hand controlled incoming ships suspected of bringing epidemic disease from at least the eighteenth century. The Admiralty of the Maze (Meuse) even established a special harbour near Hellevoetsluis where ships arriving from the East Indies had to remain in quarantine from seven to forty days. This suggests that the historical concept of a frontier included health

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862 NA, Raad van State, inv. nr. 2081, Generale Orders, art. 12, 13; Cardoza, Intrepid Women, 79-82, 123-125.
aspects as well. Guards stationed at fortress gates likewise had to turn away people suspected of spreading disease.\textsuperscript{864} Armed forces eventually saw significant changes in prophylactic health care, but at the same time medieval hygiene measures, already well developed, continued to govern military practices until well into the nineteenth century.

6.3.3 From Foraging to Natural History

The previous section revealed how commanders sought to utilise existing mechanisms of discipline and control for disease prevention. Yet maintaining army health was not solely a top-down process. Common soldiers were also quite capable of constructing shelters and seeking food themselves if the need arose. The disruptive activity traditionally denoted as 'foraging', for instance, encompassed a wide range of actions, ranging from thousands of men gathering horse fodder to individual men and women stealing a cow or gathering wood (see figure 6.11). Military commanders were often loath to sanction such actions because they lowered an army's effective strength and consequently endangered everyone; but they were rarely able to prevent them.\textsuperscript{865} The chronicle of Emond de Dynter records that during the siege of Grave in 1388 a considerable part of the Brabant forces went foraging on their own, despite instructions only to do so under the marshal’s supervision. In a subsequent Guelders counterattack many were killed, which demoralised the army.\textsuperscript{866}

Commanders obviously wanted to control combatants' movements, but there is far more at stake here than responding adequately to enemy action. The pertinent question was whether individual army members were deemed capable of managing their own health conservation. Conflicts about foraging also relate to tensions between formal versus informal knowledge.\textsuperscript{867} The French military doctor Colombier suggested that experienced soldiers should guide newer members when looking for vegetables or herbs on campaign, so they would not bring anything poisonous or useless, and his Dutch colleague Joseph Kerckhoffs (1789-1867), the medical officer in charge of the Roermond garrison, argued in 1815 that soldiers should be prevented from gathering plants they were unfamiliar with.\textsuperscript{868}

\textsuperscript{864} Unter-Officier-Reglement, 143-144; Biemans, August von Bonstetten, 62; Denys, Police et sécurité, 244-245; de Thierry, Mémoire; Devos, Allemaal beeszjes, 81; Gabriel and Metz, A History of Military Medicine, vol. 2, 108-109; Haneveld and van Royen, Vrij van zichtbare gebreken, 97-100; Leuftink, Harde heelmeesters, 186-188; Schmitz-Cliever, ‘Pest und pestilenzialische Krankheiten’, 162; van Wissekerke, Van kwade droes tot erger, 309-322.
\textsuperscript{865} de Saxe, Mes Rêveries, 136-138; Kroener, Les routes, 128.
\textsuperscript{866} de Dynter, Chronique, vol. 3, 124, 625-626.
\textsuperscript{867} de Keralio, Lacuée and Servan, Encyclopédie méthodique. Art militaire, 408-412; de Rabutin, Commentaires, vol. I, 61; Shively Meier, Nature's Civil War, 134-151; Teunisse, Onderdaan in Oranje’s oorlog, 77-78; von Bayer, Die Erhaltung; 85.
\textsuperscript{868} Colombier, Préceptes, 244; Kerckhoffs, Hygiène militaire, 91-92.
These perceptions were hardly unique. In 1747 the French commander at Huy ordered the guards at the gates to see to it that no plums entered the city because they caused dysentery. The commanders of Namur gave similar instructions to their subordinates in 1740, 1741 and 1760. These officers shared a general assumption that the eating of unripe or rotten fruit was a major cause of dysentery and saw it as their responsibility to prevent lower-ranking soldiers, who apparently did not have the necessary knowledge, from doing something that damaged their health.  

Even though physicians and surgeons regularly, if not invariably, accompanied armies from at least the High Middle Ages, it is quite unclear to what extent they could control medicinal practices within those armies. The Freiherr von Natzmer recounted in his memoirs that as a young ensign in the Dutch army he became ill from a ‘camp disease’ (Lagerkrankheit), in the aftermath of the failed siege of Maastricht in 1676. His comrades put him on a waggon with other sick soldiers, after which he started to suffer from dysentery. He then drank lapis prunellae, a mixture of salpeter, sulphur and barley water, felt better, left the waggon and arranged to stay at an inn. He relapsed later and had to go to a local doctor. Of special interest here is that he learned about this mixture from the count of Dohna, a Prussian general whom he served as a page before entering the army. This receipt must have been, or

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have become, quite widespread, since Samuel Hahnemann mentioned it as an ineffective treatment in his famous eighteenth-century *Apothekerlexikon*. Still, during the Napoleonic Wars many soldiers continued to trust in gunpowder's healing powers.  

This use of gunpowder is not only indicative of soldiers helping themselves, but might actually be rooted in specific medical theories. Colombier argued for example that the smoke of tobacco and gunpowder drove miasmas away. The perceived importance of miasmas was such that the burning of aromatic herbs became standard practice in spaces where wounded or sick combatants were kept. A fiscal account relating to the care given to wounded horsemen from Namur in 1347 accordingly note the purchase of herbs for the room where the wounded lay.  

The regulations for ‘the prevention and curing of diseases’ of the Dutch army (1673) required the burning of herbs in hospitals or other places where sick soldiers stayed. These hospitals also adopted the medieval practice of keeping gardens so they could grow their own herbs.

The emphasis on gardens is imperative because they existed everywhere soldiers stayed for extended periods of time: fortifications, army camps and hospitals. This would imply at the very least that some soldiers acquired basic forms of botanical knowledge. Doctor Jean Pierre Paul Bovy, who grew up in the citadel of Liège in the late eighteenth century, still recalled the magnificent gardens of the garrison's officers when writing his memoirs in the late 1830's. Many plant species found in nineteenth-century fortifications would in fact have originated in nearby gardens. It is only uncertain who maintained these gardens.

Biological knowledge within an army context exceeded formal medical practitioners. In the fourteenth century Guy de Chauliac (c. 1300-1368), an university-educated surgeon, made a list of people who he thought should not be allowed to practice medicine. He mentioned among others ‘men-at-arms or Teutonic knights and others who serve in war’, who ‘with conjurations and concoctions, oil, wool, and leaves of cabbages dress all wounds, and base on this that God has put his virtue in words, herbs and stones’. Dutch manuscripts of chivalric romance also attribute extensive healing skills to Walewein (Gawain), one of Arthur's knights. The notebook of the Swiss soldier Michael Andrist, who served in the garrisons of 's Hertogenbosch and Maastricht in the 1780's, might be more typical, for it

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includes several basic treatments against drunkeness, tremors in the hands and feet, infections of the fingers (panaritium), nose bleeding, and bad breath. It is conceivable that knowledge of the plants employed in such recipes (wild arum, rosemary, lavender, marjory, St John's wort, stinging nettle, betony, creeping cinquefoil, etc.) was widespread among common soldiers.\textsuperscript{876}

Armies therefore contributed in several ways to the conservation and spread of zoological and botanical knowledge. The accounts of the Count of Blois from 1362 mention that the count's farrier went to Dordrecht to buy horse medicine (theriac, laurel oil, dialtea, turpentine, dragon's blood, olive oil, \textit{sagimen vitri}) for the coming military expedition to Guelders. He also took care to compile a book on this matter (\textit{boec van medicinen van paerden}). This might have been a copy of another work, which the farrier could not bring with him. Farriers would continue to have a major role in horse medicine until the founding of veterinarian schools in the late eighteenth and early nineteenth century.\textsuperscript{877}

The famous 1831 handbook of lieutenant colonel de Brack similarly gives practical advice on how a ‘light cavalryman’ could treat wounds or illnesses of men and horse alike, in the absence of veterinarians or doctors. In not only mentions very practical precautions, some of which date back to at least the Middle Ages such as the fear of stagnant water, but also demonstrates how a soldier could make some basic medicines himself. The fact that he includes different plants without describing them implies that he expected the reader to have a basic knowledge of botany. The Dutch cavalry officer Geisweit van der Netten likewise included a list of plants to treat army horses in his 1803 handbook.\textsuperscript{878}

One could question the representativity of these examples, given the close connection between medicine and botany, or the fact that these men were relatively well educated. The Dutch militiaman (\textit{schutter}) Jan Teunisse from Amsterdam wrote down how his comrades and he made soup in the Campine during the Ten Days Campaign (1831). He was lucky enough to obtain salt, but those who did not threw some herbs into the cauldron instead. Apparently, it made their soup look like mud and blackened their lips and tongue.\textsuperscript{879} The aim here, however, is not to prove that the average soldier has extensive natural knowledge, especially if he came from an urban background, but that armies as organisations played a significant role in the spreading of biological knowledge.\textsuperscript{880} Basic forms of natural knowledge were almost a prerequisite for military life. As Erik A. Lund argued, a general has

\begin{itemize}
\item \textsuperscript{876} MD, inv. nr. 00216132 Notebook of soldier Michael Andrist, f.19r.-21v. See also Peters (ed.), \textit{Peter Hagendorf}, 59, 60.
\item \textsuperscript{877} van Doorninck (ed.), \textit{De tocht van Jan van Blois} 1362, 130-131; van Wissekerke, \textit{Van kwade droes tot erger}, 197-223; Vogeli, \textit{Flora fourragère}; Wittop Koning, ‘Een receptbriefje’.
\item \textsuperscript{878} de Brack, \textit{Avant-Postes}, vol. 2, 339-420; Geisweit van der Netten, \textit{Algemeen Samenstel}, 122-134.
\item \textsuperscript{879} Teunisse, \textit{Onderdaan in Oranje’s oorlog}, 77-78.
\end{itemize}
to be able to estimate the amount of grassland needed to produce fodder for his men's horses, while the common trooper has to actually gather the grass and herbs. The same applies to cutting wood, hunting, fishing, digging or destroying dams, dikes or trenches.881

This highlighting of informal knowledge also helps to reconsider traditional gender divisions within armies. Regulations for the Dutch army from 1729 specified that soldiers' wives would be allowed to shoe military horses. They presumably obtained the practical know-how from having to fend for themselves during campaigns. The garrison orders of Namur include one peculiar order from 12 July 1742, which says that soldiers could search for wild strawberries in nearby forests, but not bring them into the city. Apparently they peeled the fruits, which ruined them. The fact that soldiers themselves are targeted here, and not their families, who are mentioned elsewhere in the garrison orders, is notable.882

What these examples make clear is that the role of the Dutch and French military in the discovery of the mosasaur genus relate to much wider practices of armies' spreading and conservation of natural history. Basic forms of biological knowledge would have been crucial for army members to preserve their own health as well as that of the animals on which they depended. Medical practitioners, such as doctor Hoffmann, played a key role in this regard, but at the same time many common soldiers and their families also proved to be quite knowledgeable about plant and animal life.

CONCLUSION

Armies had a major role in bringing about changes in health care, but the grand narrative of progress in which armies suddenly became aware of disease prevention during the Renaissance can no longer be maintained. This assumption originates in a misunderstanding of medieval armies and a tendentious reading of the available sources, or an altogether lack of primary source material to begin with. Medieval armies suffered from epidemics during sieges and extended campaigns in different environmental contexts, but such circumstances can hardly considered typical for the kind of warfare that went on in the Meuse Region most of the time, namely mounted raiding.

Rather than persisting in such a mistaken linearity, this chapter argued that epidemics might have become more common towards the end of the fifteenth century, as a result from shifts towards larger and more permanent armed forces, which were also more likely to move into different disease environments. The widespread perception that armies, as

882 The accounts regarding the fortress of Montfort in 1342-1343 include a payment to women for planting strawberries in the orchard. NA, Raad van State, inv. nr. 2081,12/7/1742; Dibbetz, Groot militair woordenboek, 612; Gentenaar and Hupperet, ‘Personeel en werkzaamheden’, 180.
opposed to warfare, spread disease among the general population can be traced back to the
sixteenth and seventeenth century, not the Middle Ages. Serving in a medieval army still had
its risks: weather and climate were a constant health hazard throughout this research period,
and the use of waste to contaminate water supplies was well established by the fourteenth
century. Later armies developed their own adaptations of biological warfare.

From 1250 to 1850 medical theories first formulated in Antiquity, and frameworks
developed during the High Middle Ages, notably the hiring of physicians and surgeons to
accompany armies on campaign, continued to define health care within armed forces. Non-
official medical practitioners, such as soldiers, their families, and farriers, also retained an
important role in the preservation of both both humans' and animals' physical wellbeing. It
was not until the nineteenth century that military doctors, equipped with new medical
principles, took full control.

Commanders in fact sought to minimise the impact of environmental pressures by
selecting male and horse bodies perceived as most apt for military service. Because issues
regarding manpower availability and aesthetic considerations (height) were often at least as
important as a recruit's physique, the men and animals who actually served would not always
have been the most capable. Intrusions into the selected bodies themselves could have further
detrimental consequences. Although some of these practices might appear to have been
practical measures, such as the preference for geldings, the overwhelming concern proved to
be a need to maintain a specific military identity (corporal punishment, barracks). The effects
of army growth exacerbated these changes with the diet of the average combatant becoming
significantly poorer from the sixteenth century onwards. Food such as fish, eggs, and
vegetables largely disappeared from the menu, and were not replaced by meaningful
substitutes.

Significant changes in disease prevention did eventually take place, also in response
to the above-mentioned developments. Fortifications became one of the first and most
important places for disease prevention in an army context, but even though the institution of
extensive guard systems gave commanders a large degree of control, defensive structures
often remained the only available place for waste disposal. Ironically, this has much to do with
these structures' own restrictive nature. The maintenance of basic hygiene within a general
army context remained dependent on cooperation between an army's combatant and non-
combatant elements, or even armies and society at large (burying the dead, cleaning,
treatment of sick and wounded). At the same time, military discipline mechanisms and
hygiene standards developed as mutually reinforcing practices.

The issue of discipline and control even assumed a major role in the final, and
perhaps most surprising element of disease prevention in an army context: the diffusion of
natural history. The average soldier was no fully-fledged botanist, but combatants often had to
fend for themselves and in such circumstances having a basic knowledge about the natural world could be crucial. Military officers and official medicinal practitioners, especially university-educated physicians, did not always approve of such actions and used the ignorance of some to justify extended control over all. Ultimately, it shows that even though some elements support an idea of 'progress', as it is traditionally understood, the historical reality is far more complex.