The Archaeology of the Battle of Lützen: An examination of 17th century military material culture

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Abstract

In the late 20th century, historical research on the 1632 Battle of Lützen, a major engagement of the Thirty Years War (1618-1648), came to a dead end after 150 years of mostly unfruitful discussions. This thesis examines the battle's military material culture, including historical accounts and physical evidence in the form of archaeological finds from the battlefield to provide new insight into the battle's events, but also to develop a methodology which allows a comparison between two very different sources: the eyewitness account and the 'lead bullet.' To achieve this aim, the development of 17th century firearms is highlighted through an assessment of historical sources and existing weapons and by an evaluation of various collections of 'lead bullets' from Lützen and other archaeological sites, thus providing a working baseline for interpreting bullet distribution patterns on the battlefield. The validity of bullet distribution patterns is also dependant on the deposit process during the battle and metal detector survey methodologies, which also provides vital information for battlefield surveys in general. In an overarching methodology, statements from battle eyewitnesses are evaluated and compared to bullet distribution patterns, in conjunction with the historic landscape, equipment and tactics. Together, these ultimately lead to a better understanding of the battle and its historic narrative, by asking why reported events actually did not happen at Lützen. This last element is also important for understand the reliability of early modern battle accounts in general. Overall, a more general aim of this case study has been to provide a better insight into the wider potentials of early modern battle research in Europe.

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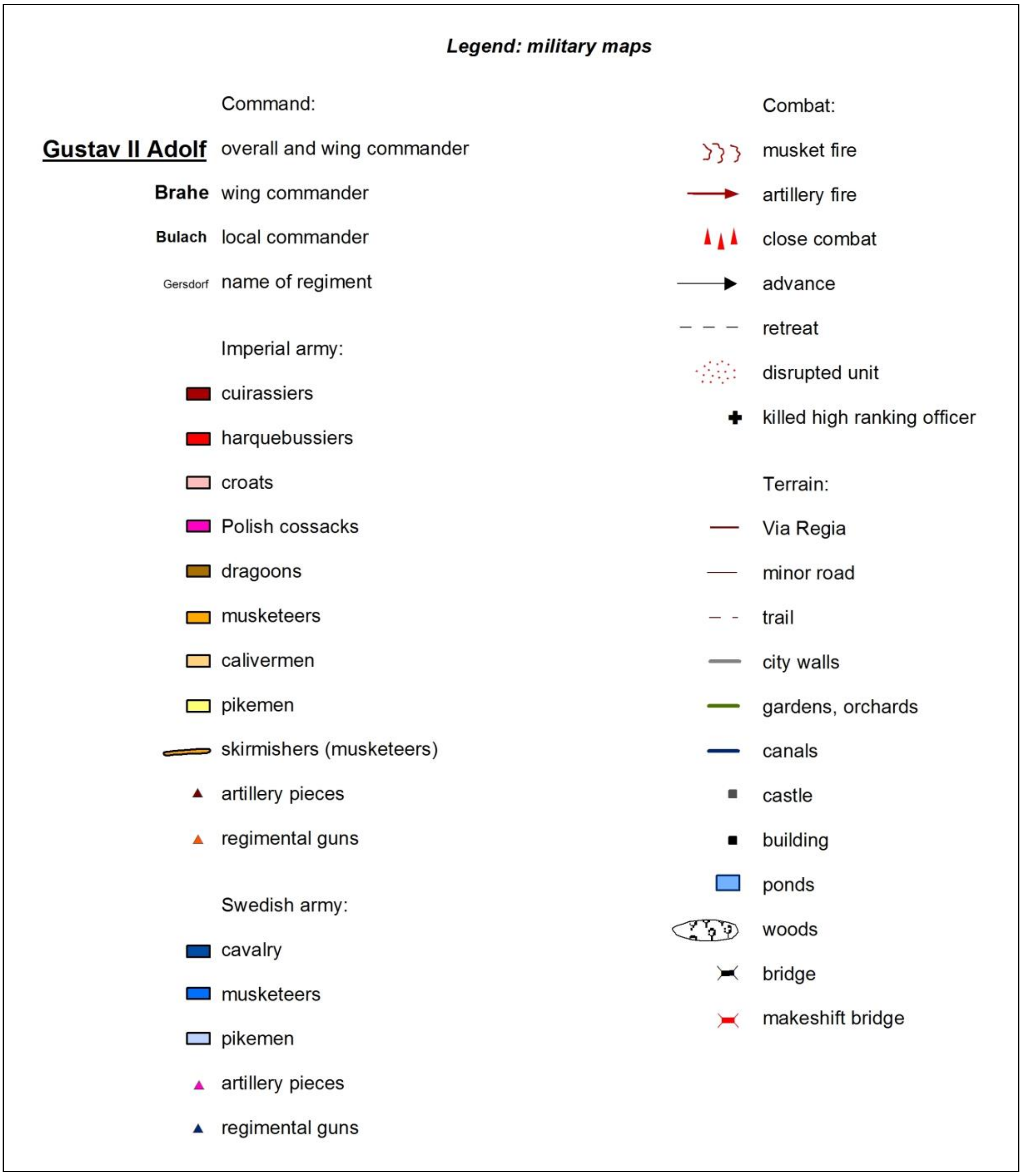
Author's declaration

I declare that, except where explicit reference is made to the contribution to others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature ______________________

Printed Name André Schürger

Legends


Legend: military maps
Command:
Gustav II Adolf overall and wing commander
Brahe wing commander
Bulach local commander
Gersdorf name of regiment
Imperial army:
cuirassiers
harquebussiers
croats
Polish cossacks
dragoons
musketeers
calivermen
pikemen
skirmishers (musketeers)
artillery pieces
regimental guns
Swedish army:
cavalry
musketeers
pikemen
artillery pieces
regimental guns
Combat:
musket fire
artillery fire
close combat
advance
retreat
disrupted unit
killed high ranking officer
Terrain:
Via Regia
minor road
trail
city walls
gardens, orchards
canals
castle
building
ponds
woods
bridge
makeshift bridge

Legend: bullet distribution maps

Musket, pistol/carbine:

- musket 99%
- musket 75%, carbine 25%
- musket 25%, carbine or pistol 75%
- carbine
- pistol or carbine
- pistol
- rifle

Firing evidence musket, pistol/carbine:

- impact damage 70%-90%
- impact damage 40%-60%
- impact damage 10%-30%
- firing evidence, no impact damage

Special ammunition:

- parted bullets
- pistol slugs
- pistol or carbine slugs
- carbine slugs
- carbine bullets with iron pin

Bullet distribution concentrations:

- high density bullet distribution
- low density bullet distribution
- very low density bullet distribution
- impact damage 70%-90%
- impact damage 40%-60%

Bullet distribution by musket models:

- heavy musket m1
- Imperial musket m4, M5
- Swedish musket M2, m3

Bullet distribution by pistol models:

- calibre 8.4mm-11.7mm
- calibre 13.8mm-14.5mm

Chapter One

Introduction

On 16 November 1632,[1] the Swedish-Protestant[2] army commanded by the Swedish King Gustav II Adolf met Wallenstein's Imperial-Leaguist[3] army at Lützen. It was the first battle on open ground Gustav Adolf did not win decisively since he landed his army in Germany in 1630.

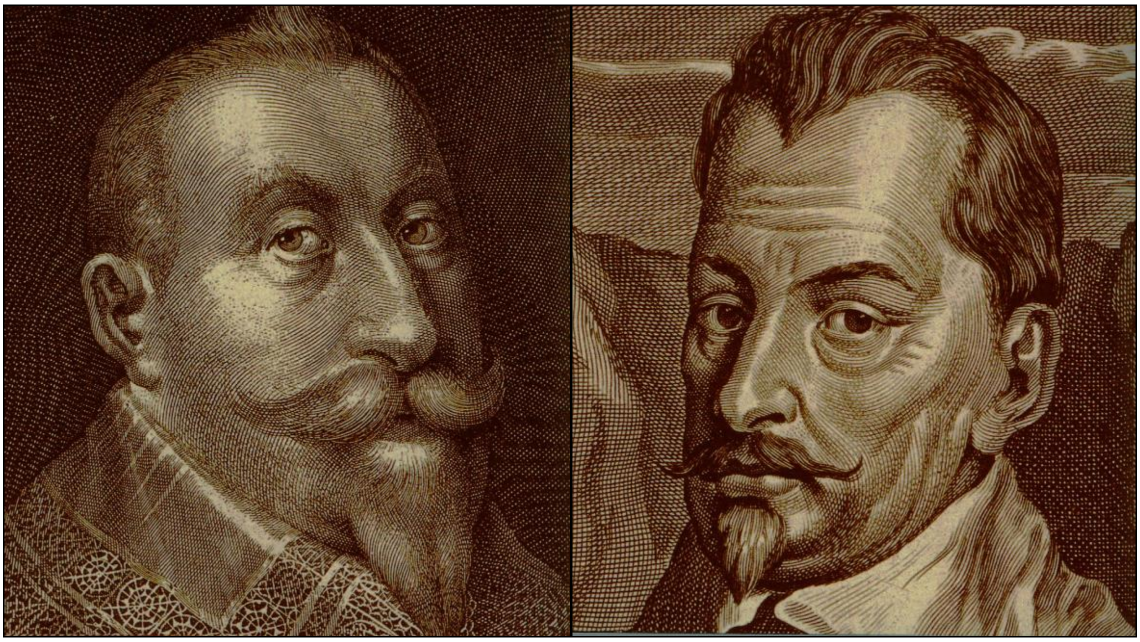


Figure 1: Left: Gustav II Adolf 'Vasa', King of Sweden, Commander of the Swedish-Protestant Army. Right: Generalissimus Albrecht Eusebius Wenzel Graf von Waldstein, Herzog von Friedland, called Wallenstein, Commander of the Imperial-Leaguist Army.

The Swedish intervention in the Thirty Years War in general, and the Battle of Lützen in particular, have long been seen as a turning point in weapons development and tactics, marking the peak of a 'Military Revolution'[4], which has been viewed as a prelude

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[1] For simplification, all dates in this thesis are given according to the Gregorian calendar; however, quoted dates according to the Julian calendar from Protestant sources are not changed.
[2] Gustav II Adolf's ('Gustav Adolf' in this thesis) army at Lützen consisted of the Swedish army, a composite of Swedish, Finnish, Scottish and German regiments, plus some German regiments from his Protestant allies Saxony and Hessen-Kassel. The correct term for his forces would be Swedish-Protestant army, which is shortened to Swedish army for simplification.
[3] The Holy Roman Empire fielded two independent and rival armies; the Imperial army under the Emperor Ferdinand II, commanded by Wallenstein, and the Leaguist army from the Catholic League under the Elector Maximilian of Bavaria, commanded by Generalleutnant Johann Tserclaes Graf von Tilly. After Wallenstein was released from command, Tilly commanded both armies. Wallenstein was reinstated as Generalissimus after Tilly's disaster at Breitenfeld 17 September 1631 and his death at Rain on the Lech 15 April 1632. Wallenstein reassembled an army consisting of veteran and newly raised Imperial regiments and a few Leaguist regiments. Although the correct term would be Imperial-Leaguist army, it is shortened to Imperial army as Wallenstein was an Imperial commander and most units were Imperial regiments.
[4] Roberts 1967a, Roberts 1967b.

to linear infantry tactics based on superior firepower, supported by light manoeuvrable regimental guns, that culminated in the Napoleonic era. Our present knowledge of Thirty Years War tactics is based chiefly on contemporary military handbooks, which often idealize situations, while battles of the same period are often poorly understood, due to the lack of reliable sources. However, both issues are connected and can not be understood independently. This thesis is a detailed study of the Battle of Lützen within the wider context of military equipment, weapons, and tactics.

1.1 The material: Archaeological and historical sources

Battlefield archaeology

A vital part of this thesis is drawn from the results of an archaeological investigation on the Lützen battlefield launched as part of the 375th anniversary commemorating the death of the Swedish King. This event is still remembered by annual ceremonies at the Gustav-Adolf-Memorial in Lützen and in Sweden on 6 November.[5]

The archaeological methodology used here was first developed by Douglas Scott for his 1983 investigation of the 1876 Little Big Horn battlefield in the USA.[6] Scott demonstrated that there is a substantial difference between what we believe occurred based on historical sources, and what was actually found on a battlefield. Since then, many more battlefields from different periods and countries have been archaeologically investigated, such as Culloden 1746 (UK), Camden 1780 (USA), Poltava 1709 (Ukraine), Lund 1676 (Sweden), Towton 1461 (UK), and Kalkriese 9 (Germany).[7] Together with many other projects collecting new archaeological evidence of a battle's events, the methodological effort has become known as 'Battlefield Archaeology'. Although some used different approaches and methodologies adapted to the special requirements of a particular battlefield, all shared some form of systematic metal detecting, collecting and recording small finds from the top soil. In terms of the number of collected small finds and effective working hours, Lützen became one of the biggest European battlefield surveys to date.

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[5] Limberg/Schuberth 2007, 159. The Protestants still commemorate the death of Gustav Adolf according to the Julian calendar on 6 November.
[6] Scott 2009, 253, Scott 2010, 45-48.
[7] Pollard 2009, Smith/Legg/Wilson 2009, Mandzy 2012, Knarrström 2009, Sutherland 2009, Rost/Wilbers-Rost 2012.

In a five year project, carried out by the author, approximately one third of the battlefield was systematically surveyed with metal detectors. It was the first survey using full coverage metal detector sweeps on such a large scale (section 4.3.1). A huge amount of unstratified small finds were recovered from the top soil, recorded in a data base, and their position mapped through a G(eographic) I(nformation) S(ystem). The GIS-based small finds distribution maps, which provides denser distribution patterns than on any other battlefield due to the full coverage detector sweeps, are a substantial asset to researching this battle. A key to understanding the survey's archaeological material is the firearms ammunition, which is usually the most numerous class of finds from early modern battlefields, and research has concentrated on their evaluation. However, since it became clear that a vital part of research on bullets - their allocation to firearm models - has been misunderstood in recent studies, clarifying the bullets and weapons became a more extended and very important part of this thesis than anticipated, because it provides a new insight into early modern calibre specifications, which is a key aspect of battlefield archaeology. Largely because the explanation of weapon calibres became much more extensive than expected, a planned evaluation of the non-ammunition small finds was not included in this thesis. There was also insufficient archaeological data on non-ammunition artefacts to ascribe dates and evaluations of them, because there was no consolidated, or regional, much less national, military production of buttons, buckles, and other uniform pieces and equipment during the Thirty Years War. The early modern non-ammunition material has to be indentified first, before distribution patterns can be interpreted, which forms a thesis in itself.

In addition to the archaeological field survey, aerial photographs were taken, a geophysical survey was executed, and trial trenches were dug to locate the Imperial field fortifications and the mass graves. However, the results of these investigations were limited and play only a minor part in this thesis, except that one mass grave was actually found in the first trial trench, specifically situated for the purpose.

Military history

Within days of the battle's end, documents about the battle were being generated. From the first accounts, the battle's actual events were superimposed, embellished and co-opted by rumours, stories and legends regarding the death of Gustav Adolf. These were published as pamphlets, or ‘relations’[8], all over Europe and fairly soon the battle’s actual events were buried in the expanding literature. Most historical sources contradict each other and there are not many real facts written about the battle.

During research it soon became clear that it was necessary to include an analysis of the historical material to evaluate accuracy and sort out buried facts. This effort required much more attention and space than anticipated because most publications about the Battle of Lützen were flawed and required interpretive explanation. The historical material reviewed included most published and some unpublished contemporary written sources and all known pictorial representations, as sketches, copperplates, and paintings. Evaluation of the accounts was challenging because they were written in seven different languages in a 17th century style, which not only required translation, but also a correct interpretation of specific terms which proved to be crucial to understanding the battle. Very few published translations exist; most of them are inaccurate and required partial re-translation.

1.2 Thesis structure and research questions

How should the archaeological and historical sources be analysed to better understand the battle? It is the intention of this thesis to compare the archaeological materials with the historical sources, in a fashion similar to a crime scene investigation with physical evidence and witness testimony.[9] However, both types of evidence have a different quality with certain advantages and disadvantages. The main disadvantage is that they are fragmented; we do not have a witness testimony from every battle participant nor do we have every object left on the battlefield. Therefore, both sources need to be analysed and evaluated; because they can only be understood together, some issues will be discussed over several chapters, which is necessary to enable a comparison between archaeological and historical sources to better understand the Battle of Lützen and with it the nature of Thirty Years War tactics – the aim of this thesis. It is also the intention of this thesis to discuss and clarify all the misunderstandings and myths, which are constantly repeated in modern research.

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[8] ‘Relation’ is an early modern term for printed pamphlet describing a single event or battle, and, on rare occasions, also for a book.
[9] Scott/Fox/Connor/Harmon 1989, 5.

Is it possible to distinguish between facts and myths in historical sources? This question constitutes the beginning and the end of this thesis. Chapter Two gives a short overview of the problem by characterising the research of the last 150 years, followed by a first categorization of the historical sources and the development of the historic narrative. Their reliability, however, is discussed in more detail in connection with the archaeological sources in Chapters Six through Eight. The development of the historic narrative is very complex and involved, excerpting half sentences, sentences, and entire sections from each other; sometimes texts were not copied but utilized as a model, which is not always clear. However, as long as it is evident that one copied from the other, the term 'copy' is used in this thesis, although sometimes words have been changed between each text version. Because research on the historical narrative has not been done since Gustav Droysen in 1865 (section 2.1), it was necessary to go to some lengths to recompile the historiography of the written data.

In Chapter Three, the armies at Lützen will be characterized. First, the evaluation of the historical sources leads to preliminary first interpretations about the regiments participating in the Battle of Lützen. This table of organization is followed by an analysis of the types and models of firearms at the time, their production, effectiveness, and specifications, based on early modern military handbooks. The weapon calibre, in particular, is of importance, because it allows the ammunition found on the battlefield to be allocated to specific firearm types and models. In addition, a short overview of troop formations and tactics is given, which is important to assess the effective firing range and the linear frontage of units, which in turn is vital to understanding the bullet distribution patterns on the battlefield.

The deposition process of artefacts during the battle and the clearing process after the battle determine how much we can find and the metal detector survey methodology determines the recovery rate of small finds; both are vital to understanding the relevance of small finds distribution patterns on battlefields. Metal detector test grids were made on the battlefield to shed some light on recovery rate and vertical small finds distribution in the topsoil, which will be discussed in Chapter Four.

A detailed analysis of the ammunition from the battlefield is provided in Chapter Five. Although some work has been done on 17th century ammunition, the issue of how to measure 'lead bullets' and allocate them to specific weapon types and models was not entirely understood yet. The data collected from bullets of the Swedish warship *Vasa* provided evidence for ammunition specifications, which are discussed together with the results on firearms from Chapter Three, making it possible to allocate the bullets from the Lützen battlefield to specific types and models of firearms. The results are compared to bullet samples from other battlefields and ship wrecks to verify them and to generate an overview on 17th century weapon development from an archaeological point of view. Although a forensic analysis on 'lead bullets' in terms of allocating them to one specific weapon is not possible, features and marks on bullets are discussed in some length. There is also a short introduction into bullet distribution patterns provided in this chapter. The results are compared to the statements from historical sources about the battle's events in Chapters Seven and Eight in detail. Some fragments and pieces of artillery ammunition were also found on the battlefield. Although their number is too small to be discussed at length, they provide some information about the battle's events, and provide an idea of artillery ammunition used at Lützen, and are therefore included in this chapter.

Landscape archaeology is a relatively new approach to battle research. In Chapter Six, on the basis of historic maps, statements by battle eyewitnesses and the author's experience from years of work at Lützen, an attempt will be made to reconstruct the historic battlefield landscape, an important step towards understanding the battle. It is believed that Wallenstein's field fortifications were an important deciding factor, something that will be discussed in detail due to new results from excavations and survey.

Deployment and command of both armies at the beginning of the battle according to all historical and archaeological evidence, in consideration of the terrain and unit formation types, sizes, and frontage, is discussed in Chapter Seven.

This interdisciplinary approach is demonstrated in Chapter Eight where it serves as a final step for reconstructing the battle's events with as much detail as possible. Known historical sources are re-evaluated, new sources are interpreted and compared with the archaeological sources and conclusions discussed. In particular, relating events to small finds distribution patterns is a challenge, a goal that was not always possible to achieve.

A short review of the results of the battle is given in Chapter Nine, including the casualties and the mass grave found in 2011.

The Tenth Chapter concludes the study of the Battle of Lützen. It discusses the potentials and limitations of battlefield archaeology and military history, the reliability and validity of the different sources, and presents a summary of both what is known and what is still necessary to discover about the battle, as well as offering suggestions for the field of battlefield archaeology.

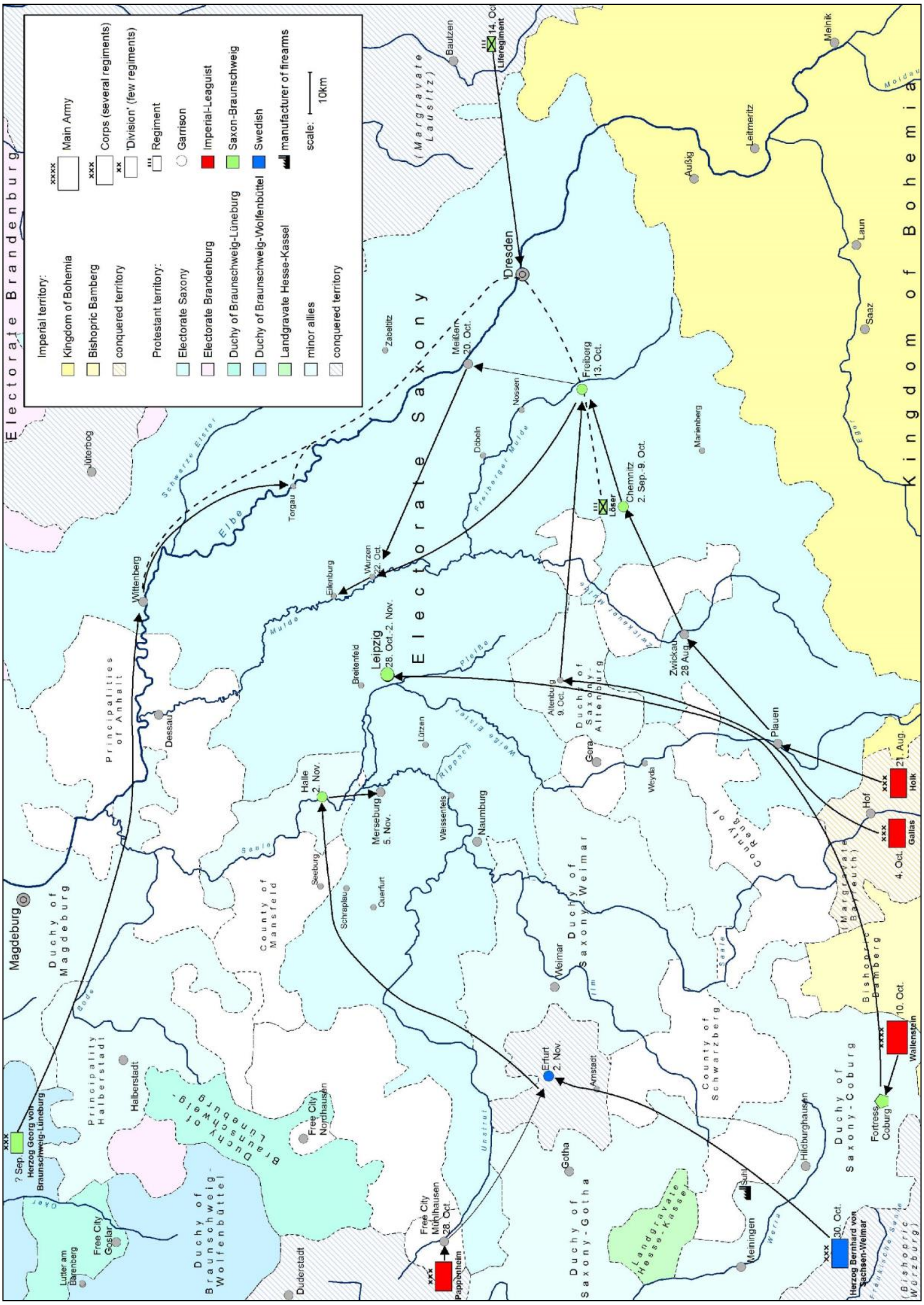

Figure 2: Start of Wallenstein's Saxony campaign 21 August to 5 November (based on Sennewald 2013, 145-200).

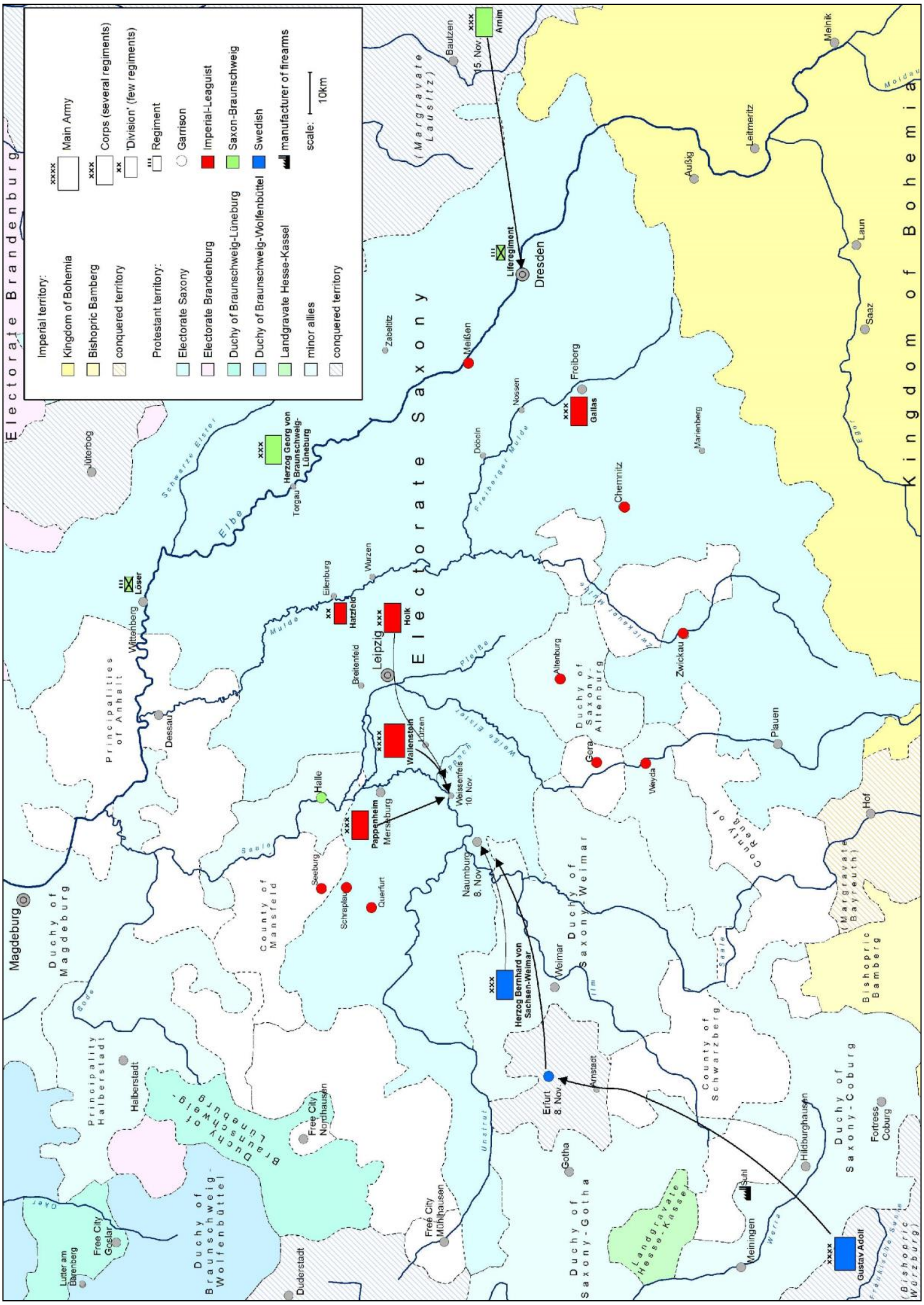

Figure 3: Gustav Adolf's approach to Naumburg 5 to 14 November.

1.3 The Battle of Lützen: A short introduction

The most famous military leaders of the Thirty Years War, Wallenstein and Gustav Adolf,[10] met only twice in battle. After losing a campaign of logistics, Gustav Adolf was finally forced to attack Wallenstein's fortified camp at Nurnberg/Alte Veste on 3 September 1632; the result was a Swedish disaster.

Imperial/Leaguist/Saxon	Swedish	English
Generalissimus (a)		
Generalleutnant	Generalleutnant	Lieutenant general
Feldmarschall	Fältmarskalk	Field Marshal
Feldmarschall Leutnant (b)		
General der Kavallerie General der Infanterie Generalfeldzeugmeister	General för Kavalleriet General för Fotfolket General för Artilleriet	General of Horse General of Foot General of Ordnance
Generalwachtmeister	Generalmajor	Major-general
Oberst	Överste	Colonel
Oberstleutnant	Överstelöjtnant	Lieutenant colonel
Obristwachtmeister	Major	Major
Rittmeister Hauptmann	Ryttmästere Kapten	Captain (Horse) Captain (Foot)
Kapitänleutnant	Kaptenlöjtnant	1st Lieutenant
Leutnant	Löjtnant	2nd Lieutenant
Cornet Fähnrich	 Fändrik	Officer cadet/ensign (Horse) Officer cadet/ensign (Foot)
Wachtmeister Feldwebel	Sergeant för Kavalleriet Sergeant för Fotfolket	Sergeant (Horse) Sergeant (Foot)
Corporal	Korpral	Corporal

a: unique rank for Wallenstein
b: out-of-date 16th century rank for Holk (Fronsperger 1558, 83-84)

Table 1: Ranks in the Imperial, Leaguist, Saxon and Swedish armies and their English equivalent (Brzezinski 2001, 19). Ranks are not always used consistently in historical sources.

After the Battle of Nurnberg/Alte Veste, Wallenstein saw an opportunity and marched north to join Holk devastating Saxony (Fig. 2), Gustav Adolf's most important but unreliable ally, to enforce a separate peace on the elector Johann Georg. The Swedish King had no alternative but to follow Wallenstein (Fig. 3). The two armies met at Lützen 16 November 1632, engaging in what became the most famous battle of the Thirty Years War; not because it was decisive, the largest or bloodiest battle, but because it was one of the longest and most tragic. With the Swedish King's death at Lützen, the dream of a Swedish victory died as well. The Imperial army also lost one of its greatest leaders, Feldmarschall Gottfried Heinrich Graf von Pappenheim and even the Generalissimus

[10] In order to avoid confusion, all names, titles and military ranks are quoted in their original language, in particular, because some German military ranks are unique and difficult to translate, such as 'Obristwachtmeister' or 'Generalissimus' (See Tables 1 and 2). Some high-ranking titles, such as 'king', 'emperor' and 'elector', are given in English.

himself was wounded. Wallenstein was murdered by his own soldiers 15 month later. With the most capable military leaders gone, the war went on for another 14 years.

German/Swedish/Italian	**English**
Prinz (German)	Prince
Herzog (German)	Duke
Graf (German), Greve (Swedish)	Earl/Count
Freiherr (German)	Baron
Marchese (Italian)	Marquis

Table 2: Titles of nobility.

Chapter Two

Historical sources and historiography

The Battle of Lützen has been a subject of interest from the time it was fought until the present day. This chapter will identify the various historical accounts, comment on their reliability, and give a short overview of the modern studies which have most influenced research.

2.1 Historiography

Thousands of publications contain at least a short version of the Battle of Lützen. However, there are only six independent academic monographs on which almost all publications are based.

Gustav Droysen

The first methodical study of the Battle of Lützen was published by Gustav Droysen in 1865.[11] He was the first to realise that the central drawback to research regarding the Battle of Lützen, as for all battle research, is the lack of records, documents and physical "remains".[12] Almost all historical sources concerning a battle are necessarily only subjective accounts of a past event as observed by eyewitnesses; opinions; or retelling of stories by others. Given the diversity of accounts and their internal conflicts, it would be a methodological and logical error to believe in reconstructing facts from historical sources. In Droysen's opinion the truth diminished the longer the passage of time between battle and account, and eyewitnesses are more reliable than non-eyewitnesses.[13] In the end he came to the conclusion that we cannot reconstruct the events of the Battle of Lützen from historical sources, because the eyewitnesses reported only single incidents, while those 'relations' with a description of the whole battle were "artificial products" without any value.[14] Droysen's work is still the best methodical study of the historiography of the Battle of Lützen, except for his unfair antipathy against the catholic eyewitness Diodati.

[11] Droysen 1865. The most quoted older publication is from Philippi 1832. See also Droysen 1865, 73.
[12] Droysen 1865, 72. His observation, the lack of physical evidence (i.e. finds from a battlefield) is remarkable for his time.
[13] Droysen 1865, 73.
[14] Droysen 1865, 231-232.

Herman Diemar

In 1890, Herman Diemar criticized Droysen's thesis and methodology,[15] but in trying to prove the unreliability of the most important Imperial eyewitness by using an erroneous printed account, his own PhD thesis was a serious setback for research.[16]

Karl Deuticke

In 1917, Karl Deuticke published a promising work. He utilized Droysen's methodology, using primarily eyewitness accounts, and acknowledged that even eyewitnesses were not free from making mistakes when they reported events they had not seen themselves. Most importantly he recognised that it was of great importance to locate the position of eyewitnesses on a battlefield.[17] Unfortunately, he did not follow his own guidelines and in the end used any historical source that supported his thesis.

Joseph Seidler

Later, in 1954,[18] Joseph Seidler claimed that "historical science in general is at stake, if it were not possible to reconstruct the events of the Battle of Lützen."[19] Seidler left verification of sources aside by using mostly accounts of non-eyewitnesses. His obsession to prove that Gustav Adolf died on the left instead of the right wing based on Khevenhiller's unreliable account became his ruling theory and damaged his, and later, research.[20] His most important observation was that an eyewitness' account might have some value even if it was written years after the battle.[21]

Swedish General Staff

In 1939 the Swedish general staff published their study of the Swedish wars with a substantial chapter about the Battle of Lützen.[22] It relied too much on experiences during World War One and tried to translate it into 17th century warfare. According to the Generalstaben, the Swedish army advanced slowly but steadily in one mighty front. The second line became, exclusively, reinforcement in a modern fashion as attack support

[15] Diemar 1890, 2-4.
[16] Diemar 1890, 18-23 and 67-68. See also Seidler 1954, 9.
[17] Deuticke 1917, 13-14.
[18] Seidler had written this thesis in the 1930's, but the war prevented him from publishing it (Seidler 1971, 50-51).
[19] Seidler 1954, 9.
[20] Seidler 1954, Seidler 1971. See also Brzezinski 2001, 94. Unfortunately, Seidler influenced research for many decades, such as Roberts 1958, Mann 1971 and Junkelmann 1993.
[21] Seidler 1954, 14.
[22] Generalstaben 1939.

following the principle of operation in depth, which not only ignores almost all eyewitness accounts, but also contradicts principles of 17th century warfare.

Wedgewood

Although there was no genuine English research, there is one independent short study on the Battle of Lützen in Wedgewood's The Thirty Years War, published in 1938, which had some influence. Surprisingly, it is based exclusively on eyewitness accounts, but left out most of the German and Italian sources.

Richard Brzezinski

For almost half a century, there was little progress in research, with the exception of Barbara Stadler's biography of Pappenheim in 1991 which contained some new sources, until Richard Brzezinski published his results in 2001. Marking a return to Droysen's more scientific method, he used mostly, but not always, eyewitness accounts with great success and discovered some new sources, in particular pictorial representations. His most important result was the reconstruction of the Imperial battle array. However, most papers containing a study of the Battle of Lützen are still based on the results of Seidler, Generalstaben and to a lesser degree of Deuticke, while Brzezinski's important observations seem not to have a major impact on research.[23]

2.2 Historical sources

A key issue is that a large number of historical sources will inevitably lead to very different results in historical research, largely because of an uncritical use of sources. Therefore, the first requirement is to evaluate the historical sources of the Battle of Lützen. There are four main types:

1. Primary sources are eyewitness accounts. They form the most important sources for reconstructing a battle's events. This includes also the records of the court martial verdicts at Prague.
2. Official records and documents such as written orders or correspondences about the terms of surrender. Although there are a large number of objective documents for contemporary campaigns and sieges, there are none for the Battle of Lützen itself.

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[23] Examples are Guthrie (2002, 200-232), who was greatly influenced by Seidler and Generalstaben, and Mortimer (2010, 171-176), who was influenced by Seidler and Guthrie.

However, there are a few important documents written before and after the battle, including lists of troop strength and casualties, as well as a few orders from Wallenstein, such as the famous order he sent Pappenheim (section 7.1.3).

3. Secondary sources are accounts by contemporary writers, who were not present at the battle. There are two basic categories; those who were not in contact with participants, and those who were. The first are generally unreliable. Unless it can be shown that the author was in direct contact with participants and obtained specific information from eyewitnesses, information in these accounts must be considered suspect.
4. Although copperplates, maps and paintings are, technically, just a different form of historical source (primary, secondary or documentary), they are discussed in an independent section.

2.2.1 Primary sources: Eyewitness accounts

2.2.1.1 Methodology

The most important historical sources are the eighteen eyewitness accounts. These are subjective and the following considerations must be observed:

1. Was the person actually an eyewitness?
2. Every eyewitness saw only a small portion of the battle and their accounts of only those events are potentially reliable. Their descriptions of all other events are based on hearsay and are at the very least doubtful. It is, therefore, essential to determine their position in battle, if possible.
3. A high-ranking officer on horseback, moving from place to place, had a better overall view of the battle than a low ranking officer on foot, who remained with his unit during battle. [24]
4. Statements about enemy forces, their strength, numbers and the names of officers and regiments are generally unreliable. Even if their intentions were to relate facts, enemy forces always seem larger than they actually were, and the knowledge of enemy 'uniforms'[25] and commanding officers is basically superficial.

[24] Babits 1998, XV.
[25] Infantry regiments of the Swedish army were usually clad in a specific color, but those were not national uniforms as we understand today (Brzezinski/Hook 2006, 39).

5. One's own defeats are rarely mentioned and victories are usually exaggerated.
6. Most eyewitnesses felt an obligation to tell the story of the deaths of Gustav Adolf or Pappenheim in detail, although they did not actually witness it. Those events are a glorification of their heroes and largely unreliable.
7. Although Wallenstein's decision to divide his force and send Pappenheim back to the Rhineland was a strategic necessity, it nearly cost him the Battle of Lützen and could have be seen as a serious tactical mistake. Some Imperial sources tried to conceal this fact by claiming Pappenheim was present with his corps during the whole battle, which was partially true, because some regiments of Pappenheim's corps actually were on the field well before the Feldmarschall arrived with his main forces (section 3.1.2).

However, discussing incorrectly events they have not seen and enemy personnel and numbers, while being silent about their own defeats does not mean that an entire account is unreliable, as Droysen claimed.[26] The events may have been incorporated deliberately to hide something, by mistake, to make the account more interesting, or to glorify their own deeds. These nuances must be considered when evaluating eyewitness commentary.

The only way to get somewhere near the facts of the battle's events is to find out what eyewitnesses actually saw, and from that suggest what is reliable for reasons discussed under no. 2-7. If an event was seen by more than one eyewitness, it most likely happened. In some cases, an account will say something happened. By asking what caused that episode to occur, and then what the opponent did in response, it is possible to identify verifying details that might otherwise be missed.[27] Ultimately there is no method to prove if an eyewitness account is correct, beyond a reasonable doubt.

2.2.1.2 Early letters from eyewitnesses

After the battle, there was a hectic correspondence in the Protestant Alliance, assuring everyone that the Swedish army was in good order despite the death of Gustav Adolf.[28] Other than the king's death and the Swedish victory, those early letters provide little useful

[26] Droysen 1865, 86-87. Seidler 1954, 22.
[27] Babits/Howard 2009, XIII.
[28] Letters from Generalleutnant Bernhard von Weimar (Mankell 1860, 643-644), Generalmajor Dodo von Inn- und zu Knyphausen (Studien 1844, 49-50), Oberst Caspar Graf von Eberstein (Diemar 1893, 347-349), Oberst Friedrich von Rostein (Diemar 1893, 351-352) and Rittmeister Bodo von Bodenhausen (Glafey 1749, 10-11).

information. That observation also applies to Wallenstein's 17 November letter to Generalfeldzeugmeister Johann Graf von Aldringen of the War Council of the Court, in which he played down his retreat by exaggerating Swedish losses and stated, incorrectly, that Pappenheim arrived before the battle.[29] In this very short letter, Wallenstein did not provide details but only informed Aldringen of the battle, because he was about to send Oberst Francesco Grana, Marchese di Caretto with a detailed report to the emperor (section 2.2.1.4).

2.2.1.3 Swedish eyewitness accounts

Royal Swedish Headquarters

The first account, written the day of the battle, is a letter from an unknown author in the Royal Swedish Headquarters.[30] He was probably some kind of secretary, who remained with the baggage train at Meuchen during the battle, but returned to the Swedish base of operations at Naumburg before the battle ended because the baggage train was in danger of being captured by Imperial cavalry.[31] Although he probably had not seen much of the battle itself, he is a valuable source for the Imperial outflanking manoeuvre that threatened the Swedish rear.

Vitzthum/Berlepsch

Two Saxon officials wrote an account of the battle to Elector Herzog Johann Georg of Saxony.[32] Erich Volkmar Berlepsch was Kriegskommissar[33] in Erfurt, the Swedish headquarters; Johann Georg Vitzthum von Eckstedt, elder brother of Oberst Damian commander of the Saxon Regiment Dam Vitzthum (section 3.1.3), was canon of the cathedrals Halberstadt and Naumburg.[34] As non-combatants Vitzthum and Berlepsch were either with the baggage train behind the battle or in Naumburg. It is, therefore, uncertain if they were eyewitnesses at all. However, they reported unique details from the early stage of the battle which could have been seen from behind the lines. That makes it likely that at least one of them was actually near the baggage train and saw what he reported. The date

[29] Lorenz 1987, 255-256.
[30] Söltl 1842, 346-347, Droysen 1865, 75-76.
[31] Söltl 1842, 347.
[32] Glafey 1749, 12-14.
[33] 'War commissary' was a supply officer.
[34] They are often incorrectly believed to have been Saxon officers (Diemar 1890, 30, Deuticke 1917, 16).

of this ‘post scriptum’ is unknown. Droysen believed that it was sent on 21 November 1632 together with a letter from Bodo von Bodenhausen.[35]

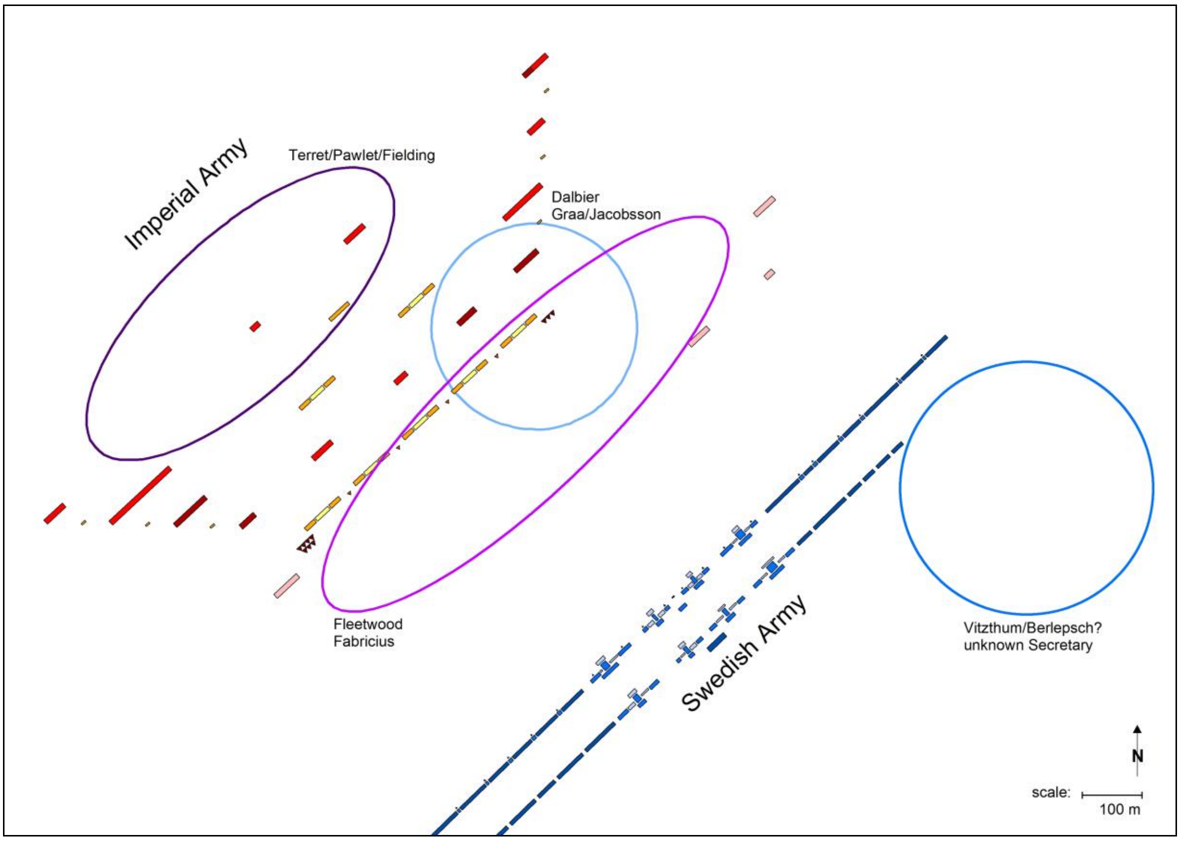

Figure 4: Approximate positions of Protestant eyewitnesses.

Fleetwood

Oberst George Fleetwood wrote a letter to his father from Stettin on 2 December 1632.[36] He must have left the army soon after the battle to reach Stettin, some 320km from Lützen. His account is less influenced by others, except his description of the king’s death, which he might have copied from Truchseß.[37] Fleetwood had no command in battle[38] and could have been anywhere during the fighting. He was most likely not with his fellow countrymen in Leslie’s Scots Regiment, as Deuticke and Seidler believed,[39] because he would have outranked Oberstleutnant Ludovick Leslie and probably have been given the command. Since this is not mentioned by him, or by anyone else, his association with Leslie’s Regiment is unlikely. His detailed description of a skirmish on the Swedish right wing before the battle started suggests that he was on that wing initially. Later, he was seen

[35] Droysen 1865, 77-78, Glafey 1749, 10-11.
[36] Fleetwood 1632.
[37] Fleetwood quoted “Truckes”, which is Truchseß (Fleetwood 1632, 8). The account of Truchseß is lost, but was used occasionally by contemporary writers when describing the death of Gustav Adolf, although Truchseß was no eyewitness (Seidler 1954, 133, rem. 139).
[38] Fleetwood (1632, 4) reported that his regiment was not with the army.
[39] Deuticke 1917, 23, Seidler 1954, 49 and 135, rem. 146.

by Jacobus Fabricius behind the centre,[40] and was probably in the staff of the right wing or centre to perform special tasks.

Fabricius

King's Chaplain Jacobus Fabricius wrote his report of Gustav Adolf's death 18 years after the battle.[41] Surprisingly, he did not repeat the circulating rumours, as everyone else did, but gave his own independent and very detailed account, which may give some weight to its accuracy. According to his account, he was behind the centre during the battle.

Stockmann

Coincidently, in 1632 Gustav Adolf's former chaplain, Paul Stockmann, was vicar in Lützen. He did not witness the battle, but visited the battlefield the next day and described it in one of his sermons.[42]

Dalbier

The date of Oberst Johann Dalbier's account of the battle is unknown,[43] but it was written soon after the fighting and was the first account to reach England.[44] Except for his description of the king's death, in which he copied *Extrakt Schreiben aus Berlin*,[45] he gave a detailed personal account of the second Swedish attack on the small Imperial battery in the afternoon. Because Oberst Johann Dalbier was a close associate of Generalmajor Dodo von Innhausen und zu Knyphausen, it is likely he was initially in the centre of the second line and then later sent with an infantry detachment to man the captured Imperial guns.[46]

Leubelfing

When Gustav Adolf was killed, his page Augustus von Leubelfing was in his entourage. Leubelfing was wounded in the incident and died a few days later in Naumburg, but not before telling the story of the king's death to his father, who wrote it down.[47] This text is full of historical mistakes, which could be excused by his youth, low rank, and his severe wounds. Curiously, the account mentions Gustav Adolf commanding the centre and, if Leubelfing was with the king, he should have known that he was on the right wing. This

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[40] Wittrock 1932, 306.
[41] Wittrock 1932, 305-307.
[42] Stockmann 1633.
[43] Dalbier 1632. The account is in 18th century handwriting and probably a copy or translation from the original.
[44] Brzezinski 2001, 80.
[45] Mankell 1860, 658-659.
[46] Brzezinski 2001, 75.
[47] Murr 1790, 121-124.

error suggests the account is completely unreliable and it almost certainly did not even derive from Leubelfing.[48]

2.2.1.4 Imperial eyewitness accounts

Münchhausen

An anonymous letter written on 19 November 1632 is the earliest Imperial account.[49] The author was long believed to be a cavalry officer.[50] He recorded that his regiment undertook a joint operation with the Infantry Regiment[51] Baden; the commander of the Regiment Baden, Oberstleutnant Stolper, took command, because his own Oberst was mortally wounded and his Oberstleutnant killed.[52] Therefore, the letter was almost certainly written by an infantry officer. Two Imperial infantry officers, Oberst Berthold von Waldstein and Oberst Theodor Comargo, were mortally wounded during the battle, but the Oberstleutnant of Waldstein's Regiment was only wounded, while Comargo's Oberstleutnant was killed.[53] In a second letter, written by Münchhausen to the Elector Maximilian of Bavaria 6 December 1632, some sentences are virtually identical to the first, anonymous, letter. It is, therefore, very probable that the author of the anonymous 19 November 1632 letter is Obristwachtmeister Hans von Münchhausen of the Regiment Comargo.[54]

Diodati

After the battle, Wallenstein sent Oberst Francesco Grana, Marchese di Caretto to the emperor, then at Vienna, to give him a report of the battle, but he fell ill on the way. As a replacement, Wallenstein sent Oberstleutnant Giulio Diodati of Grana's Regiment, who reported to the emperor on 29 November 1632.[55] There has been a long discussion among historians about the reliability of Diodati's account because he omitted the left wing's rout, claimed the Swedish army left the battlefield first, and gave a completely erroneous description of the Swedish initial deployment. Those errors may be partially explained

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[48] The unreliability of Leubelfing's account is also proved in detail by Droysen (1865, 193-198) and Deuticke (1917, 26). Nevertheless, Seidler (1954, 67) claims "that there is some truth in the account" without giving any argument. Also Guthrie (2002, 232, rem. 42) and Sennewald (2013, 170) believed Leubelfing's account.
[49] Wittrock 1932, 304-305.
[50] Wittrock 1932, 304, Seidler 1954, 130, ref. 112.
[51] During the Thirty Years War, German regiments in Imperial, Leaguist or Swedish service were not numbered, but were named after their owner, which was sometimes, but not always the commanding officer. This custom can lead to confusion, if one person owns more than one regiment, because historical sources usually do not state which regiment they are referring to. Regimental names are given in English in this thesis.
[52] Wittrock 1932, 305.
[53] For officer casualties see section 9.1.1 and table 27.
[54] Brzezinski 2001, 67 and 80.
[55] Fiedler 1884, 555-568.

because Diodati was in the uncomfortable position of not embarrassing Wallenstein by relating details about tactical mistakes made at Lützen while still reporting as accurately as possible to the emperor. The mistakes in Diodati's account are not, *sensu strictu*, an argument against his general reliability, as Droysen claimed.[56] Diodati's description of the Imperial deployments matches that of Feldmarschall Leutnant Heinrich Holk (section 7.1.2). Even more important is that most of his account is about the fighting of the Imperial centre. This suggests that he was actually with this regiment.[57] The Regiment Grana was deployed as the central squadron[58] in the centre of the first line, and Diodati reported largely those events he had personally seen.

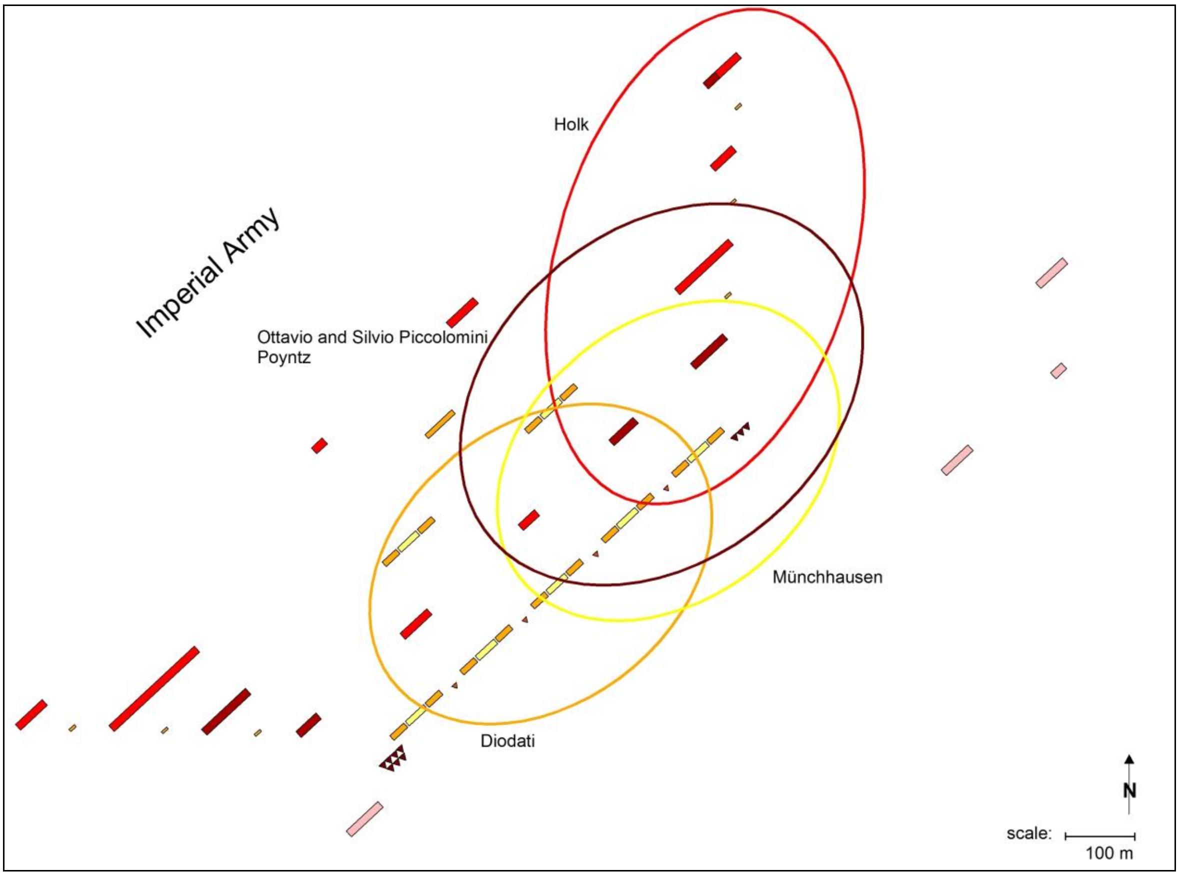

Figure 5: Approximate positions of Imperial eyewitnesses.

[56] As a Protestant, the otherwise objective Droysen (1865, 86-87) argued against the whole account of the catholic Diodati without giving any reasonable proof. See also Seidler 1954, 21-25 and Deuticke 1917, 29-30.

[57] Brzezinski 2001, 67. Diodati did not own a regiment at Lützen, as Seidler (1954, 37) claimed. According to the War List No. 18 (Toegel 1977, 439) he was promoted to Oberst after Lützen and got his own regiment then.

[58] 'Squadron' is the contemporary term for a tactical unit (section 3.3.1).

Holk

The Danish Feldmarschall Leutnant Heinrich Holk wrote a letter not long after the battle, the exact date of which is unknown, to King Christian IV of Denmark informing him of the battle.[59] Holk commanded the Imperial left wing and, as second-in-command in the absence of Pappenheim, he was responsible for deploying the army.[60] His position in the command structure is reflected in his account, which is one of the main sources for the Imperial army's deployment. His account is short, but mostly honest and reliable, with the exception of the rout of Pappenheim's cavalry, which he probably described more seriously than it was in order to look better. Holk remained in charge of the left wing during the battle and was not relieved by Pappenheim as Seidler believed (section 7.1.3).

Ottavio Piccolomini

Two quite different letters from Italian soldiers of the Harquebusier Regiment Piccolomini have survived. The commanding officer, Oberst Ottavio Piccolomini di Aragona, wrote the emperor a boastful letter on 4 December 1632, informing him of his own heroic deeds and his part in the events that led to Gustav Adolf's death.[61] It seems that all reports about his regiment are influenced by him and his actions in the battle are exaggerated. Nevertheless, his account's raw details are the most detailed description of a single regiment's action extant.

Silvio Piccolomini

The 2 December 1632 letter from Rittmeister Silvio Piccolomini to the bishop of Siena Askanio Piccolomini contains some serious mistakes, such as the date of the battle, given as 15 November, and the arrival of Pappenheim before the battle, about which he should have known better.[62] Since he served in the regiment of his uncle Ottavio Piccolomini, there is no reason to believe that he was not present at the battle. In particular, the description of wounds his fellow officers received is an important detail, which shed some light on the fighting.

Poyntz

The 'relation' of Rittmeister[63] Sydnam Poyntz was written in 1636/37.[64] Poyntz's account of his deeds in the Thirty Years War is full of mistakes and he confused the chronology of

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[59] Wittrock 1932, 307-309.
[60] Brzezinski 2001, 38.
[61] Argang 1894, 89-90.
[62] Archivio 1871, 239-242.
[63] Hauptmann according to Brzezinski (2001, 81).

events where he was not present.[65] His account of the Battle of Lützen is more colourful than truthful. As an example, Poyntz claimed that when Pappenheim arrived on the battlefield, he and Gustav Adolf recognized each other immediately, then fought and killed each other in a duel.[66] For the errors, his account is usually seen as unreliable by modern historians,[67] but he was an eyewitness of the battle. Apart from his fictitious elaborations, there is no reason to doubt that he reported what he saw. It is not known in which regiment Poyntz served during the battle. According to his report, he lost all his horses, and he gave a detailed report of the Harquebusier Regiment Piccolomini, which fought on the Imperial left wing.[68] His association with cavalry regiments indicates he was probably in a left wing or centre Imperial cavalry regiment.

Name and rank	**Date of Account**	**Position of Eyewitness**
Unknown person from Royal Swedish Headquarters	16 November 1632	Swedish baggage train
Generalissimus Albrecht von Wallenstein	17 November 1632	Imperial army, right wing
Generalleutnant Bernhard von Weimar	18 November 1632	Swedish army, left wing, 1st line
Generalmajor Dodo von Inn- und zu Knyphausen	18 November 1632	Swedish army, centre, 2nd line
Obristwachtmeister Hans von Münchhausen	19 November 1632	Imperial army, centre, 1st line
Rittmeister Bodo von Bodenhausen	21 November 1632	Swedish army, position unknown
Kriegskommissar Erich Volkmar Berlepsch Canon Johann Georg Vitzthum	Probably 21 November 1632	Probably Swedish baggage train
Oberst Caspar Graf von Eberstein	28 November 1632	Swedish army, right wing, 1st line
Oberstleutnant Giulio Diodati	29 November 1632	Imperial army, centre, 1st line
Feldmarschall Leutnant Heinrich Holk	Date unknown, very likely before 1633	Imperial army, left wing
Oberst George Fleetwood	02 December 1632	Swedish army, probably centre and right wing
Rittmeister Silvio Piccolomini	02 December 1632	Imperial army, left wing and centre
Oberst Ottavio Piccolomini di Aragona	04 December 1632	Imperial army, left wing and centre
Oberst Friedrich von Rostein	06 December 1632	Swedish army, right wing, 2nd line
Obristwachtmeister Hans von Münchhausen	06 December 1632	Imperial army, centre, 1st line
Oberst Johann Dalbier	date unknown, possibly late 1632	Swedish army, centre, 2nd line
Rittmeister Sydnam Poyntz	date unknown, possibly 1636	Imperial army, probably left centre or left wing
King’s chaplain Jacobus Fabricius	30 December 1650	Swedish army, centre, 2nd line

Table 3: Accounts of eyewitnesses in chronological order with their approximate position in battle.

Testimonies of the Prague Court Martial

There are records of nine courts martial verdicts issued at Prague from 11 February 1633. These verdicts were based on sworn testimony against deserters from the Battle of Lützen

[64] Poyntz 1908.
[65] Poyntz 1908, 24-25.
[66] Poyntz 1908, 73.
[67] Brzezinski 2001, 94.
[68] Poyntz 1908, 72 and 126.

and the siege of Chemnitz. Testimony involved questioning eyewitnesses.[69] Although based on subjective eyewitness accounts, the aim was to reveal facts. Therefore, these records represent an important account of the Imperial cavalry's rout at Lützen.

Ehinger

On 13 May 1633, a statement from the interrogation of Pappenheim's trumpeter Ehinger was recorded about the death of the Feldmarschall.[70] Ehinger's statement about Pappenheim's cavalry disobeying orders is supported by other testimony verdicts; his statement about Pappenheim's last words seems more sentimental than reliable.

2.2.1.5 Conclusion

Most eyewitnesses were positioned on the Imperial left wing or centre, while some were with the Imperial and Swedish baggage trains; there are no eyewitness accounts from the Imperial right wing. Unfortunately, most potential archaeological evidence from the right Imperial wing is likely destroyed by housing development. These factors make it very difficult to reconstruct this portion of the battle.

2.2.2 Secondary sources

Shock and excitement about the death of Gustav Adolf resulted in an almost limitless series of letters, 'relations', historical papers and copperplate illustrations from contemporary non-eyewitnesses. These were followed by a 200 year long discussion about their reliability. Due to Droysen's substantial research on the development of the battle's historic narrative, there is a good idea of the process of copying, altering and inventing events. As many 'relations' and historical papers were known to him, his results are still valid, even though they were often not acknowledged by historians.[71] Secondary sources can be arranged chronologically and by topic into four groups:

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[69] Seidler 1954, 141-148.
[70] Hallwich 1912b, 133-136.
[71] Diemar 1890, 2-5, Deuticke 1917, 7, Seidler 1954, 9.

1. Letters
2. Early printed ‘relations’
3. ‘Relations’ and copperplates from 1633 until 1637
4. Early modern historical papers

2.2.2.1 Letters

The news about the death of Gustav Adolf spread rapidly through a huge amount of letters from Protestant secretaries, correspondents, officials, and liaison officers, none of whom had seen the battle. It is not possible to discuss them in detail in this thesis. Most letters only state that the King of Sweden has died and are of little relevance for researching the Battle of Lützen itself. The most quoted letters from 1632 are: (in chronological order) secretary Heinrich Schwallenberg to Fältmarskalk Gustav Horn (17 November, 22 November);[72] an unknown author to the Chancellor of the Reich Axel Oxenstierna (probably 19 November);[73] the *Copia verträulichen Schreibens from Pegau* (20 November);[74] the correspondent Lars Grubbe who was quoted as *Relation I from Grimma* (23 November);[75] Bernolf von Kreilsheim (approximately 23 November);[76] the *Extrakt Schreiben aus Berlin* (24 November);[77] Feldmarschall Matthias Gallas to Ferdinand King of Hungary (approximately 25 November);[78] the correspondent Lars Grubbe quoted as the *Relation II from Grimma* (28 November);[79] the correspondent Johann Hallenus to the Swedish Council of the Reich (30 November);[80] three letters from unknown authors (26 November, 3 December, 7 December);[81] Adam Heinrich Pentz probably to Fältmarskalk Horn (2 December),[82] and finally the letter from the Venetian Resident in Vienna Antonio Antelmi (4 December).[83]

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[72] Fiedler 1864, 569, Hallwich 1912a, 522-523. Schwallenberg was secretary in the Royal Swedish Headquarters at Naumburg (Droysen 1865, 77).
[73] Mankell 1860, 645-649, Droysen 1865, 78-79.
[74] Söltl 1842, 340-341, Droysen 1865, 79.
[75] Studien 1844, 50-52. Grubbe was Gustav Adolf’s correspondent in Torgau to report the movement of the allied Saxon army to him and prepare their joining with the Swedish army. He went to Grimma after the battle (Droysen 1865, 79-80).
[76] Droysen 1865, 80.
[77] Mankell 1860, 658-659.
[78] Förster 1844, 94-96, Diemar 1890, 55-57.
[79] Droysen 1865, 80-82.
[80] Mankell 1860, 661-664. Hallenus was correspondent in Stralsund to report the Council of the Reich. See also Droysen 1865, 82-83.
[81] Söltl 1842, 349-356, Droysen 1865, 83-84.
[82] Fiedler 1864, 569-572.
[83] Antelmi 1632, 359-362. It is often claimed that this letter is “excellent”, based only on a statement of the German historian Ranke (Deuticke 1917, 32), but, in fact, it is contradicted by most eyewitness accounts.

Some letters, in particular Pentz, contain many details about the battle and the circumstances of Gustav Adolf's death, but in comparison to the eyewitness accounts, they give an almost entirely different kind of information. Most details can neither be proved nor disproved by reference to the eyewitnesses, so there is the question of where all this information originated. There is at the moment no evidence whatsoever that someone from Gustav Adolf's entourage survived to tell the circumstances of his death; instead rumours filled the gap in knowledge. These rumours very likely derived initially from Swedish army soldiers, who needed to know how their beloved king died. It is likely that creating this myth did not stop with Gustav Adolf's death, but soon co-opted all battle events, spreading by letters and verbal accounts. Although there is little evidence, this creation of the battle's mythology seems the only reasonable explanation for the fundamental differences between eyewitness and non-eyewitness accounts. The early letters rapidly began to influence each other. This is most evident when comparing Kreilsheim's letter and *Relation I from Grimma*, where either one copied the other or both had access to a now unknown written account.[84] This one example demonstrates that some letters were copied and distributed by, and to, officials. Nevertheless, their impact on the development of the historic narrative was limited.

An exception to those early letters is the Hallenus account. Two eyewitnesses, Löjtnant Bengt Graa from Kyle's Regiment and Fändrik Ambrosius Jacobsson from Hastfehr's Regiment, reached Stralsund on 29 November 1632 and reported the battle to Johann Hallenus, who had not yet received any detailed report.[85] Both the Kyle and Hastfehr Regiments mustered as part of the Swedish Brigade and were thus deployed on the right centre.[86] Most of their account deals with Gustav Adolf's death, which then was certainly only a rumour spreading from the Swedish army. It is very peculiar that they mentioned Generalmajor Nils Brahe, Greve till Visingborg as left cavalry wing commander, because he actually commanded the first line of the centre (section 7.2.2). They should have known this, because Brahe was their wing-commander. What is curious is that when Brahe advanced with his "wing", Hallenus correctly described combat involving an infantry brigade and the resulting counterattack of an Imperial cuirassier regiment. This is what happened to the Yellow Brigade, commanded personally by Brahe, when it fought just to the left of the Swedish Brigade.[87] It is very likely, that the two officers correctly reported events that occurred to their left, but that Hallenus

[84] Droysen 1865, 137-138.
[85] Mankell 1860, 661-664.
[86] Brzezinski 2001, 22. They were not in Winckel's Old Blue Brigade, as Deuticke (1917, 22) suggested.
[87] Brzezinski 2001, 67.

misunderstood, and thought Brahe commanded the ‘left wing’. This is one example of how the narrative of events changed and was erroneously recorded, if not falsified shortly after the battle. There is a substantial difference between direct eyewitnesses accounts and accounts that were related by non-eyewitnesses, who were not aware of their mistakes. Once this error is rectified, the Hallenus’ account becomes an important source.

2.2.2.2 Early printed ‘relations’

Printed accounts, like the second-hand letters, reported an entirely different kind of information than eyewitness accounts; they naturally had a bigger impact on the developing historical narrative due to their high print run. In order to understand the influence printed accounts had on the development of historic narrative, it is necessary to discuss the earliest ones.

58th Weekly Newspaper

The first printed account was published as early as 17 November 1632, the day after the battle, in the *58. Ordentliche Wochentliche Zeitung* 1632,[88] a local newspaper from Naumburg. The newspaper theoretically could have obtained some intelligence from Swedish soldiers, who had fled to Naumburg during the battle, but, instead, it gives only a very short account, full of mistakes; the stream Rippach is confused with the Floßgraben, Gustav Adolf is wounded, but still alive and so on.

Relation from Torgau

The second printed account, the *Relation from Torgau* or *Bericht von der mächtigen Victoria* dated 19 November 1632,[89] claimed to have had intelligence from an Imperial prisoner of war. In fact, it tells a story completely different from any other account, and it is therefore incorrect and not based on an eyewitness testimony.

Relation I from Erfurt

The 21 November 1632 *Extrakt Schreiben aus Erfurt*[90], quoted as *Relation I from Erfurt*, is largely a touching story of how Gustav Adolf, sensing he would die in battle, said goodbye to his wife. Then to embellish the account, a speech to his soldiers in the middle of the battle was added. This speech later became a topos (cliché), repeated in almost every

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[88] Söltl 1842, 337-339, Droysen 1865, 78.
[89] Droysen 1880, 13-15.
[90] Söltl 1842, 342-344.

relation, but in very different ways. Although the Swedish headquarters was in Erfurt, and could have provided real information, it is obvious that this relation contains no factual material. These three 'relations' had no impact on each other and developed independently.

Relation II from Erfurt

The first printed 'relation' describing the whole battle in a chronological fashion was the 'Warhaffte unnd eygentliche Relation, von der Blutigen Schlacht, zwischen Königl. Mayest: zu Schweden, unnd der Kayserl: Armee den 5. und 6. Novemb deß Jahrs 1632. bey Lützen 2. Meilwege von Leipzig vorgangen und geschehen,' quoted as *Relation II from Erfurt*. It was published 22 November 1632.[91] Again, the author claimed he was an eyewitness to the battle, when he was not, which seems to have become a figure of speech in printed accounts to give it some weight.[92] It is, however, the first 'relation' relying chiefly on previously printed accounts. The battle's commencement, given as 9am in the *Relation I from Erfurt*,[93] and 10am in the newspaper,[94] is stated as 9am to 10am.[95] The statement that Imperial forces would have been completely routed at Rippach if the Swedes had more time before nightfall[96] and a reference to the Imperial army's advantage of terrain[97] is drawn from the newspaper, using similar sentences. The loss of all Imperial artillery, baggage, and ammunition is mentioned in all 'relations', while the Swedes taking advantage of a mist is probably from the *Relation from Torgau* and so on.[98] It might be argued that some events were common knowledge, but it is certainly no coincidence that the *Relation II from Erfurt* mentioned precisely those events, and almost all of them, that had been published before, using similar words or sentences. The *Relation II from Erfurt* is still more than just a compilation of previous accounts. It provides more details, few of which can be verified by eyewitness accounts. These include the Imperial attack on the Swedish baggage train, and the obviously incorrect Imperial fortifications at the Floßgraben (section 6.2); for most of these events there is no other evidence. In essence, the *Relation II from Erfurt* combines previously published and incorrect events with some facts; they certainly heard the rumours current at the Swedish headquarters, and invented events, such as the speech Gustav Adolf gave before the battle. These were woven into a

[91] Droysen 1880, 16-23. There are seven almost identical versions published under different titles.
[92] Diemar (1890, 18-23) believed this 'relation' to be the lost account from Schwallenberg based on the assumption that he was an eyewitness, which is both incorrect (Seidler 1954, 10).
[93] Söltl 1842, 343.
[94] Söltl 1842, 338.
[95] Droysen 1880, 19.
[96] Söltl 1842, 338, Droysen 1880, 18.
[97] Söltl 1842, 338, Droysen 1880, 18.
[98] Note that Droysen (1865, 151-166) has failed to realise the context between the *Relation II from Erfurt*, *Ordentliche Wochentliche Zeitung* and *Relation I from Erfurt*.

tale that sought to take advantage of the public's thirst for news about the fighting. Even at this very early stage, less than one week after the fighting, it is virtually impossible to determine from secondary sources, which events were facts and which stories, without comparing them to more reliable sources.

Relation* and *Declaration from 1633

The next printed 'relations', the *Relation from 1633*[99] and the *Declaration from 1633*,[100] followed the same rubric of compiling earlier published 'relations', altering them and then combining them with invented stories.[101]

2.2.2.3 Protestant 'relations' and copperplates from 1633 to 1637

Inventarium Sueciae

The 1633 publication of the *Inventarium Sueciae* marks a shift to the developing historic narrative. It is the first publication with a copperplate, made by Friedrich van Hulsen, showing the initial Swedish and Imperial armies' deployment. Needless to say, the *Inventarium Sueciae* was itself a compilation[102] that altered events found in previous 'relations' and invented stories.

Theatrum Europaeum

The *Theatrum Europaeum*, first published in 1633,[103] not only copied almost verbatim the *Inventarium Sueciae* text and added its own version of Gustav Adolf's death, but also plagiarized van Hulsen's copperplate with slight differences while including a new copperplate from Matthaeus Merian, showing various battle events.

Glaubwürdiger Bericht/Wahrhaftige Beschreibung

Later 'relations', including the *Glaubwürdiger Bericht* and *Wahrhaftige Beschreibung*, then copied nearly the entire text from the *Inventarium Sueciae* and both copperplates; except for some minor alterations there was no new information.

[99] Droysen 1880, 24-35.
[100] Droysen 1880, 36-46.
[101] See Droysen 1865, 166-188 for details.
[102] In particular from the *Relation II from Erfurt* and the *Relation from 1633* (Droysen 1865, 201-208).
[103] There are several versions. The *Theatrum Europaeum* from 1646 is used in this thesis.

Monro

The description of the Battle of Lützen in Monro's account is, in most respects, an exact translation of the *Inventarium Sueciae* with some minor alterations and translation errors.[104]

2.2.2.4 Other 'relations'

Swedish Intelligencer

The development of historical narrative until the early historical papers suggests that the Battle of Lützen is exclusively a German-Protestant matter of interest. However, there are a few other 'relations' and historical papers, such as the account of the battle in William Watts' 1633 *Swedish Intelligencer*, the longest and most detailed 'relation' of the Battle of Lützen. Watts used different sources, such as the *Spanish Relation*[105] which, in turn, utilized Diodati's eyewitness account. While Watts came to different conclusions, they are not necessarily more reliable. Watts claimed that he had reports from three English eyewitnesses, Francis Terret, John Pawlet, and Edward Fielding, who served in the Swedish army, were captured by Croats and saw the battle as prisoners from the Imperial army's baggage train, before they were freed.[106] There is no reason to doubt this story, but it is important to know which parts of Watts' account derive from these three eyewitnesses. Watts mentioned them twice explicitly as his source; once when noting that after Wallenstein sounded the alarm on evening 15 November, his regiments came in all night long;[107] the second event occurred when about 1,000-1,500 Imperial horse fled from the battle to the baggage train and frightened the female camp followers who, in turn, cut the wagon horses loose and rode off together with the cavalry.[108] It is almost certain that the English prisoners actually saw the two events, especially the second one. However, Watts did report a completely erroneous initial deployment and fortification of the Imperial army (sections 6.2 and 7.2), which suggests that his eyewitnesses had not seen it and therefore probably had not seen anything else of importance about the battle itself.[109] Watts' reliability is clearly restricted to the events mentioned by his eyewitnesses.

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104 Monro 1637, part II, 162-165. The description of the results of the battle from page 165 on is different from *Inventarium Sueciae*.
105 The *Spanish Relation* seems to have been lost, but was translated and published by Watts (1633, 160-164).
106 Watts 1633, 118.
107 Watts 1633, 125.
108 Watts 1633, 142.
109 Watts 1633, 130. Compare to Imperial deployment in Brzezinski 2001, 44. It is a characteristic of the history of Lützen research that Deuticke (1917, 31) claimed that the English prisoners had seen the whole battle without giving any argument.

***Relation from 1632* and others**

There is also the Catholic 'relation' *Gründlicher und Außführlicher Bericht* printed in Munich in 1632, quoted as *Relation from 1632*[110], which is based partially on the *Particular from 1632*. While this 'relation' altered the events of the battle, the *French Relation from 1633*, translated into English and published in London, is a completely fictitious story.

2.2.2.5 Early historical papers

In the early 1640's, discussion about the Battle of Lützen resumed and historians started to re-evaluate the historical sources; a process that is still in progress. The early historians obviously had access to some eyewitness accounts, of which some are known. It was often claimed by modern historians that the early authors had access to eyewitness accounts which are now lost, or that they were eyewitnesses themselves, something that would indeed make their accounts valuable sources. The following section discusses the possibilities raised by the early authors to clarify this matter.

Chemnitz

Chemnitz Bogislaus Philipp[111] chiefly used the *Inventarium Sueciae*, but also included some earlier 'relations' known to us, that were rephrased, which do not provide any new evidence.[112]

Priorato

Galeazzo Gualdo Priorato[113] was the first historian to publish a complete list of those Imperial regiments he believed fought in the battle. Since he listed every Imperial regiment whose name he knew, and many of them were not even close to Lützen, this listing is incorrect, as is his account of the battle.[114]

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[110] Droysen 1880, 6-12.
[111] Chemnitz 1648, 463-467.
[112] Droysen 1865, 230.
[113] Priorato 1672, 118-123.
[114] Droysen 1865, 230. Although Seidler (1954, 36) admitted the listing to be incorrect, he claimed that he will prove that Priorato's account "is not as bad as usually suspected," but he actually did not even try (Seidler 1954, 14).

Burgus

Seidler claimed, without providing any evidence, that Petrus Baptista Burgus was present at the battle.[115] Burgus' account is largely copied from other sources. His description of Wallenstein motivating his soldiers and Pappenheim arriving before the battle comes from Siri;[116] from Holk's account he copied the statement that he did not have enough musketeers to deploy some in the wood to his left.[117] His praise of Piccolomini's heroic deeds is identical to Diodati's account.[118] Apart from inventing a long speech of Gustav Adolf, Burgus simply repeats the usual rumours and it is most unlikely that he was present in the battle.

Richelieu/Siri

It was often claimed by modern historians that Cardinal Richelieu's account was "supplied by Bernhard's [von Weimar] chancellery."[119] Generalleutnant Bernhard von Weimar commanded the Swedish left wing, and the claim is based on the fact that Bernhard von Weimar was in French service and probably knew Richelieu personally.[120] Richelieu's account, however, is a word-for-word translation of Vittorio Siri's account.[121] Siri actually claimed that he used an account from Bernhard von Weimar, who had given it to the King of France.[122] Even if that is true, Siri did not relate very much about combat on the Swedish left wing, which he should have if he had actually drawn his information from Bernhard von Weimar. Deuticke and Seidler claimed that Richelieu copied a letter from Truchseß and that Truchseß made a personal report to Richelieu.[123] However, Richelieu copied Siri and he could not have copied Truchseß as well. Truchseß was not an eyewitness[124] and it is therefore unnecessary to speculate whether Siri used Truchseß. As long as there is no proof of the reliability of Siri's sources, his or Richelieu's accounts should be used with great care.

[115] Seidler 1954, 13.
[116] Burgus 1641, 318-320, Förster 1829, 337.
[117] Burgus 1641, 318, Wittrock 1932, 308.
[118] Burgus 1641, 325, Fiedler 1864, 563. For the similarity of Diodati's and Burgus' accounts see also Droysen (1865, 210-214) and Seidler's (1954, 14) counterargument that "he could not find much of a conspicuous similarity (of Burgus and Diodati)."
[119] Brzezinski 2001, 80.
[120] Richelieu 1823, 256-268, Brzezinski 2001, 80, rem. 8.
[121] Förster 1829, 336-341, Droysen 1865, 231.
[122] Droysen 1865, 231.
[123] Deuticke 1917, 24, Seidler 1954, 126, rem. 87.
[124] Seidler 1954, 133, rem. 139.

Khevenhiller

Srbik claimed that Khevenhiller[125] used the now lost account of Oberst Nicolas Desfours, who fought on the Imperial right wing.[126] Srbik's presumption is based on a note in the 29 November 1632 expedition protocol of the War Council of the Court that

"Nicolaws des Four baro avisiert J. K. Mt. aus Leitmeritz vom 19. November des Schweden und von Pappenheim Tod."[127]

Srbik believed that Khevenhiller quoted Desfours's 'relation', which started with the head line:

"Die Relation, so der Kayserl. Majestät dieses Todes halber in hoc passu überschickt worden, meldet,“ [128]

followed by a bold printed text. That indicates that there was, in fact, an account by Desfours and that Khevenhiller used an account which is now lost, but not that he used the account of Desfours. The bold printed text describes the circumstances of Gustav Adolf's death. Even if this part were from Desfours's 'relation', Desfours could not have seen it because the Swedish King died on the Imperial left wing while he was serving on the right.[129]

2.2.2.6 Conclusion

The main problem relating to the non-eyewitness accounts is that it is difficult to tell which parts are fictitious and which are based on eyewitness testimony. If contemporary writers did not cite their sources, as Hallenus and Watts did, it is almost impossible to prove whether or not they used now unknown eyewitness accounts. If it can be shown that they did use known accounts, then their information is superficial because the original eyewitness account can be used directly. But it is at least suspect, if not evidence for their unreliability, when the same incident is repeated again and again in printed accounts, because a battle consists of an unlimited number of events, which can all be told. In fact,

[125] Khevenhiller 1726, 188-198.
[126] Srbik 1926, 246, Seidler 1938, 231.
[127] "Nicolaus Desfour reports His Imperial Majesty from Leitmeritz the 19 November the death of the Swede (i.e. Gustav Adolf) and Pappenheim."
[128] Khevenhiller 1726, 192. "The 'relation' which was sent in *hoc passu* to the Imperial Majesty because of this death, reports…"
[129] Seidler (1938 and 1954) was eager to prove the reliability of Khevenhiller's account, because he tried to prove that Gustav Adolf died on the left, rather than on the right wing, and his whole paper is based on that incorrect assumption (see also Brzezinski 2001, 9).

there are very few events, which were seen and written down by several eyewitnesses. Finally, it must be taken into consideration that it was not necessarily in the interest of contemporary writers to tell the truth but rather to tell a good story that would sell.

2.2.3 Official records and documents

Few official records concerning the Battle of Lützen have survived.

Imperial war lists

There are eight Imperial war lists from 1631 to 1634 with all regiments and their companies and commanding officers noted.[130] These lists very often give a number of ten companies in a regiment, the official regimental organisation at that time.[131] It seems unlikely that all regiments during the Thirty Years War had this organisation in actuality. At least one list (no. 14) contradicts itself by officially listing Hagen's Regiment with ten companies, then saying in a footnote that the regiment was disbanded and its thirteen companies distributed among three regiments.[132] Whilst these observations represent warning signs, there is a certain base line of data in the lists that can provide interpretive approaches if used carefully.

Imperial casualty and reward lists

The "list of damaged"[133] is one of very few records with an exact and reliable number of Imperial soldiers, even though it only includes seven regiments.[134] Imperial commanders kept records of numbers of companies rather than men.[135] A "reward list" names five regiments rewarded very likely for their service in Lützen.[136] Holk's 6 December 1632 list names fourteen regiments, named also in the Trauttmansdorff list, suggesting that it is a list of regiments present in Lützen.[137]

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[130] Toegel 1977, 386-443.
[131] Wrede 1898, 29.
[132] Toegel 1977, 402 and 406.
[133] In trying to save the meaning of 17th century German or Italian, the author often favoured a literally above a correct translation.
[134] "Verzaichnuß der Beschädigten" (Hallwich 1912a, 596-599). The record lists the wounded of the Regiments Desfour, Holk, Trcka, Götz, Bredau, Loyers and Goschütz. It does not include the killed, because the Oberstleutnant of Desfour's Regiment, who was killed, is not included.
[135] Brzezinski 2001, 26.
[136] Hallwich 1912a, 538-539.
[137] Hallwich 1912a, 577-578.

Swedish troop and casualty lists

There are three reliable Swedish lists of regimental strength. Langman's 14 November 1632 list contains an actual number of infantry men and an approximate number of cavalry men.[138] The second document is an undated casualty listing of wounded infantrymen, written not long after the battle.[139] The last list is an unpublished and undated list of the strength of infantry regiments after the battle.[140]

2.2.4 Pictorial representations

Copperplates and paintings are a different form of secondary source with similar problems. The copperplates from van Hulsen in the *Inventarium Sueciae* (Fig. 62), from Merian in the *Theatrum Europaeum* (Fig. 63), and the copperplate published by Watts in *The Swedish Intelligencer* (Fig. 64), were meant to illustrate their account of the battle, which had already been substantially altered. For a long time, deployment of the Imperial army was subject to discussion until Brzezinski found evidence in two pictorial representations, the equestrian portrait of Gustav Adolf by Giovanni Paolo Bianchi of Milan (Fig. 123),[141] and the painting by Pieter Snayers (Fig. 65).[142] In particular the latter shows many details that are confirmed by historical and archaeological sources, suggesting that it was based on at least one eyewitness account.

Weißenfels battle plan

There are also three maps of particular interest. The first, a sketch of the Imperial army published by Förster in 1829, had long been misidentified as Wallenstein's battle plan for Lützen (Fig. 73).[143] Brigitte Holl has since shown that it is a 12 November 1632 plan for a battle at Weißenfels which never occurred.[144] It does provide clues leading to a better understanding of Wallenstein's battle tactics.

[138] Langman 1632, 162.
[139] Mankell 1861, 126-128.
[140] Stockholm 1632, Brzezinski 2001, 87.
[141] Brzezinski 2001, 47.
[142] Pieter Snayers, *Die Schlacht bei Lützen*, Kunsthistorisches Museum Wien, Inv. Nr. GG1820.
[143] Förster 1829, 275-279.
[144] Holl 1976, 71-72. See also Brzezinski 2001, 48. The map is still misidentified as battle plan for Lützen (Guthrie 2002, 202, Mortimer 2010, 170).

Trauttmansdorff list

In 1991 Barbara Stadler published the Trauttmansdorff list, which shows an undated list of Imperial units marked with letters or signs (Table 21).[145] There is an included note that says that the list is to be given to the Imperial Vice President of the War Council of the Court Löbl, who was promoted to this position in 1633.[146] Originally this list was a legend belonging to a lost battle map. Although its origin cannot be proved without a date and the map itself, the Imperial units listed are known to have been at Lützen (section 3.1.2). There is a special mark noting the units of Pappenheim's corps, so it is probable that this legend belonged to a battle plan of Lützen.[147]

Sketch from the Krigsarkivet

It is often claimed that the sketch of the Battle of Lützen from the Stockholm Krigsarkivet is from a Swedish soldier who fought in the battle (Fig. 57).[148] However, the deployment of the Imperial army is shown incorrectly whilst the Swedish centre and second line are missing. Particularly suspicious is that the illustration shows only four cavalry squadrons on each wing, which is stated incorrectly by the *Declaration from 1633* and Khevenhiller.[149] It seems possible that the sketch was drawn by someone who was studying accounts from the battle. While these omissions and faults do not necessarily prove that the sketch is not from an eyewitness, attributing it to a participant is at least doubtful. It may be that the omissions and incorrect deployment of the Imperial and Swedish army actually reflect what a low ranking soldier might have been able to see, or it is possible that the sketch is from someone in the Swedish baggage train. The latter is supported by some remarkable details on the sketch, such as the float-wood near the Floßgraben, where the baggage train was positioned.

2.3 Conclusion

Except for Droysen and Brzezinski, most historians have used all historical sources equally and then chosen those statements which fit their thesis. Important sources are quoted incorrectly, sometimes seemingly on purpose. Often mere hints are called evidence and if that fails to fully support his interpretation, the author simply stated that the source was reliable. Translation of foreign texts is often flawed. These misconceptions are deeply

[145] Stadler 1991, 891-892. She accidently omitted the Regiment Piccolomini (see Brzezinski 2001, 48).
[146] Löbl was Oberst in late 1632 (Letter from the emperor to Wallenstein: Lorenz 1987, 256).
[147] Brzezinski 2001, 48.
[148] Brzezinski 2001, 52.
[149] Droysen 1880, 29, Khevenhiller 1726, 189.

embodied in the historical research of the Battle of Lützen; it would be a thesis of its own to complete a detailed analysis of all historical sources to determine who copied what from whom; this will not be attempted here.

It is the intention of this thesis to demonstrate in Chapter Eight that most secondary sources are artificial products with little relevance for research on the Battle of Lützen. In this case most events described by secondary sources are contradicted by eyewitness accounts as well as by results from archaeological investigations on the battlefield. There are very few exceptions, chief among them the painting by Snayers.

Chapter Three

The Armies

This chapter provides a basic description of the Imperial and Swedish armies at Lützen, concentrating on the participating regiments, their strength, equipment, weapons, artillery and tactics. In particular, the structure of Wallenstein's army was very organic. Some newly recruited regiments were still acquiring equipment whilst older regiments were upgraded with armour. Wallenstein adapted his tactics to match Swedish tactics. The Swedish army also changed substantially during Gustav Adolf's campaign in Germany and acquired weapons and equipment different from their original issue. Although there are countless publications concerning the Thirty Years War, these changes in tactics, weapons and equipment during that time are still not fully understood.

3.1 Order of battle

Research on the participating regiments of the Imperial army and their strength at Lützen was conducted by German historians influenced mostly by Seidler on one side, and Swedish and English historians influenced by the Swedish General Staff on the other, with both groups coming to wrong conclusions.[150] Still, even for the well documented Swedish army, it is not entirely certain which regiments actually were at Lützen. This can only be understood by looking at both armies and their movements during the week before the battle.

3.1.1 Armies at Weissenfels and Naumburg

On 8/10 November 1632 Gustav Adolf and Wallenstein entrenched their armies only 11km from each other at Naumburg and Weissenfels.[151] On 12 November Gustav Adolf undertook a reconnaissance in force to Weissenfels, where Wallenstein, reinforced by a Leaguist corps under Pappenheim, waited for him with his army in full battle array. Since this important battle plan of the Imperial army survived, we know what regiments of Wallenstein's army were present on that day (Fig. 73).[152]

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[150] Seidler 1954, 37-39, Generalstaben 1939, 413-414, Guthrie 2002, 223-224.
[151] Brzezinski 2001, 31.
[152] Holl 1976, 59 and Fig. 3.

Gustav Adolf must have been impressed by the Imperial forces as he made no attempt to attack their position.[153] With winter drawing near, both army commanders knew they could not supply their armies in these positions indefinitely. Wallenstein's army, consisting of approximately 13,000 foot and 7,500 horse and an estimated 5,000 camp followers and 2,500 horses in addition for the baggage train, artillery train and cavalry reserve horses, consumed approximately 125 tons of food and forage per day and the Swedish army probably not much less.[154] After four days 1,000 tons of food and forage was consumed and the area was almost certainly picked clean by then. To avoid a disaster comparable to that suffered by the Swedish army at Nurnberg two month before,[155] Wallenstein made the first move. In the morning of 14 November he dispersed his army and sent it to winter quarters (Fig. 6).[156] His order survived, but it lists seven regiments which are neither mentioned in the Weissenfels' battle plan nor in the Trauttmansdorff list.[157] The order is therefore very likely not a plan only for Wallenstein's army at Weissenfels, but instead the order for winter quarters of his whole army in Saxony, including those regiments already in garrison.[158]

Wallenstein was often criticised for dispersing his army at that time,[159] but all he needed was to be ahead of the Swedish King by two days. Once his regiments were entrenched, he would have been in a strong position during the winter, cutting off Swedish supply lines from the Baltic Sea, dividing the Swedish and Saxon armies, and supplying his own army from enemy territory. Another motivation for dispersing his army was the news he received from the Rhineland, where in the absence of Pappenheim, Swedish

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153 *Relation from 1632* (Droysen 1880, 6).

154 According to Engels (1980, 18) each person consumes three pounds of food (Schwendi 1594, 172) and each horse twenty pounds of forage per day. Both armies had access to water.

155 At Nurnberg the Swedish army lost approximately 10,000 soldiers and 10,000 to 12,000 horses, most of them due to epidemics, desertion and in the case of the horses also starvation (Engerisser 2007, 116).

156 Brzezinski 2001, 32. The connection between Wallenstein's retreat and logistical problems has not been subjected to research yet, but the underdeveloped nature of the early modern economy caused logistical problems throughout the Thirty Years War in general (Parrott 2011, 133). Naumburg and Weissenfels are both located on the Saale, a small, navigable river. The importance of river transport during the Thirty Years War is mentioned by Monro (1637, part II, 50), in this case for the Swedish camp at Werben in 1631. However, Wallenstein's river supply route was blocked by the Swedish army to the south and a Saxon garrison at Halle to the north. Concentrations of larger forces could not be supplied for more than a few days. As an example, food began to run low in two days after the 75,000-strong Confederate army had concentrated at Gettysburg in 1863, despite modern means of transportation (Engels 1980, 45).

157 Hallwich 1912a, 480-484. Regiments: Hatzfeld, Trcka Foot, Thun, Contreras, Mohr vorm Wald, Scharffenberg and Czernin. For the Trauttmansdorff list see section 2.2.4 and below.

158 Priorato's (1672, 119) list of regiments (section 2.2.2.5) is incorrect.

159 Parker 1984, 131, Englund 1998, 129, Guthrie 2002, 196. See Seidler (1954, 28) for criticism of the dispersal and Deuticke (1917, 49).

forces threatened Cologne.[160] Wallenstein had to send Pappenheim with his corps back to prevent losing the whole Rhineland.

On the same day, 14 November, the Swedish army was mustered and a record of this survives, providing exact numbers of infantry and approximate numbers of cavalry for each regiment that day.[161] When Gustav Adolf heard about Wallenstein dispersing his army he followed him the next day, but left a garrison in Naumburg, hoping he could catch Wallenstein by surprise.[162] Gustav Adolf's advance was delayed by a small group of Croats and dragoons at Rippach, who held the high ground on the eastern side of the small stream just long enough to give Wallenstein time to gather his forces (Fig. 54).[163]

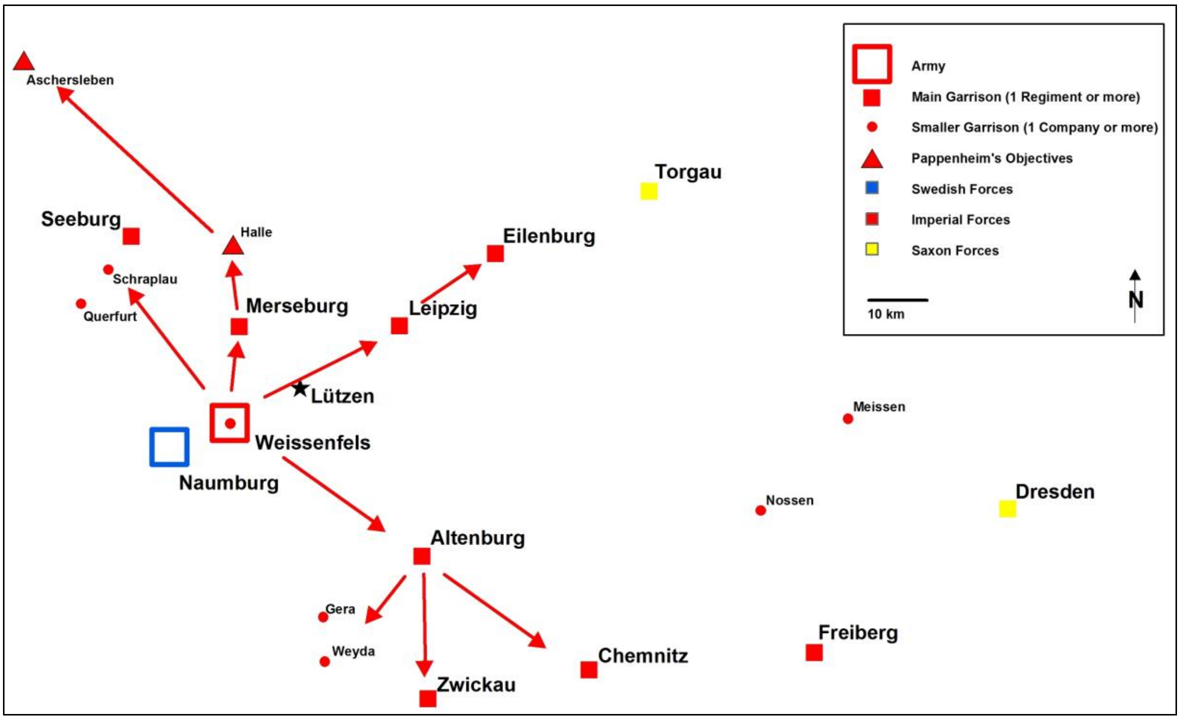

Figure 6: Wallenstein's 14 November dispersal plan.

Wallenstein, then on his way to Leipzig, was at that time 6km northeast of Rippach in the town of Lützen with a corps of only ten regiments, approximately 6,000 men strong, when he was informed of Gustav Adolf's approach around midday.[164] With the Swedish army on his heels, he could not move without risking being chased out of Saxony and losing his slow moving artillery train. Wallenstein opted to stay at Lützen and prepare for

[160] Brzezinski 2001, 32.
[161] Langman 1632, 162.
[162] Brzezinski 2001, 34.
[163] Brzezinski 2001, 34-38.
[164] The Regiments Waldstein, Chiesa, Altsachsen, Baden, Holk, Hagen, Lohe, Westfalen, Drost and Beygott (Hallwich 1912a, 482-483). It is not entirely certain if Wallenstein had only his corps at Lützen at midday on 15 November or if there were also parts of the rear guards of other corps.

battle. His other corps' were already one and a half days on their way from Weissenfels to their winter quarters but he hoped to gather enough troops to face the Swedish army the next day.

3.1.2 Imperial army at Lützen

There was a debate about which regiments managed to return in time for the battle on 16 November until Barbara Stadler published the Trauttmansdorff list in 1991.[165] According to this list, all regiments of the Weissenfels army returned to Lützen in time except the Mannsfeld[166] and Suys Regiments and most of Pappenheim's corps, of which only the Bredau and Tontinelli Regiments arrived before battle. The arrival of two of Pappenheim's regiments before the battle might be the reason why some secondary sources, but only two eyewitnesses, reported incorrectly that Pappenheim arrived with all his cavalry regiments before battle (section 8.3.1).

Some units that were probably at Lützen are not mentioned in the Trauttmansdorff list. It lists only one Croat[167] unit, that of Isolani. But Croats are mentioned on the Weissenfels' battle plan, not by their regiment name but only generally as "Croats".[168] Since it can be shown that Wallenstein had the Croat Regiment of Beygott in his corps at Lützen and Isolani was the General of all Croats it is very likely that "Isolani" in the Trauttmansdorff list means any number of Croat regiments including his own. There was at least one Croat regiment on the right Imperial wing (section 6.3). Fleetwood mentioned a fierce combat between Stalhandske's 500 Finns and the Croats on the Imperial left wing at the beginning of the battle, which would not have been worth mentioning, if it were only one Croat regiment.[169] It is therefore very likely, that Wallenstein had more than two Croat regiments, possibly, in addition to Isolani and Beygott, the Regiments of Corpes[170] and Révay, listed in Brzezinski's order of battle.[171] A company of Reinach's Regiment of Pappenheim's corps was in Weissenfels in garrison and able to reach Lützen, closely

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[165] Stadler 1991, 891-892. See also Brzezinski 2001, 48. The list is often overlooked in modern publications (Guthrie 2002, 223-224).
[166] Mannsfeld's Regiment was on his way to Eilenburg to support the Regiments Trcka Foot, Thun and Hatzfeld against the 6,000 strong Saxon corps of Herzog Georg von Braunschweig-Lüneburg at Torgau (Holl 1976, 67, Brzezinski 2001, 29).
[167] Irregular light cavalry recruited in Hungary (section 3.3.2.3).
[168] Holl 1976, 64a, Fig. 3.
[169] Fleetwood 1632, 7, Schürger 2011.
[170] Mentioned by Holk's payment list (Hallwich 1912a, 577-578).
[171] Brzezinski 2001, 25.

pursued by the Swedish army.[172] The Harquebusier Regiment Leutersheim is mentioned in the Trauttmansdorff list and Wallenstein's dispersal plan, but not in the Weissenfels' battle plan. It was probably on patrol or in a nearby garrison on 12 November, but arrived in time for the fighting at Lützen on 16 November.

In theory, most Imperial regiments consisted of ten companies, as the Imperial war lists suggest, but those lists are not entirely reliable (section 2.2.3). Many companies were detached from their regiments; furthermore, the strength of companies varies substantially so the number of companies in a regiment does not reveal much about the regiment's manpower. The only reliable source mentioning a total number of companies in Lützen is Holk's letter to Christian IV. He stated that there were 36 cavalry companies on each Imperial wing, a figure that almost matches Brzezinski's calculations.[173]

Excursus: Wallenstein's musketeer reserve

One of the few uncertainties in Holk's account is his statement

"och sidst stode udcommenderet 5 Fahner à 500 Mand til foedz"[174]

about the Imperial reserve.[175] Holk himself admitted that he would have liked to deploy 1,000 musketeers in the town of Lützen and the wood to his left if he had them. Under this circumstance it seems very unlikely that he deployed 2,500 musketeers in reserve. The term "Fahner" means infantry colour, which could be a company or regiment colour. In the context of a unit it usually means a company, as regiments are referred to as regiments. The theoretical full strength of an Imperial company was 343 men; the actual field strength was much less. In Gallas' corps on 7 November 1632, each company had an average strength of 68 men.[176] It is therefore much more likely that Holk meant "five companies with a total of 500 men", which is confirmed by Diodati, who stated that the infantry reserve consisted of one squadron which, together with the 7,000 men in seven brigades and 700 detached musketeers, yields a total of 8,200 infantrymen.[177]

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[172] Brzezinski 2001, 25.

[173] Wittrock 1932, 308. Brzezinski (2001, 25) assumes 37 companies on the left and 36 on the right wing. All other calculations, such as those of Generalstaben 1939, 413-414 (29 and 50 companies) and Guthrie 2002, 223 (38 and 41 companies), are inaccurate.

[174] "And last stood a detachment of five flags of 500 men on foot each."

[175] Wittrock 1932, 308.

[176] Hallwich 1912a, 448. Number of companies according to Toegel 1977, 397-399. Note: Average troop strengths give only a clue to the strength of other units and they are under no circumstance qualified to calculate the actual field strength of an entire army, because they can vary substantially. See also below.

[177] Fiedler 1864, 561. See also Seidler 1954, 125, ref. 79 and 82, Brzezinski 2001, 39 and Sennewald 2013, 169. According to Brzezinski (2001, 25) there were 8,550 infantrymen, but he admitted that those numbers

Cuirassiers	Commanders	Coy	Str.	YoR	Destination
Desfours (b, c, f)	Oberst Nicolas Desfours	6	300	1628	Chemnitz
Götz (c, d, f)	Oberstleutnant Moritz von Falkenberg	9	400	1626	Zwickau
Holk (b, e, f, j)	Oberstleutnant Frantz von Uhlefeld	8	250	1630	Leipzig
Lohe (a, b, c, e)	Oberst von der Lohe	5	150	1632	Leipzig
Trcka (b, c, f, g)	Oberst Adam Erdmann Graf von Trcka	4	250	1629	Altenburg
Bredau (a, f)*	Oberst Hans Rudolf von Bredau	6	300	1631	Aschersleben
Harquebusiers					
Drost (e)	Oberst Wilhelm von Westfalen, Landdrost und Dringenberg	5	250	1632	Leipzig
Goschütz (f, g)	Oberst Benedikt Goschütz	5	250	1632	Merseburg
Hagen (e, g)	Oberst Johann Nicolaus Hagen von Sauwenbein	13	800	1631	Leipzig
Leutersheim	Oberst Johann Freiherr von Leutersheim	6	200	1632	Eilenburg
Loyers (f)	Oberst Gottfried Freiherr von Loyers	5	200	1632	Merseburg
Piccolomini (b, c, d, j)	Oberst Ottavio Piccolomini di Aragona	12	500	1629	Altenburg
Tontinelli*	Oberstleutnant Anton Tontinelli	6	250	1619	Merseburg
Westfalen (e)	Oberst Heinrich Leo von Westfalen	3	150	1632	Leipzig
Westrumb (a)	Oberst Johann von Westrumb	3	100	1632	
Dragoons					
Trcka		5	100	1632	Merseburg
Croats					
Isolani (j)	General Ludwig Johann Hector Graf von Isolani	5	250	1625	Merseburg
Beygott (e)	Oberst Daniel Beygott	5	100	1632	Leipzig
Corpes (j)	Oberst Marcus Corpes	10	300	1631	Eileburg
Révay	Oberst Paul Freiherr von Révay	5	250	1632	
Infantry					
Baden (a, e, j)	Oberstleutnant Stopler	6	**	1630	Leipzig
Friedrich Breuner (h, j)	Oberst Philipp Friedrich von Breuner	10	**	1632	Zwickau
GFZM Breuner (b, c, h, j)	Generalfeldzeugmeister Hans Philipp von Breuner	13	**	1618	Chemnitz
Jung-Breuner (c, j)	Oberst Hans Gottfried von Breuner	5	**	1630	Zwickau
Colloredo (c, h)	Generalwachtmeister Rudolf von Colloredo	7	**	1625	Zwickau
Comargo (b, h, j)	Oberst Theodor Comargo	10	**	1619	Altenburg
Grana (c, h)	Oberst Francesco Grana, Marchese di Caretto	8	**	1627	Altenburg
Chiesa[178] (e, j)	Oberstleutnant Matias Lasky or Oberst Andreas Matthias Kehraus	12	**	1618	Leipzig
Reinach (detachm.)		1	**	1620	Weissenfels
Alt-Sachsen (c, e)	Oberstleutnant Bernhard Hämmerle	8	**	1618	Leipzig
Waldstein (b, c, e)	Oberst Berthold von Waldstein	11	**	1628	Leipzig

italic: Units not mentioned in the Trauttmansdorff list, but probably at Lützen.
* Regiments of Pappenheim's corps arriving before battle
** A total of 8,200 infantry
Red: Leaguist regiment   Black: Imperial regiment
Coy: Number of Companies   YoR: Year of Recruitment
Str.: Strength according to Brzezinski 2001, 25-26, highly speculative
Destination: Destination of units according to Wallenstein's dispersal plan
(a, b…): see below

Table 4: Imperial army at Lützen according to the Trauttmansdorff list.

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were highly speculative. Generalstaben (1939, 413) and Guthrie (2002, 223) gave a number of 9,870, which is too high (see also Eriksson 2006, 235, Larsson/Villstrand/Wolke 2006, 128, Wolke 2007, 64).

[178] Chiesa himself was in Frauenstein on 16 November (Hallwich 1912a, 505). Oberstleutnant Kehraus commanded the Regiment Dohna in 1632 (Toegel 1977, 397 and 409), but was promoted to Oberst and put in charge of Chiesa's Regiment in late 1632. However, it is uncertain whether before or after the battle (See also Brzezinski 2001, 25 and 48).

Regiments at Lützen mentioned by eyewitnesses (a-d) or documents (e-j):
a: Münchhausen (Wittrock 1932, 305)
b: Holk (Wittrock 1932, 309)
c: Diodati (Fiedler 1864, 563-567)
d: Piccolomini (Argang 1894, 88)
e: Wallenstein's corps according to the disposition of 14 November 1632 (Hallwich 1912a, 482-483)
f: Verzeichnis der Beschädigten (Hallwich 1912a, 596-598)
g: Protocols of the court martial at Prague (Seidler 1954, 141-148)
h: Wallenstein's letter to Falchetti, 22 November 1632, Chemnitz (Hallwich 1912a, 538-539)
j: Holk's payment list, 6 December 1632 (Hallwich 1912a, 577-578)

Artillery
nine 24-pounders, two 16-pounders, six 12-pounders, one 10-pounder, six 6-pounders

Table 5: Imperial artillery at Lützen according to the Schwerin 1633 document (Generalstaben 1939, 414).

Cuirassiers	**Commanders**	**Coy**	**Str.**	**YoR**	**Destination**
Sparr (g)	Oberstleutnant Albrecht von Hofkirchen	10	300	1629	Halle
Harquebusiers					
Bönninghausen (g)	Oberst Lothar von Bönninghausen	11	500	1630	Aschersleben
Lamboy (c, j)	Oberst Wilhelm von Lamboy	6	250	1632	Halle
Dragoons/Guard					
Merode's 'Obwacht' Lifeguard		1	40		Halle
Pappenheim's 'Rennfahne'[179] Lifeguard		1	40		Halle
Merode (j)	Oberstleutnant Robert Borneval d'Arlin	5	160	1625	Halle
Pappenheim (j)		4	140	1632	Halle
Croats					
Batthyanyi	Oberst Franz Graf Batthyanyi	9	200	1632	Halle
Forgacs (c)	Oberst Nicolas Forgacs de Gymes	2	100	1630	
Orossy	Oberst Paulus Orossy	9	450	1631	Halle
Cossacks					
Poles (j)		3	250	1631	Querfurt

Table 6: Pappenheim's cavalry arrived midday at Lützen.

Infantry	**Commanders**	**Coy**	**Str.**	**YoR**	**Destination**
Gil de Haes	Oberst Gil de Haes	6	500	1632	Halle
Goltz	Oberst Martin Maximilian Freiherr von der Goltz	10	700	1626	Halle
Moriamez-Pallant	Oberst Karl Dietrich Pallant, Baron de Moriamez	8	500	1632	Aschersleben
Pallant	Oberst Rudolf Freiherr von Pallant	10	500	1632	Halle
Reinach	Oberstleutnant Gabriel Freiherr Comargo	9	650	1620	Halle
Würzburg	Hauptmann Willich		75	1631	Halle

Table 7: Pappenheim's Infantry arrived on the evening at Lützen.

Infantry	**Commanders**	**Coy**	**Str.**	**YoR**	**Destination**
Mannsfeld	Oberstleutnant Niderum	10		1625	Eilenburg
Suys	Oberst Freiherr Ernest Rolland von Suys	10		1631	Zwickau

Table 8: Regiments on Weissenfels' battle plan and Wallenstein's dispersal plan not arrived at Lützen.

[179] 'Rennfahne' was the general term for 16th century elite cavalry advance guard (Fronsperger 1558, 84, Schwendi 1594, 72).

Infantry	Commanders	Coy	Str.	YoR	Garrison
Trcka Foot	Oberstleutnant Adrian Enckhevoert	7		1631	Eilenburg
Thun	Oberst Graf Rudolf Thun	7		1631	Eilenburg
Contreras	Oberst Andreas von Contreras	5		1628	Altenburg
Mohr vorm Wald	Oberst Franz Wilhelm Mohr vorm Wald	10		1628	Freiberg
Scharffenberg	Oberst Gotthard von Scharffenberg	10		1630	Freiberg
Cuirassiers					
Hatzfeld	Oberst Mechior von Hatzfeld	6		1625	Eilenburg
Harquebusiers					
Czernin	Oberst Graf Czernin	10		1632	Freiberg

Table 9: Regiments on Wallenstein's dispersal plan probably already in garrison on 14 November.

Troop strength

There are three accounts by Imperial eyewitnesses mentioning the Imperial army's strength. Diodati[180] and Münchhausen[181] give a total number of 12,000 men, 6,000 infantry and 6,000 cavalry, while Holk stated that the infantry was 8,200 strong. Holk's statement seems reliable, because this number would give the ten Imperial infantry regiments an approximate strength of 820 men. This can be compared to the average strength of 725 men of the seven Imperial regiments in Gallas' corps on 7 November 1632, which is a reasonable field strength.[182] The total army strength of 12,000 in Diodati's and Münchhausen's accounts seems too low. It is, however, unlikely Diodati substantially changed the army's strength in his report to the emperor because some battle eyewitnesses would have noticed. He certainly rounded the numbers down slightly so that Wallenstein's retreat from Lützen looked more reasonable. It is also possible that he did not include those cavalry regiments arriving on the battlefield at the last minute (section 8.1.2) or the Croats. We can thus assume a total strength of approximately 13,000-14,000, but certainly not more than 15,000.[183] That would have left Wallenstein with approximately 4,800-5,800 cavalrymen: 1,000 as reserve in the centre and 1,900-2,400 on each wing.[184] Together with

[180] Fiedler 1864, 562. There is no hint in Diodati's account that the Imperial army had 8,000 infantry and 4,000 cavalry, as Deuticke (1917, 55) claimed.
[181] Wittrock 1932, 304.
[182] Letter from Gallas to Wallenstein (Hallwich 1912a, 448). The theoretical full strength of a regiment was 2,000, but this was only a commission, given by the emperor or the Generalissimus to a colonel, allowing him to raise a regiment of 2,000 men (Wrede 1898, 33). There was probably not one regiment in the Imperial army, that ever had this strength, but the historical sources do not give any valuable information. The actual full strength was more likely 1,500 men and the field strength after a few month of campaigning much less.
[183] Most modern historians came to the conclusion that the Imperial army's strength was 16,000 men or more. Their arguments derived, either from presuming that regiments which were actually somewhere else in garrison fought at Lützen (Generalstaben 1939, 413-414, Guthrie 2002, 223), or they calculated the Imperial army's strength at Lützen according to estimated average company strengths of the Imperial army in 1633 (Seidler 1954, 42). As long as there is no reason to doubt the eyewitnesses Diodati (Fiedler 1864, 562) or Holk (Wittrock 1932, 308), the numbers they give must be considered seriously (See Wedgewood 1938, 325, Sennewald 2013, 168).
[184] Brzezinski (2001, 25-26) gave a number of 5,350 cavalry, which fits within the limit of 14,000 men total. Also Junkelmann (1993, 453) calculated 6,000 cavalry, including Croats, and 8,000 to 9,000 infantry. Generalstaben (1939, 414) gave a number of 6,700 cavalry; Guthrie 2002, 223 (followed by

150 musketeers, each wing would have had 2,050-2,550 men against approximately 2,400 Swedes of the first line, which seems a reasonable number and matches eyewitness accounts, who reported a long and fierce combat on both wings.

Artillery

The number of Imperial artillery pieces and their calibre is not entirely certain, as there are almost no Imperial eyewitnesses mentioning any number of guns. The Swedes captured the entire Imperial heavy artillery at Lützen. According to Schwallenberg, nine 24-pounders and twelve other guns were taken, but it is uncertain whether or not those were all the cannon or only the intact ones.[185] A document from 18 April 1633 stated that the captured Imperial artillery from Lützen arrived in Mecklenburg, consisting of nine 24-pounders, two 16-pounders, two 14-pounders, four 12-pounders, one 10-pounder and six 7-pounders.[186] The nine 24-pounders are consistent with Schwallenberg's and Knyphausen's statement; the latter also mentioned six 12-pounders and four 6-pounders.[187]

Only two Protestant eyewitnesses gave specific numbers of Imperial guns at Lützen. The most reliable source is Oberst Dalbier, who probably commanded the captured small Imperial battery, which consisted of four 24-pounders and two 12-pounders. Again, it is not certain if this number is the total number or only the small Imperial battery guns not destroyed.[188] This is confirmed by Silvio Piccolomini, who mentioned incorrectly that the Imperial army lost six pieces, which seems in reality to have been small Imperial battery cannon only, near which he had fought.[189] The other Protestant eyewitness, who gave the specific number of Imperial artillery cannon (21 in total) in common with most other sources, is Fleetwood.[190] He stated that the windmill battery had nine guns, and twelve guns were in two or three other batteries, a statement that contradicts almost all other sources. Fleetwood probably never went close to the frontline and therefore could not see single guns, which might explain the low total of guns he gave for the windmill battery,

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Larsson/Villstrand/Wolke 2006, 128, Wolke 2007, 64) claimed 6,900 and Pfaffenbichler (2007, 269) 7,500; all three are too high.

185 Hallwich 1912a, 523. Watts (1633, 152) gives almost the same number: Nine 24-pounders and 11-12 field pieces. A total number of 21 guns is mentioned by the *Relation from 1633* (Droysen 1880, 32) and Gottfried 1633, 25-26, copied by *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 750 and Chemnitz 1648, 464.

186 Schwerin 1633, Generalstaben 1939, 414. The strange calibres are probably due to the use of different pounds in use in the various countries (see section 3.2). Specifications in the Schwerin 1633 document are probably calculated according the Swedish pound. A 14-pounder in Swedish pounds is a 12-pounder in Saxon pounds and a 7-pounder would be a 6-pounder.

187 Studien 1844, 50.

188 Dalbier 1632, 252.

189 Archivio 1871, 240.

190 Fleetwood 1632, 7.

but he certainly could see whole batteries firing. Since we know that the Imperial army had only two main batteries, the other 1-2 batteries mentioned by Fleetwood are possibly regimental guns. This suggestion is supported by a sketch in the Stockholm Krigsarkivet which shows a total of three batteries and the copperplate published in *The Swedish Intelligencer* which shows two smaller batteries between the main batteries.[191] The painting by Snayer shows the Imperial artillery deployed in ten batteries flanking each of the five infantry squadrons of the first line centre; two large batteries are on the flanks and eight small batteries, probably regimental guns, are posted between the infantry squadrons.[192]

No historical source makes explicit mention of any Imperial regimental guns at Lützen, which does not mean that there were none.[193] When Wallenstein was reinstated as Generalissimus in December 1631[194] and reassembled his army, he asked his colonels on 14 May 1632 if they had their regimental guns or if they were obtainable.[195] Additional evidence might be war lists no. 14 and 15 from 1632 giving a number of two light pieces for every regiment, but this seem more likely a theoretical figure than the actual number.[196] Nevertheless, these documents suggest that Wallenstein had regimental guns at Lützen, but certainly not as many as were mentioned in the sources otherwise, and that there were two to eight batteries with two or four guns per battery, but probably not more than 16 in total.[197]

3.1.3 Swedish army at Lützen

Gustav Adolf's tactical plan was to force parts of Wallenstein's dispersed army to engage on 15 November. Most of the Swedish baggage train was left with a garrison in Naumburg, which very likely consisted of one brigade, probably that of Vitzthum. The main sources for the Swedish army at Lützen are Langmann's 14 November 1632 list of the army at Naumburg and the incomplete Swedish casualty list with the number of foot soldiers killed at Lützen.[198] There are secondary sources, most based on the *Inventarium Sueciae* which lists Swedish cavalry regiments at Lützen and corresponds with Langmann's list, and

[191] Brzezinski 2001, 50 and 52.
[192] Pieter Snayers, *Die Schlacht bei Lützen*, Heeresgeschichtliches Museum Wien, Inv. Nr. GG1820.
[193] As Seidler (1954, 35) claimed. It is most unlikely that all regimental guns were in Gallas' corps, as (Stadler 1991, 729) suggested.
[194] The exact date is unknown, but possibly mid-December (Kortus 2010, 117-118).
[195] Mittheilungen 1882, 346.
[196] Toegel 1977, 404 and 417.
[197] Brzezinski (2001, 25) suggests two regimental guns per front line battalion or ten in total.
[198] Langman 1632, 162, Mankell 1861, 126-128. See also section 2.2.3.

which are accepted by modern historians. Gustav Adolf's plan to launch a surprise attack suggests that he took all regiments except the Naumburg garrison with him. However, it should be noted that there is no first-hand evidence for Swedish cavalry at Lützen.[199]

Six infantry regiments that were in Naumburg on 14 November are completely missing from the casualty list. The six were Hard, Hastfer, Brandenstein, Erbach, Uslar and Vitzthum, but since the casualty list is incomplete, absence is therefore not proof that those regiments did not fight at Lützen. When historical sources mention any Protestant infantry, they usually refer to brigades instead of regiments, so it is not entirely certain whether a brigade had all their regiments present at Lützen. Nevertheless, it seems that the ten brigades of Gustav Adolf's main army in Saxony remained intact as brigades without single regiments being detached to different places. One missing regiment is mentioned by Johann Hallenus, who wrote that two officers were sent to him to provide him with information of the battle. One of these men was Fändrik Ambrosius Jacobsson, an officer in Hastfer's Regiment.[200] Hard's Regiment was part of the Swedish Brigade and therefore very likely in Lützen, as was Brandenstein's Regiment, which was part of the '9th Brigade'.[201] The Erbach's and Uslar's Regiments were very likely part of 'Vitzthum's Brigade' and therefore probably guarding the camp at Naumburg.[202] This 850 strong garrison had to protect the supply base and was the last defence if the battle at Lützen ended in a disaster. A *djurskyttar* company of 48 mounted riflemen accompanied Gustav Adolf to Germany in 1630 as part of his personal entourage (section 3.3.3.4).[203] Although this unit is not mentioned in any Swedish troop lists of the Battle of Lützen, it is very likely that they took part, as they were usually not mentioned in muster rolls. In total the Swedish army at Lützen fielded 19,272 men, 13,032 infantry and approximately 6,240 cavalry.

Artillery

There are no eyewitness accounts or documents giving a total number of Swedish artillery pieces. The eyewitness Vitzthum/Berlepsch was alone in stating that the battle was opened by three Swedish 24-pounders (section 8.1.3). Almost all research, contemporary and

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[199] Brzezinski 2001, 50. Watts 1633, 128 and Gottfried 1633, 27-28, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Abelinum 1646, 751-752 and Chemnitz 1648, 463-464. According to Khevenhiller (1726, 189), the *Relation from 1633* (Droysen 1880, 29) and the sketch in Stockholm Krigsarkivet (Brzezinski 2001, 52) there were only four squadrons per line on each wing, which is incorrect.
[200] Mankell 1860, 661.
[201] A '9th Brigade' is mentioned by Hülshorst (Wittrock 1932, 303).
[202] According to Watts (1633, 121), Oberst Damian Vitzthum was left as commander of the garrison of Naumburg (Brzezinski 2001, 22), but he remained unclear about the units under his command. However, all Swedish infantry was usually grouped into brigades and it is therefore likely that the Regiments Vitzthum, Uslar and Erbach formed a brigade.
[203] Brzezinski/Hook 2006, 67-68.

modern, is based on the *Inventarium Sueciae*, according to which the Swedish army had 20 larger cannon and 40 regimental guns.[204] Although the numbers from the *Inventarium Sueciae* seem reasonable when compared to the 42 regimental guns the Swedish army had at Breitenfeld on 17 September 1631, doubts remains until we have more reliable sources.[205] Gustav Adolf experimented with leather guns as regimental guns during the Swedish-Polish War (1621-1629), but they tended to explode if fired continuously in rapid succession.[206] In Germany the Swedish army usually used cast iron 3-pounder guns instead of leather guns,[207] but they probably had also some small calibre German 'Falkonett'-type artillery pieces, as they were common in Germany, but are usually not mentioned in historical sources.[208]

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[204] Gottfried 1633, 27, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Abelinum 1646, 751-752 and Chemnitz 1648, 464. Watts (1633, 128) gives a number of 24 larger cannons and 40 regimental guns.
[205] Brzezinski/Hook 2006, 70.
[206] Brzezinski/Hook 2006, 70.
[207] Brzezinski/Hook 2006, 70. Nevertheless, leather guns were still used by the Scottish army at Newburn in 1640 (Edwards 2002, 243).
[208] Engerisser 2007, 580. The German 'Falkonett'-type artillery pieces have a slightly smaller calibre of 3.8cm to 5.5cm than the English falconet's 7cm. Pappenheim was reported to have been shot by a 'Falkonett', but the reliability of this statement is not entirely certain (section 8.3.4).

Regiment	Commander	Coy	Str	YoR
Smaland	Överste Fredrik Stenbock	8	400	1627
Östgöta	Överstelöjtnant Lennart Nilsson Baat	4	100	1627
Uppland	Överstelöjtnant Isaak Axelsson	4	250	1627
Södermanland	Överste Otto Sack	4	200	1627
Västgöta	Överste Knut Soop	8	400	1627
Finland	Överste Torsten Stalhandske	8	500	1627
Georg von Uslar	Oberst Georg von Uslar	8	160	1630
Hessian squadron: Rostein	Oberst Friedrich Rostein	5	180	
Kurt von Dalwigk	Oberstleutnant Kurt von Dalwigk		100	
Franz von Dalwigk	Oberst Franz von Dalwigk		50	
Thilo Albrecht von Uslar	Rittmeister Birckenfeld		50	
Beckermann	Oberst Eberhard Beckermann	4	150	
Bulach	Oberst Klaus Konrad Zorn von Bulach	8	120	1631
Goldstein	Oberstleutnant Marx Conrad von Rehlinger	8	150	1632
Duke Wilhelm	Oberst Herzog Wilhelm von Sachsen-Weimar	12	120	1631
Bernhard‘s Life Regiment	Oberstleutnant Bouillon	12	500	1631
Carberg	Oberst Carl Joachim Carberg	8	220	1630
Kurland	Oberst Hans Wrangel	4	230	1630
Livland	Oberstleutnant Karl von Tiesenhausen	8	300	1630
Courville	Oberst Nicholas de Courville	5	300	1628
Hofkirchen	Oberstleutnant Henning von Geisto	12	350	
Ernst von Anhalt	Oberst Ernst von Anhalt-Bernburg	8	300	
Löwenstein	Oberst Georg Ludwig Graf von Löwenstein	6	200	
Brandenstein	Oberst Brandenstein	4	300	
Steinbach	Oberst Jaroslav Wolf von Steinbach	4	200	
Stechnitz	Oberstleutnant Georg Matthias von Stechnitz	4	80	
Öhm	Oberst Johann Bernhard von Öhm	8	300	1626
Krak‘s *Djurskyttar* (b)	Kapten Nils Krak	1	30	1611

a: Infantry regiments not listed in the Swedish casualty list.
b: Not listed in any source, but probably took part in the battle as part of Gustav Adolf’s entourage.
c: Regimental commander Oberst Caspar Graf von Eberstein commanded the right wing musketeer detachment.
d: Regimental commander Oberst Hans Abraham Graf von Gersdorf commanded the left wing musketeer detachment.

m: musketeers
p: pikemen
offs: officers

colours:
blue: Swedish army, national Swedish regiments
black: Swedish army, foreign regiments
green: Hessian allies
red: Saxon allies

Table 10: Swedish cavalry at Lützen according to Langmann’s list and Swedish casualty list.

Regiment	Commander	Coy	Str	YoR
Swedish or New Blue Brigade:	*Överstelöjtnant Gabriel Kyle*		*1,575*	
Eric Hand's New Blue Regiment	Överstelöjtnant Gabriel Kyle	8	465m, 267p, 96offs	1628
Karl Hard (a)		8	447m, 96offs	
Klas Hastfer (a)		4	156m, 48offs	
Yellow Brigade:	*Generalmajor Nils Brahe, Greve till Visingborg*		*1,221*	
Royal Lifeguard	Kaptenlöjtnant Erik Stenbock	1	45m, 38p, 12offs	
Yellow Guard Regiment	Generalmajor Nils Brahe, Greve till Visingborg	16	610m, 324p, 192offs	1624
Old Blue Brigade:	*Oberst Hans Georg aus dem Winckel*		*1,110*	
Winckel's Old Blue Regiment	Oberst Hans Georg aus dem Winckel	16	486m, 432p, 192offs	1624
Green Brigade:	*Oberst Georg Wulf von Wildenstein*		*2,036*	
Bernhard's Green Life Regiment	Oberstleutnant Johann Winckler	12	396m, 210p, 142offs	1627
Wildenstein's Black Regiment	Oberst Georg Wulf von Wildenstein	12	468m, 102p, 142offs	1629
Leslie's Scotts	Oberstleutnant Ludovick Leslie	16	360m, 24p, 192offs	
Duke Wilhelm's Brigade:	*Oberst Carl Bose*		*1,726*	
Duke Wilhelm's Life Regiment	Oberstleutnant Georg Philip von Zehm	12	276m, 78p, 142offs	
Carl Bose	Oberst Carl Bose	8	540m, 156p, 96offs	
Pforte	Oberst Hans von der Pforte	4	306m, 84p, 48offs	
White Brigade:	*Generalmajor Dodo von Innhausen und zu Knyphausen*		*1,120*	
Knyphausen's White Regiment	Generalmajor Dodo von Innhausen und zu Knyphausen	12	708m, 270p, 142offs	1630
Thurn's Brigade:	*Oberst Hans Jacob Graf von Thurn*		*1,252*	
Thurn's Black Regiment	Oberst Hans Jacob Graf von Thurn	8	240m, 144p, 96offs	1629
Isenburg	Oberst Wolfgang Heinrich Graf von Isenburg-Büdingen	8	120m, 54p, 96offs	
Hessen-Kassel's Green Life Regiment	Oberstleutnant Hans Heinrich von Güntherode (c)	12	216m, 144p, 142offs	
Mitzlaff's Brigade:	*Oberst Joachim Mitzlaff*		*1,834*	
Gersdorf	Oberstleutnant (d)	8	330m, 96p, 96offs	
Mitzlaff	Oberst Joachim Mitzlaff	12	342m, 198p, 142offs	
Rossow	Oberst Friedrich von Rossow	8	366m, 168p, 96offs	
'9th Brigade':			*1,158*	
Brandenstein (a)	Oberst Brandenstein	4	198m, 48offs	
Löwenstein	Oberst Georg Ludwig Graf von Löwenstein	7	600m, 84offs	
Henderson	Oberst John Henderson	4	180m, 48offs	

Table 11: Swedish infantry at Lützen according to Langman's list and Swedish casualty list.

'Vitzthum's Brigade':	*Oberst Damien Vitzthum von Eckstädt*		*850*	
Dam Vitzthum (a)	Oberst Damien Vitzthum von Eckstädt	8	150m, 24p, 96offs	
Erbach (a)	Oberst Georg Friedrich Graf von Erbach	8	144m, 18p, 96offs	
Thilo Albrecht von Uslar Guard (a)	Oberstleutnant Alexander von Östringer	12	144m, 36p, 142offs	

Table 12: Probable garrison of Naumburg.

3.2 Firearms

One of the main concerns within the field of 17th century battlefield archaeology is matching firearms ammunition to weapon types and models, and their assignment to different service branches and armies. This issue is the key to understanding the distribution of firearms, as represented by archaeological recovery of particular types of ammunition, and therefore being able to make interpretive assessments of gunfire combat and sequencing a battle's events. Unfortunately, 17th century battlefield archaeology has barely scratched the surface of this important issue: the connection between gun barrel's diameter and bullet calibre is not clearly understood. Moreover, not all 17th century firearms are known, nor is it known which army used which firearms during what period.

The reason for this lack of knowledge is simple: A very wide range of different weapon models with substantially different calibres, often with different names, were in service. These can be analysed through recourse to three quite different sources – historical sources; ammunition from battlefields, sieges and ship wrecks; and modern firearms collections. This study, in turn, involves three fields of research – military history, battlefield archaeology, and weapons history. Of these three fields, military history has the longest academic tradition, but most historians, with very few exceptions, have failed to understand the relevance of precise firearm specifications and terminology, as well as their production and delivery dates to field units. Battlefield archaeology is still in its infancy and lacks the depth of experience and compilation of enough data to develop clear cut-patterning. The study of weaponry is not an official academic field of research and therefore it is no surprise that there are very few 17th century firearms experts who have published their results.[209]

Because of the complexity of this issue, firearms, ammunition, and their distributions are discussed across five chapters. It is the intention of this section to provide information on firearms production and export and the development of firearms models with their theoretical calibre specifications and windage dating back to a period three decades before the Battle of Lützen. The results will be compared and verified with ammunition archaeologically recovered from Lützen and other 17th century battlefields, sieges, and ship wrecks so as to be able to allocate bullets to the weapon types and models discussed in Chapter Five. Finally, the bullet distributions on the battlefield will be

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[209] Brzezinski/Hook 2006, Engerisser 2007.

discussed in Chapters Five through Eight and the results of the previous chapters verified according to their distribution patterns.

In the Thirty Years War firearms were defined by the gun lock and the weapon type. There were three types of ignition systems, represented by different gun locks: Matchlock, wheel lock and snaphance. The matchlock required ignition using a burning fuse that had to be attached to the serpentine before each shot.[210] The wheel lock had a spring-powered iron wheel with a roughened surface, which was wound up with a spanner. The wheel spun when the trigger was pulled running against a piece of marcasite or pyrites,[211] causing sparks that ignited the priming powder. The snaphance was a precursor of the flintlock with a gunflint striking a steel plate and igniting the priming powder. The snaphance was not a common gun lock in the Thirty Years War except in Sweden, but Gustav Adolf made great efforts to replace his snaphance weapons with match lock weapons.[212]

In general there were four types of firearms: Musket, arquebus, carbine and pistol. The musket was a heavy long gun. A light shoulder gun was called arquebus or caliver, but it was abandoned during the first half of the Thirty Years War with a few exceptions, Spain being an example.[213] Both firearms were infantry matchlock weapons. A few wheel lock muskets (fire locks) were produced for dragoons and guards of artillery and ammunition; the burning fuse of the matchlock could detonate the gun powder supply, and they were easier to handle on horseback. Therefore, pistols and carbines, cavalry guns, were always equipped with a wheel lock. While 17th century pistols were short weapons with a length of 30cm to 60cm, carbines could vary between 60cm and 120cm in length, and short carbines looked not much different from long pistols. Almost all barrels were smooth bore, but there were also a few rifled barrels used by marksmen. Most rifled weapons were wheel locks brought into the army by their owners who had used them in civilian competitions. They were fairly slow loading but also quite accurate in capable hands.

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210 Sivilich 2015, (30-31). The ‘cock’ of a matchlock is called ‘serpentine’.
211 It was mostly marcasite, not pyrites, used in wheel locks (Babits 1974, 7); however, both look very similar and were only listed as independent minerals since the mid-19th century.
212 Engerisser 2007, 558, Brzezinski/Hook 2006, 20.
213 Engerisser 2007, 548.

3.2.1 Production of firearms in the Thirty Years War

The production of firearms, even the simple match lock muskets, was a complicated procedure and the knowledge was not widely spread. In addition, the exceptionally complicated wheel lock mechanism for pistols and carbines had to be produced by specialists, probably by clock makers.[214] Production also required a ready supply of iron. Firearms production was therefore largely centralised in a few cities. During the Thirty Years War neither the Habsburgs nor Sweden were able to supply their armies with firearms from national production as this was outstripped by demand due to the large scale recruitment of new regiments. Vast amounts of firearms had to be imported. In addition, many firearms were acquired by looting armouries in conquered cities and by recovering weapons from battlefields after a victory. The result of these various procurement processes was that soldiers were equipped with a variety of older and newer firearms, from different sources and with different calibres.

Habsburg had two facilities for the production of firearms, at Ferlach and Styria. However, these came nowhere close to producing the numbers required by the Imperial army.[215] Naturally, most firearm imports came from the Holy Roman Empire, as it was part of the Empire. Suhl, in the Duchy Saxony-Coburg, was the largest German manufacturer of firearms and one of the most important in Europe, with an output of 28,950 muskets in 1631 and 1632.[216] The iron ore of Suhl contains manganese, making it almost steel-like, which in turn makes it more resistant to catastrophic failure under explosive pressure, so accidents were probably not as frequent as with firearms from other facilities.[217] The Suhl production centre was completely destroyed by the Imperial General Isolani in 1634.[218] Two smaller facilities were in the free cities of Augsburg and Nurnberg; the latter was famous for its production of wheel locks.[219]

Nurnberg and Saxony were Protestant while Augsburg had a unique Catholic-Protestant government, but all three states remained neutral and maintained good relations

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[214] Sivilich 2015, (31).
[215] Brooker 2007, 53-57.
[216] Engerisser 2007, 549.
[217] Piersig 1990, 4, Engerisser 2007, 551.
[218] Engerisser 2007, 550. Due to the destruction of Suhl, Habsburg set up a new arms manufacturer in Vienna in 1634 (Brooker 2007, 57).
[219] Sivilich 2015, (22). Wheel locks were probably invented in Nurnberg, one of Europe’s technically most advanced cities (Engerisser 2007, 548). Essen was also an important arms manufacturer, but was captured and recaptured by Spanish and Dutch forces; their weapons were very likely exported to the Spanish-Netherland theatre of war.

with the emperor.[220] That changed in 1631 with the destruction of Magdeburg, because Saxony and Brandenburg entered the war on the Swedish side. With the Swedish victory over Tilly at Breitenfeld on 17 September 1631, there followed a Swedish triumphal progress through Germany in which Nurnberg and Augsburg were captured. Cut off from German weapons, it is not certain where Habsburg received firearms after 1631, especially in early 1632, when Wallenstein raised and equipped a whole new army.[221]

When the Thirty Years War began Sweden was unable to produce large quantities of firearms, and in particular was unable to produce wheel locks at all; instead, Sweden had to rely largely on imports from the Netherlands, in particular from Amsterdam.[222] The 13,000 Swedish soldiers landing in Usedom in 1630 were very likely equipped chiefly with Amsterdam firearms. Although there was a substantial increase in firearms production in Jönköping,[223] the increased number of regiments was even greater and by late 1632 the Swedish-Protestant army in Germany was 146,000 strong.[224] The situation got better in early 1632, when all important German arms manufactories were either allied or captured and many armouries of captured cities were looted.

3.2.2 Calibre, windage and firing range of firearms

Few military firearms from the Thirty Years War have survived in museums because they were mostly undecorated, in comparison with more ornate, and therefore more collectable, civilian hunting weapons. Barrels could only be produced with a precision of approximately one millimetre. This lack of precision meant that even firearms of the same model had slightly different calibres[225] and it is not certain how many barrels of original weapons have widened due to firing and corrosion and on what scale. Therefore, the key to understanding calibre, windage and the development of 17th century firearms is the historical sources, in particular military handbooks. Most historical sources refer to only one model of each weapon type, something of a consolidation of all weaponry of that type, which brought historians to the mistaken conclusion that weapons used by Thirty Years

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[220] Nurnberg remained neutral despite being in the Protestant Union, which was dissolved in 1621 (Schormann 2004, 33).
[221] Pfaffenbichler (2007, 268) suggests that Wallenstein received muskets from Danzig and Holland in 1632.
[222] Engerisser 2007, 547, Brzezinski/Hook 2006, 9 and 54. The production of wheel locks in Sweden started approximately in 1640.
[223] Engerisser 2007, 549.
[224] Engerisser 2007, 452.
[225] Toifl 1989, 127.

War armies were standardized.[226] Some military handbooks, like that of Johann Jakob von Wallhausen, first director of Johann von Nassau's *schola militaris* in Siegen,[227] counter this impression and designate two models – one older, still in service, and one modern, which he recommends.[228] This comment provides valuable evidence of ongoing weapons development, upgrading, and replacement. Since historical sources do not state which weapon models were actually being used in which European armies, battlefield archaeology is better suited to resolve this question by analysing ammunition recovered from battlefields (Chapter Five).

In historical sources, calibres of firearms were specified in bullets per pound. The reason for using weight and not a linear measure was a technical problem: the calliper rule was not invented. The actual weight of a pound varied according to region: England (453g), Saxony/Suhl (467g), Amsterdam (494g), Nurnberg (510g) and Sweden (425g). The Nurnberg silver pound (477g) was used occasionally, but not always with pistols, and on rare occasions was also applied to muskets.[229] In addition, the calibre of firearms in bullets/pound was sometime designated by the buyer instead of the arms manufacturer. This became more and more common during the course of the war, in particular in Amsterdam and Suhl when they started selling huge amounts of firearms to England during the English Civil War.[230] Furthermore, some arms manufactures changed their calibre to a foreign weight due to the influence of poached foreign specialists. Unfortunately, historical sources do not mention the weight system used for calibre specification and it takes a great deal of experience to figure out which weight was used.[231] One example of the complicated situation is the Swedish production of 10 bore muskets in Jönköping. The manager of the Swedish weapon manufacture was the Fleming, Louis de Geer. The calibre specification of the 10 bore musket was designated using the English pound instead of the Swedish or Flemish pound, because this particular musket was first produced by Dutch arms manufactures, who decided to use the English pound, because this weapon was also exported to England.[232]

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[226] Ortenburg 1984, 56, Busch 2000, 147.
[227] Parker 1996, 21.
[228] Wallhausen 1615, 32.
[229] Engerisser 2007, 547. As leading weapon manufacturer, the Nurnberg pound became a standard measurement in the early 17th century (Schwarz 1977, 207).
[230] Engerisser 2007, 547.
[231] Engerisser 2007, 544-563.
[232] Brzezinski/Hook 2006, 20, Engerisser 2007, 546.

Historical sources refer to two different calibre specifications, which are often confused or misunderstood:

1. The calibre of the barrel is called 'bore', which defines the inside diameter of the barrel, and which is also the technical term in English and Dutch ('gheboort') sources.[233] If a source does not specify, or if it refers to a weapon, then it refers to the 'bore'. The technical term of the barrel's calibre in German sources, such as in Wallhausen's *Kriegskunst zu Fuß*, is usually 'Schießende Kugel' (firing bullet). This can easily be misunderstood when Wallhausen states:

   "Dann ein rechte Musquet höret acht Kugeln eines Pfunds schwer zu schießen…,"[234]

   which refers to the bore and not the bullet, even if he is referring to firing the gun.

2. English sources refer to bullet calibre by stating that the bullet is 'rolling (in)', like Cruso did, while German and Dutch sources often use the term 'Laufkugel/ loopende Coghel (running bullet)' or they speak directly of the number of bullets that can be produced from a pound of lead.[235] 'Rolling (in)', 'Laufkugel' and 'loopende Coghel' are thus terms specifying the bullet calibre. Although these terms meant that the bullet will run down the barrel without ramming, 17th century bullets were always small enough to run down the barrel, except when soldiers were supplied with wrong calibre ammunition, or if the barrel was heavily fouled.

Most sources give either the bore or the bullet calibre, few sources give both. The difference between bore and bullet calibre is the 'windage'. The fact that some sources distinguish between bore and bullet calibre of one weapon model, like Cruso and the Dutch regulation from 1599, can be seen as evidence for specifying windage.[236] Therefore, it may be assumed that windage was very likely already a fixed value in the late 16th century[237] and not just an unknown value merely based on experience. As far as we can tell from the few sources, musket windage was calculated by adding two to the calibre of the barrel in bullets/pound. If for example, the barrel of a musket has a calibre of 10 bullets/pound (19.7mm), the bullet calibre is 12 bullets/pound (18.5mm) and the windage 1.2mm. Since

[233] Cruso 1632, 30, *Ordre op de wapeninghe* 1599, 144.
[234] "Then a true musket should be eight bullets to a pound heavy to fire." Wallhausen 1615, 32.
[235] Cruso 1632, 30-31, Erlach 1629, 112, *Ordre op de wapeninghe* 1599, 144, Lavater 1644, 50-51.
[236] Cruso 1632, 30, *Ordre op de wapeninghe* 1599, 144.
[237] Standardization of windage was not a result of the Thirty Years War, as Roberts (1967b, 205) suggested.

this method leads to a smaller windage the smaller the calibre, windage of smaller calibre weapons, such as carbines and pistols, was calculated by adding four to twenty to the calibre of the barrel. This fixed value of windage is the basis for all further interpretations of bullets in Chapter Five. Windage, bore and bullet calibre are of course influenced by the inability to produce barrels and bullets within $1/10^{th}$ millimetre. Therefore, the term 'theoretical calibre' is used in this thesis for calibres mentioned in historical sources.

In recent decades many tests have been made to figure out the effectiveness of firearms. Most important for the interpretation of bullet distributions is calculating the range to which these weapons could shoot, a value which allows the researcher to calculate where a bullet would finally land if it missed its target. Historians seem to agree that the maximum range of a musket during the Thirty Years War was approximately 200-300m,[238] which is confirmed by tests carried out by battlefield archaeologists, in which the bullet hit the ground at 200m and bounced another 100m.[239] There are also some historical sources concerning the weapons' ranges. Johann Boxel wrote in 1675 that they were able to fire through a wooden plank at a distance of 390m.[240] On the other hand, Graf Cratz von Scharfenstein complained in 1634 that the gunpowder he received was of such a low quality that his musketeers were barely able to fire 80m using double the usual amount of gunpowder.[241] Although these might be two extreme examples, they show that the firing range depends on the quality of the gunpowder, which may vary substantially from battle to battle. Also a weapon's efficiency is influenced by its windage. Although a larger windage means less velocity and accuracy, the main concern was an easy loading process during battle when the barrel was fouled with gunpowder residues and speed of firing was all important.[242] Considering that Swedish musketeers usually fired at point-blank range 10-15m (section 3.3.3.1) and the Imperial musketeers probably at 70m (section 7.1.1), the maximum range becomes meaningless for the common soldier.

The rate of fire of musketeers was one shot in 2.5 minutes according to Montecuccoli,[243] although tests have established a rate of fire of two to three shots per

[238] Effective range 100m, medium range 200m (Junkelmann 2004, 70). Effective range 225m (Ortenburg 1984, 56). Effective range vs. armoured targets 100m and vs. unarmoured targets 200m (Engerisser 2007, 552).
[239] Foard 2009, 122.
[240] Engerisser 2007, 552.
[241] Engerisser 2007, 553.
[242] Confirmed by tests in the Graz Armoury with original Thirty Years War firearms (Kalaus 1989, 46): A windage of 0.5-0.8mm results in an optimal loading process and velocity. At a larger windage, accuracy and velocity decrease and at a smaller windage, velocity increases while accuracy and loading time decrease.
[243] Veltzé 1899a, 330.

minute under best conditions.[244] The actual rate of fire during a battle was more likely determined by the Thirty Years War infantry tactics, whose combat-deciding factor was the shock attack, less the ability of a musketeer to rapidly load and fire his weapon. This is reflected by the fact that musketeers usually carried no more than twelve charges of gunpowder in a battle, expecting to fire not more than twelve times.[245] Buck shot, charging the weapon with a multiple load, was unknown in the Thirty Years War and no buckshot has been found at Lützen.

3.2.3 Development of firearms from late 16th to mid-17th century

3.2.3.1 Arquebuses and Calivers

The arquebus was developed in France in the late 15th century from the German 20 bore *Halbe Hakenbüchse* (half hackbut).[246] This match lock, smoothbore long gun with a weight of less than 5kg and a calibre of approximately 12mm to 14mm,[247] became the first standard infantry gun powder weapon.[248] Its high military value was demonstrated in particular by the Spanish army during the first half of the 16th century[249] and from then on soon replaced longbows, crossbows and older gunpowder weapons in most European armies.[250]

While the arquebus kept its name in France and Spain (*arcabuz*), most European countries developed their own version under different names: Caliver in England, *Rohr* or *Schützenrohr* in Germany, *roer* in Holland and *rör* in Sweden.[251] To complicate matters, the arquebus later became a term for a cavalry weapon in the second half of the 16th century and gave its name to the new light cavalryman, the 'harquebusier'.[252] In order to enable the cavalryman to have it ready to fire from horseback, the match lock was replaced with a wheel lock. The barrel was constantly shortened during the 17th century and became a new weapon type, the carbine,[253] but even then it was often still referred to as 'arquebus'.

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[244] Engerisser 2007, 555.
[245] Engerisser 2007, 546.
[246] López/López 2012, 34, Fronsperger 1558, 44.
[247] Arquebus bullets from the ship *La Trinidad Valencera*, sunk in 1588 as part of the Spanish Armada, had a calibre of 13mm (Martin 2001, 81).
[248] López/López 2012, 35.
[249] López/López 2012, 6-7.
[250] Roberts 2002, 4.
[251] Brzezinski/Hook 2006, 19, Engerisser 2007, 548, Foard 2008, 81.
[252] Engerisser 2007, 559.
[253] From French 'carabine' (Engerisser 2007, 559).

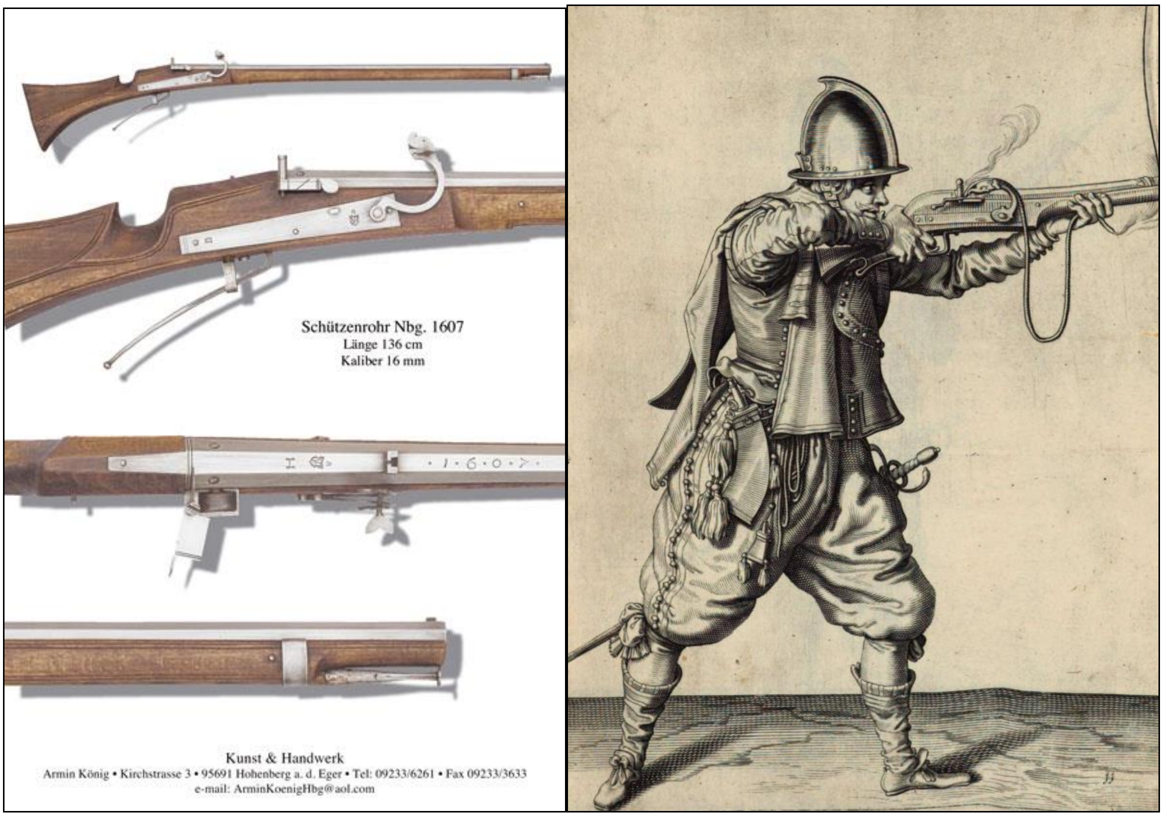

Figure 7: Left: Caliver s1 from Nurnberg, calibre 15.9mm, length 136cm (replica). Right: Caliverman (de Gheyn 1608).

In the early 16th century, the *mosquetta* (mosquito) or musket, a much longer, heavier and larger calibre weapon than the arquebus which had to be fired with a rest, was developed in Spain and replaced the 8/10 bore *Hakenbüchse* (hackbut) in Germany in the late 16th century.[254] Both arquebus and musket coexisted for at least half a century in two different military branches: the musketeers and the calivermen or *Rohrschützen* or *arcabuceros*.[255] At the present, the use of calivers/arquebuses in Europe is generalized evidence for the Spanish-style infantry formation (section 3.3.3.2) except for Eastern European and Turkish armies. England, Holland and Germany were the first countries to abandon the caliver; in the first half of the Thirty Years War it was replaced by the musket, which had a better firing range.[256] The last caliver models in Germany and Holland were produced in the early 17th century in Nurnberg, Amsterdam and Suhl. They had a larger calibre (20 bullets/pound, or 15.8mm and 15.9mm) than the Spanish version and a weight

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[254] Engerisser 2007, 544, Fronsperger 1558, 44. German 16th century infantry was equipped with three different portable firearms; the 20 bore *Halbe Hakenbüchse*, the 8/10 bore *Hakenbüchse*, and the 4 bore *Doppelhaken*. By the late 16th/early 17th century, they developed into the caliver, the musket, and the *Doppelhaken* (section 5.2.1) with similar calibres, which can be seen as a continuation of tactics and weaponry.
[255] Engerisser 2007, 548.
[256] Engerisser 2007, 548, Foard 2008, 81. In 1608 de Gheyn gave a detailed description of handling a caliver, while Wallhausen (1615, 42) recommended not to use calivers. However, according to Hrncirík (2011, 17-21) some Leaguist infantry still used calivers during the Battles of Rakovnik (1620) and Rozvadov (1621), which suggests that the caliver took longer than expected to vanish completely (section 5.1.1.4). Montecuccoli 1736, 11.

of approximately 3-3.5kg.[257] Despite reorganization of the infantry during the Thirty Years War, local militia (*Landesdefension*) and possibly some dragoons used calivers throughout the war.[258]

Production Site	Pound	Designation*	Weapon Calibre – Bullets/Pound	Weapon Calibre – Millimetre**	Bullet Calibre – Bullets/Pound	Bullet Calibre – Millimetre**	Approximate Date***
Nurnberg/Amsterdam	Nurnberg silver	s1	20	15.9	24	15.0	1590-1615
Suhl	Suhl	s2	20	15.8	24	14.9	1590-1615

* A designation of weapon models is introduced for simplification - small letter: out of date in 1632, capital letter: in production in 1632, M/m: musket, S/s: Caliver, C/c: carbine, P/p: pistol.
** All calibres in millimetre are theoretical calibres.
*** The dates are the approximate time frame of the weapon's main service, but some weapons could have been in service much longer.

Table 13: Caliver specifications.

Sweden missed the musket's development in the 16th century.[259] It was due to Gustav Adolf's military reform that the Swedish *rör* and snaphance weapons were replaced with muskets before Sweden entered the Thirty Years War in 1630.[260] Spain never completely abandoned the arquebus[261] until the development of a light musket model in the 1630's made them obsolete (see below), and it seems that a different version of the arquebus saw service until the second half of the 17th century in Turkey and Eastern Europe.[262]

[257] Engerisser 2007, 548.
[258] Engerisser 2007, 548.
[259] The first documented delivery of muskets arrived in Sweden in 1592 (Brzezinski/Hook 2006, 19).
[260] Doughty/Gruber 1996, 15.
[261] The average composition of the Spanish infantry was 37% pikemen, 40% arquebusiers and 23% musketeers in 1601 (López/López 2012, 36), 37% pikemen, 42% arquebusiers and 21% musketeers in 1632 and 31% pikemen, 11% arquebusiers and 56% musketeers in 1636 (Engerisser/Hrncirík 2009, 190). There is almost no change in the composition between 1601 and 1632. While the number of musketeers increased substantially between 1632 and 1636, very likely a result from the introduction of the new light musket (see below), the number of pikemen was steady.
[262] Some small calibre bullets found on the battlefield of Zboriv/Ukraine (1649) derive probably from a Turkish version of the arquebus (Mandzy 2009, 200-201, Montecuccoli 1736, 149).

3.2.3.2 Matchlock muskets and forked rests

In general, muskets became lighter during the Thirty Years War due to shortening the barrel and developments in production engineering which made it possible to produce thinner barrels, but this development did not reflect their calibre.[263] In the late 16th and early 17th century there were two different developments. Holland, and probably Spain,[264] favoured larger calibres, as with the 8 bullets/pound (21.6mm) heavy musket, sometimes called 'rechte (true)' or 'full' musket, which was replaced by the 10 bullets/pound (19.7mm) musket by the early 17th century.[265] Both musket models were also exported, chiefly, but not exclusively, to England and Scandinavia. These weapons were probably what were being referred to by a 1626 eyewitness report that the Swedish army in Poland had very large muskets.[266] The term 'bastard musket', which is often used in modern publications,[267] was probably created by Francis Markham in 1622;[268] he described it as having a slightly smaller bore, while still being as efficient as the 'full musket'. It seems very likely that he referred to the change from the 8 to the 10 bore musket in the early 17th century, a development which was described by Wallhausen seven years before.[269] At the moment the terms 'bastard', 'full' and 'true' musket are misleading, as they are possibly referring only to different weapon models.

Saxony produced much smaller calibre (16 bullets/pound or 17.5mm) muskets in Suhl which were exported chiefly to southern Germany, Switzerland and Austria.[270] It is not certain if Augsburg was producing the 13 bullets/pound (18.8mm) musket in the early 17th century but, if not, it was probably not much later. All these early muskets had a weight of approximately 7.2-7.7kg. The production of larger calibres was generally abandoned between 1620 and 1630. Muskets produced in Augsburg and Nurnberg had a calibre of 14 bullets/pound (18.3mm) and those of Amsterdam and Suhl had a calibre of 15

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[263] Engerisser 2007, 546, Brzezinski/Hook 2006, 22.
[264] The 19mm lead bullets found on the ship wreck *La Trinidad Valencera* derive very likely from an 8 bullets/pound musket (Martin 2001, 82). It is either the Dutch model, or a similar model produced in Spanish facilities in the Basque Country (Quatrefages 1988, 16). See also Schwarz 1977, 207.
[265] Engerisser 2007, 545, Wallhausen 1615, 32, *Ordre op de wapeninghe* 1599, 144, Turner 1683, 175. Markham (1635, 3) is referring very likely to another weapon model when he mentioned a 'true musket'.
[266] Brzezinski/Hook 2006, 20.
[267] Roberts 2002, 8-9.
[268] Markham 1622, 33-36.
[269] Wallhausen 1615, 32.
[270] Engerisser 2007, 545.

bullets/pound (17.7mm) and 16 bullets/pound (17.5mm) with a reduced weight of approximately 5.5kg.[271]

Production Site	Pound	Designation	Weapon Calibre – Bullets/Pound	Weapon Calibre - Millimetre	Bullet Calibre – Bullets/Pound	Bullet Calibre - Millimetre	Approximate Date
Holland	Nurnberg silver	m1	8	21.6	10	20.0	1590-1615
Suhl/Amsterdam/Jönköping	England	M2	10	19.7	12	18.5	1630-1640
Holland	England	m3	10	19.7	12	18.5	1600-1620
Augsburg	Nurnberg	m4	13	18.8	15	17.9	1600-1620?
Augsburg/Nurnberg	Nurnberg	M5	14	18.3	16	17.5	1620-1630
Amsterdam	Amsterdam	M6	15	17.7	17	17.0	1620-1630
Suhl	Nurnberg	m7	16	17.5	18	16.8	1600-1620
Suhl	Nurnberg	M8	16	17.5	18	16.8	1620-1630

Table 14: Musket specifications.

In 1631 Gustav Adolf ordered Louis de Geer to equip 32 regiments with what would become the famous Swedish light musket.[272] It was produced in Suhl, Amsterdam and Jönköping, had a calibre of 10 bullets/pound (19.7mm), a weight of 4.6kg and it is said that it was the first musket that could be fired without a rest.[273] This development made the caliver obsolete. It is unclear why Gustav Adolf ordered such a large calibre weapon in contradiction to the ongoing development of smaller calibre muskets in the 1620's. A possible explanation could be that the Swedish army was still using the older 10 bullets/pound musket (m3) and that Gustav Adolf wanted to keep that calibre in a futile attempt to standardize Swedish firearms. In 1632 the first light muskets were delivered to the Swedish army. Sebastian Dehner reported on 6 May 1632 that a Swedish company arrived at Rothenburg ob der Tauber with musketeers carrying the new light musket without a rest.[274] Strangely, the Swedes kept the larger calibre for their muskets until the Nordic War (1700-1721).[275]

[271] Engerisser 2007, 545, Lavater 1644, 50-51, Erlach 1629, 112. Although the musket models produced in Suhl in 1600 and 1620 had the same calibre, they were completely different weapons with a weight difference of 2kg.
[272] Brzezinski/Hook 2006, 20.
[273] Engerisser 2007, 546-547, Brzezinski/Hook 2006, 20.
[274] Engerisser 2007, 546-547.
[275] Mandzy 2012, 72.

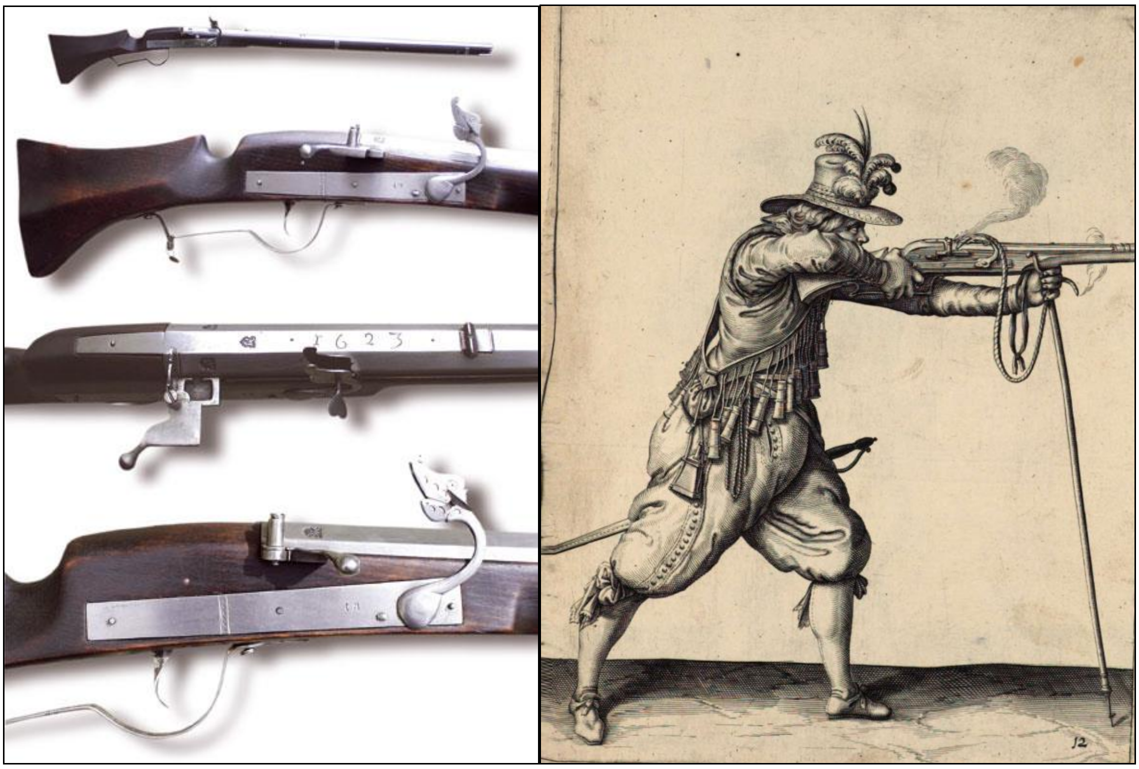

Figure 8: Left: Musket M2 from Suhl, Amsterdam and Jönköping, calibre 19.7mm (replica). Right: Musketeer (de Gheyn 1608).

However, the rest did not vanish with one new weapon model. The 1620's Dutch-German muskets were not much heavier than the early Spanish arquebuses and were light enough to be fired without a rest.[276] Therefore, it was not Gustav Adolf who suddenly came up with a new light musket, as often claimed;[277] he only continued a general development. The Swedes had no intention of abolishing the rest because the new Swedish light musket was delivered with rests.[278] The number of rests in the Stockholm Armoury even increased from 5,300 in 1626 to 12,126 in 1635 and decreased to 826 in 1645.[279] Probably out of habit, musketeers used their weapons with a rest until the last stage of the Thirty Years War although it was no longer necessary.

3.2.3.3 Wheel lock carbines

There is not much known about carbines.[280] It seems that there was a development similar to muskets. In the early 17th century Holland used large calibre carbines of 14 bullets/pound (18.1mm), while carbines produced in Ferlach had a calibre of

[276] Johann von Nassau proposed already in 1596 that muskets should be light enough to be fired without rest in emergency situations (Engerisser 2007, 547, Frauenholz 1939, 58).
[277] Roberts 1967a, 68-69.
[278] Brzezinski/Hook 2006, 20.
[279] Brzezinski/Hook 2006, 20.
[280] Most information about calibres of carbines is according to Peter Engerisser and is unpublished to date.

approximately 32-38 bullets/pound (13.1-13.9mm). That changed in the 1620's, when the calibre in Holland was reduced to 15 and 20 bullets/pound (17.2mm and 16.1mm),[281] while Suhl produced the much-favoured 16 bullets/pound (16.8mm) carbine of the 1630's.[282] Still, there were far too many exceptions to speak of a standard carbine. Unfortunately, carbines of late 16th/early 17th century were re-manufactured in the 1620's with new wheel locks using their old stocks and barrels, which certainly reflects on the calibre of carbines in service between 1620 and 1640.[283] Carbines used at Lützen, therefore, had all sizes of calibres ranging from 13.1mm to 18.1mm with a tendency toward 16.8mm.

Production Site	Pound	Designation	Weapon Calibre – Bullets/Pound	Weapon Calibre - Millimetre	Bullet Calibre – Bullets/Pound	Bullet Calibre - Millimetre	Approximate Date
Holland	Amsterdam	c1	14	18.1	16	17.3	1600-1620
Holland	England	C2	15	17.2	17	16.5	1620-1630
Nurnberg/Amsterdam	England	C3	16	16.8	18	16.2	1630-1640
Suhl	England	C4	16	16.8	18	16.2	1620-1630
Holland	Amsterdam	C5	20	16.1	22	15.5	1620-1630
Ferlach	Nurnberg	c6	32	13.9	35	13.5	1600-1620
Ferlach	Nurnberg	c7	38	13.1	42	12.7	1600-1620

Table 15: Carbine specifications.

3.2.3.4 Wheel lock pistols

Pistols of the first half of the Thirty Years War tended to be decorated and many of them were produced in pairs rather than in large quantities.[284] Based on those in the Armoury Graz, German-Austrian pistols had a relatively small calibre of 10.0mm to 12.7mm in the early 17th century.[285] Slightly larger models with a calibre of 35 bullets/pound (13.1-13.5mm) were produced in Nurnberg and Suhl by 1620.[286] There were changes, probably due to war time increased production, between 1630 and 1640 as decorative embellishments vanished and the calibre became much larger, up to 16.0mm, although

[281] Cruso 1632, 30-31.
[282] Engerisser 2007, 559.
[283] Brooker 2007, 315.
[284] Brooker 2007, 60-61.
[285] Brooker 2007, 269-497.
[286] Engerisser 2007, 561.

smaller calibres were still produced.[287] However, it is unlikely that many larger calibre pistols reached Imperial or Swedish armies before the Battle of Lützen in large quantities. There is not much known about the development of pistols in Holland and northern Europe. John Cruso, who served in the Swedish army, stated in 1632 that the typical military pistol had a calibre of 20 bullets/pound (15.6mm).[288] If we compare pistol development to muskets and carbines, it seems likely that Holland also produced pistols with a larger calibre in the early 17th century.

Production Site	Pound	Designation	Weapon Calibre – Bullets/Pound	Weapon Calibre - Millimetre	Bullet Calibre – Bullets/Pound	Bullet Calibre - Millimetre	Approximate Date
Amsterdam	England	P1	20	15.6	24	14.7	1620-1630
Suhl/Nurnberg/Ferlach	England	P2	28	14.0	32	13.4	1625-1650
Suhl/Nurnberg	Nurnberg	P3	35	13.5	42	12.7	1620-1635
Suhl	Suhl	P4	35	13.1	42	12.3	1620-1630
Nurnberg	Nurnberg	P5	38	13.1	45	12.4	1625-1635
Nurnberg	Nurnberg	P6	42	12.7	50	12.0	1620-1625
Nurnberg/Ferlach	Nurnberg silver	P7	50	11.7	60	11.0	1625-1630
Nurnberg/Augsburg	Nurnberg silver	P8	70	10.5	90	9.6	1625-1630
Nurnberg	Nurnberg silver	P9	80	10.0	100	9.3	1620-1625
Nurnberg/Augsburg	Nurnberg silver	P10	80	10.0	100	9.3	1600-1630

Table 16: Pistol specifications.

[287] Brooker 2007, 427.
[288] Cruso 1632, 30.

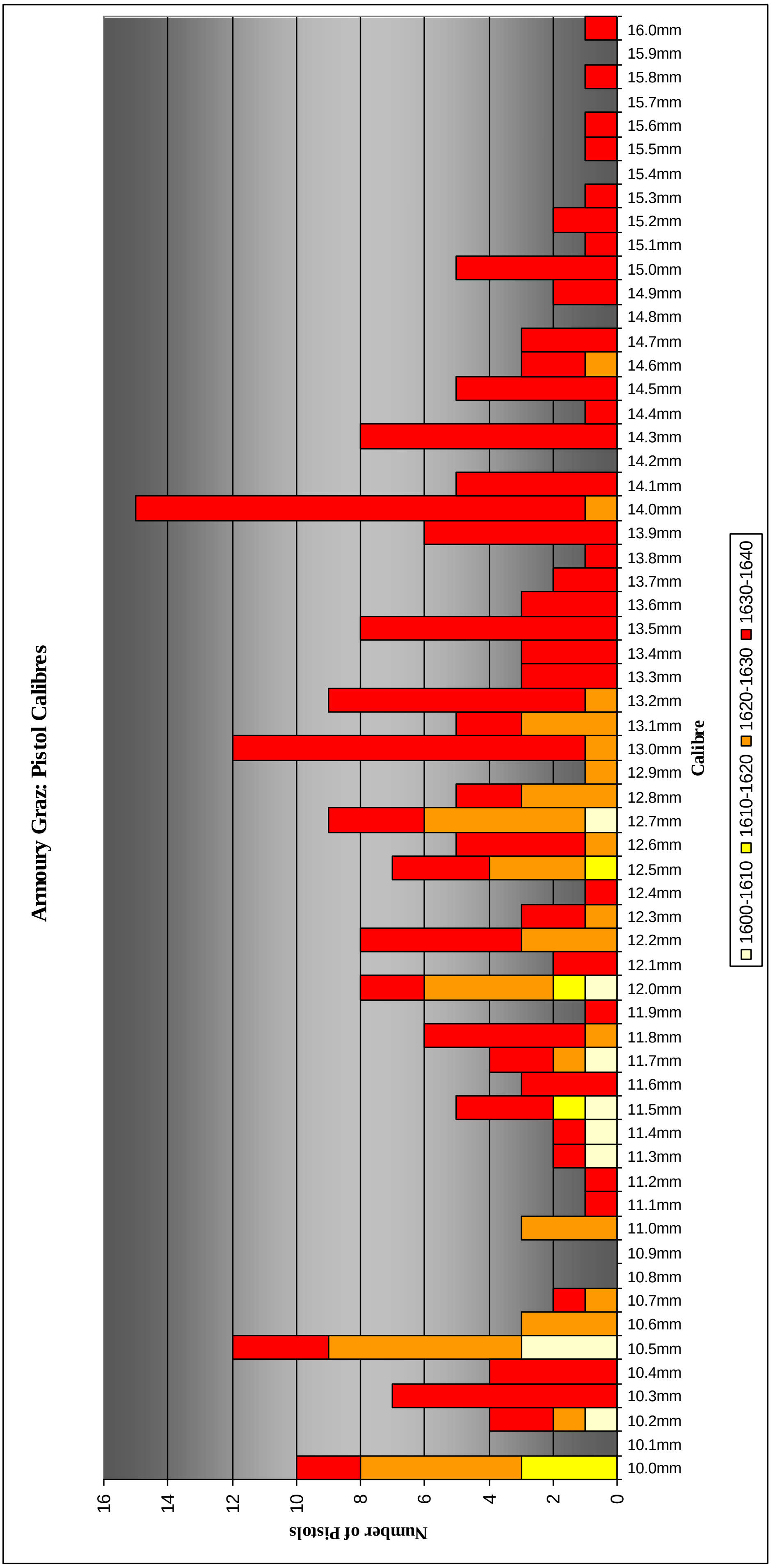

Figure 9: Calibre graph of pistols from the Armoury Graz.

3.2.3.5 Rifles

The previous sections have shown that our knowledge of early modern, smoothbore military firearms is limited, but we know even less about early modern rifles, because they were not standard military weapons and are therefore not mentioned in contemporary military handbooks.

The inaccuracy of early modern firearms was not as much a military problem - it was solved by firing volleys - as it was a problem for huntsmen and marksmen who used crossbows in addition to firearms until the late 16th century.[289] To increase accuracy, rifled barrels were tested in the late 15th century.[290] Although probably invented for hunting and target shooting, the value of rifled weapons was soon discovered by the military. The Austrian army used them, particularly in border defence against the Ottoman Empire, where skirmishes against small groups of marauding Turks were common and to fire at a target of opportunity was more important than volley fire.[291] These weapons are documented physically by the firearms collection in the Armoury Graz, where the oldest of 147 rifles from the 16th and 17th century is dated 1520-1540.[292]

The rifles in the Armoury Graz have a calibre of 11.0mm to 16.5mm and were produced in Styria, Nurnberg and Augsburg, but no pattern of calibre development can be determined. Swedish snaphance rifles of the second half of the 17th century have much smaller calibres, as low as 8.8mm.[293] Although from a later period and an advanced weapon type, it seems that northern European rifles took a different developmental track. One snaphance musket, which is not rifled, but that was probably used by marksmen, also has a very small calibre of 6.0mm.[294] There seems to have been a genuine military development of rifles, but it is often difficult to establish whether a rifle was produced for the military or as civilian weapon.[295]

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[289] Dolínek/Durdík 1996, 247 and 267.
[290] Knarrström/Larsson 2008, 107.
[291] Brooker 2007, 315.
[292] Brooker 2007, 79.
[293] Knarrström/Larsson 2008, 109-124.
[294] Knarrström/Larsson 2008, 122.
[295] Brooker 2007, 671.

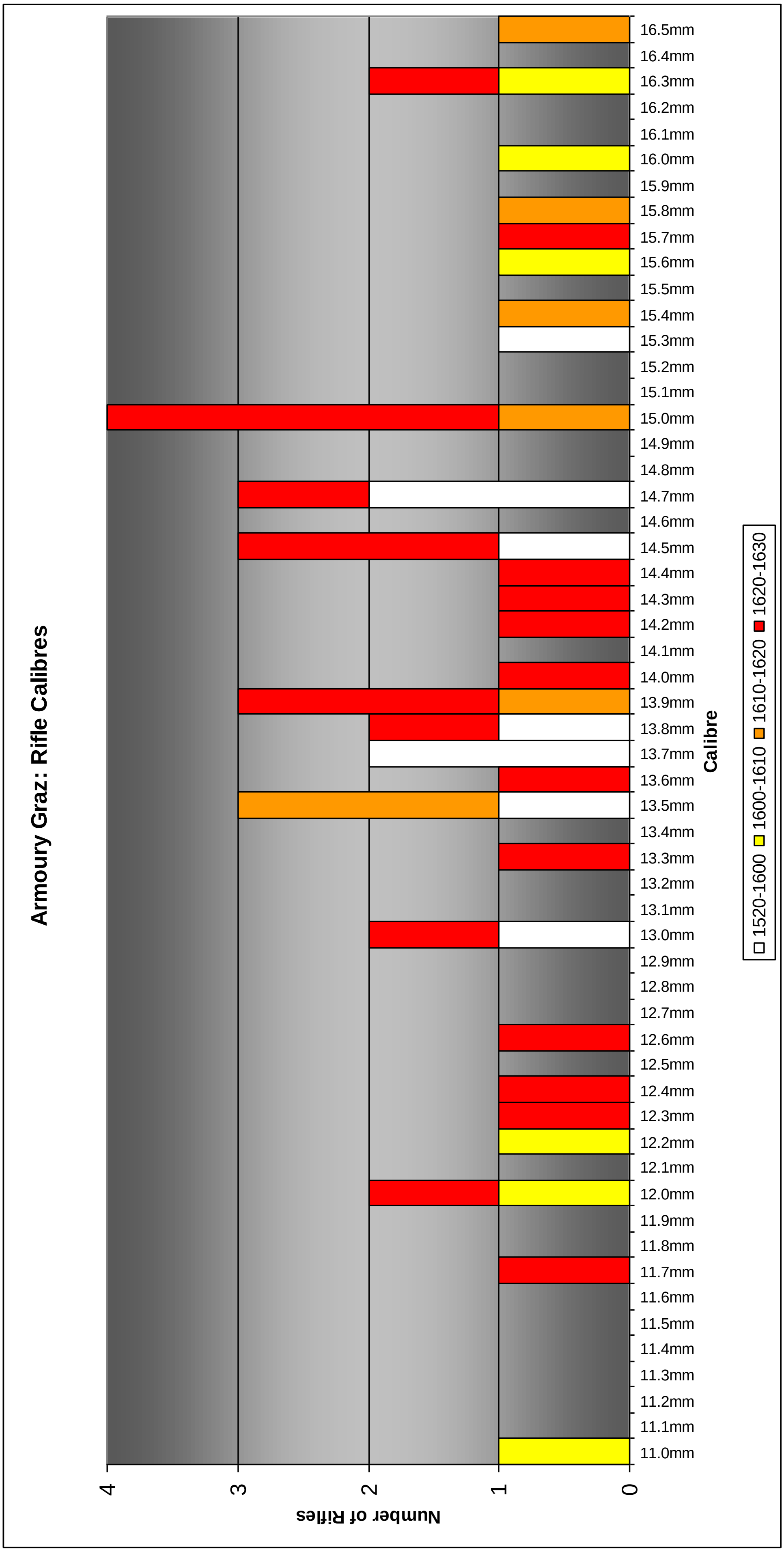

Figure 10: Rifles from Armoury Graz.

3.3 Organisation, arms, equipment, formations and battle tactics

Many military handbooks were written during the Thirty Years War, most of them by experienced officers, giving quite a good, but generalized, picture of formations and battle tactics. That said, armies, equipment, organisation, battle formations and tactics were in constant development during that time. In every battle, commanders had to consider available forces, terrain and weather, and adapt his tactics accordingly. This makes it very difficult to find out what equipment and formations troops actually used in a specific battle. We also have to consider replacement of soldiers' equipment after long service, because all soldiers tend to adapt their equipment according to their needs and circumstances during long campaigns. Sometimes regiments were hastily raised and went into battle without sufficient equipment and training while some veteran regiments were upgraded, receiving better armour or weapons, but there are few sources of the Thirty Years War confirming these observations (section 3.3.2.2). In battlefield archaeology knowledge of the actual formation size and frontage of every unit is important, as it gives a better understanding of the deployment and small find distributions.[296]

3.3.1 Organisation: Tactical and administrative units

In the Thirty Years War there was a difference between administrative and tactical units. The administrative unit was the regiment, divided into companies. Only in battle were regiments deployed as tactical units. The main tactical unit for infantry and cavalry in the Swedish and Imperial armies was the 'squadron'.[297] The term 'battalion' for tactical infantry units emerged during later stages of the Thirty Years War, and was transferred into an administrative unit after the war. To guarantee a specific strength of a squadron, multiple weak regiments formed a squadron or, conversely, strong regiments were divided to form more than one squadron. A few companies were detailed to form independent units in battle, mostly musketeers. In the Swedish army, three infantry squadrons formed a brigade, which was a tactical unit formed only for battle (section 3.3.3.1). However, the association of regiments with a brigade was usually fixed during a campaign. In 1633 the Imperial army experimented with brigade organisation, but not before the Battle of Lützen (section 3.3.3.2).

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[296] Mandzy 2012, Foard 2008, 183.
[297] Brzezinski/Hook 2006, 18.

3.3.2 Cavalry

In theory, there were four main types of cavalry in the Thirty Years War: Cuirassiers (heavy cavalry), harquebusiers (medium cavalry), Croats (light cavalry) and dragoons (mounted infantry),[298] but in practice many of them were mixed, in particular the Swedes. In battle, cavalry was deployed in squadrons according to the size of their regiments. At Lützen, most regiments were strong enough to be deployed as single squadrons, but some weak regiments, such as the Hessians, were combined to form one squadron while a few were strong enough to provide two squadrons, such as Bernhard's Life Regiment. Cavalry squadrons were deployed three to ten ranks deep. Military handbooks give some idea of the ideal spacing adopted by cavalry. Each heavy cavalry trooper needed a minimum of 1.0m to 1.2m in front and 3m in length, while the light cavalry usually assumed an open order with 2m frontage for each horseman. These spaces became meaningless in hand-to-hand combat, retreat and pursuit.[299] The space of 1.0m to 1.2m for heavy cavalry was the attack formation and seems too small for manoeuvring, when it was probably more likely 1.5m.[300]

Cavalry tactics: 'Caracole', 'firing and retiring' and 'charge'

In early modern battles there were two main tactics for cavalry: charge and caracole. In a charge, the cavalry used momentum to break through the enemy's formation with the blunt force of cutting and thrusting weapons. When caracoling, the cavalry moved close to the enemy, firing all firearms in single ranks and then turning 90° to 180° to retreat to a safe position.[301] Complaints about the caracole are as old as the caracole itself, which dates to the late 16th century when the Dutch military reformer Johann von Nassau wrote that a charge is much more effective than caracoling.[302] Most German cavalry was accused of caracoling during the Thirty Years War,[303] while it was often claimed, incorrectly, that Gustav Adolf's victories were chiefly based on his aggressively charging cavalry (section 3.3.2.6).[304] These myths derive partially from misunderstanding the caracole, which was a tactic designed for cavalry attacking infantry deployed in dense anti-cavalry formations, which might have been a 17th century pike front as well as a bayonet wall of a Napoleonic

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[298] Dragoons were officially mounted infantry, but are listed in Imperial war lists from 1632 as cavalry (Toegel 1977, 415).
[299] According to Montecuccoli (Veltzé 1899b, 579) 1.5 paces and to Ward (1639, 295) 3 feet in front. See also Schürger 2011, 107.
[300] Foard 2008, 183.
[301] Engerisser 2007, 466-467.
[302] Engerisser 2007, 467.
[303] Brzezinski/Hook 2006, 85.
[304] Brzezinski/Hook 2006, 53.

square, and therefore never really went out of fashion during the musket-era. At Lützen, Ottavio Piccolomini admitted that he made a caracole against Swedish infantry, who lowered their pikes against him, and no one held this manoeuvre against him.[305] On the other hand, the caracole would have been an ill-advised manoeuvre against cavalry, but this is often confused with ‘firing and retiring,’ a skirmishing tactic used by light cavalry in a looser formation (section 3.3.2.2).[306] However, neither the caracole nor ‘firing and retiring’ were standard tactics for Imperial cuirassiers at the time of Lützen,[307] although such action was often claimed.[308]

3.3.2.1 Imperial heavy cavalry: Cuirassiers

A cuirassier was a cavalryman equipped with a sword and two pistols and protected by armour.[309] The armour changed substantially during the Thirty Years War. Just before the war it was full armour, covering the whole body including face (visor), feet and hands.[310] This armour was expensive, tiring and inconvenient to wear in battle.[311] The shin protection was abolished at the outbreak of the war and remaining armour was reduced further to breast and back plates with a Hungarian-style open helmet (Zischäge). After 1635 no further armour was ordered.[312]

Figure 11: Cuirassier (Wallhausen 1616).

[305] Argang 1894, 89.
[306] Brnardic 2010b, 21.
[307] Brzezinski 2001, 23.
[308] Delbrück 2008, 228.
[309] Brzezinski 2001, 23.
[310] Engerisser 2007, 456-457.
[311] 10-11 Reichsthaler for full armour, 4-5 for simple breast and back plate (Engerisser 2007, 461-462).
[312] Engerisser 2007, 461.

The Imperial war lists of 1631-33 stated that cuirassiers wore full armour in German-style; Watts claimed that they were clad *cap á pied* in black armour at Lützen, which is not very helpful, because the war lists are not accurate and Watts was no eyewitness to the battle; 'full armour' does not necessarily mean from head to foot.[313] Although there is no way of knowing, it may be assumed that the Imperial cuirassiers did wear a variety of armour ranging from three-quarter armour with knee protection, also called 'Pappenheimer' after the Feldmarschall who died at Lützen, to simple breast and back plate with open helmet. Of the seven Imperial cuirassier regiments participating in the Battle of Lützen, few of Lohe's men had armour,[314] while Sparr was driven off the battlefield possibly, in part, because the men lacked armour. The other five regiments, Götz, Holk, Trcka, Desfour and Bredau, held their ground well or even charged through the Swedish cavalry, which suggests that they were well equipped.[315]

The oldest Imperial cuirassier regiment was Götz, raised in 1626. The others were raised between 1628 and 1632, which might have had an impact on their equipment.[316] Götz's Regiment very likely had the older and heavier three-quarter armour, and it was probably this unit that Watts described as clad from head to foot in black armour. Many Imperial cuirassiers were very likely equipped with the German-Austrian smaller calibre pistols of 10.0mm to 13.5mm. The cuirassiers were an Imperial elite force, deployed at the inner wings to support the infantry, which saved Wallenstein's day at Lützen, and were therefore spared for battle, rather than used on campaign.[317]

3.3.2.2 Imperial medium cavalry: Harquebusiers

Harquebusiers, initially developed as a light cavalry, became medium cavalry during the Thirty Years War. They were equipped, in theory, with a carbine, one or two pistols, sword, breast plate and open helmet, but few had armour in actuality.[318] Imperial harquebusiers probably had a mixture of both the smaller calibre carbines (13.1-13.9mm) from Ferlach and the medium calibre carbines (16.8mm) from Suhl, but it is unlikely that

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[313] Toegel 1977, 412, Watts 1633, 134-135. Full armour in contemporary sources meant mostly three-quarter armour (Engerisser 2007, 458).
[314] Brzezinski 2001, 26, rem. 23.
[315] Bredau "fought bravely" (Münchhausen: Wittrock 1932, 305), Holk, Trcka and Desfour fought 2 hours against Swedish infantry (Holk: Wittrock 1932, 309) and Götz forced Swedish cavalry to retreat (Diodati: Fiedler 1864, 563).
[316] Brzezinski 2001, 25.
[317] According to Wallenstein's order from 1633 (Mittheilungen 1882, 347).
[318] Engerisser 2007, 464, Brzezinski 2001, 23.

they carried the larger calibre carbines from Holland in any quantity. In contrast to the cuirassiers, the poor performance of the harquebusiers at Lützen almost led to the Imperial army's destruction. Wallenstein accused them of disobeying orders, desertion, and 'caracoling'; he had some executed at Prague following the battle.[319] His reaction was an order to upgrade them to cuirassiers, take away their carbines and prohibit the caracole.[320] Wallenstein's harsh criticism ignores the fact that harquebusiers were to conduct reconnaissance on campaign and support cuirassiers in battle, not fight head on against charging Swedish cavalry, and, because he was upset, he did not distinguish between 'caracoling' and 'firing and retiring'.[321] Wallenstein's 1633 order reduced the number of Imperial harquebusier regiments from 21 to sixteen, but they were still used at the end of the Thirty Years War, and still without metal armour.[322] The Thirty Years War proved that medium cavalry's assigned tasks could have been done much better by a light cavalry, such as Croats, or by dragoons, which were both cheaper than the harquebusiers.[323]

Figure 12: Harquebusier (Wallhausen 1616).

The exception was the Harquebusier Regiment Piccolomini, which was better armoured than some cuirassier regiments and fought well at Lützen. This regiment was officially upgraded to cuirassiers in 1633 and it is not clear how far this process had

[319] Seidler 1970.
[320] Trial at Prague: Seidler 1970. Wallenstein's order: Hallwich 1912a, 683-684, Toegel 1977, 120. See also Brzezinski 2001, 89, Engerisser 2007, 467.
[321] Brzezinski/Hook 2006, 54. Montecuccoli (1736, 14) pointed out that harquebusiers should not be deployed in key positions of a battle line (Veltzé 1899b, 577).
[322] Toegel 1977, 414-415 and 436-437, Engerisser 2007, 465 and 467.
[323] Pfaffenbichler 2007, 267.

progressed by Lützen. As they were still harquebusiers, they probably had still their carbines.[324]

3.3.2.3 Imperial light cavalry: Croats and Cossacks

Although originally recruited in Croatia, most light cavalry that came from Hungary, Transylvania and Croatia was called ‘Hungarian-style light cavalry’ or ‘Croats’ according to the Imperial war lists in 1632.[325] They replaced harquebusiers as light cavalry during the Thirty Years War. In 1631 Croats were equipped with a sword and two pistols; a carbine was added to their weaponry during the 1630’s.[326] It seems probable that the Croats had carbines at Lützen, as Wallenstein excluded them from his order taking away carbines from his cavalry, but it is not certain how many carbines they had already acquired, an issue that will be discussed in section 8.2.1.[327] Their duties on campaign were reconnaissance, skirmishing, patrolling, setting ambushes and foraging. They were not suited for main force engagements and were often deployed on the outer wings harassing the enemies’ rear with hit and run tactics or covering a retreat as they did at Lützen.[328] There were also three companies of Polish Cossacks in Pappenheim’s corps.[329] This light cavalry was even more inconsistently equipped than Croats and shared only their name with the famous Zaporozhian Cossacks.[330]

3.3.2.4 Dragoons

While dragoons were originally musketeers on horse and therefore mounted infantry,[331] the Imperial war lists mentioned them as cavalry equipped with half armour and fire locks.[332] It is very likely that Pappenheim’s two Dragoon Regiments Merode and Pappenheim fought as cavalry.[333] It is uncertain which type of muskets dragoons used, but it is unlikely that they had standard infantry muskets as they were too heavy, too long, and the burning match was impractical on horseback. Some might have had calivers, which were light

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[324] Toegel 1977, 414 and 433. Sydnam Poyntz (1908, 72) and Silvio Piccolomini (Archivio 1871, 242) mentioned that the regiment was already heavily armoured at Lützen.
[325] Bauer 1969, 30, Engerisser 2007, 472 and 481, Toegel 1977, 416, Brnardic 2009b, 38.
[326] Engerisser 2007, 481-482.
[327] Brzezinski 2001, 24, Hallwich 1912a, 683-684, Toegel 1977, 120.
[328] Brzezinski 2001, 24, Engerisser 2007, 472.
[329] Brzezinski 2001, 24.
[330] Brzezinski 1987, 17.
[331] Engerisser 2007, 468-470.
[332] Toegel 1977, 415.
[333] Brzezinski 2001, 24. It seems that their use as cavalry at Lützen is no exception. In the English Civil War, dragoons have been reported fighting as cavalry too (Naseby 1645: Foard 2004, 62).

enough, but still needed the smouldering match. Others probably had fire locks (wheel locks or snaphances) as stated in the war lists or even carbines. In the end it probably did not matter much because their main duty on campaign was serving as advance guard, clearing roads and securing bridges.[334]

Figure 13: Dragoon (Wallhausen 1616).

3.3.2.5 Imperial cavalry formations

There is not much known about Imperial cavalry formation depth at Lützen. In general they were deployed five to ten ranks deep.[335] It is often assumed, according to the sketch from the Stockholm Krigsarkivet (section 2.2.4), that the Imperial cavalry had a depth of six ranks at Lützen. Although the sketch is not proven as a reliable source, Wallenstein did not have enough cavalry on his wings, suggesting that what cavalry was present was deployed at minimum depth of five to six ranks to ensure their front was wide enough to prevent being outflanked.

3.3.2.6 Gustav Adolf's cavalry

Gustav Adolf had a variety of cavalry at his disposal at Lützen; they are mentioned only generally as 'cavalry' in Swedish troop and casualty lists; a reference that makes it difficult to determine their equipment. At the beginning of Gustav Adolf's reign in 1611, Swedish

[334] Brzezinski/Hook 2006, 67.
[335] Engerisser 2007, 462.

cavalry was in poor shape. The Swedish horses were too small, the Swedish weapon manufacturers were not able to produce wheel lock weapons, and there was no money for armour and expensive carbines.[336] His solution was to equip the first three ranks of each squadron with breast and back plate armour, rather than three-quarter armour, and then take away the few carbines.[337] *De facto*, this means that he disbanded his harquebusiers and reformed his cavalry into semi-armoured cuirassiers. It was the reduced firing range that prevented them from using the 'firing and retiring' tactic and forced them towards more aggressive behaviour. This might have been one reason for the myth that it was Gustav Adolf who had to teach the cavalry to 'charge', rather than to 'caracole', which is often seen as a revolution in mounted warfare.[338] Gustav Adolf's cavalry reform worked in most battles, but at Lützen Fleetwood wrote about the Swedish cavalry:

"…for had not our foote stoode like a wall, there had not a man of us come off alyve…; and our horse did but poorely."[339]

This comment is not surprising; the Imperial cuirassiers were much better armoured[340] and equally well-trained as the Swedish cavalry and they also knew how to 'charge'; Gustav Adolf knew how dangerous the Imperial cuirassiers were.[341]

The Finnish cavalry, called 'Hakkapelits' from their battle cry 'hakkaa päälle' (hit them hard), was eastern European-style light cavalry, used to protect the outer right wing at Lützen.[342] After Breitenfeld, Gustav Adolf recruited many German cavalry regiments.[343] Although he had no genuine cuirassier and harquebusier regiments, it seems that his German regiments consisted of both; it is possible, although unproven, that his Swedish cavalry had also acquired some carbines in Germany, but had far fewer than the Imperial army with their pure harquebusier regiments.[344] These carbines were probably the medium calibre versions (16.8mm) from Suhl and the larger calibre carbines (17.2-18.1mm) from Holland.

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[336] Engerisser 2007, 460, Brzezinski/Hook 2006, 54.
[337] Brzezinski/Hook 2006, 54-55, 61.
[338] Brzezinski/Hook 2006, 53.
[339] Fleetwood 1632, 9.
[340] Brzezinski 2001, 20. Gustav Adolf ordered 8,000 armours in 1631, but when the first arrived in September 1632, most of them had flaws and were not usable; he cancelled the order (Brzezinski/Hook 2006, 61).
[341] Watts (1633, 134) stated that Gustav Adolf explicitly commanded Stalhandske against the Imperial cuirassiers. Although this story was certainly made up, Gustav Adolf knew very likely how dangerous they could be in battle.
[342] Villstrand 2007, 33, Brzezinski/Hook 2006, 91.
[343] Brzezinski/Hook 2006, 60.
[344] Brzezinski/Hook 2006, 62.

Montecuccoli and Watts wrote that the Swedish cavalry was deployed three or four ranks deep; the sketch of the Battle of Lützen (section 2.2.4) shows them deployed three ranks deep, which will be discussed further in section 7.2.2.[345]

3.3.3 Infantry

During the Thirty Years War infantry consisted of musketeers and pikemen. A pikeman was equipped, in theory, with a 5.5m long pike, sword and helmet; some pikemen wore armour (breast and back plate, thigh protection), others were unarmoured ('Picche Freeche').[346] For the Swedish army, there is evidence that pikemen threw away their cumbersome armour and pikes, or at least shortened the pikes, on long campaigns, but it seems that this was not only a Swedish problem as Imperial pikemen did the same, thus increasing the number of unarmoured pikemen.[347] This might be one reason why the pikemen numbers constantly decreased, even though they were still needed, because musketeers could not defend themselves against cavalry. At Lützen, the Swedish infantry consisted of 73.8% musketeers and only 26.2% pikemen. We have no exact figures for the Imperial army, but if we consider that Wallenstein was able to detach at least 1,200 musketeers without reducing his regiment's fire power too much, his infantry probably consisted of at least 60-65% musketeers.[348]

Musketeers were equipped with musket and rest; many of them had no sword although it was officially part of their equipment.[349] At Breitenfeld, many Swedish musketeers charged using their musket butts as clubs, which was probably easier than fighting with a sword in one hand and the musket and rest in the other. It is probably that this was also the case at Lützen.[350] The space one foot soldier required is approximately 1.0m to 1.2m in width and 2.1m in depth.[351]

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[345] Veltzé 1899b, 9, Watts 1633, 132, Engerisser 2007, 462.
[346] Brzezinski/Hook 2006, 24, Engerisser 2007, 491-492, Brnardic 2009a, 33.
[347] Turner 1683, 177, Brzezinski 2001, 21, Brzezinski/Hook 2006, 24.
[348] At the least, Wallenstein had more musketeers than pikemen in 1632 (Pfaffenbichler 2007, 264).
[349] Brzezinski/Hook 2006, 24.
[350] *Discipline* 1632, part III, 24, Turner 1683, 175, Brzezinski/Hook 2006, 84, Engerisser 2007, 488. There are two non-eyewitness accounts mentioning Imperial musketeers fighting with their muskets in hand-to-hand combat at Lützen: *Extract unterschiedlicher Schreiben* (Droysen 1880, 4-5) and the *Relation from 1632* (Droysen 1880, 9).
[351] Veltzé 1899b, 586, Ward 1639, 212. See also Schürger 2011, 107 and Foard 2008, 183.

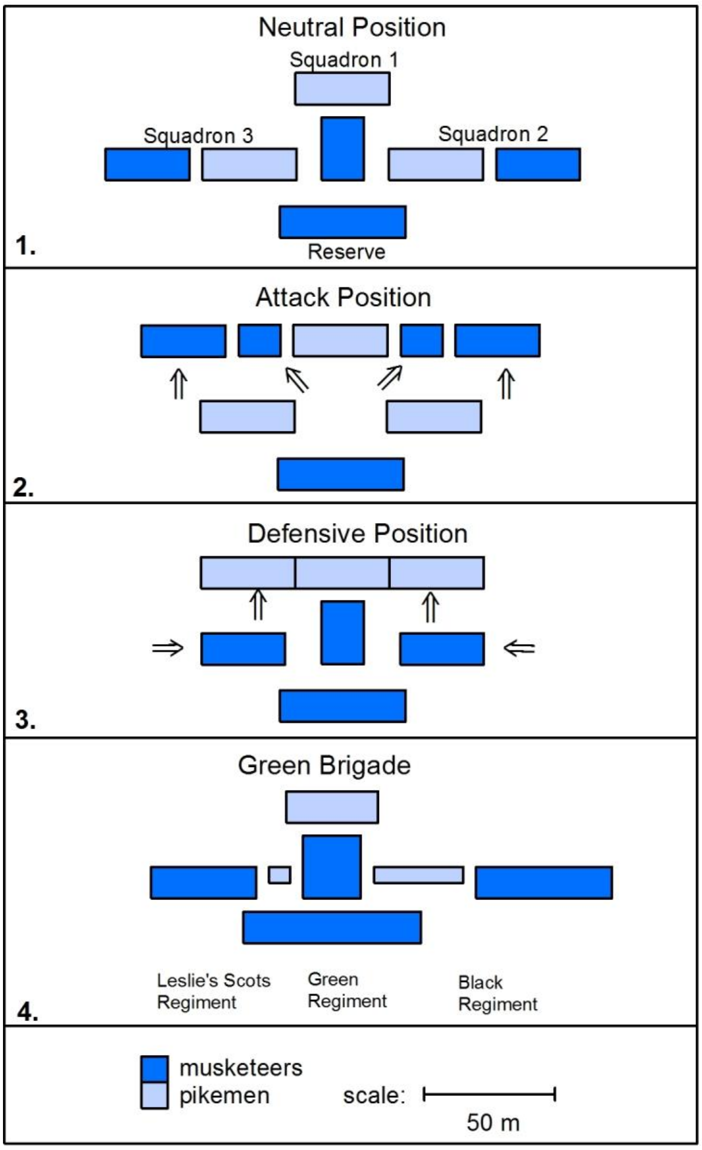

Figure 14: Swedish brigade in theory (1.-3.) and practice (4.). Note that there is no evidence of a defensive position.

Infantry formations and battle tactics adapted to the rapid improvement of weapons during the Thirty Years War. At the beginning of the war, the Spanish 'square' (*cuadro*) and the small Dutch formations dominated European battlefields. It was Gustav Adolf who introduced a reformed Dutch-style infantry battle formation, the Swedish brigade, to the European theatre of war. On the other side, Wallenstein, probably resuming Tilly's military reforms, developed the Imperial-Leaguist infantry from the 'Spanish school' into what would become the German-style infantry battle formation, which dominated the second half of the Thirty Years War as well as the English Civil War.[352]

[352] Roberts/Tincey 2001, 24-26.

3.3.3.1 Swedish-style infantry battle formation: The Swedish brigade

Theory

During the Thirty Years War, the Swedish brigade underwent several changes. After some experiments with a four-squadron brigade (Fig. 16), the Swedish infantry battle formation was a three-squadron brigade in 1632.[353] A squadron was deployed, similar to the linear Dutch tactics, only six ranks deep and divided into three bodies. One-third of the musketeers served as reserve while the remaining two-thirds were assigned as either flankers for a single body of pikemen on its exterior side or, in case of the central squadron, would seek cover behind the pikemen (Fig. 14-1.).[354] Reserve musketeers filled up gaps in the ranks caused largely by enemy artillery fire, as Monro described for the Battle of Breitenfeld.[355] It is not entirely certain if they still had a musketeer reserve at Lützen, an issue which will be discussed below and in section 7.2.2.

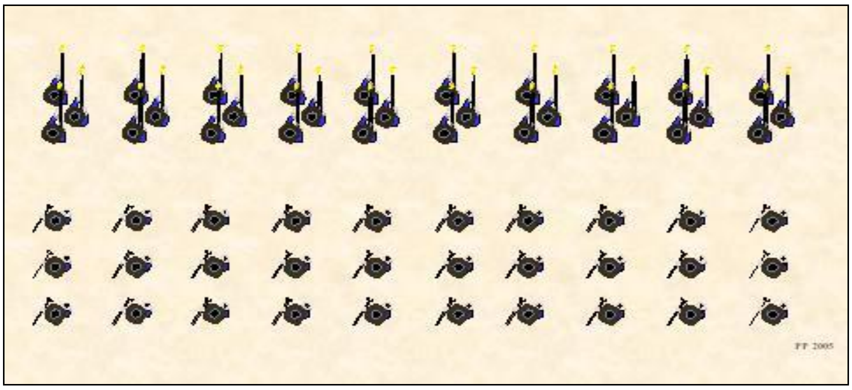

Figure 15: Swedish volley.

The single bodies of musketeers and pikemen of a squadron stood at a distance of just 5 paces from one another.[356] These gaps were probably left for the sergeants, who flanked each body.[357] The distance between brigades is discussed by contemporary military theorists, eyewitnesses and modern historians. Monro mentioned that a cavalry squadron could move between the brigades deployed at Breitenfeld,[358] which seem to have been common practice in 17th century warfare.[359] At Lützen, a cavalry squadron averaged 223 men with a front of 37m (six ranks) to 74m (three ranks), which seems to agree with a

[353] Brzezinski/Hook 2006, 18.
[354] Brzezinski/Hook 2006, 9-10, Veltzé 1899b, 9 (Montecuccoli's comment on formation depth). Note: Before Gustav Adolf entered the Thirty Years War, a considerable number of Swedish musketeers actually might have been calivermen.
[355] Monro 1637, part II, 65.
[356] Veltzé 1899b, 587.
[357] Brzezinski/Hook 2006, 11.
[358] Monro 1637, part II, 65.
[359] Foard 2008, 183.

reasonable gap between brigades for deploying artillery, moving reserves forward, or letting withdrawing soldiers through (section 7.2.2).

In the neutral position, or advancing order at the start of battle, the pikemen of the 1st squadron took an advanced position with their musketeers behind them whilst the 2nd and 3rd squadrons formed a line with musketeers flanking pikemen on the outside of the brigade.[360] The reason for the advanced position of the central pike formation was probably that the armoured pikemen should draw the musket fire, while the musketeers remained relatively unharmed until they reached point-blank range.[361]

We do not know exactly how the Swedish brigade functioned in battle, but it was clearly an attack formation based on superior fire power. When attacking, the musketeers advanced to both sides of the 1st squadron's pike formation (Fig. 14-2.) or passed in front of the pikes to a distance of 10m to 15m from the enemy.[362] At that range, they fired two volleys, the first with first rank kneeling, second rank leaning forward, and the third rank standing erect. After firing, the first three ranks changed place with the next three ranks, which fired the same way (Fig. 15).[363] According to Monro one single volley, doubling ranks and firing as described above, was designed for its shock effect by detached musketeer companies on the wings against cavalry at the Battle of Breitenfeld, but this complicated manoeuvre was not performed by whole brigades, as often claimed.[364] Before the enemy could reform and close ranks, the musketeers charged with their musket butts and swords or the pikemen advanced to break into the already damaged formation.[365] It is vital to understand that the key to Gustav Adolf's infantry tactics was a combination of firepower and followed up charge.[366]

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[360] Brzezinski/Hook 2006, 18, Engerisser 2007, 499.
[361] Mentioned by Diodati (Fiedler 1864, 653).
[362] I. e. pistol shot range (*Discipline* 1632, part III, 24).
[363] *Discipline* 1632, part III, 24.
[364] Monro 1637, part II, 65, Engerisser 2007, 487. This tactic is also described by Watts (1632, 124) for the detached musketeer companies. Later, he assumed the same tactic for all Swedish infantry in *Discipline* (1632, part III, 26), although his source clearly stated that the Swedish detached musketeer companies doubled ranks against cavalry and not the Swedish infantry in general. Turner (1683, 237-238), although he served in the Swedish army in the 1630's, seems to have known Monro's and Watts' works, using similar sentences, and concluded from their statements rather than from his experience that this became Swedish standard infantry tactics. However, there is no proof for this and it seems unlikely that whole brigades performed this complicated manoeuvre, but it is often suggested (Roberts 1967a, 66, Parker 1995, 157-158).
[365] At Breitenfeld the infantry did both: Pikemen advancing after the volley (Monro 1637, part II, 66) and musketeers charging into the enemy's formation (*Discipline* 1632, part III, 24).
[366] It is sometimes assumed incorrectly that infantry hand-to-hand fighting did not play an important part during the Thirty Years War (Schwarz 1977, 214).

There is no record of how the Swedish brigade formed a defensive position. It is probable that, in theory, the 2nd and 3rd squadron pikemen advanced and took position on both sides of the 1st squadron, while the musketeers retreated behind them (Fig. 14-3.). Obviously, here lies a weak point of this formation because it is vulnerable at the flanks and had to manoeuvre to form a defensive line. The complicated procedure was probably one reason for giving up the brigade formation (see below).

The Swedish brigade at Lützen

Brigades (and therefore also squadrons) were tactical units formed only in battle with from one to five regiments depending on their strength. At Lützen five of the eight brigades consisted of three regiments, suggesting that each squadron was composed of one regiment. This interpretation is supported by the 14 November troop strength list in which the number of pikemen in all but one regiment can be divided by six giving an even number of ranks and files. The number of musketeers of seven regiments can be divided by six and of eight regiments even by eighteen, the latter giving even numbers after detaching one-third as the reserve. This suggests that regiments had already exchanged soldiers on 14 November to give every regiment the ability to function as a squadron or brigade with full ranks; it is also evidence that squadrons were still deploying reserve musketeers.[367]

An ideal squadron had 216 (42.86%) pikemen and 288 (57.14%) musketeers without counting officers. By Lützen the number of pikemen had declined substantially: In the Green Brigade, the Green Regiment consisted of 34.65%, the Black Regiment of 17.89% and Leslie's Scots Regiment of only 6.25% (Fig. 14-4) pikemen. The New Blue Brigade had two regiments with no pikemen at all. The question remains as to how the Swedish brigade could have functioned at Lützen with so few pikemen. Brzezinski has suggested that the Swedish infantry was not always deployed in six ranks, but sometimes only three or four ranks deep.[368] This seems very unlikely for the musketeers as the Swedish army had so many of them that it was unnecessary and also would have reduced fire power, a major keystone for Gustav Adolf's success. In addition, there was not enough space on the Lützen battlefield to deploy all infantry in three or four ranks (section 7.2.2). However, considering how narrow a front pike formation would have been in six ranks, it seems very likely that some of the smaller pike formations were only three ranks deep, in particular in the Green and New Blue Brigades. It was not necessary for those two brigades

367 Note: A musketeer reserve is usually not illustrated on copper plates and it is also missing on the Lützen copper plates.
368 Brzezinski 2001, 48.

to have many pikemen as they were deployed adjacent to the cavalry wings and could have been supported by them in the emergency of an Imperial cavalry charge.[369]

The position of infantry regiments inside the brigades is unknown. However, it is assumed that the regiment with the most pikemen formed the centre squadron, because they played the key role in holding the brigade together. If the pikemen of the centre squadron broke, the entire brigade would collapse.

Development after Lützen

It should not come as a surprise that the Swedish infantry took heavy casualties from Imperial cavalry attacks at Lützen, which caused a reform of the Swedish brigade.[370] In the Battle of Nördlingen on 6 September 1634, the pikemen of all squadrons were flanked by musketeers, which enabled each squadron to operate more independently from the brigade.[371] By Wittstock on 4 October 1636, the brigade was abandoned and the infantry was deployed in squadrons only and, learning the lesson from Lützen, supported by a cavalry reserve.[372]

3.3.3.2 Spanish-style infantry battle formation: The *cuadro*

The victory of Gustav Adolf's brigades over Tilly's Spanish 'tercios' at the 17 September Battle of Breitenfeld has long been seen as the victory of mobility and linear tactics over massive but inflexible infantry formations,[373] a mistake which some historians believed Wallenstein repeated at Lützen.[374] This shows more or less the myths and stereotypes modern research still has about the Spanish tactical infantry system used by Leaguist and Imperial armies, which were, in part, responsible for Roberts' flawed 'Military Revolution' hypothesis.[375] Although an analysis of the Spanish infantry tactical development deserves a thesis of its own, it can not be discussed here in detail, but is still too important to be left out entirely.

[369] Watts 1633, 145.
[370] Brzezinski 2001, 89.
[371] Engerisser/Hrncirík 2009, 196. This formation was adopted by the Royalists during the English Civil War at Edgehill 1642 (Foard 2008, 182-186).
[372] Eickhoff/Grothe/Jungklaus 2012, 133.
[373] Roberts 1967a, 74.
[374] Diemar 1890, 67-68, Lloyd 1908, 114, Weigley 2003, 150.
[375] Roberts 1967b, 196.

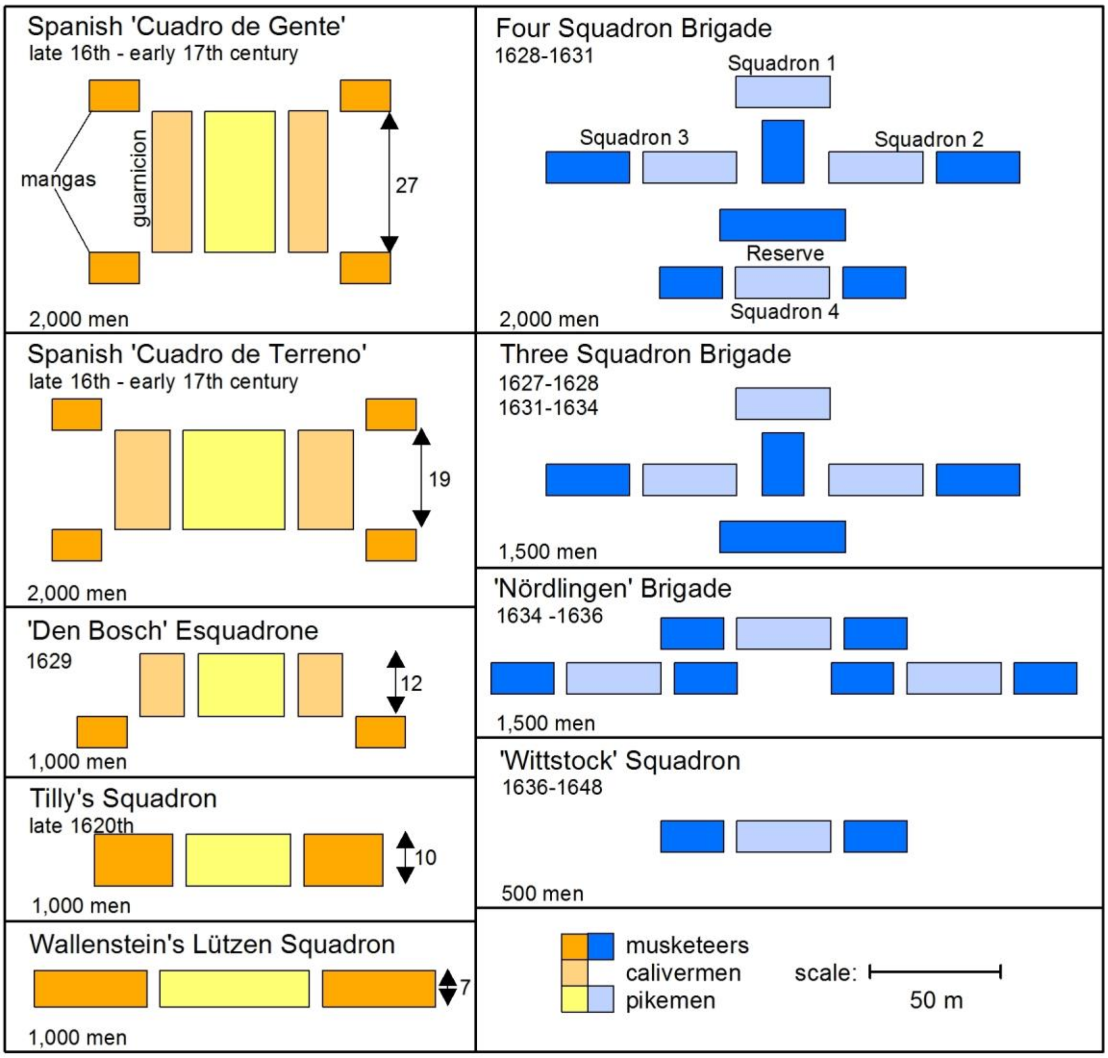

Figure 16: Left: Spanish-Leaguist-Imperial infantry formations. Their strength is roughly averaged according troop strength lists (Engerisser/Hrncirík 2009, 189). Composition of pikemen-calivermen-musketeers is the average composition of the period (37%-40%-23%: see section 3.2.2.2); a similar composition of 40% pikemen and 60% musketeers is assumed for Wallenstein's infantry. *Mangas* are shown six ranks deep, which was the usual formation depth (Engerisser/Hrncirík 2009, 187). Formation depth of the *cuadro de gente* is calculated from the square root of the number of pikemen, the *cuadro de terreno* is calculated from the number of pikemen multiplied by 2,041, divided by 1,000, and from the result the square root (Quatrefages 1988, 17, López/López 2012, 38). The Tilly Squadron is suggested as transitional stage between the Spanish and Wallenstein's squadrons. Right: Swedish brigade formations. Four- and Three-Squadron Brigade according to Brzezinski/Hook 2006, 18. Note: Development and size was very organic, depending on the situation and available troops, and shown here only in theoretical numbers.

Spain, involved in constant warfare in the Netherlands, Italy and other theatres of war over decades, had one of the most experienced armies in Europe, which reflects on the flexibility of Spanish infantry tactics. 'Tercio' translates as 'one-third' and very likely means third part of an army, the infantry, while the other two parts were cavalry and artillery.[376] The tercio was the administrative unit of the infantry, similar to regiment,[377] while the tactical unit was called *escuadron* (i.e. Eng.: squadron, It.: squadroni, Ger.:

[376] Quatrefages 1988, 18, López/López 2012, 11-12.
[377] Also, German 16th century sources often use the term 'regiment' to describe the three parts of an army, artillery, cavalry and infantry (Fronsperger 1558, 31).

Schwadron). This could have been formed in battle from several tercios or one tercio could form several escuadrones, as it was customary in all armies of the time.[378]

The escuadron deployed with a block of pikemen in the centre, flanked by calivermen, called *guarniciones* (garrisons). Up to this point, an escuadron did not look much different from any early Swedish squadron, except for its formations depth. While Swedish infantry deployed in a theoretical fixed number of ranks (i.e. six) the escuadrons depth could vary according to the formation type. The pikemen of the *cuadro de gente* (square of men) had as many ranks as files, while the *cuadro de terreno* (field square), *cuadro de prolongado* (extended square), and *cuadro de gran frente* (wide-fronted square) were consecutively shallower with wider fronts.[379] All *cuadros* were flanked by calivermen.[380]

In addition to these formations, the Spanish army formed small musketeer units, called *mangas* (sleeves). Prior to engagement four *mangas* were usually deployed at the edges of the *cuadro*, giving the formation the typical Spanish look, which is often incorrectly called tercio; the entire formation could have a strength of 600 to 3,000 men, averaging 1,000. The *mangas* were highly mobile units, giving fire support where needed, and they were not permanently attached to the *cuadro* during the battle.[381] This enabled the Spanish infantry to respond very flexibly to any situation.[382] Clearly, Spanish infantry formations were not huge, inflexible and outdated in the Thirty Years War, as often believed.[383]

3.3.3.3 German-style infantry battle formation: The Imperial squadron

The commander who influenced warfare most during the early stage of the Thirty Years War was Johann Tserclaes Graf von Tilly. He started his military career in 1576 in the Spanish army, where he learned the Spanish art of war from some of the best military leaders, and he fought in many battles all over Europe. In 1610, he was promoted to

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378 Parker 1995, 150, Engerisser/Hrncirík 2009, 186, López/López 2012, 12.
379 Mendoza 1596, 54. Although *cuadro* means ‘square’, it is an often repeated misconception that the pikemen always formed an actual square (Schwarz 1977, 210).
380 Parker 1979, 89, Engerisser/Hrncirík 2009, 186-187, López/López 2012, 37-38. Actual strength of a *cuadro* is usually estimated too high (Schwarz 1977, 210, Kaiser 1999, 106).
381 Assumed by Schwarz 1977, 217.
382 Parker 1979, 89, Quatrefages 1988, 18, Engerisser/Hrncirík 2009, 187, López/López 2012, 38.
383 Kaiser 1999, 109, 458.

Generalleutnant and was in charge of organizing the Leaguist army. It is not entirely certain how the Leaguist infantry tactics developed under Tilly's command.

The results from archaeological surveys in the Czech Republic seem to provide evidence that Tilly introduced the 'Spanish school' into the Leaguist infantry at the beginning of his command and during the early Thirty Years War (section 5.1.1.4). In 1629, the Spanish army deployed their infantry in shallow formations with only two *mangas* in the Battle of Den Bosch[384] and it is probable that Tilly was not unaffected by this development. According to the archaeological results from Lützen, Tilly's Leaguist Regiment Comargo did not have any calivers, which is usually evidence for Spanish infantry tactics. Whether Wallenstein took the calivers from this regiment when he assembled his army in early 1632, or Tilly had disbanded his calivermen before then, is uncertain, but the latter seems likely, because calivers were not being produced after the first stage of the Thirty Years War (section 3.2.3.1). If this assumption is correct, then it would have been Tilly and not Wallenstein, who reformed the infantry into a simplified version of the Spanish school by attaching two bodies of musketeers directly to the pikemen centre. However, additional archaeological evidence from the Breitenfeld battlefield is needed to confirm this suggestion.

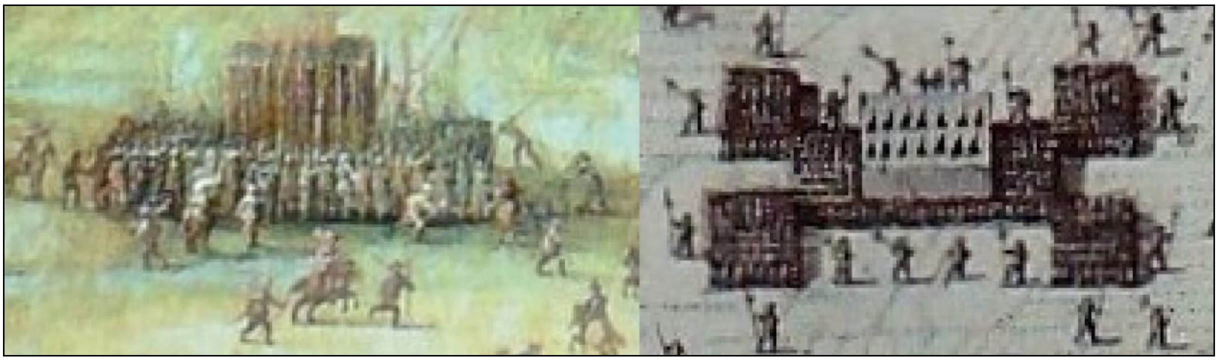

Figure 17: Left: Imperial infantry squadron in the Pieter Snayer painting, showing an actual infantry formation in the Battle of Lützen. Right: Spanish *cuadro de terreno* with massive pike block in the centre, flanked by calivermen, a branch the Imperial army had abandoned during the early stage of the Thirty Years War, and four *mangas* on the edges in the van Hulsen copperplate.

There is no evidence for Tilly deploying his infantry in Spanish *cuadro de gente* formations thirty ranks deep at the 17 September 1631 Battle of Breitenfeld, but it is very unlikely, because the Spanish deployed this formation only against an enemy with cavalry

[384] Engerisser/Hrncirík 2009, 187.

superiority.[385] Not even the usually unreliable copperplates illustrate such formations. Another myth is that the Battle of Breitenfeld, and the later 18 May 1643 Battle of Rocroi, showed the weakness of Spanish infantry tactics against the modern, linear and shallow Swedish and French infantry,[386] because both battles were decided by cavalry on the wings, while the Imperial and Spanish infantry was slaughtered after the battle was decided.[387] Junkelmann suggests that Tilly deployed his infantry ten to twelve ranks deep.[388]

It is unclear why copperplates show Wallenstein's infantry at Lützen in Spanish *cuadro de terreno* formations, but there is sufficient proof that they did not.[389] Wallenstein deployed his infantry squadrons[390] according to Montecuccoli[391] seven ranks deep with the central pikemen flanked by musketeers, which is also illustrated on the painting by Snayer.[392] The Protestant eyewitness Fleetwood noted that "the enemies army was ordered like ours," which could be related to the Imperial infantry formation.[393] With 1,000 men, they were much stronger than the Swedish squadrons, which is probably why Holk called them "Brigader".[394]

Some historians were astonished that at Lützen Wallenstein deployed a completely different infantry formation from Tilly's at Breitenfeld.[395] However, currently it seems more likely that Wallenstein only reduced the depth from ten or twelve to seven ranks, bringing Tilly's reforms to a provisional end. With six ranks, it would become the German-style infantry battle formation used by the Imperial army for the remainder of the Thirty Years War, adopted by the Parliamentarian, and later by the Royalist, armies during the English Civil War.[396]

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385 Parker 1984, 126, Parker 1995, 156, Huf 2006, 186, Weigley 2003, 146. See also Sennewald (2013, 61), who based his argument on an anonymous source, which he believed was written by the eyewitness Gustav Horn, an unproved presumption.
386 Roberts 1967a, 70, Schwarz 1977, 207, 214, Bernecker 2002, 74.
387 Bennassar/Vincent 1999, 131.
388 Junkelmann 2007, 31.
389 Deuticke 1917, 67, Seidler 1954, 35-36.
390 'Squadroni' according to Diodati (Förster 1829, 561).
391 Brzezinski 2001, 24.
392 Diemar (1890, 67-68), Diwald (1969, 499), Weigley (2003, 142-143) suggested incorrectly that the Spanish square formation was adopted by the Imperial army at Lützen, based on the van Hulsen and Merian copperplates (Brzezinski 2001, 46 and 50-51, Engerisser 2007, 488).
393 Fleetwood 1632, 6.
394 Wittrock 1932, 308. To avoid confusion with the Imperial brigade with which Wallenstein experimented for a short period in 1633, the term 'squadron' is used for Imperial infantry formations in this thesis (Toegel 1977, 440).
395 Deuticke 1917, 67, Mann 1971, 849, Parker 1995, 158.
396 Roberts/Tincey 2001, 25-26.

Until the 1634 Battle of Nördlingen, Spanish and Imperial musketeers fired with single ranks retreating behind the formation to reload and giving way for the next rank, called 'caracoling fire', which was not necessarily inferior to volley fire.[397] It should be noted that the Battle of Nördlingen was decided by the Spanish infantry and was a decisive victory of the Spanish-Imperial army, which could not have been achieved if the Spanish infantry tactics were outdated in comparison to the Swedish.[398] In fact, the infantry formation was only one factor for success in a Thirty Years War battle, while numerical superiority, combat experience, training, physical condition, group cohesion, superior leadership and trust in their officers, were equally important.[399] The main reason for simplifying infantry formations was probably that they were easier to handle in battle, in particular by inexperienced recruits.

3.3.3.4 *Jäger*-infantry, *djurskyttar* and riflemen

A few sources suggest that both sides acknowledged the advantages of sharpshooters and probably had them at their disposal in the Battle of Lützen. Gustav Adolf recruited the first recorded unit of mounted riflemen in 1611: a *djurskyttar* company consisting of 48 huntsmen,[400] which was probably present at Lützen. Following the Swedish example, the Swedish ally Hessen-Kassel recruited three companies of mounted *Jäger*,[401] which were probably not at Lützen.[402]

The Imperial army used single marksmen as early as the 16th century, but they are rarely mentioned in historical sources in context of a battle.[403] In 1642, the Elector Maximilian of Bavaria recruited a whole *Jäger*-regiment,[404] suggesting that the Imperial-

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[397] Engerisser 2007, 488. Brzezinski (2001, 67) claimed that the Imperial musketeers fired with three rank volleys at Lützen, which seems possible, but there is no confirming account. However, the Imperial officer Montecuccoli (1736, 20-22) described caracoling fire, and Markham (1635, 91) clearly favoured caracoling fire over volley fire, because the enemy can approach unchallenged after the volley.
[398] Parker 1979, 90, Bennassar/Vincent 1999, 131.
[399] This misconception has a long history and is deeply embedded in historical research. It is mostly based on Delbrück's (2008, 271) work, first published in 1908, and adopted by Roberts (1967a, 67-68), whose authority seems to have prevented historians from verifying his thesis, and it is repeated by Polisenský 1971, 209, Schwarz 1977, 207, 232, Kaiser 1999, 105-112, Weigley 2003, 143, 146, Brnardic 2009a, 22, Rebitsch 2010, 92, Murray 2013, 13 and many others.
[400] Brzezinski/Hook 2006, 67-68.
[401] 'Huntsmen' – German light infantry.
[402] Brzezinski/Hook 2006, 68.
[403] Monro (1637, part II, 149) was wounded by an Imperial sharpshooter at Nurnberg/Alte Veste. Fronsperger (1558, 44) is an early reference to rifles in military context.
[404] Maximilian 1642, 253.

Leaguist side had experimented with smaller *Jäger* units, probably on company level, before.[405]

Jäger had to be experienced marksmen, which is why Gustav Adolf recruited huntsmen. The recruitment of sharpshooters in Germany was easier due to the long tradition of the *Schützenverein* (rifle association) and the *Schützenfest* (shooting competition), which produced many experienced marksmen. They are likely to have been equipped with all kinds of rifled firearms and tended to use their own weapons, with which they were very familiar.

3.3.4 Combined Arms Tactics

3.3.4.1 Swedish combined arms tactics

Gustav Adolf compensated for lacking long-range fire power of carbines in his cavalry by interlining musketeer companies between his front line cavalry squadrons on each wing.[406] Those musketeer companies at Lützen had an approximate strength of 72 men (section 7.2.1). Distances between cavalry formations were not fixed and are usually not mentioned in contemporary military handbooks. According to Montecuccoli, who gave the best description of Swedish formations but is not always reliable, squadrons were deployed 20 paces (approx. 15m) from each other with a musketeer company in each gap.[407] That would have been sufficient space for six ranks and eight files in a company formation.

The Swedish cavalry tactic of musket volley from the interlined musketeers, followed by a cavalry charge and withdrawal, then another musket volley worked well at Breitenfeld.[408] In fact, Montecuccoli, an expert on Swedish tactics, wrote that this tactic was the main reason for most Swedish victories.[409] At Lützen, however, the Swedish cavalry was never able to break through the heavily armoured Imperial cuirassiers, even though Gustav Adolf had added more fire power since Breitenfeld by deploying two regimental guns per interlined musketeer company.

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[405] Brnardic 2009a, 35.
[406] Engerisser 2007, 462 and 487, Brzezinski/Hook 2006, 54 and 61.
[407] Veltzé 1899b, 593.
[408] Monro 1637, part II, 65, Engerisser 2007, 487.
[409] Veltzé 1899b, 579.

The winning arm of the Swedish army was the infantry based on a point-blank volley fire – shock attack combination supported by heavy artillery and regimental guns.[410] At the outset of the Battle of Breitenfeld, all Swedish artillery, including regimental guns, opened fire at medium range.[411] The infantry then advanced together with their regimental guns, stopped at short range and the guns fired two volleys. Finally, the infantry advanced again, receiving the defenders' musket fire without firing back, until they reached point-blank range. At 10m to 15m distance, they fired two volleys and charged.[412] This tactic was effective at Breitenfeld because the Imperial-Leaguist cavalry was already beaten on both wings.

3.3.4.2 Imperial combined arms tactics

Wallenstein quickly adjusted his own tactics to suit his opponent's. According to Holk, Wallenstein deployed 150 musketeers in front of each wing at Lützen to give his cavalry additional fire power and counter the Swedish musketeer companies.[413] It is likely that Wallenstein's musketeers were deployed in companies of 50 men between the four cavalry squadrons on each wing, although Holk said "in front of the cavalry."

Another simple but effective tactic saved Wallenstein's day. He had deployed small cavalry squadrons as reserves behind his infantry centre. They waited until the Swedish brigades were engaged in hand-to-hand combat with Imperial infantry and then attacked the exposed Swedish flanks with devastating results because the Swedish brigades had too few pikemen to protect the musketeers, and Gustav Adolf had no cavalry reserve behind his first line infantry. After the disaster at Lützen, this mutual support by infantry and cavalry to cover infantry retreats and exploit success became common during the second half of the Thirty Years War[414] and during the English Civil War.[415]

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[410] Brzezinski/Hook 2006, 84.
[411] Monro 1637, part II, 65.
[412] Monro 1637, part II, 66, *Discipline* 1632, part III, 24.
[413] Wittrock 1932, 308.
[414] Battle of Pfaffenhofen 10 August 1633 (Brzezinski/Hook 2006, 83).
[415] Roberts/Tincey 2001, 28.

Chapter Four

Battlefield Archaeology: Methodology

Battlefield archaeology is a specialised sub-discipline of conflict archaeology, which focuses on the material remains and traces left behind by a battle in contrast to sieges, naval and air warfare and other engagements not fought on open ground. The methodologies deployed in battlefield archaeology are not as much dependent on the scale and nature of the engagement as they are on the period in which it was fought. There are four main types of physical evidence on 17th century battlefields: fortifications, bullet impact scars, mass graves, and unstratified artefact scatters.[416]

In 17th century warfare, the locations of engagements were usually too unpredictable to construct any significant fortifications in advance. However, during the Thirty Years War army commanders, in particular Wallenstein, made great efforts to choose and fortify their battlefields, as was done at the Battles of White Mountain (1620), Dessau Bridge (1626) and Nurnberg/Alte Veste (1632), and this has been suggested for Lützen (section 6.2).[417] Bullet impact scars on structures are common on siege sites, but not on battlefields.[418] Since all 17th century structures on the Lützen battlefield were removed except the castle and the Sckölpitz Bridge (section 6.1), impact scars play no role in the interpretation of this particular battle.

The knowledge of mass graves locations could be used to assist in locating a battlefield, while the trauma on bones could be an important source of information for interpreting the nature of combat in the vicinity of a mass grave.[419] Two mass graves were found at Lützen: one, by chance in 1891 due to house development, which was not excavated,[420] and the other in 2011 during the Lützen project under the direction of the author. However, the investigation of this mass grave does not represent a component of this research, though a summary of the process of discovery is relevant to a comprehension of how the battle has been investigated (section 9.1).

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[416] Foard 2008, 64.
[417] Matousek/Grabolle/Meduna/Smrz 2009, 180, Diwald 1969, 350 and 492-493.
[418] Foard 2008, 66.
[419] Foard 2008, 66-67.
[420] Mentioned in the newspaper *Volksbote* 1901, 2. The building has already been replaced by a supermarket, but its location was pinpointed by Rainer Münzberg.

Most physical evidence of a battle is left in the top soil. In a 17th century major battle thousands of bullets were shot from firearms, in addition to artillery discharging hundreds of round-, grape- or case shot. In hand-to-hand combat, hundreds of buttons, buckles and pieces of equipment (harness, gun parts, etc.) would be lost. Therefore, the unstratified artefact scatter is the most important archaeological signature of a battle, and one that cannot be effectively recovered through conventional archaeological methods.[421] Although not all battle related artefacts are metal, the use of metal detectors is the only practicable means to recover these artefacts at the present time. This chapter is concerned with the methodology of metal detecting survey.

Battlefield archaeology is a young discipline and though its methodology is not very different from fieldwalking, developed in the 1970's to locate settlements and graveyards, there is still debate over how to produce a statistically relevant small find distribution eligible for interpretation. The interpretation of any distribution patterns is highly dependant on the deposition process during the battle, the clearing and looting process after the battle, and the recovery rate of finds during the survey. In addition the impact agriculture has on small finds is not always fully understood.

4.1 Deposit process and 'background noise'

Very little is known of the depositional process during a battle beyond knowing that we can expect many more artefacts from large scale, long and bloody battles than from short skirmishes. The density of small find distributions also depends on the mobility of the opposing forces during the battle; a highly mobile battle produces more scattered distributions than a static battle like Lützen or a 'defile' battle like Kalkriese, where several battle events overlap in a single area.[422] Another influence on the types of small finds lost on a battlefield might be the outcome of the battle; the annihilation of an army, as at Kalkriese,[423] very likely produces a distribution pattern very different from a rout, such as at Edgehill, or a stalemate, as occurred at Lützen. For example, 27 charging flask caps were found at Edgehill which were probably lost in the rout, but only one has been found at Lützen.[424]

[421] Foard 2008, 68, Rost 2009, 106, Schürger 2012, 247.
[422] Schürger 2011, 113, Rost 2009a, 55, Rost/Wilbers-Rost 2012, 13-14.
[423] Rost/Wilbers-Rost 2012, 8.
[424] Foard 2008, 89.

In a 17th century battle, bullets were fired in their thousands by musketeers and cavalry. This certainly applies to Lützen, with its six hours duration making it one of the longest battles in the Thirty Years War. Although the total number of bullets fired by a musketeer in a 17th century battle is difficult to calculate, an account from the long lasting 1636 battle at Kitzingen reported that Swedish musketeers fired at least seven times over the three engagements.[425] At Lützen, Imperial Rittmeister Sydnam Poyntz claimed that he could not find any loaded pistols nor any pistol shot towards the end of the battle, although he found many straying horses with empty pistols in their saddle holsters, thus providing an idea of the nature of the Battle of Lützen, where many soldiers probably ran out of ammunition.[426]

The total number of bullets fired at Lützen might range from 100,000 to 200,000, if it is calculated that every musketeer fired six to eight times and every cavalryman two to five times. The great number makes shot the most important archaeological source as their distribution defines the battlefield's extent, the location of wings, or even single units. Although the absence of bullets does not necessarily show the absence of troops, it demonstrates the absence of combat, as all independent units had firearms in the Thirty Years War.

In contrast to firearms ammunition, the rate of fire of heavy artillery pieces was too slow to deposit much roundshot on a battlefield, and even in a prolonged artillery bombardment, there were probably not more than 300 roundshot fired.[427] A higher number of ammunition elements can be expected from grape- or case shot, where a large number of projectiles were fired with a single discharge,[428] and from shells producing multiple fragments of spherical cast iron shells. In particular, case shot represents valuable evidence as it can be used to pinpoint the position of artillery pieces according to the spray pattern.[429]

Most buttons, buckles, pieces of harness and armour deposited on the battlefield were very likely ripped off in hand-to-hand combat or during the post-battle clearing and looting process.[430] However, the entire process of losing those items is not fully understood, as there are too few comparable battlefield projects. What is to be expected is

[425] Engerisser 2007, 546.
[426] Poyntz 1908, 126-127.
[427] Foard 2008, 68.
[428] Foard 2008, 68.
[429] Case shot spray patterns were found in Edgehill (Foard 2009, 124).
[430] Foard 2008, 69, Rost 2009, 109, Rost/Wilbers-Rost 2012, 9.

that there will be far fewer metal pieces from uniforms and harness than firearms ammunition to be found on an early modern battlefield. One reason for the lack of understanding is that those items were not standardized for military use alone until the 18th century and therefore they are indistinguishable from civilian items.

Non-battle related artefacts are quite common on European battlefields, and are often referred to as 'background noise'.[431] No research has yet been conducted to establish the ratio of battle related artefacts to background noise.[432] However, Foard has suggested that the number of bullets not relating to a battle is negligibly small in comparison to the vast amount of bullets fired during a major battle, while with the non-ammunition finds it is the opposite.[433] The main point to be drawn from this is that we can not relate any single unstratified item to the battle just because it was found on the battlefield.

4.2 Clearing and looting process

Any assemblage recovered from a battlefield can only represent a fragment of the total body of material deposited during a battle. An important factor in understanding the recovery rate is the clearing of battle and the looting of bodies which takes place after any battle.

"And now also did Stolhanske charge so fiercely towards that very place [where Gustav Adolf was killed], that he beate off the Imperialists, recovered the Kings Body: which he brought off naked…"

reported Watts from the Battle of Lützen.[434] This might be an extreme example of looting a dead soldier by stripping him naked in an ongoing battle and there might have been other reasons, such as gaining a trophy from a king, but this incident best illustrates the Thirty Years War, when violence was omnipresent, looting paid the soldiers and greed was a common trait. In battlefield archaeology it is essential to understand the clearing and looting process after the battle, as it can considerably reduce and manipulate the physical evidence of the battle.[435]

431 Foard 2008, 69.
432 Foard 2008, 69.
433 Foard 2008, 69.
434 Watts 1633, 141-142.
435 Rost 2009, 107, Rost 2009a, 51.

With vast amounts of weapons, ammunition and equipment lost, with possibly some artillery pieces and the baggage train captured, a battlefield contained considerable riches, which were usually protected and collected by the victor. One document states that a few days after the Battle of Lützen, 200 civilians from Weissenfels were commanded to clear the battlefield, very likely under supervision of Saxon officials.[436] They carried all the dead bodies to “the road,” obviously to systematically remove their cloth and equipment as the weapons and armour were handed over to the Saxon Oberst Tauber before burying them along that roadside.

The clearing process is illustrated best in a Saxon inventory from the Battle of Breitenfeld (1631). This is an exact list of every item collected from the battlefield, mostly weapons, armour and artillery pieces, but also artillery ammunition and 357kg of musket shot, or 13,730 bullets assuming an average weight of 26g for one musket bullet.[437] It is not entirely certain if the ammunition was only collected from the captured Imperial baggage train, or if the total also reflects ammunition taken from dead soldiers, or if it even includes fired or dropped bullets collected from the ground. Although it is believed that bullets were not collected from 17th century battlefields during the clearing process,[438] there is a possibility that some battlefields were cleared very thoroughly. Whether the Lützen battlefield is one of them is unknown, but at least it was officially cleared by 200 men for a couple of days. After the official clean-up operation, the battlefield was cleared or looted a second time by the local population. This process would take place over a longer period, particularly in densely populated areas, until the number of artefacts was reduced to a limit where the effort was greater than the gain.[439]

Unfortunately, much damage to battlefields was inflicted during the late 19th and 20th century, in particular by house and road construction (Fig. 18).[440] Though only a quarter of the Lützen battlefield was affected by development, important parts of the main battleline’s centre and large areas of the Imperial right wing were destroyed. If a battlefield was in agricultural use, the few larger items, which might have been buried during the battle, were almost all collected in the first half of the 20th century due to mechanisation of agriculture and deep ploughing. In Lützen, locals reported that GDR officials paid for the

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[436] Wernigerode 1632, Stahl 2012, 258-259.
[437] Dresden 1631: “7 rl.64 pf. Mußquetir Kugeln (7 hundredweight 64 pounds of musket bullets).”
[438] Foard 2008, 70.
[439] Schürger 2012, 248. During the American Civil War, lead bullets were picked up on sight by the local population (Gay 1897, 256).
[440] Foard 2008, 72.

delivery of roundshot to use them as raw material and, in fact, not one was found during the survey, nor were any larger pieces of weapons or armour.

Figure 18: Accessible areas of the Lützen battlefield (white): Grey areas were not accessible for survey due to house and road development, or state border to Saxony.

Probably the most serious current threat to battlefields began in the 1980's, when metal detectors became available and modern looters did and still do great damage by collecting vast amounts of what until then were 'invisible' small finds.[441] Fortunately, damage caused by metal detecting on the Lützen battlefield is not as severe as on other battlefields for various reasons. In Eastern Germany metal detectors became available only after the 1989 reunification and even then it took a while until metal detecting became popular. Further, a combination of law enforcement, one committed policeman and a local population interested in their history, the visibility of the battlefield from a major road and the lack of interest of most metal detectorists in 17th century artefacts has prevented the battlefield from becoming severely looted.

[441] Foard 2008, 72.

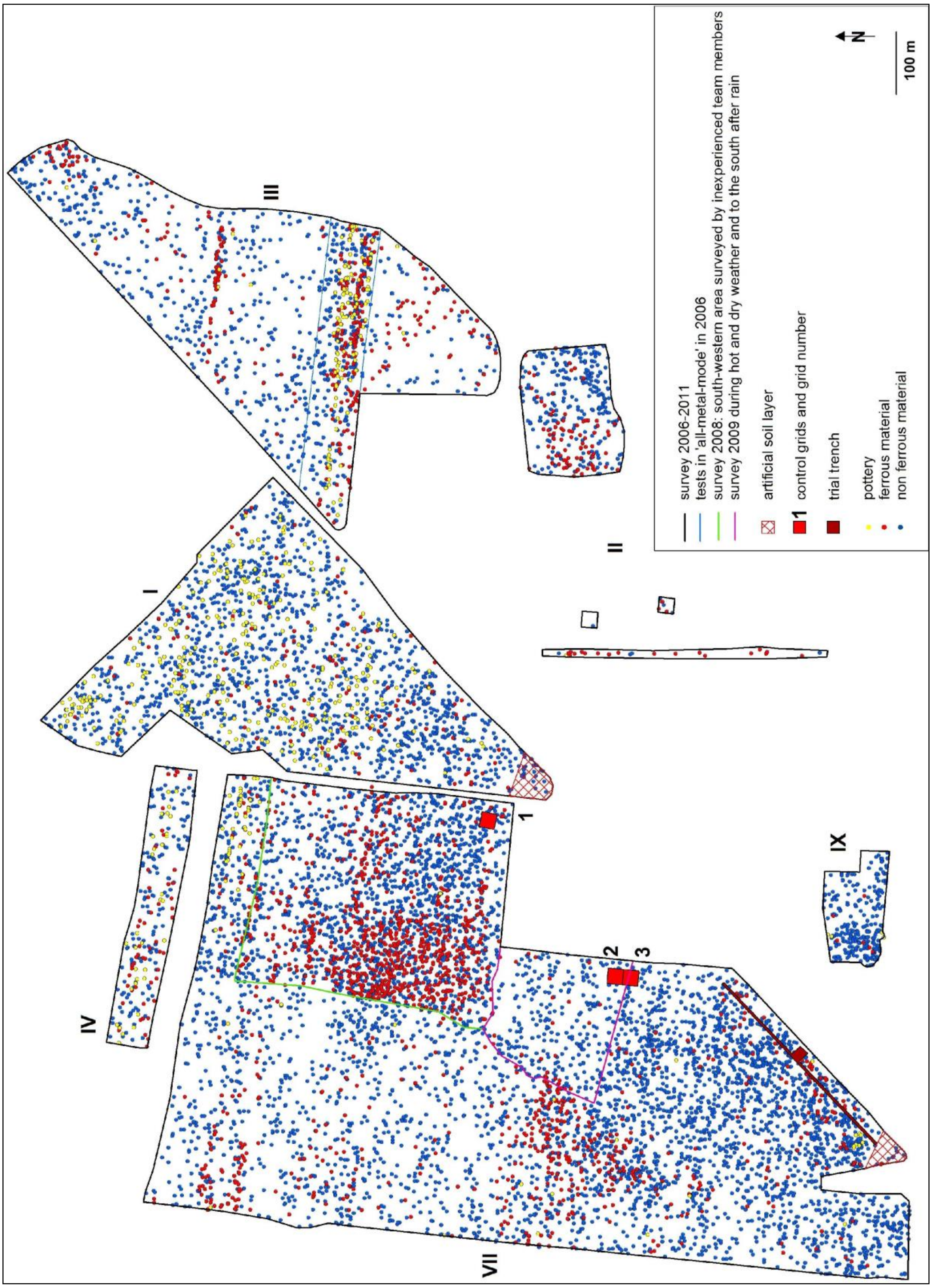

Figure 19: Surveyed areas of the Lützen battlefield (roman numbers) with distribution of ferrous and non-ferrous material.

It is difficult to estimate the impact that the clearing and looting process has had on battlefield artefact scatters, and this will certainly vary from battlefield to battlefield, depending on the environment, nature of battle and victory, density of population and many other factors.

At Lützen, almost all larger artefacts were already removed from the battlefield by the mid-20th century due to the extensive clearing and looting process and agricultural use. Also, some of the small finds were removed by illegal metal detecting. This process of constant removal of small finds is not equal in all areas of the battlefield and manipulates the artefact scatter on different scales.[442] Considering the time consuming process of collecting small finds from a battlefield even with a metal detector, it is assumed that many more small finds were removed from high than from low density artefact scatters.[443] The author has witnessed the behaviour of skilled but archaeologically untrained metal detectorists who gave up their search after a few minutes without finding anything. Therefore, we have to take into consideration that a lot, in Lützen possibly up to one-third, of small finds from main combat areas of a major battle may have been removed, if the area was seriously looted by metal detectorists, while almost all small finds and some larger items from short skirmishes might have survived in the topsoil.[444]

4.3 Recovery: the survey

One of the few constants in battlefield archaeology is that it is very difficult and time consuming to strip an area completely of metal with metal detectors.[445] There are many factors influencing the recovery rate of small finds, including temperature and soil humidity (see below), which have a serious impact on methodology, and because the artefact scatter has already been modified by the clearing and looting process, the main goal of a survey should be to gain a representative and statistically relevant sample of small finds from a battlefield.[446]

[442] This is also suggested for the 9 AD Kalkriese/Varus battlefield (Rost 2009, 113).
[443] Rost 2009a, 54.
[444] A Roman sword scabbard, one of the few weapons found in Kalkriese, was found at the edge of the battlefield (Rost 2009a, 55-56). Some battlefields have been seriously looted by metal detector rallies (Ferguson 2013, 266-267).
[445] Pollard 2009, 142, Schürger 2012, 250.
[446] Foard 2008, 73.

4.3.1 Methodology of survey

Most readily available metal detectors with a display meet the requirements of an archaeological survey. Adjustment of the discriminate mode is a more important consideration than which type of detector should be used. Adjusting the discrimination mode controls which type and size of metal objects can be found. Three different types of detectors, Tesoro Cortez, Minelab Explorer SE and Whites, were used in Lützen, and considerable testing was necessary before the different detectors were synchronized and produced a similar number of small finds.

When the Lützen project began in 2006, the Tesoro Cortez was used in 'all-metal-mode' and produced a vast amount of small iron fragments slowing down the survey substantially without producing much evidence of the battle, a problem Foard faced at Edgehill, and therefore it was abandoned after a few weeks (Fig. 19).[447] From then on the 'minimum-discriminate-mode' was used, with the satisfying result that only larger iron objects, together with other non-ferrous objects of any size were detected, speeding up the survey by approximately 500%.[448] In 2010, the Minelab Explorer SE was introduced into the survey and synchronized with the Tesoro Cortez with a 'discriminate-mode' of 26 on a scale of 1 to 31. In addition, in 2006, non-metal objects collected on sight also proved to be too time consuming (Fig. 19).

Unfortunately, over the life of the five year project, the composition of the detecting team members changed and it was difficult to keep the standard of detecting at the same level throughout. From 2008 to 2011, the main team consisted of five untrained individuals without any prior archaeological knowledge or experience. Therefore, team members were trained to dig up every metal object they found according to the setting of their detectors and bag it in order to prevent selective find recovery.[449] They were also trained to move with the same slow speed to assure an even, full coverage of the surveyed area.[450] This was taken very seriously, even in areas with few or no battle related artefacts at the edge of the battlefield; though this discipline paid off as peripheral areas produced important evidence of skirmishing in front of the Imperial left wing.[451] The importance of a uniform adjustment of all metal detectors and moving with the same speed should not be

[447] Foard 2008, 210.
[448] On the Lützen battlefield the ratio of ferrous to non-ferrous material was between 6:1 and 10:1 (Schürger 2012, 249).
[449] Foard 2008, 75.
[450] Schürger 2012, 250.
[451] Schürger 2011, 119.

underestimated, because it has an important impact on recovery rate and can falsify the results substantially.[452] It took team members four months of metal detecting before they developed the skill to distinguish between ferrous and non-ferrous material, leading them to produce a more dense distribution pattern of iron objects in 2008 (Fig. 19). Due to this variation iron objects do not represent equal recovery distribution patterns across the entire battlefield. However, they do provide valuable evidence in some areas where iron has been collected more systematically.

A total of 11,066 small finds were recovered from the battlefield. All find positions were recorded with a GPS ‘Garmin 60’. The introduction of the Wide Area Augmentation System (WAAS) in 2004 enables an approximate accuracy of 5m, depending on the position and availability of satellites and on nearby obstacles, such as buildings or trees.[453] Since the battlefield of Lützen is a flat plain almost without obstacles an accuracy of 2m was possible for the most part. On relatively flat terrain, there is usually little small find displacement and we can assume that also for those parts of the battlefield, where the soil has not been moved due to development.[454]

Plate 1: Marking transects during the survey.
(image has been removed due to copyright restrictions)

From the start of the project in 2006 to its end in 2011, 1,329,940 square yards (111.2ha or 1.1km²) of the battlefield were surveyed with 100% coverage, i.e. every square

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[452] Haselgrove 1985, 9, Haupt 2012, 38.
[453] Foard 2008, 76.
[454] Haselgrove 1985, 7.

meter was searched once, instead of using transects of 2.5m to 10m as it is often done on early modern battlefields.[455] To ensure a systematically 100% coverage, each detectorist marked his transect every 10m at the limit of his reach with the detector with a simple pile of top soil. This way, every detectorist determined the width of his transect, which in turn makes the coverage independent of his arm's length (Plate 1).

The decision to detect for ferrous material or not depends largely on the period in which the battle was fought and the desired results. Generally, 16th to 19th century battles produce enough bullets and other non-ferrous artefacts to justify a metal detector survey with discriminate mode, while more artefacts lost in a medieval or ancient battle will be ferrous, usually from armour, horse equipment or arrow heads.[456]

Coverage has an impact on distribution pattern densities and determines the quality of the interpretation that can be made; therefore, there is no ground rule of which coverage should be used on which battlefield, except that the coverage should not be changed during the survey, because distribution patterns can not be compared between areas surveyed with a different coverage.[457]

In any case, the limits of a survey should always be shown on distribution maps, together with a notation about transect width, because areas with few or no battle related finds are just as important as areas with a dense artefact scatter.

4.3.2 Control grids

In order to check the results, a resurvey of three test grids of 625m² was conducted during late September 2009 in areas previously surveyed using the 'Tesoro Cortez' metal detector to establish just how many artefacts may have been overlooked during the initial survey (Fig. 19).[458] The ground had moderate soil humidity with temperature of 15°C during the resurvey. Grid 1 was ploughed once and grids 2 and 3 were not ploughed between the surveys. However, fields II, III, VII and IX were not really ploughed for several years and only the topsoil to a depth of approximately 10cm was tilled. Therefore, no finds were expected to have been ploughed to the surface.

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455 Edgehill with 2.5m to 10m grids (Foard 2008, 208-209).
456 Battle of Towton 1461 (Sutherland 2009, 110-111) and Kalkriese/Varus Battle 9 (Rost 2009, 108). Schürger 2012, 249.
457 Schürger 2012, 250.
458 Schürger 2014, 154.

Grid 1 was surveyed for the first time in December 2008 by the author. The ground had high soil humidity with temperature near the freezing point. Three bullets, one coin, two buttons and eleven other small finds were found. The resurvey conducted by Bo Knarrström with a 'Minelab Explorer SE' recovered two bullets and eight other small finds.

Grid 2 was surveyed for the first time in mid August 2009 by a team member. The ground had very low soil humidity with temperature of 35°C. Three bullets and one other small find were found. The resurvey conducted by Bo Knarrström with a 'Minelab Explorer SE' recovered two bullets, five coins, three buttons and nine other small finds.

Grid 3 was surveyed the first time in August 2009 by a team member directly after the first rainy day in weeks. Therefore, the ground had high soil humidity with temperature of 20°C. One coin, two buttons, one buckle and nine other small finds were found. The resurvey conducted by the author with a 'Tesoro Cortez' recovered two bullets, two coins and two other small finds.

Although the control grids are too small to be representative of all surveyed areas, they demonstrate the severe impact weather can have on the recovery rate. Approximately 50% more small finds were recovered in a second survey in grids 1 and 3, where the soil humidity was high in the first survey. In contrast an additional 500% of small finds were found in grid 2, where soil humidity was very low at the time of the first survey. Actually, the area surveyed following the first day of rain after a hot and dry August can be seen according to linear concentration of small finds (Fig. 19). After the connection between soil humidity and recovery rate had been established, surveying was postponed in hot and dry weather. However, grid 1 and 2 both produced three bullets in the first survey and two bullets in the second, even though they had completely different humidity conditions. This suggests that the recovery of bullets is not affected by soil humidity, probably because their mass is large enough to produce a signal under any soil conditions, while thin pieces of metal, in particular coins, do not. The reason why there were no bullets found in grid 3 in the first survey and two in the second is probably coincidental, because there were apparently few bullets in this grid.

It is difficult to calculate the percentage of finds overlooked in a survey under good conditions according to one resurvey. If the results of the resurvey of grids 1 and 3 are representative, it seems that the number of finds may be reduced by 50% in each consecutive survey and therefore a total of approximately 50% of the artefacts, which were actually in the top soil, were found in the first survey. This would of course include only those artefacts lying within the metal detector's zone of the depth penetration. Most artefacts were found at a depth of up to 10cm with the exception of very large and massive metal objects, while most small and thin metal objects were found near the surface, usually not deeper than 5cm.

The circa 10cm[459]depth penetration of metal detectors might cause a problem when soil is brought onto the battlefield, as was the case at Kalkriese. On the one hand this might preserve the battlefield, but on the other makes it difficult or impossible to find battle related artefacts with metal detectors unless this soil overburden is removed.[460] Additional soil layers were observed on the Lützen battlefield in two small areas where the ground rises slightly (Fig. 19). In these areas no artefacts older than early 20th century were found, although they are located in the zone of the battle's main action.

4.3.3 Vertical small find distribution

In order to more fully understand vertical distribution of finds the opportunity was taken to metal detect regular spits down through the topsoil. In 2011, a 4m wide and 340m long trial trench was dug with an excavator on the battlefield in an area already surveyed in order to find a mass grave (Fig. 19, section 9.1). The 30cm top soil layer and 40cm black subsoil underneath was removed in seven levels or spits of 10cm, and each was surveyed twice, once with a 'Minelab Explorer SE' and once with a 'Whites'. A total number of 211 artefacts were found in the trial trench, including artefacts from the first survey in 2009.

	Level 0 1st survey 0-10cm	Level 1 10-20cm	Level 2 20-30cm	Level 3 30-40cm	Level 4 40-50cm	Level 5 50-60cm	Level 6 60-70cm	Level 7 70-80cm
number of finds	38	82	65	16	4	2	2	2

Table 17: Number of finds in the trial trench.

Levels 4 to 7 were through black earth. Ploughing, the main reason for vertical small finds distribution, usually did not reach this depth and therefore no finds should have

[459] See also Haupt 2012, 39.
[460] Wilbers-Rost 2009, 128.

been made there. However, half the artefacts from level 4 to 7 were found in two refilled modern pits, the other half were very likely brought down to this depth by rodents.

The higher number of artefacts in level 1 and 2, in comparison to level 0, can be explained by the fact that level 0 was surveyed only once and the removal of the top soil with an excavator produced a flat and even surface with high soil humidity and no air pockets, thus providing ideal conditions for metal detecting and producing very likely at least a 50% higher recovery rate in level 1 through 7 than in level 0.

Although those numbers are difficult to compare, they give us at least an idea of the vertical small find distribution on the battlefield of Lützen, with approximately 70% of finds located deeper than 10cm and therefore mostly outside the depth penetration of metal detector. Calculating further that approximately 50% of the finds are overlooked in a survey (section 4.3.2) and up to 30% were already removed from the battlefield due to the clearing and looting process (section 4.2), the full coverage survey has recovered an average of roughly 10% of the small finds deposited during the Battle of Lützen. However, the recovery rate might vary according to object size, soil condition, density of object deposition etc. and is certainly much higher on battlefields which were not in agricultural use during the last century, such as the 1876 Little Big Horn battlefield. This important observation has a serious impact on the interpretation of small find distributions which can be illustrated by the following example.

When the Blue Brigade attacked the first Imperial line at the beginning of the Battle of Lützen, they fired one volley of 486 bullets (number of musketeers) and charged. If we try to identify this volley on the battlefield, we will find approximately 49 bullets in a full coverage survey in a zone 120m (front of brigade) wide and 300m (overshots) deep, or 3.6ha, which is barely enough to see a distribution pattern. If we survey the area in 10m transects the number of bullets found is statistically reduced to ten, which is insufficient for any interpretation, and is insufficient to find the location of any cavalry skirmish at all, where the number of fired bullets was much smaller.

It would appear that 100% coverage survey using a low setting discriminate mode on an early modern battlefield, currently in agricultural use, seems to be the best compromise between progress of survey and quality of results, a conclusion that seems to be confirmed by results from the surveys of Landskrona and Lützen, and also by the 2.5m transect survey at Edgehill.[461]

[461] Knarrström 2009, 189, Foard 2009, Fig. 6.

Chapter Five

Battlefield Archaeology: Ammunition

5.1 Firearms ammunition

The idea to locate battlefields by looking for firearms ammunition goes back to the 19th century, but historians failed to see the significance of this new information source.[462] With metal detectors readily available in the 1980's, many 17th century British battlefields were subsequently collected and produced huge collections of bullets, as from Naseby and Marston Moor. Many more large samples were found on ship wrecks, including *La Trinidad Valencera, Solen, Vasa* and *Batavia*. However, the data of those collections were often inaccurately published or not published at all. It was not until 2008 that the first attempt to systematically and accurately evaluate 17th century bullets was made by Glenn Foard. The reason why it took over 150 years to achieve the first results is threefold. First, the sheer number of different weapon models in service in the 17th century made accurate statistical accounting difficult. Then, the different weight systems used for calibre specifications complicated comparison. Finally, the inaccuracy of weapon barrel and ammunition production made it difficult to fully understand the relevance of calibre and weight of recovered bullets as well as complicating bullet allocation to weapon models and types.

It is the intention of this chapter to provide an evaluation of bullets, and in particular their calibre and weight. Once the archaeologically recovered bullets are statistically arranged, they can be applied to specific weapon types and models. This result in turn forms the basis for all further discussion of bullet distribution patterns. Once patterns are identified, there will be an evaluation of the significance of casting sprues, modified firearms ammunition and firing evidence, especially bullet deformation due to impact. Firearms ammunition from Lützen will be discussed in the context of six other archaeological sites, from which exact data and a representative sample of bullets were available, in order to understand the development of firearms in the first half of the 17th century.[463]

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[462] Foard 2008, 37.

[463] The ammunition from the *Vasa* and Stralsund has been measured by the author; the ammunition from Edgehill has been measured by Glenn Foard, who has kindly placed his data to the author's disposal.

1. The 28 October 1620 Battle of Rakovnik (Rackonitz) was the prelude to the decisive Battle of White Mountain between the Bohemian-Protestant and the Imperial-Leaguist armies.
2. The 16 July1621 Battle of Rozvadov (Roßhaupt) was a minor battle between Ernst Graf von Mansfeld and the Catholic League. The ammunition of both Czech Republic battles provides an insight in firearms used during the early stage of the Thirty Years War.
3. The Swedish flag ship *Vasa* sank on 10 August 1628 in Stockholm Harbour.
4. The Dutch East Indian Company ship *Batavia* sank on 4 June 1629 near Australia. The bullets from both wrecks give us a unique insight in unused and undeformed ammunition of those weapon models used by in Sweden and the Netherland three and four years before the Battle of Lützen.
5. An excavation of Wallenstein's fortifications erected during the siege of Stralsund (May-July 1628), was carried out in 2009 and 2010, revealing a trench and a mass grave.[464] The trench was filled up during the siege, probably due to an explosion, preserving a vignette of the siege frozen in time including soldier's skeletons, weapons, ammunition, and personal equipment. The archaeological finds from the *Vasa*, the *Batavia* and Stralsund are important evidence for interpreting Thirty Years War firearms ammunition, because they are stratified finds and therefore not mixed with finds from other periods. The forces engaged in the siege of Stralsund were Wallenstein's besieging army on one side and the garrison of the Hanseatic city of Stralsund on the other. Initially the garrison of Stralsund consisted only of the city's militia, but was reinforced by 1,000 Scots and Danes commanded by Lieutenant Colonel Robert Monro and Oberst Heinrich Holk on 7 June[465] and 10 July and by 1,200 Swedes on 16 July. Realising that capturing Stralsund was no longer possible after the arrival of reinforcements, Wallenstein retreated after some mock attacks at the end of July.[466] As the Danish-Swedish reinforcements arrived on the last days of the siege, most bullets were very likely fired either by the Stralsund militia, the Scots or the Imperial army, which provide clues to the weapon models used by the Imperial army four years before the Battle of Lützen.
6. On 23 October 1642, almost exactly ten years after the Battle of Lützen, the English Civil War Battle of Edgehill was fought. In a three year project, 5km² of

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[464] The excavation was carried out by Landesamt für Kultur und Denkmalpflege Mecklenburg-Vorpommern. Hansestadt Stralsund at Frankenhof (Fundplatz 333), reference no. trench: Bef. 20, reference no. mass grave: Bef. 18. Konze/Samariter 2012, 266-281.

[465] Monro 1637, part I, 64.

[466] Konze/Samariter 2012, 279, Olesen 2010, 52-54. Holk changed allegiance after the siege of Stralsund and fought in Wallenstein's army at Lützen.

the battlefield was surveyed by Foard and his team, collecting 3,250 artefacts.[467] Edgehill was the first major battle of the English Civil War and occurred only three months after war broke out. This early date suggests that new firearms from English production, or imports from the continent, probably had not yet reached the armies in large quantities, and that many recently raised soldiers were very likely equipped with older weapon models from armouries. While some veterans returning home from the Thirty Years War may have brought their German, Austrian and Dutch weapons, these were probably a minority, albeit a distinct minority possible to identify from bullet distributions. In comparison with Lützen, similarities and differences of firearms ammunition and the development of firearms from 1632 to 1642 will be examined as well as the differences of firearms used in Germany and England.

5.1.1 Calibre: Allocation of ammunition to firearms types and models

In order to enable an interpretation of battlefield bullet distribution, the first task is assigning the bullets to known types and models of firearms according to their calibre, as discussed in section 3.2. The great number of different weapon models and the inability to produce 1/10th millimetre exact calibres for either bore or bullet already suggest that this is not a simple task which can be done in the field, as it has been in the past.[468] There are two approaches to determine the bullet's calibre: measuring the diameter or the weight. As the calibre was specified in weight (i.e. bullets/pound) in the 17th century, the best approach for allocating bullets to weapons seems to be measuring their weight. In contrast to diameter, weight allows determining the calibre of deformed bullets.

Foard first developed a method to measure diameter and weight of bullets while analyzing those from Edgehill, then visualising the data in graphs by calibre, so as to allocate bullets to weapon types.[469] Since an unusually high percentage (56.6%) of the Edgehill bullets were deformed due to firing and impact, they were therefore not eligible for measuring diameter.[470] Consequently, Foard used primarily weight as a means to deduce calibre. This section is concerned with the methodology of Foard's approach and

[467] Foard 2009, 121.
[468] Foard 2008, 116.
[469] Foard 2008, 90-128.
[470] According to Foard's data.

the validity of bullet weight and diameter, followed by interpreting the bullets from Lützen within a context of bullets from other archaeological sites.

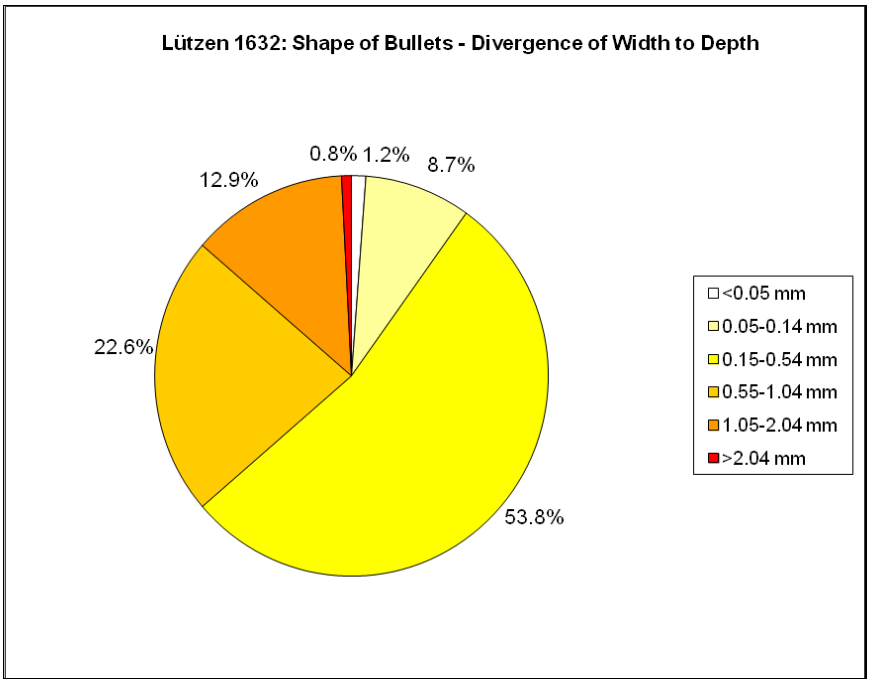

Figure 20: Lützen: Spherical and elliptic bullets according to their divergence in width and depth.

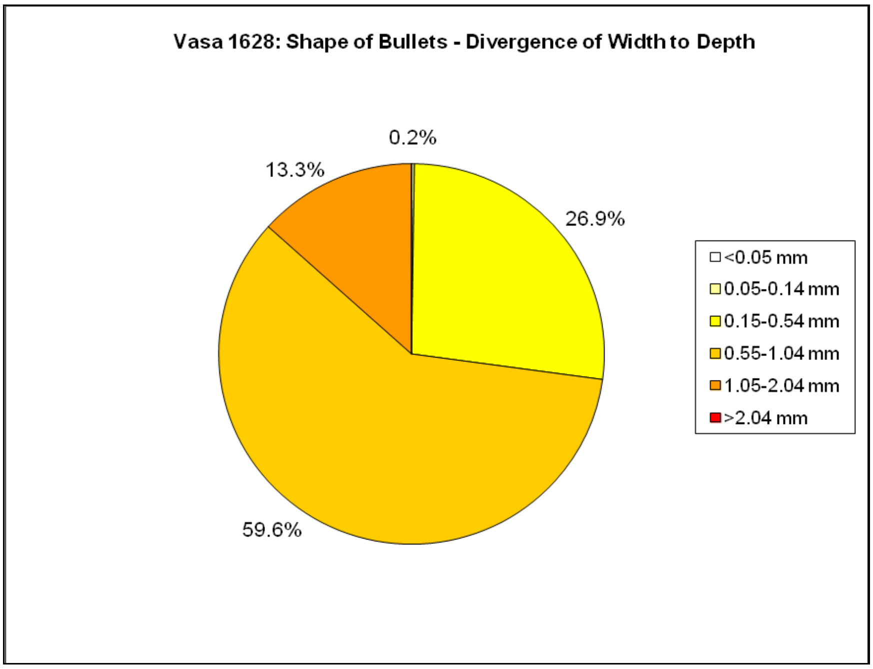

Figure 21: *Vasa*: Spherical and elliptic bullets according to their divergence in width and depth.

5.1.1.1 Validity of weight and diameter of bullets

The validity of bullets' weight and diameter is influenced by their shape. In theory, all unfired bullets should be spherical, but at Lützen only 1.2% actually are, while 8.7% are almost spherical with a divergence of width to depth of less than 0.15mm (Fig. 20). 90.1% of the bullets are more or less elliptical, as in the form of a cherry stone. In comparison to the *Vasa* (Fig. 21) and Stralsund (Fig. 22) bullets, the elliptical shape of the Lützen bullets does not seem unusual. Although the bullets from the *Vasa* are larger calibres, which generally tend to have a greater divergence of width to depth, and the bullets from Stralsund are too few to be statistically representative, all three sites have a similar ratio of 12.9% to 16.7% of bullets with a divergence of 1.05mm to 2.05mm. The consequence of those divergences in width and depth is either a substantially different bullet weight with the same diameter or a clearly different bullet diameter with the same weight. This problem will be discussed further in section 5.1.1.2.

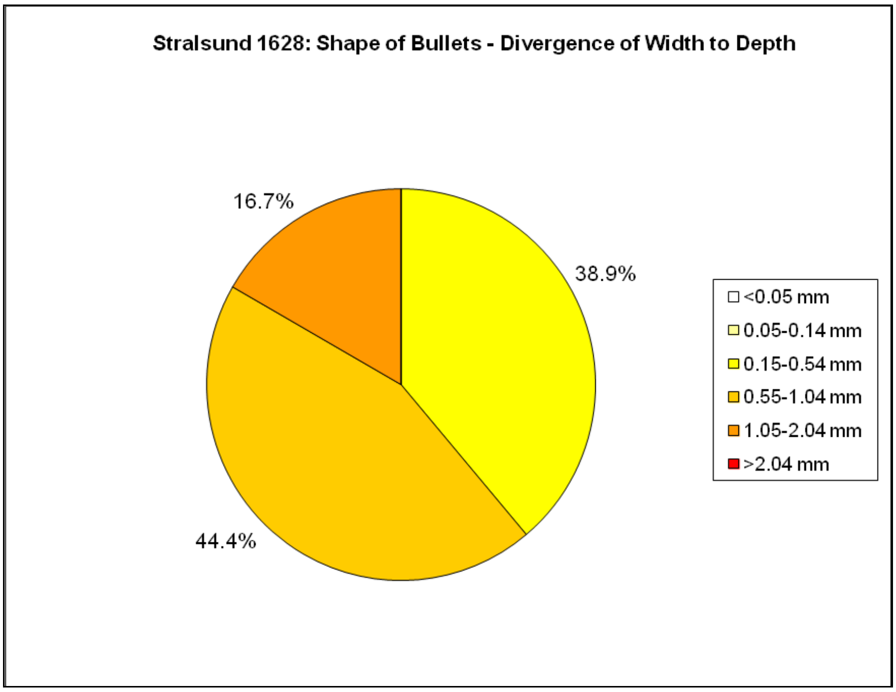

Figure 22: Stralsund: Spherical and elliptic bullets according to their divergence in width and depth.

If weight is the indicator for calibre, then it is necessary to calculate the length of remaining casting sprues. Usually sprues were removed, but 162 (5%) bullets from Lützen have sprues at least 2mm in length (Fig. 24). According to three single sprues found on the battlefield, the average weight of a sprue is approximately 1.5g to 2.5g. As another problem, 51 (2%) bullets have their casting sprues removed by cutting off parts of the bullet as well, which reduced their weight. Weight is further influenced by the bullet material. Although the bullets from Lützen have not been fully analysed, some general observations can be made according to the colour of corrosion and their specific weight. 182 (7%) are dark grey tin bullets.[471] As tin has a specific weight of 7.28g/cm³, while lead is 11.34g/cm³, tin bullets are substantially lighter than lead bullets. We must also consider the possibility that tin and lead was mixed on different scales. Small amounts of tin in a lead bullet might not create a different patina.[472] This consideration can be demonstrated with five lead bullets from Lützen. The lead bullets are spherical, as exactly as can be measured with a digital calliper rule, are only slightly corroded, and have no sprues. They are 2.5% to 10.0% lighter than a pure lead bullet should be. While a 2.5% weight difference can be explained by an inaccurate measurement, a 10% weight difference almost certainly derives from other reasons, such as a small portion of tin mixed into the lead (section 7.2.5). Another influence on weight, other than impure lead and pewter, could be corrosion, although no tests on the 17th century lead bullets have been conducted yet to understand the significance corrosion has on weight. At any rate, at Lützen, the observation has been made that 109 (4%) moderately and 35 (1%) severely corroded bullets have lost a significant amount of weight. Tests carried out by Foard have demonstrated that bullets loose 0.57g to 2.01g weight due to melting when fired.[473] In summary, shape, different material, corrosion, and firing reduced the weight of bullets on different scales, which implies too many inaccuracies to simply calculate their weight to derive the bore.

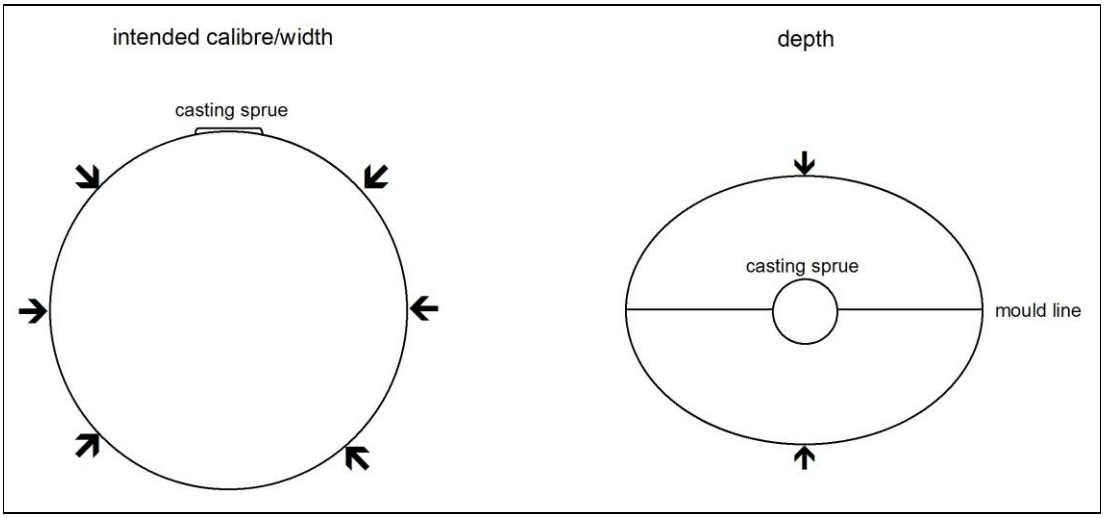

Figure 23: Measuring width and depth of bullets.

The different shape of bullets not only has an impact on weight, but also on calibre, because it complicates measuring the diameter. From the view of a 17th century soldier, it

[471] See Sivilich's 2014, (112, 203) comment on tin and pewter bullets.
[472] Sivilich 2015, (112, 203).
[473] Foard 2008, 118.

was most important that a bullet could roll easily into the barrel. Considering the non-spherical shape of most bullets, the calibre is defined by the mould line, or seam, which is almost always the biggest diameter. All recovered bullets were measured at least three times at the mould line using the biggest diameter as intended calibre or width and one time at the smallest diameter or depth 90° from the mould line. On rare occasions, bullets have a single rise usually at the sprue, but sometimes at the mould line, which creates a bigger diameter than intended. Those single rises do not prevent the bullet from rolling into the barrel and therefore do not indicate the intended calibre. Bullet calibre was measured with a digital calliper rule with an accuracy of 1/10th millimetre. 2,019 bullets out of 2,756 from Lützen were not or only slightly deformed due to firing or impact and therefore eligible for measuring their calibre.

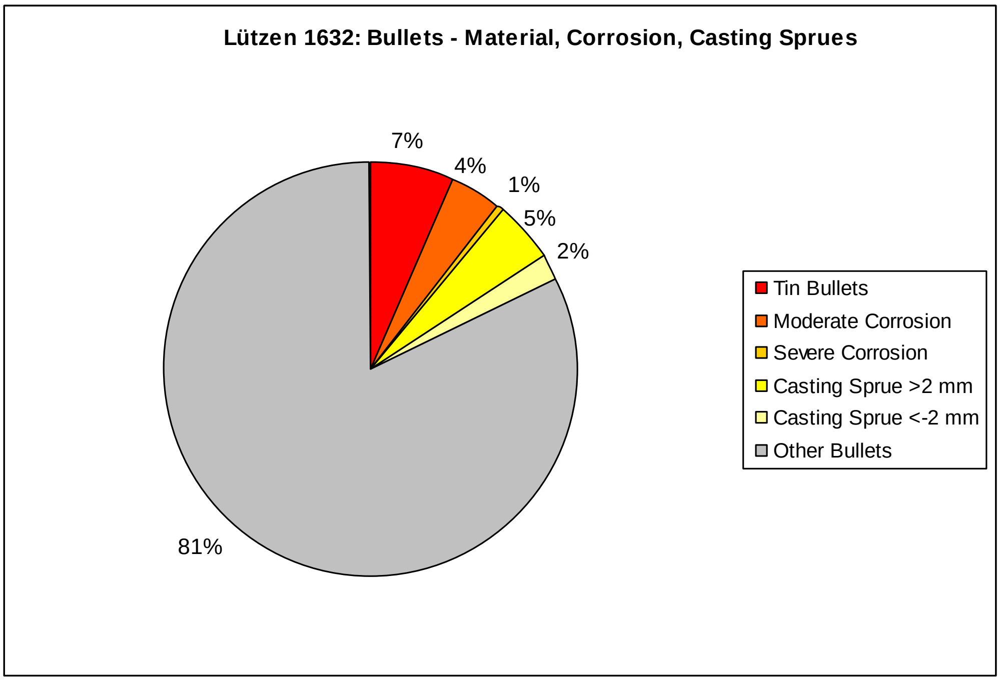

Figure 24: 19% of the bullets are not eligible for measuring by weight due to different material, corrosion or casting sprues.

5.1.1.2 The *Vasa*: Correlations between bullet calibre, bullet weight and weapon bore

The calibre graphs from Lützen (Fig. 31), Stralsund (Fig. 35) and Edgehill (Fig. 37) show a variety of calibres deriving from different models of pistols, carbines and muskets. The reason why there are no clear concentrations of single weapon models visible on the graphs can be explained by the inability of manufacturers to produce bullets with an accuracy of 1/10th millimetre. In order to understand the divergence in diameter, a large collection of unfired bullets from a single weapon model is required. This is provided by the *Vasa* bullets. The ship contained several barrels of lead bullets - tin bullets were not among them - stored probably to be used as case shot. A sample of 60 lead bullets from each of the seven barrels was measured. The bullets were chosen by chance to ensure a random sample. Some bullets did show corrosion, which created bubbles on the surface, probably from the sea water exposure; since this complicated measurement of diameter, corroded bullets were therefore not evaluated. The diameter ranges from 17.5mm to 18.7mm.

If the calibres of musket bullets are sorted according to storage barrels, the divergence is most distinct between barrel 17193, with calibres ranging from 17.5mm to 18.5mm, and barrel 17908, with calibres ranging from 18.0mm to 18.6mm (Fig. 25). Although not all bullets were measured, the sample of 60 bullets from each barrel seems sufficient to suggest that this is not coincidental. It is not entirely certain if the reason for this divergence is because the barrels were delivered by different arms manufactures, or if the bullets in one barrel were produced with one large gang mould, which would suggest that the calibres of one mould differ less than the calibres between different moulds.

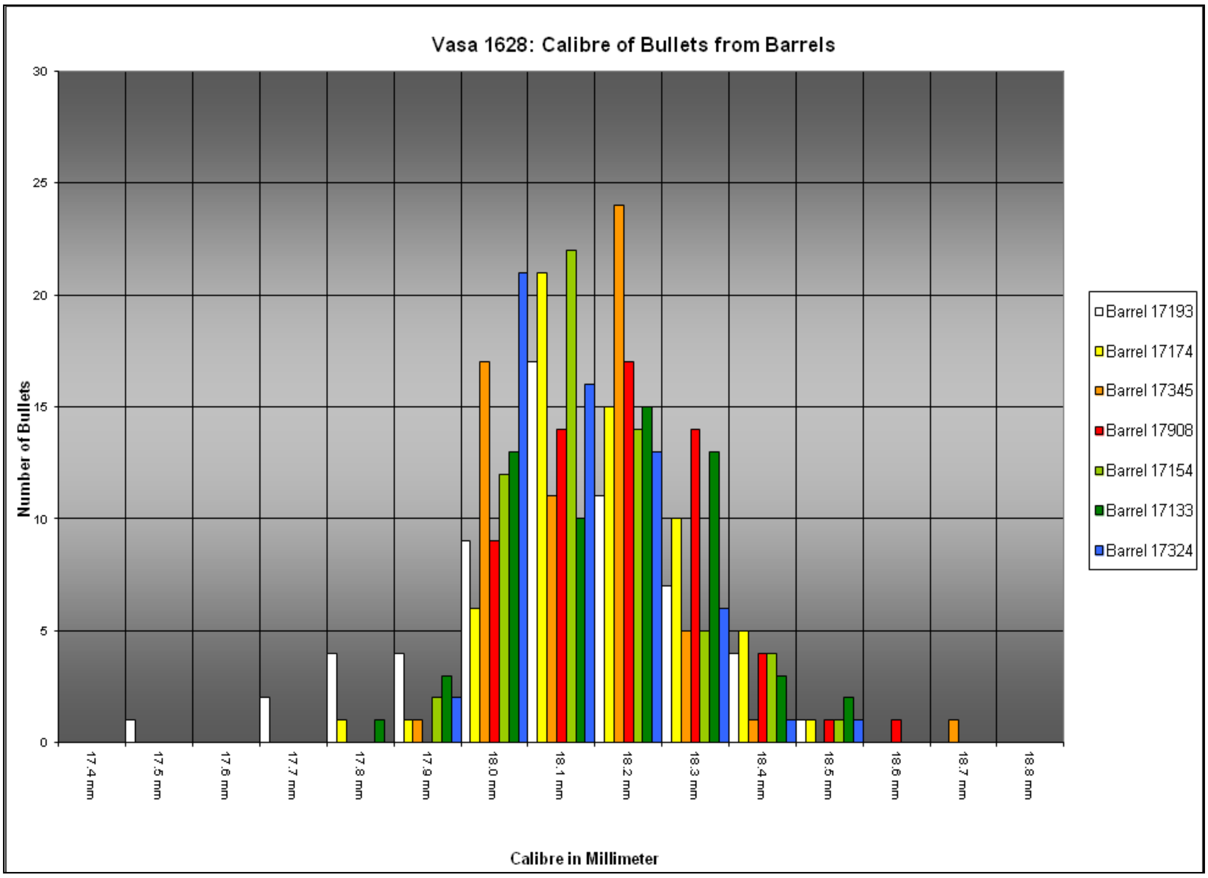

Figure 25: Calibre graph of musket bullets from the *Vasa* sorted according to barrels. (*Vasa* museum: Inv. No. 17193, 17174, 17345, 17908, 17154, 17133, 17324).

While most *Vasa* bullets (87%) have a calibre of 18.0mm to 18.3mm, the distributional curve of the calibre graph drops steeply at 18.4mm and 17.9mm and is phased out at both ends (Fig. 27). Although the calibre of the bullets has a divergence of 1.3mm, the form of this curve suggests that one specific calibre was meant and the bullets were produced for one specific musket model before they were set aside to be used as case shot. The most reasonable explanation that the intended bullet calibre is the most common calibre of 18.1mm or 18.2mm is problematic, because no weapon firing this bullet calibre is known in 1628. Before that time, three musket models with bore diameters those bullets could fit are known to have been produced:

1. The 21.6mm musket from Holland (m1) fired 20.0mm (10 bore) bullets. That would mean a windage of 2.9mm to 4.1mm, which is far too large to provide the bullet with an effective velocity, even by 17th century standards.
2. The 17.9mm (15 bore) ammunition of the 18.8mm musket from Augsburg (m4) is in the range of calibres from the *Vasa*. The largest bullet of 18.7mm would barely fit the barrel of this musket, but it must be considered that barrels also vary in calibre, approximately some +/-0.5mm (section 3.2). That would give the Augsburg musket an actual calibre of 18.3mm to 19.3mm. 7.4% of the bullets would not fit the smallest barrels (Fig. 26). Many other bullets would have to be rammed home, which would have cost valuable time in battle and increase the risk of malfunction or even of exploding the musket. Although ramming of bullets or treating bullets by soldiers to reduce their size is reported in at least one 17th century military handbook, this account is related to the use of different calibre muskets in one army and the problems caused by delivery of ammunition only for larger calibre muskets, in which case musketeers using smaller calibre weapons had to improvise.[474]
3. Therefore, the bullets from the *Vasa* almost certainly belonged originally to the heavy 19.7mm (10 bore) musket produced in Holland from 1600 to 1620 (m3), firing, in theory, bullets with a calibre of 18.5mm (12 bore), which were found on the Lützen battlefield (Fig. 26). This presumption is consistent with a 1626 eyewitness account, which stated that the Swedish army used heavy muskets (section 3.2.2.2) and with the fact that Sweden imported most firearms from Holland until the late 1620’s (section 3.2.1).

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[474] Orrery 1677, 29.

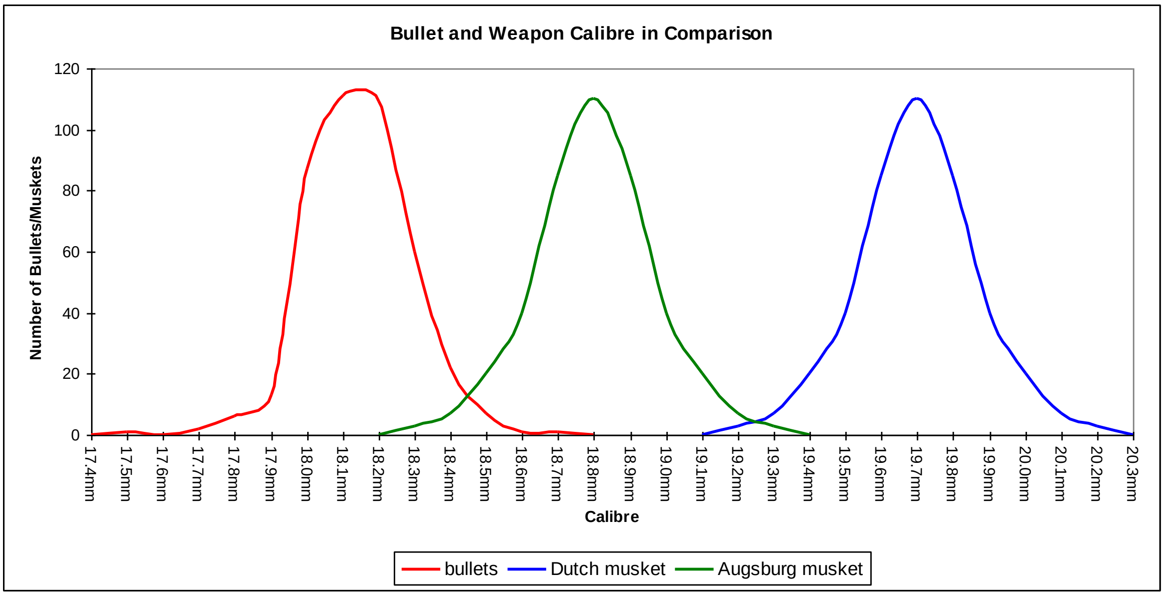

Figure 26: Comparison of calibres of *Vasa* bullets with a suggested +/-0.5mm calibre divergence of Dutch (m3) and Augsburg (m4) muskets.

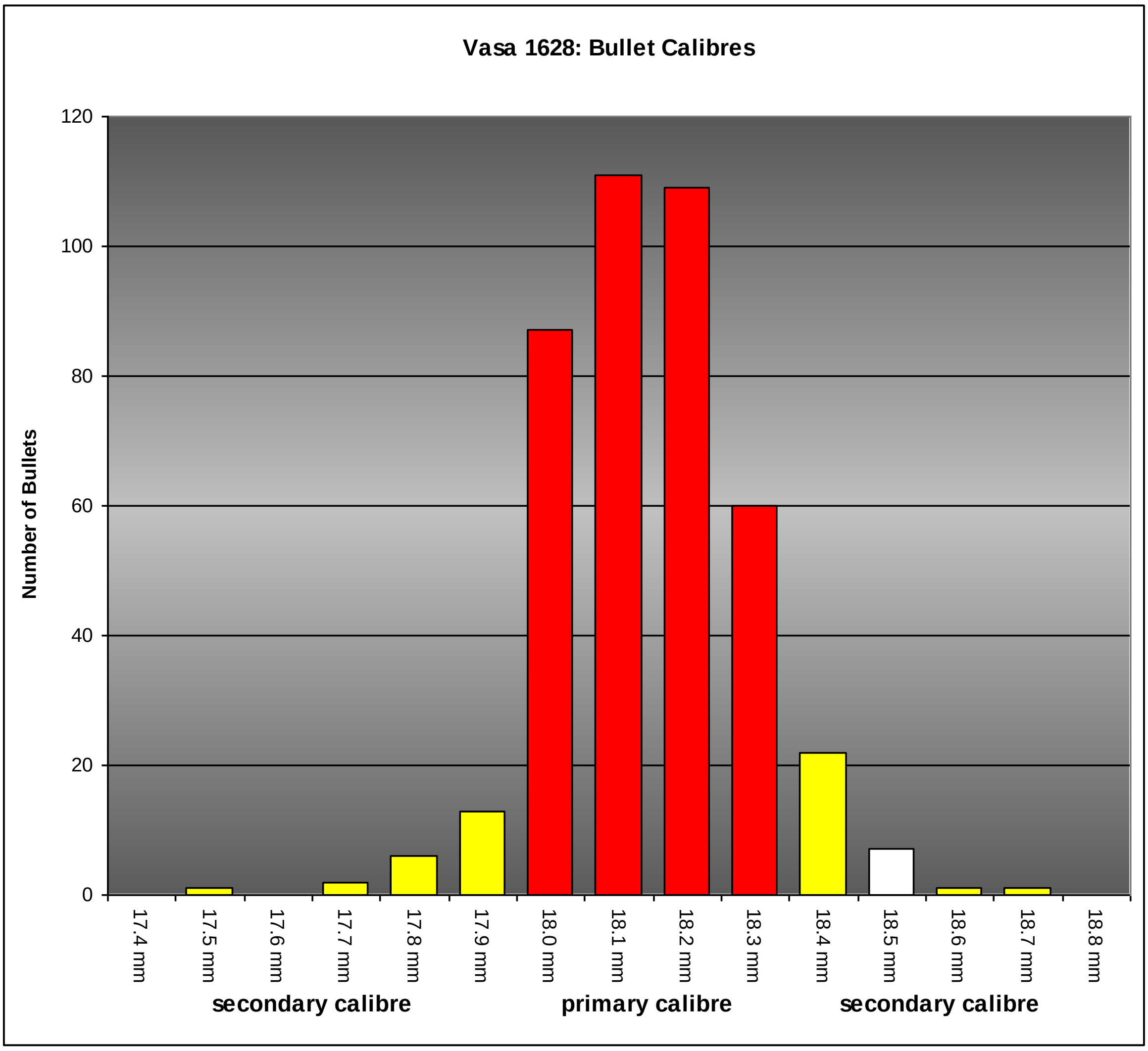

Figure 27: Calibre graph of musket bullets from the *Vasa* with primary (red), secondary (yellow) and ideal (white) calibre.

It is no contradiction that few bullets actually have the theoretical 12 bore calibre of 18.5mm, while 98% are up to 1.0mm smaller and only 0.5% are up to 0.2mm bigger. It suggests that it was far more important that a bullet could roll easily into the barrel, in particular after the barrel was narrowed due to fouling caused by repeated firing, than to have a greater bullet velocity. Also an effective windage of 0.5mm to 2.7mm, calculating the divergences of bullet and bore, seems acceptable, which guaranteed that larger bullets fit smaller barrels of the same model.

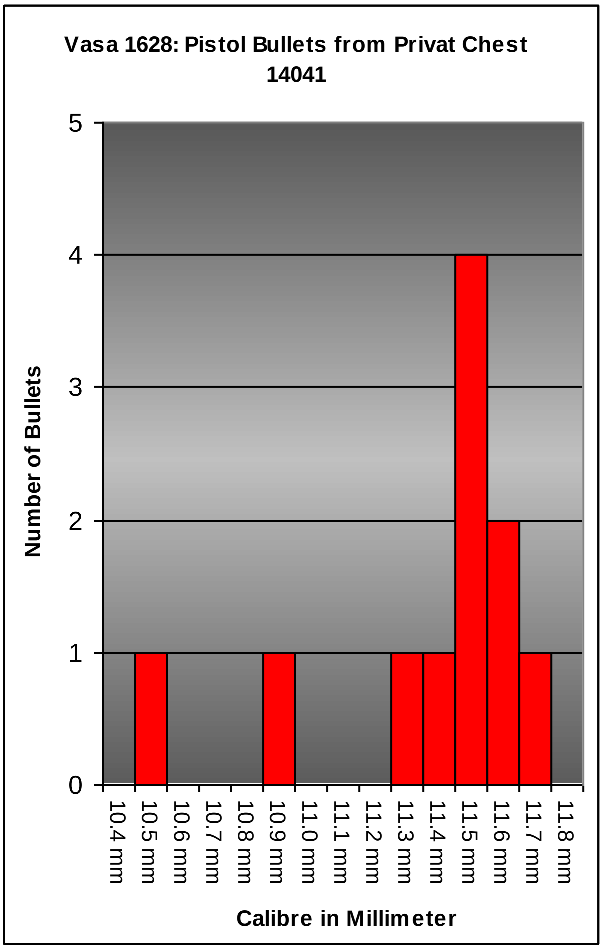

Figure 28: Calibre of eleven pistol bullets from a private chest, found on the *Vasa*, which also contained also two powder horns, and a gun flint. (*Vasa* museum: Inv. No. 14041).

The divergence of 1.3mm from smallest to largest bullet seems to be the accepted range of production error for Thirty Years War firearms ammunition. An alternative interpretation might be that the range was, in fact, unacceptable, and defective bullets were set aside for case shot. This does not seem likely, given the bell shaped curve of bullet diameters shown in the various graphs. Of major importance for interpreting 17th century calibre graphs is the fact, that 87% of the musket bullets from the *Vasa* have a calibre of 0.2mm to 0.5mm below the theoretical bullet calibre, while 13% have a calibre of -0.6mm to -1.0mm and -0.1mm to +0.2mm of the theoretical bullet calibre. To express this ratio the term ‘primary calibre’ is used for the 87% majority and the term ‘secondary calibre’ for the 13% minority.

There is similar data for the French Charleville musket used by American soldiers during the American Revolutionary War. This musket had a calibre of 17.5mm, while the bullets had a diameter of 15.2mm to 16.8mm with most bullets at 16.0mm.[475] That means a windage of 0.7mm to 2.3mm and a bullet calibre divergence of 1.7mm. At the present time, it seems that the calibre values did not change substantially over time in the musket-era.

One chest on the *Vasa* contained eleven pistol size bullets, but not the pistol or pistols themselves (Fig. 28). The calibre ranges from 10.5mm to 11.7mm. It is likely that these bullets belonged to one pistol, or a pair of pistols, with the same calibre. A pair of different calibre pistols would have produced two visible groups of calibres in the calibre graph. The calibres of the pistol bullets have the same divergence of 1.3mm as the musket bullets. Although the small number of pistol bullets is not sufficient to be representative, it seems to support the notion that 1.3mm is an acceptable divergence in the 17th century.

The difficulty of using weight for allocating bullets to specific weapon models is reflected by a comparison of bullet weight and calibre (Fig. 29). The weight-calibre graph appears to create a curve similar to the diameter-calibre graph. If the presumption that the bullets from the *Vasa* belonged to the 19.7mm (m3) musket is not accepted, those bullets have a calibre of 12 bore according to diameter, but not one bullet approaches the intended weight of 37.75g. The actual weight of bullets is 4g to 11g or 10.6% to 29.9% lower than intended, suggesting that they are 14 or 15 bore. In a cross-check, 37.75g bullets from Edgehill have a diameter of 18.7mm to 19.5mm. The weight suggests that they are 12 bore, but the diameter is similar to 11 bore.

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[475] Sivilich 2015, (60).

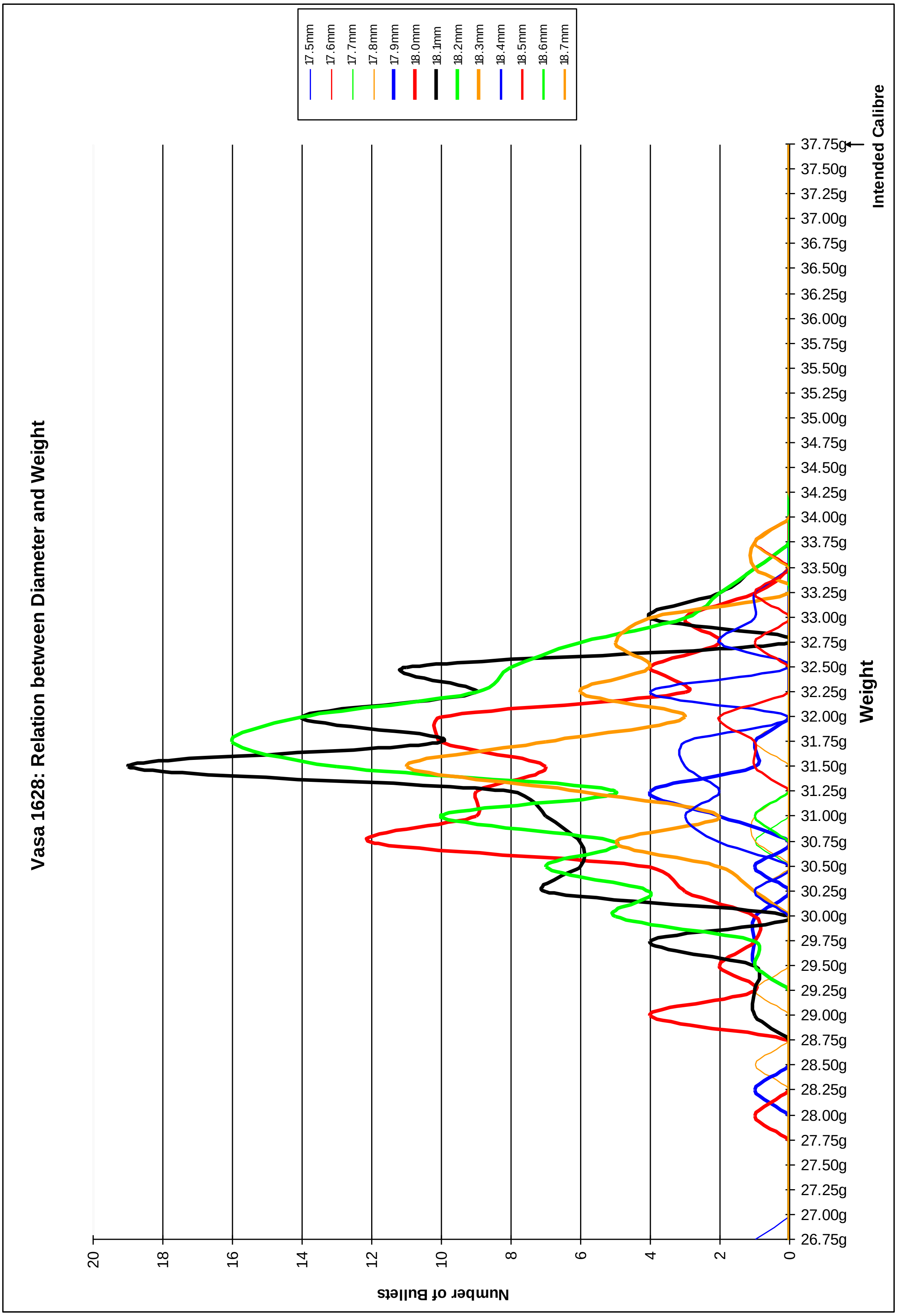


Figure 29: *Vasa*: Comparison of weight and calibre of bullets from the 19.7mm musket from Amsterdam.

It is evident that both weight and diameter could not have been responsible for determining calibre simultaneously. The deciding factor for 17th century ammunition supply was much more likely whether bullets could fit the barrels of firearms, and therefore had the correct diameter, rather than having bullets with the correct weight, which did not, or barely fit the barrel of a firearm. This suggestion is supported by evidence from the *Vasa*, where the bullets apparently can be allocated to one known weapon model according to their calibre. Therefore, the diameter of bullets will be used to determine their calibre so as to allocate bullets to specific firearm types and models in this thesis. However, weight is too important a value to disregard it entirely, and section 5.1.2.1 will discuss how to use it. In any case, the approach discussed here applies to early modern ammunition. With advancing weapon standardization, weight could still produce sufficient data to determine the weapon type when the divergence between calibres of the main weapons is big enough, as it is between the British 19.1mm Brown Bess and the French 17.5mm Charleville 18th century muskets.

5.1.1.3 Lützen: Interpretation of calibres

The analysis of firearms ammunition from the *Vasa* provided valuable evidence about bullet calibre diversity, the relation between calibre and weight, and the problematic issue of using primarily weight and bore as means for a calibre interpretation. The Lützen calibre bullet data will be analysed according to primary and secondary calibres of each known weapon model, instead of the current method of representing the data in bullet weight and bore. This methodology will allow a far more accurate assigning of bullets to weapon models; in turn attribution of bullets to weapons will provide the basis for interpreting bullet distribution on the battlefield.

The distribution of calibres on graphs is generally influenced by the surveyed areas of a battlefield, in particular the ratio of pistol and carbine shot to musket shot, which serves as an indicator for cavalry and infantry action (Fig. 30). At Edgehill, the ratio is 50% to 50%; it is one of the few 17th century battlefields where all areas, wings and centre, were at least partially surveyed. Edgehill will thus provide a ‘typical’ ratio of pistol/carbine shot to musket shot. This suggestion is supported by the substantial survey of Marston Moor by Roberts (Fig. 30). The lower number of pistol and carbine shot at Lützen can be explained because most of the centre (infantry), but only approximately 50% of the left and

10% of the right Imperial wings (cavalry), has been surveyed. Thus it must be considered that pistol and carbine shot are underrepresented.

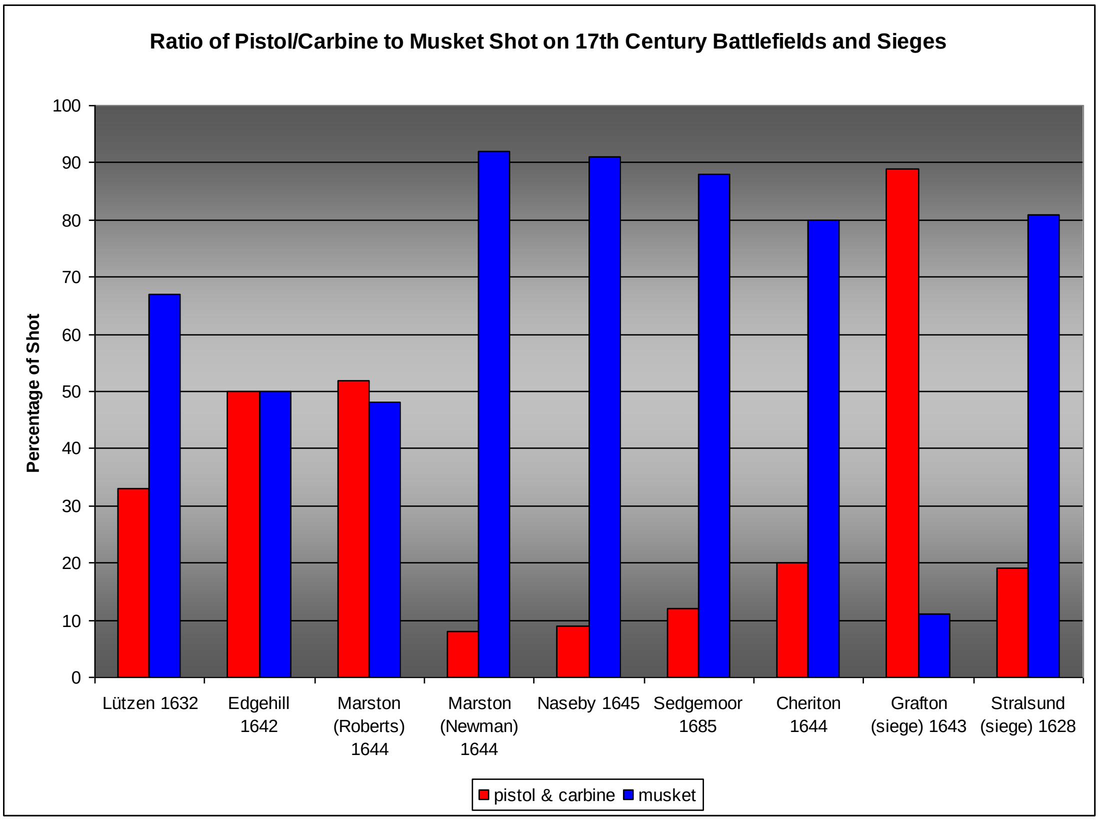


Figure 30: Ratio of pistol and carbine bullets to musket bullets. This is a subjective and approximate allocation of bullets to weapon types. Bullets from Lützen, Edgehill and Stralsund were allocated by the author; the ratios from other battlefields are from Foard 2009a, 151.

Generally the large number of weapon models makes it impossible to allocate a single bullet to one model with certainty because calibres of different models overlap with one exception (see below). Bullet diameters for three broad weapon classes are 17.6mm to 19.9mm/musket shot, 15.3mm to 15.8mm/carbine shot and 8.4mm to 11.7mm/pistol shot, although it is possible the latter might be mixed with rifle shot (Fig. 31). Therefore, a statistical probability has to be calculated according the following presumptions:

1. There are more bullets of primary than of secondary calibre.
2. There are fewer old and very new models, than those which had been in general production for some years (see below).
3. At Lützen, there are more musket than carbine or pistol bullets, with an approximate ratio of 4:1:1.

The calibre graph is discussed in nine groups (weapon types/models) subjectively identified by peaks or concentrations on the distributional graph of bullet diameters or by known weapon types and models. The groups are 18.9-19.9mm, 17.9-18.8mm, 17.3-17.8mm, 15.9-17.2mm, 15.0-15.8mm, 14.0-14.9mm, 11.8-13.9mm, 8.4-11.7mm and less than 8.4mm diameter.

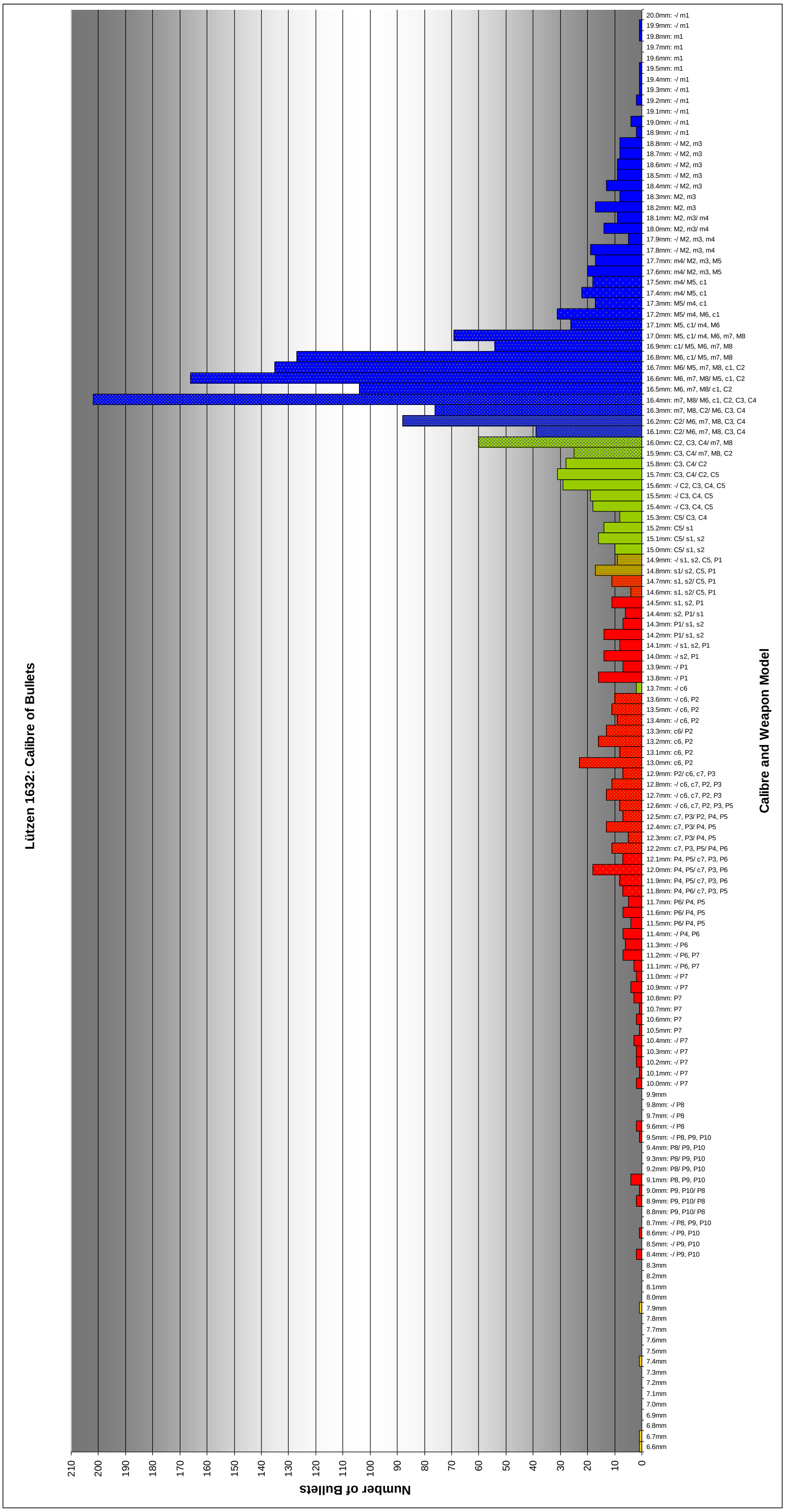
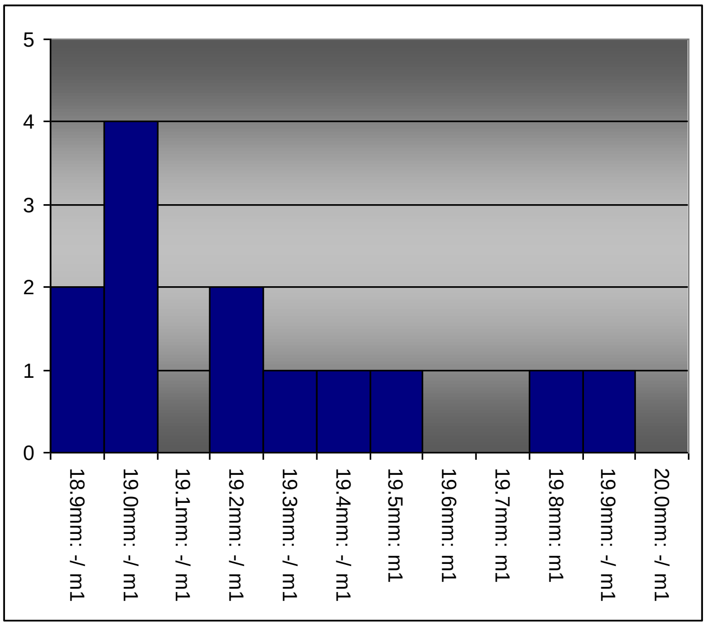


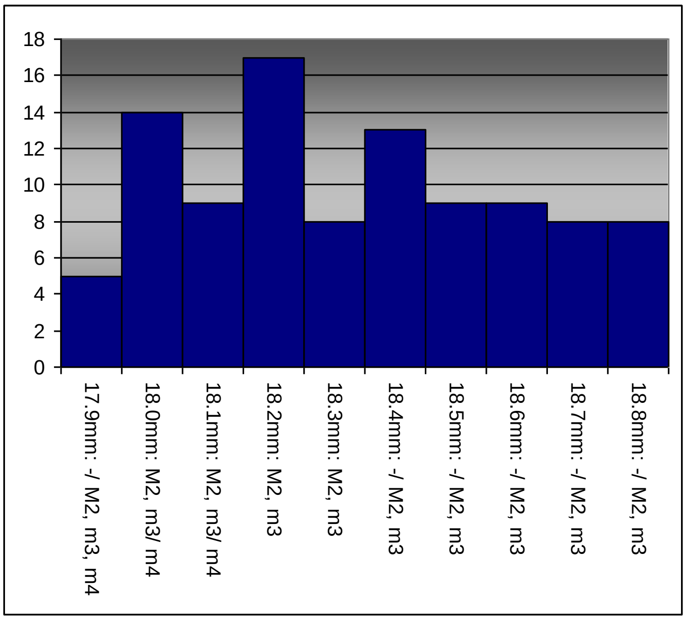
Figure 31: Lützen calibre graph with models of firearms: musket bullets – blue, carbine bullets – green, pistol bullets – red, rifle bullets – orange. Weapon models: In front of backslash – primary calibre, behind backslash – secondary calibre.

Group 1 (18.9-19.9mm)



At Lützen only the largest bullets (18.9-19.9mm) can be allocated to a single weapon model with a certain degree of probability; the heavy 21.6mm musket with a bullet calibre of 20.0mm produced in Holland (m1). Only thirteen bullets (0.6%)[476] of that type were found. This does not come as a surprise as this weapon had already been out of date for two decades. Weighing 7.5kg, it was relatively heavy, in particular on long campaigns; it was probably transported with the baggage or artillery train and employed with the artillery due to its lack of mobility.

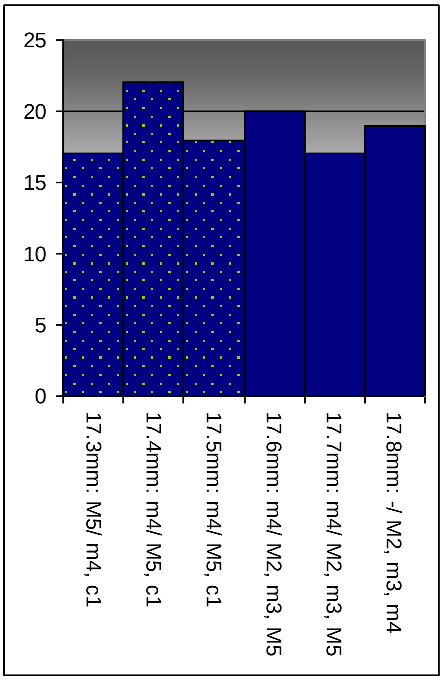
Group 2 (17.9-18.8mm)



[476] The percentage value given after a number of bullets refer to the 2,019 slightly or not deformed bullets eligible for measuring.

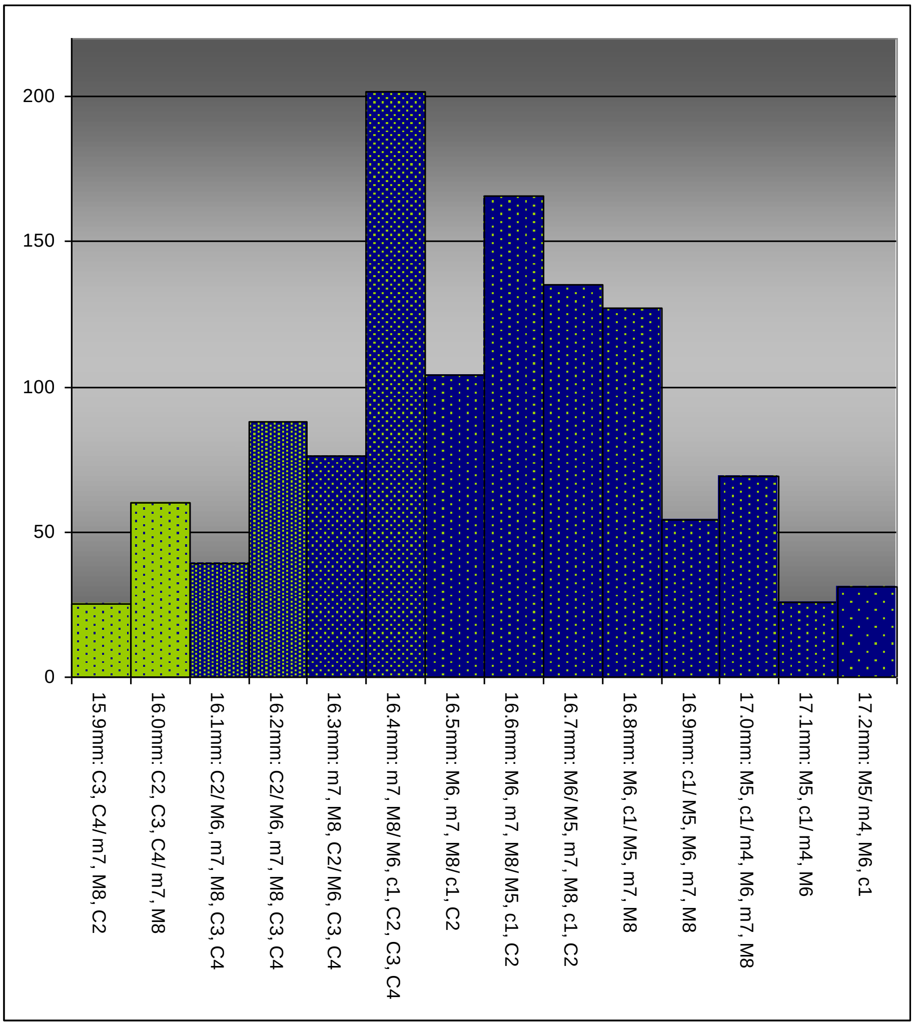
There is a conspicuous series of peaks at 17.9mm to 18.8mm similar to the peak on the *Vasa* musket bullet calibre graph. It has a peak in the middle at 18.0mm, 18.2mm and 18.4mm and drops at both 17.9mm and 18.8mm. The high point is not as distinct as on the *Vasa* graph because there were fewer bullets of this calibre found at Lützen. These bullets can belong to two weapon models: The old, heavy 19.7mm musket as on the *Vasa* (m3), or the new, light musket of the same calibre produced from 1630 to 1640 (M2). The dual possibility of an obsolete model and a very recent model is reflected by the low number of those bullets (100 or 5.0%) found on the battlefield. The m3 was out of production for twelve years and the production of the M2 started just two years before the battle. How many bullets derive from which of these two weapons will be discussed when interpreting the bullet distribution (section 8.3.3). Both models were used chiefly by the Swedish army at Lützen (section 3.2.2.2). The low number of bullets used by two out of date models (m1 and m3) and the one recently developed model (M2) is one key for understanding the calibre graph. According to the Lützen bullet distributions, older weapons were still in use in the Thirty Years War, but in significantly lower numbers. As the army upgraded its weaponry, it took some years until it was equipped with a newer model.

Group 3 (17.3-17.8mm)



A slight concentration on the calibre graph occurs between 17.3mm and 17.8mm, but without the typical bell-shaped curve seen on the *Vasa's* calibre distribution graph. The 113 bullets (5.6%) in this peak can be allocated to five different weapon models making any interpretation difficult. The c1 carbine from Holland had been obsolete for 12 years. Neither the Swedish nor the Imperial armies had many type c1 carbines in service by 1632 (sections 3.3.2.2 and 3.3.2.6), therefore, an insignificant number of c1 carbine ammunition is to be expected on the battlefield in general and in particular in this concentration on the calibre distribution graph, as the c1 bullets are a secondary calibre here. The M2 and m3 musket bullets are also secondary calibres in this part of the calibre distribution graph and, as there were only few of those muskets in service in Lützen, they can be largely disregarded. That leaves the older m4 musket (primary calibre range of 17.4-17.7mm) and the M5 musket (primary calibre at 17.3mm). The process of elimination suggests that most bullets in the 17.3mm to 17.8mm range derive from the m4 and M5 muskets. As both models were produced in southern Germany's Augsburg and Nurnberg, they were very likely used chiefly by the Imperial army, although some were probably captured by the Swedish army during their earlier German campaign.

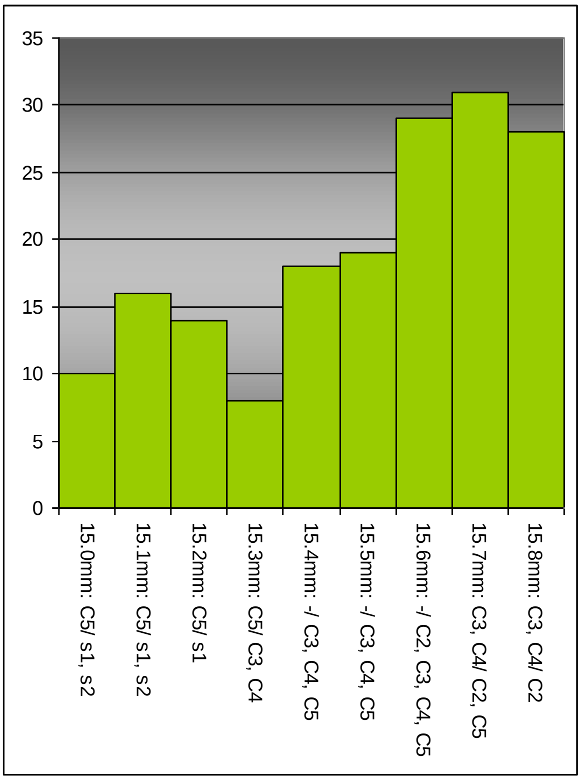
Group 4 (15.9-17.2mm)



The most conspicuous concentration (1,200 bullets/59.4%) on the calibre graph occurs in the range between 15.9mm and 17.2mm with a peak (202 bullets) at 16.4mm. It has the typical bell shaped curve expected from a single weapon model, but the bullets actually represent nine different models: five muskets and four carbines. Although it is impossible to allocate these bullets to any specific weapon model, it is the typical curve of one weapon model that must be considered. The curve suggests most of this bullet group derives from a single model or models with a similar calibre. Four models (muskets M6, m7 and M8 and the carbine c1) have their primary calibre at the peak (734 bullets/36.4%) between 16.4mm and 16.8mm. As the carbine can be ruled out (see above) as a weapon represented in this calibre peak, and musket m7 was obsolete by the time of the battle, most bullets almost certainly derive from the 17.7mm musket (M6) produced in Amsterdam and the 17.5mm musket (M8) produced in Suhl. The calibre distribution indicates that, since only 11.2% of the total bullets recovered derive from larger calibre muskets m1, M2, m3 and m4, a total that is far too small a number for a 17th century battlefield, the explanation with the best fit is that most musketeers, approximately 75%, in both armies, were equipped with musket models M6 and M8, as shown by the bullet calibre graph's distribution. It is not certain whether the Swedish army was chiefly equipped with Amsterdam model M6 and the Imperial army with the Suhl model M8. It seems likely that the Swedish army acquired many Suhl-manufactured 17.5mm muskets during 1631 and 1632, when Saxony became an ally and many new regiments were recruited. In any case, the calibre divergence between these two models is too small to distinguish them from each other, which means that most musket bullets can not be allocated to a particular side.

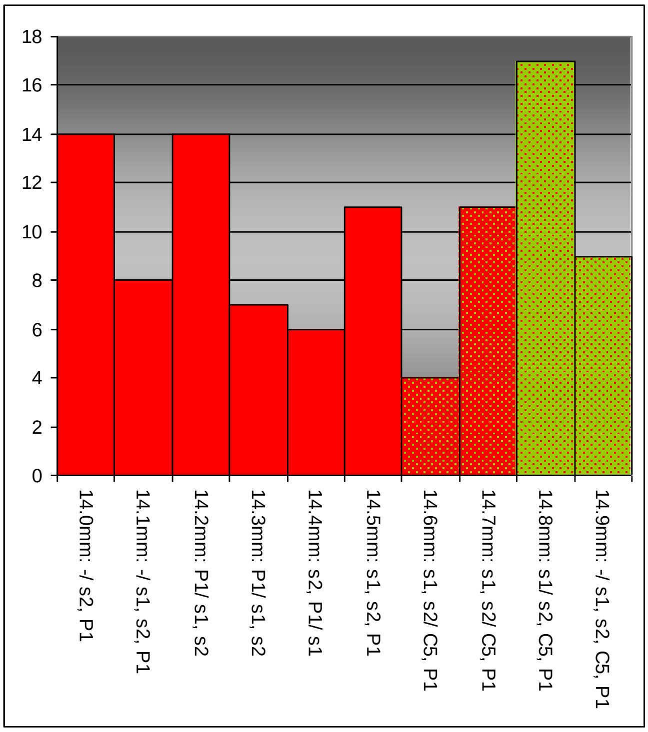
Bullets at 16.7mm and below can be allocated to three carbine models (C2, C3 and C4). The 17.2mm carbine from Holland (C2) and the 16.8mm carbine from Suhl (C4), together with the C5 carbine (see below), saw service mainly from 1620 to 1630 suggesting that they were the standard carbines in Lützen. The 16.8mm Nurnberg (C3) carbine was too new to be in service in any great number at the time of Lützen.
The various carbine bullets at 16.4mm to 16.7mm overlap with the standard muskets M6 and M8, but only as their secondary calibre. If it is considered that, normally, there are many fewer carbine than musket bullets on a normal battlefield, the bullets at 16.4mm to 16.7mm are more likely to be almost exclusively from muskets. That changes at 15.9mm to 16.2mm where only carbines have their primary calibre. In particular, the small peak at 16.0mm represents three carbines' primary calibre (C2, C3, C4) and might indicate carbine bullets predominate at 15.9mm and 16.0mm.

Group 5 (15.0-15.8mm)



Bullets with a calibre of 15.0mm to 15.8mm are exclusively carbine shot. They can be divided into two concentrations, 15.0mm to 15.2mm and 15.4mm to 15.8mm. The variation suggests different carbine models. The larger calibre concentration probably derives from the C3 Nurnberg carbine and the C4 Suhl carbine with the addition of some of C2 and C5 carbine bullets. The smaller calibre concentration derives mostly from the 16.1mm carbine from Holland (C5) with, possibly, a few bullets from calivers (see below). Although Gustav Adolf had disbanded his harquebusier regiments, the Swedish army certainly had some carbines in service, in particular with his German cavalry. Since we do not know the number of carbines used in the Swedish army at Lützen, it is not possible to suggest a ratio of Imperial to Swedish carbines without more evidence.

Group 6 (14.0-14.9mm)



Ammunition from the 15.9mm calivers from Nurnberg and Amsterdam (s1) and the 15.8mm caliver from Suhl (s2) has a calibre ranging from 14.0mm to 15.2mm. This distribution overlaps entirely with the C5 carbine and the P1 pistol. The gap at 14.6mm, where the s1 and s2 calivers have their primary calibre, and between the two small concentrations at 14.2mm and 14.5mm suggests that there were no s1 or s2 calivers present; however, the total of 140 bullets is not enough to be certain that the gap is not coincidental. If there were any calivers at Lützen, they may have been used by the Leaguist Regiment Comargo, which, as formerly part of Tilly's army, had once used them (section 3.3.3.3). The actual bullet distribution patterns of this calibre show a wide scatter on the battlefield (Fig. 32). Although there is a low density bullet concentration where Comargo's Regiment is expected, a denser second concentration is located northeast of the windmills. If Comargo's Regiment was still equipped according to the Spanish school with calivers, there should have been one clearly visible concentration of caliver bullets. The calivers might have been used by Imperial dragoons, but there was only the small Dragoon Regiment Trcka at beginning of the battle on the right wing, while two other dragoon regiments, Pappenheim and Merode, arrived with Pappenheim around midday on the far left wing. They probably did not make much use of their calivers, which were not even their official standard weapon, because they were put into action as cavalry. They could not have created any visible distribution patterns, while any potential patterns would have been outside the surveyed area. Therefore, it is far more likely that most bullets in this group derive from the P1 pistol and, possibly, a few from the C5 carbine, with its secondary calibre at 14.6mm to 14.9mm.

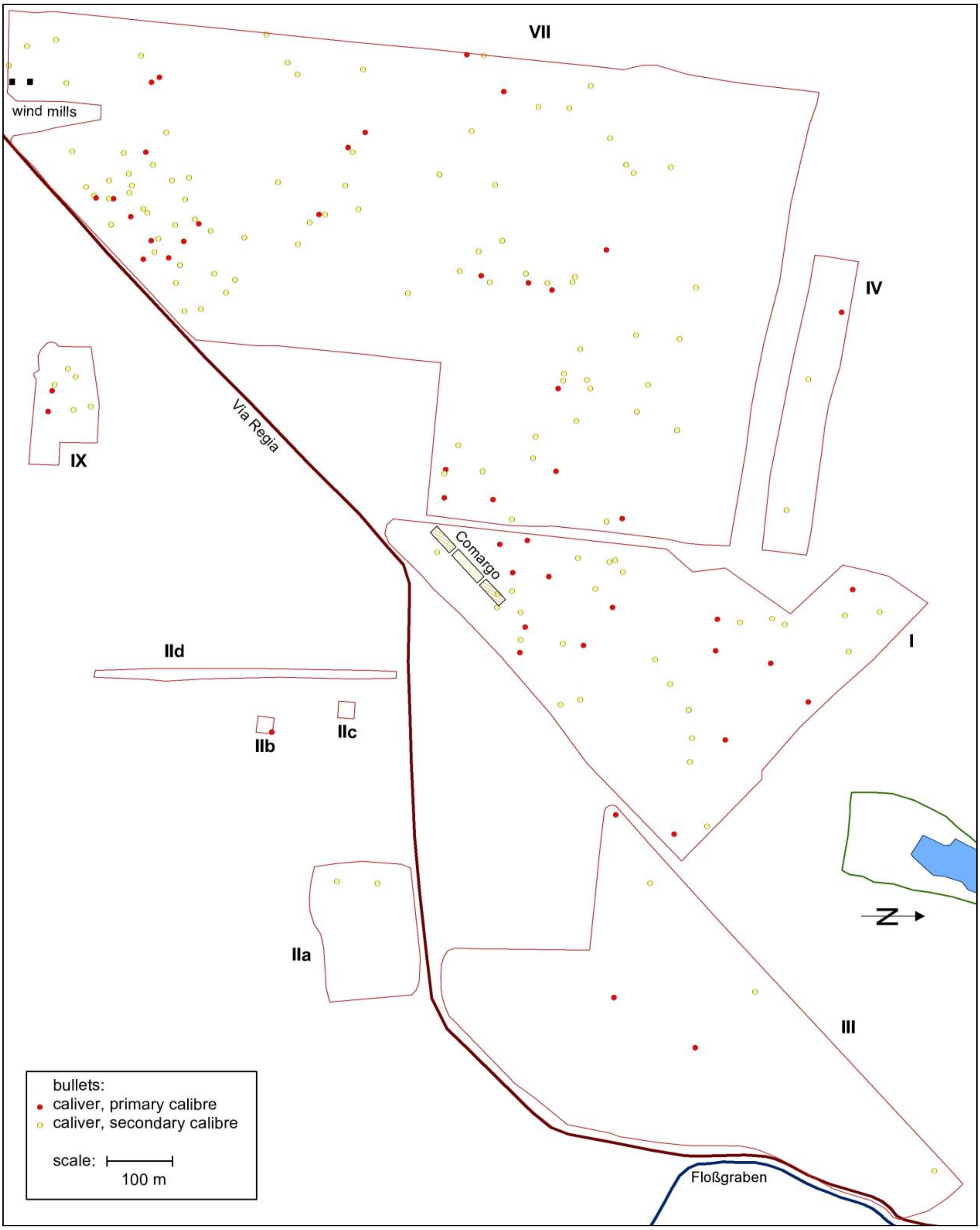
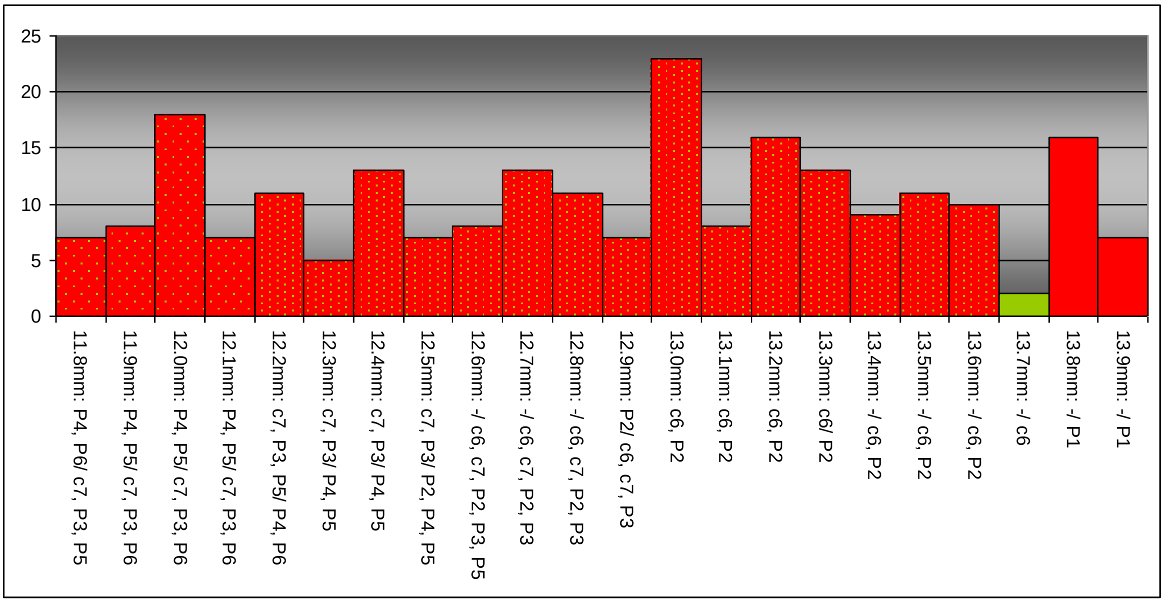


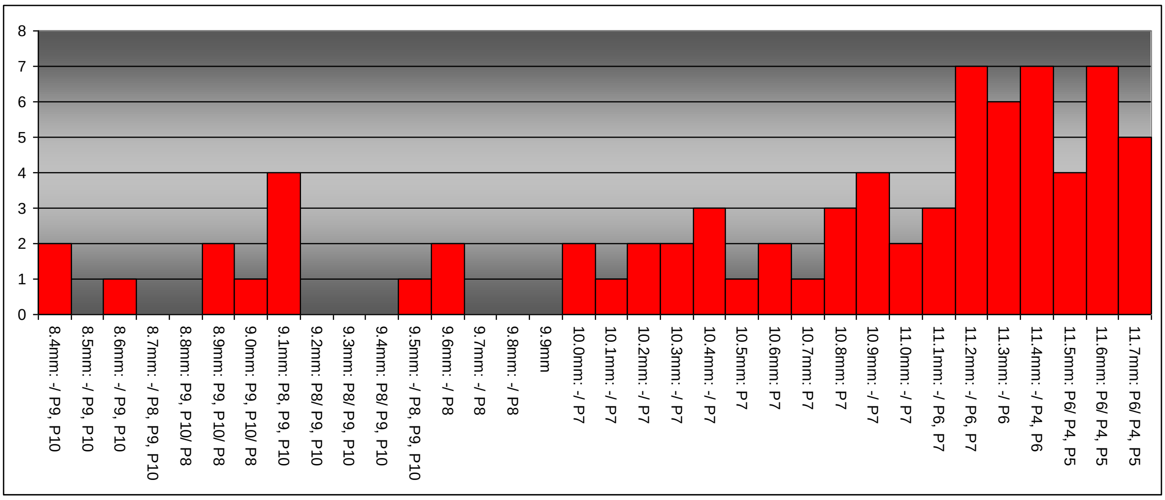
Figure 32: Distribution of possible caliver bullets s1 and s2: primary calibre – 14.4-14.8mm, secondary calibre – 14.0-14.3mm, 14.9-15.2mm and 15.00-16.50g.

Group 7 (11.8-13.9mm)



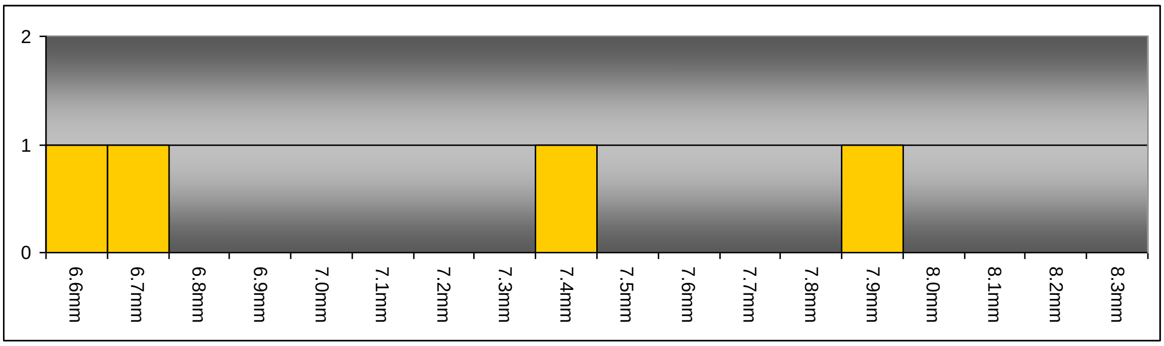
Caution is essential when interpreting the smaller calibres because there were very likely many more small calibre pistol and carbine models in service than suggested by the calibre distribution graph. Bullets with calibres between 11.8mm to 13.9mm can be allocated to various pistol models (P1 to P7) and the small calibre carbines c6 and c7 produced in Ferlach. Although these carbines were obsolete at the time of Lützen, many were remanufactured and still in service in the Imperial army (section 3.2.2.4). The carbine bullets have their secondary calibre at 11.8mm to 12.1mm and it is likely that there are actually more pistol than carbine bullets at this calibre, while between 12.2mm to 13.6mm both pistol and carbine bullets mix at an unknown ratio.

Group 8 (8.4-11.7mm)



There are only 75 bullets (3.7%) with a calibre between 8.4mm to 11.7mm. They can be allocated almost exclusively to pistols with the exception of a few possible rifle bullets. Small calibre pistols from Germany and Austria are thought to have been used more regularly by Imperial cavalry in the early 1630's. However, 11mm bullets from the Swedish ships *Vasa* and *Solen* (section 5.1.1.4) suggest that the Swedish army also used them, not just the larger calibre Dutch pistols, as one might have expected because of the good trade relations between Sweden and Holland.

Group 9 (6.6-8.3mm)



There are no standard military weapons known which could have fired bullets with a calibre of 8.3mm or below. This is reflected by the fact that only four bullets (0.2%) with a calibre of 6.6mm to 7.9mm were found at Lützen. They might not even relate to the battle, because small shot usually derive from hunting weapons.[477] If they are battle related, these bullets derive most likely from Swedish hunting rifles used by Gustav Adolf's *djurskyttar*. The low number of small calibre bullets makes it unlikely that buck shot, which ranges in size from 6.1mm to 9.1mm, was used at Lützen.[478]

5.1.1.4 European firearms in the first half of the 17th century: A summary

Although we know something about most standard weapons of the time from military handbooks, they simplify the actual conditions of military equipment production by suggesting there was standardization of weapons, while archaeological evidence reveals something different. At Lützen, the range of bullet diameters indicates many different models of firearms; this suggests a lack of standardisation of equipment in Thirty Years War armies. While the development of pistols and carbines during this period is still too complex, and vague to fully grasp, there is some evidence for understanding the basic musket evolution and development. There was a tendency toward standardized muskets, whether it was on purpose or simply the result of mass recruitment increasing the necessity to acquire thousands of new weapons in a short time, purchasing huge amounts of weapons

[477] Sivilich 2015, (230).
[478] Sivilich 2015, (265).

of a model recently in production is uncertain. To fully understand equipment evolution during the late 16th and early 17th century European armies much more closely dated archaeological evidence from battlefields, sieges and ship wrecks from different periods and locations, and in clearly defined contexts is necessary, to demonstrate the chronology of orders, production and delivery. Some archaeological evidence is already available as evidenced by the following examples.

***La Trinidad Valencera* 1588**

The bullets from the ship *La Trinidad Valencera*, sunk as part of the Spanish Armada, have calibres of 13mm and 19mm.[479] The 13mm bullets were for the arquebus, while the 19mm bullets very likely belonged to the 21.6mm Dutch musket (m1). The latter was probably the main musket model of the Spanish infantry as early as 1588.

Rakovnik 1620

The bullet calibre distribution graph from the Battle of Rakovnik, although measured in half millimetre and therefore difficult to compare, seems similar to the Lützen distribution (Fig. 33). The concentration between 15.5mm and 17.0mm suggests that the primary musket model was the m7 from Suhl. There were fewer m3 from Holland and m4 from Augsburg at 17.0mm to 18.5mm, and very few m1 from Holland at 19.0mm to 19.5mm. That said, however, there is one significant difference. While there is a concentration at 14.5mm to 15.5mm in Rakovnik, the Lützen calibre distribution graph has a gap between 14.5mm to 14.8mm. This gap represents only the primary calibre of caliver models s1 and s2 from Amsterdam, Nurnberg and Suhl. The huge amount of those diameter bullets at Rakovnik suggests that at least one side, the Leaguist, used a great many calivers and therefore deployed their infantry very likely according to Spanish tactics (section 3.3.3.2).

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[479] Martin 2001, 82. The calibres were rounded to full millimetre and therefore are difficult to evaluate.

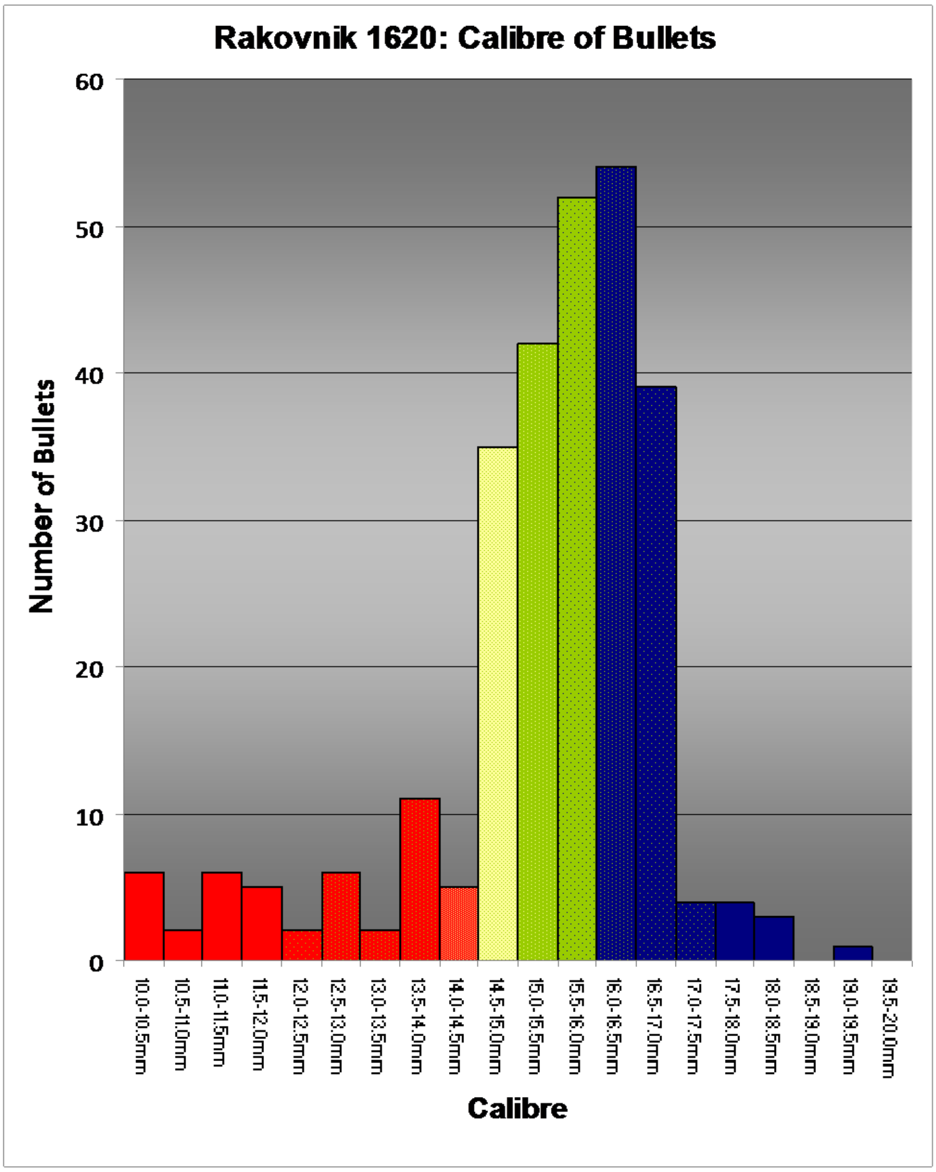

Figure 33: Rakovnik calibre graph. Caliver bullets – yellow.

Rozvadov 1621

A similar distribution occurs with the Rozvadov bullet calibre distribution graph, tending to confirm the use of calivers by Leaguist infantry during the early Thirty Years War (Fig. 34).

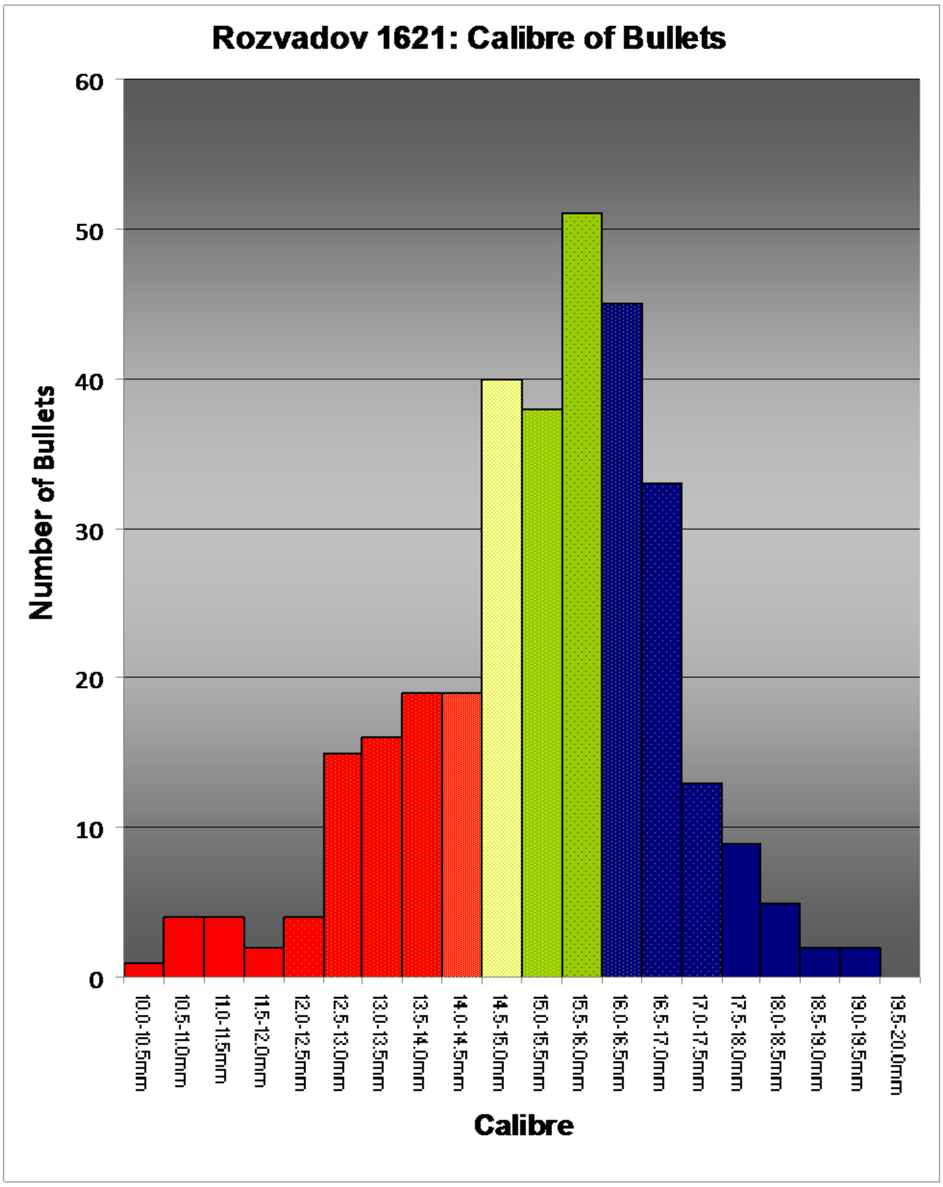

Figure 34: Rozvadov calibre graph.

Solen 1627

The Swedish warship *Solen* sank during the Battle of Oliwa near Gdansk (Danzig) on 28 November 1627.[480] 466 bullets were recovered from the ship, of which the dominant calibres were 21mm, 17mm (the most common), 14mm and 11mm. Without more precise data, these calibres are difficult to interpret. The 11mm examples match the bullets from *Vasa's* chest no. 14041 and probably represent ammunition for the P6 or P7 pistol models from Nurnberg. The 21mm bullets could have derived only from the old Dutch/Spanish (m1) musket, which matches the German account from Poland that states the Swedish army used heavy muskets in 1626 (section 3.2.3.2). The 17mm probably belong to several different musket models, including the older m7 from Suhl and the new M6 from Amsterdam. Most interesting are the 14mm bullets, which might have derived from the

[480] Mandzy 2012, 72.

new P1 pistol from Amsterdam, from an older carbine model, or even from the Swedish *rör*; this could indicate either the introduction of a new pistol model, or it could be seen as evidence that Gustav Adolf's military reforms of abolishing carbines and calivers had not yet progressed.

Vasa 1628

The German 1626 account from Poland about heavy muskets used by the Swedes is supported by the *Vasa* bullets, which clearly suggest that one of the main Swedish army's firearms in the 1620's was the 19.7mm musket (m3). This weapon was already out of date by 1628, possibly reflecting on the poor condition of the Swedish army and the incomplete military reform of Gustav Adolf's. In either case, sufficient data from the Swedish-Polish War (1621-1629) is required to fully understand firearm development in the Swedish army before it entered the Thirty Years War.

Stralsund 1628

At Stralsund 49 bullets were found in a trench and a mass grave from the siege. Of these, thirteen bullets (26.5%) were too deformed due to impact damage to measure their calibre. The remaining number, 36 bullets, were found in a very small area and are certainly not numerous enough to provide sufficient data for a relevant statistical evaluation of firearms used in the siege. They can, however, at least suggest an idea of the firearms in service during 1628. In context of the events, and their location, it is likely that most of the Stralsund bullets derive from the Imperial army, from the Stralsund militia, or from Monro's Scots, because the main action took place before the arrival of Danish and Swedish reinforcements. Twenty-two Stralsund bullets (61.1%) have diameters ranging from 16.3mm to 17.0mm with the peak at 16.7mm. The distribution of musket shot (Fig. 35) on the graph is similar to the Lützen calibre graph; although the Lützen peak is at 16.4mm. This difference suggests that musket bullets found at Stralsund derive from the same musket models used at Lützen, except that in Stralsund there seem to be fewer 17.5mm Suhl muskets (m7, M8), while there were probably more 17.7mm Amsterdam muskets (M6) and 18.3mm (M5) and 18.8mm (m4) muskets from Augsburg and Nurnberg. Four bullets (11.1%) with a calibre of 18.0mm to 18.3mm very likely derive from older 19.7mm Dutch muskets (m3). As a Protestant Hanseatic city, Stralsund had good relations with Holland. Therefore, those bullets and the bullets from the 17.7mm musket (M6) very likely belonged to the militia or, possibly, to the Scottish reinforcements.

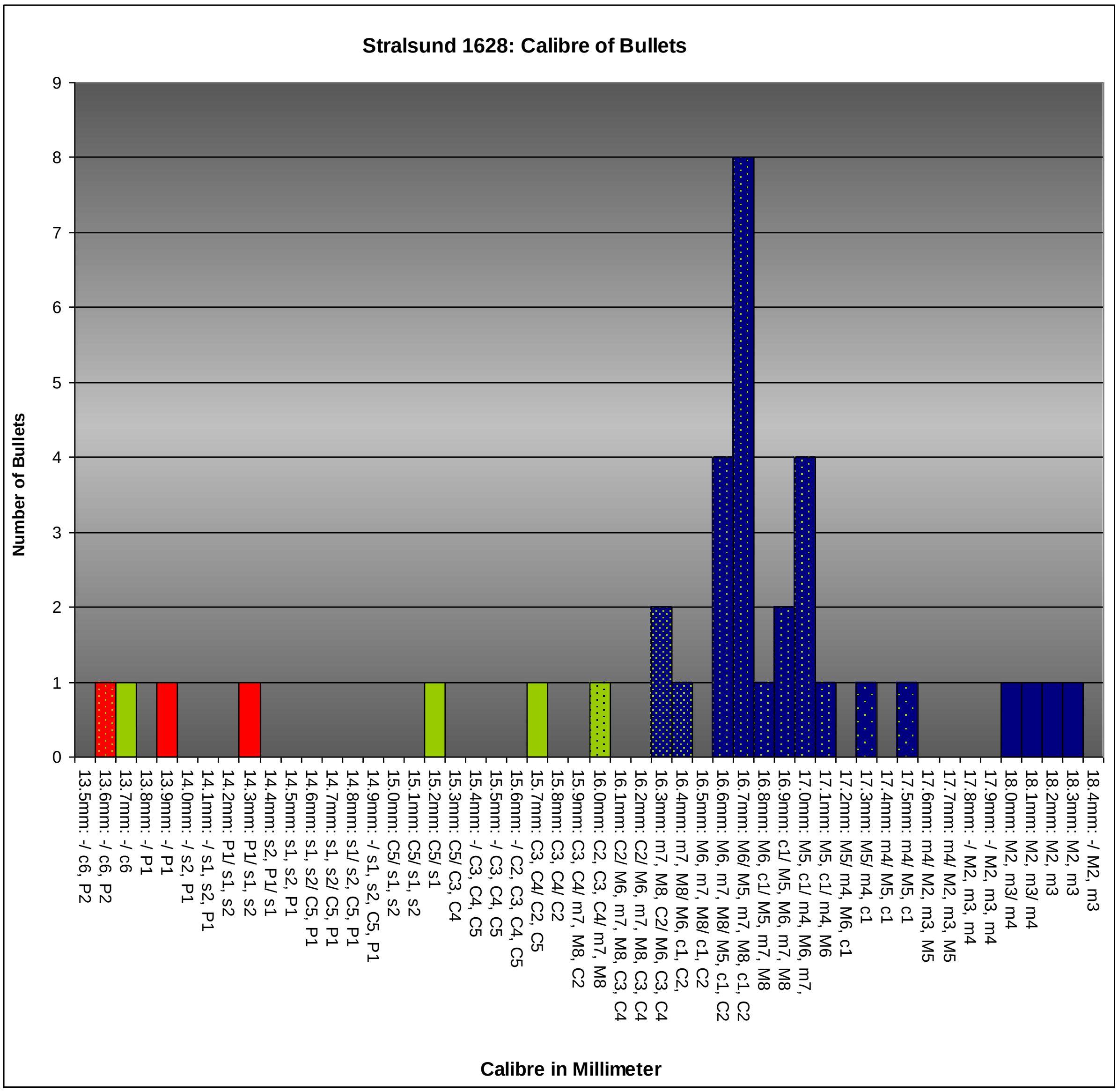

Figure 35: Stralsund calibre graph.

Batavia 1629

In contrast to the *Vasa*, bullets from the *Batavia* have a much greater variety, ranging from 10.9mm to 19.8mm in calibre, possibly because the *Batavia* was not a warship, but a merchant ship from the East India Company sailing to a colony (Fig. 36). Between 17.9mm and 18.7mm, the *Batavia* calibre graph is similar to Lützen with a drop at 17.9mm; these bullets derive from the older 19.7mm Dutch musket (m3). The very low number of bullets above 18.8mm for the obsolete 21.6mm Holland musket (m1) is similar to the Lützen calibre graph. The largest number of bullets, between 16.4mm and 17.8mm, derive mostly from German weapons, in particular the 18.8mm (m4) and 18.3mm (M5) muskets from Augsburg and Nurnberg with, possibly, a few 17.7mm muskets from Amsterdam (M6). This is surprising to find on a Dutch ship, because Holland, as one of the largest arms manufacturers in Europe, should have had the capability to equip all their ships with their own muskets. It may be that they preferred to equip their forces with their own weaponry whiles sending foreign weapons to their colonies. The peak at 14.0mm, where no known weapon has the primary calibre, clearly shows that there were other weapons unknown to us, making an interpretation of smaller calibre bullets difficult.

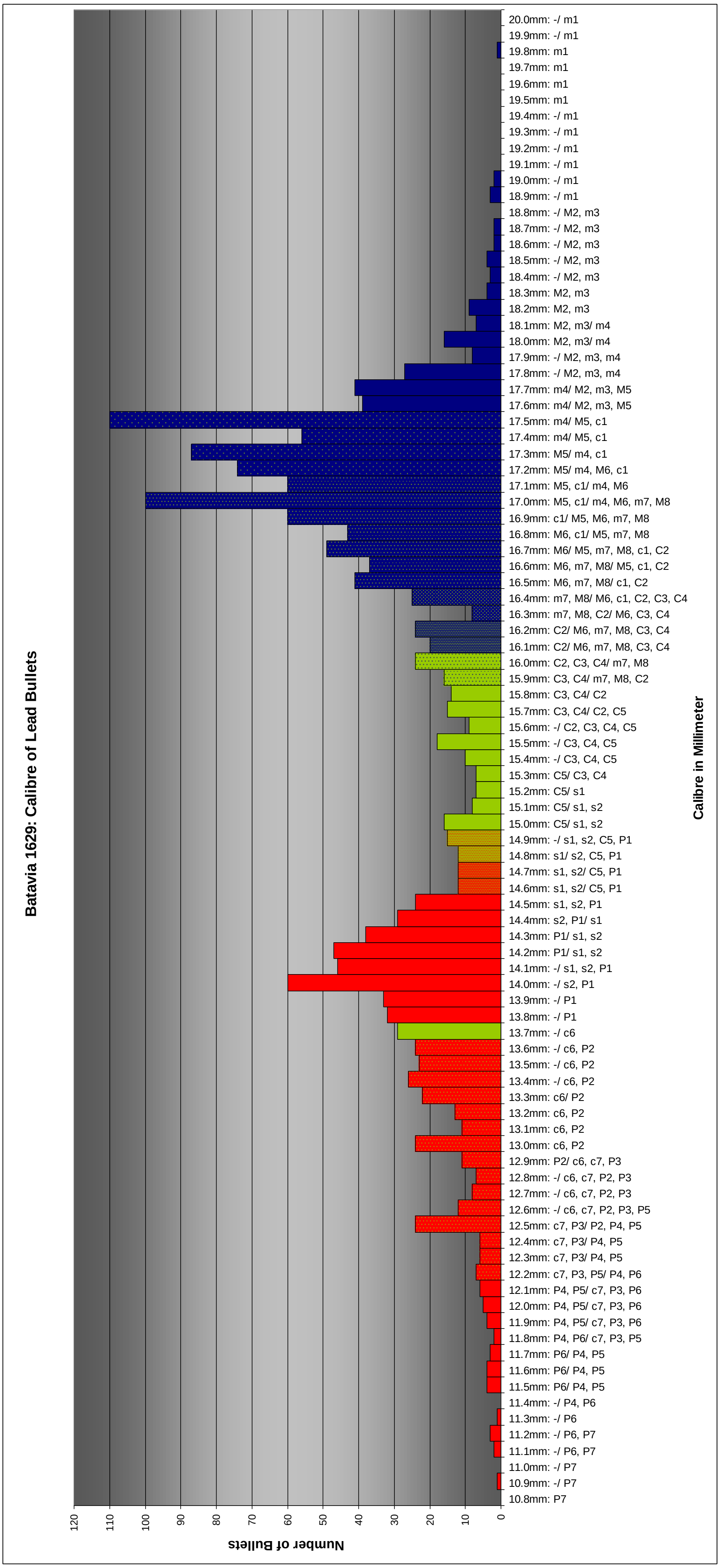

Figure 36: *Batavia* calibre graph.

Lützen 1632

The standard muskets of both armies at Lützen were the 17.7mm Amsterdam (M6) musket and the Suhl (m7, M8) 17.5mm muskets with which approximately 75% of the musketeers were equipped. The Imperial army had a low number of 18.8mm (m4) and 18.3mm (M5) muskets from Augsburg and Nurnberg. In comparison to Stralsund four years before Lützen, the muskets in service during 1632 had not changed much in the Imperial army. The Swedish army seems to have retained a small number of old 19.7mm muskets (m3) while in the process of equipping their soldiers with new 19.7mm muskets (M2). A very few old 21.6mm muskets (m1) were still in service as well. Since only 25% of the Swedish musketeers were equipped with these three models, most of them probably carried the new 19.7mm musket (M2). It seems that the Swedish army's weaponry changed substantially between 1628 and 1632 and became similar to that of the Imperial army. It is also evidence that the assumption by Delbrück and others, that the Swedish army was superior because their infantry was equipped completely with light muskets that could be fired without a rest, is wrong.[481]

Edgehill 1642

At Edgehill, 1096 bullets were collected from the battlefield, of which 621 bullets were either case shot or too deformed to measure their calibre.[482] The remaining 475 bullets create similar concentrations on the calibre graph as musket calibres at Lützen. At least 155 bullets (32.6%) have a calibre of 18.6mm to 19.6mm, with a peak at 19.0mm (Fig. 37). They create the typical indicator of one weapon model. This suggestion is supported by the fact that this group of bullets has a calibre divergence of 1.1mm, which is within the accepted divergence. The mathematically calculated ideal bullet calibre of this group is approximately 19.4mm, 0.2mm below the largest bullets of 19.6mm, with a primary calibre from 18.9mm to 19.2mm (95 bullets). Therefore, the bullets are very likely 11 bore. This calibre musket was not used at Lützen or Stralsund. Some of these bullets might derive from the 20.8mm snaphance carbine used by the New Model Army's cavalry, which can be seen in the Littlecote collection,[483] but it is unlikely that this carbine had reached the army by 1642 and the large quantity of these calibre bullets suggests that most derive from a musket model used by both sides. The model in question is very likely the 9 bore (20.4mm) musket (M9), which is mentioned only by William Eldred as being used in the

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[481] Lloyd 1908, 112, Deuticke 1917, 67 and Delbrück 2008, 224, followed by Schwarz 1977, 217. See also Roberts 1967a, 69.
[482] Foard 2009, 122.
[483] Foard 2008, fig. 34.

1620's.[484] At the present time there is no evidence that this weapon was used on the continent and it is probably a genuine English musket. An 18.9mm bullet found during an excavation in Derry in Ireland, which derives probably from the 1649 siege, also suggests that an English 9 bore (20.4mm) musket was one of the main weapons in the English Civil War.[485]

The smaller concentration (45 bullets/9.5%) on the calibre graph at 17.7mm to 18.6mm almost certainly derives from the 19.7mm Amsterdam muskets; the gap at 17.7mm clearly separates this cluster from lower calibre weapons. Although it is possible that a few old muskets (m3) were still in use in 1642, this model had been out of date for over two decades. It is more likely that most of these bullets derive from the newer model M2, which first saw service at Lützen, but was only recently out of date by Edgehill. Nevertheless, there seem to be very few outdated weapons in service at Edgehill. The two bullets (0.4%) with a calibre of 20.2mm and 20.5mm were probably fired by the old 21.6mm Dutch musket (m1), a new weapon during the 1588 Spanish Armada, and it seems possible that those muskets were still stored as war booty in an armoury only to find service 54 years later at Edgehill.[486] However, two bullets are not enough to be certain that they are related to the battle.

[484] Eldred (1646, 96) relates to the bullet calibre of 11 bore, which should have been fired by a 9 bore musket.
[485] Although Logue/O'Neill (2006, 60) suggest that this bullet derives from the siege in 1689, it is almost certain that the bullet is 11 bore and belonged to the 9 bore weapon mentioned by Eldred, because the calibre lies exactly between 10 and 12 bore.
[486] In particular the royalist army was supplied with old weapons from armouries (Foard 2008, 220). However, even new supply from the continent was far from being of a standard type, as Sir Ralph Hopton complained in 1643 (Parker 1995, 152, Ferguson 2013, 165).

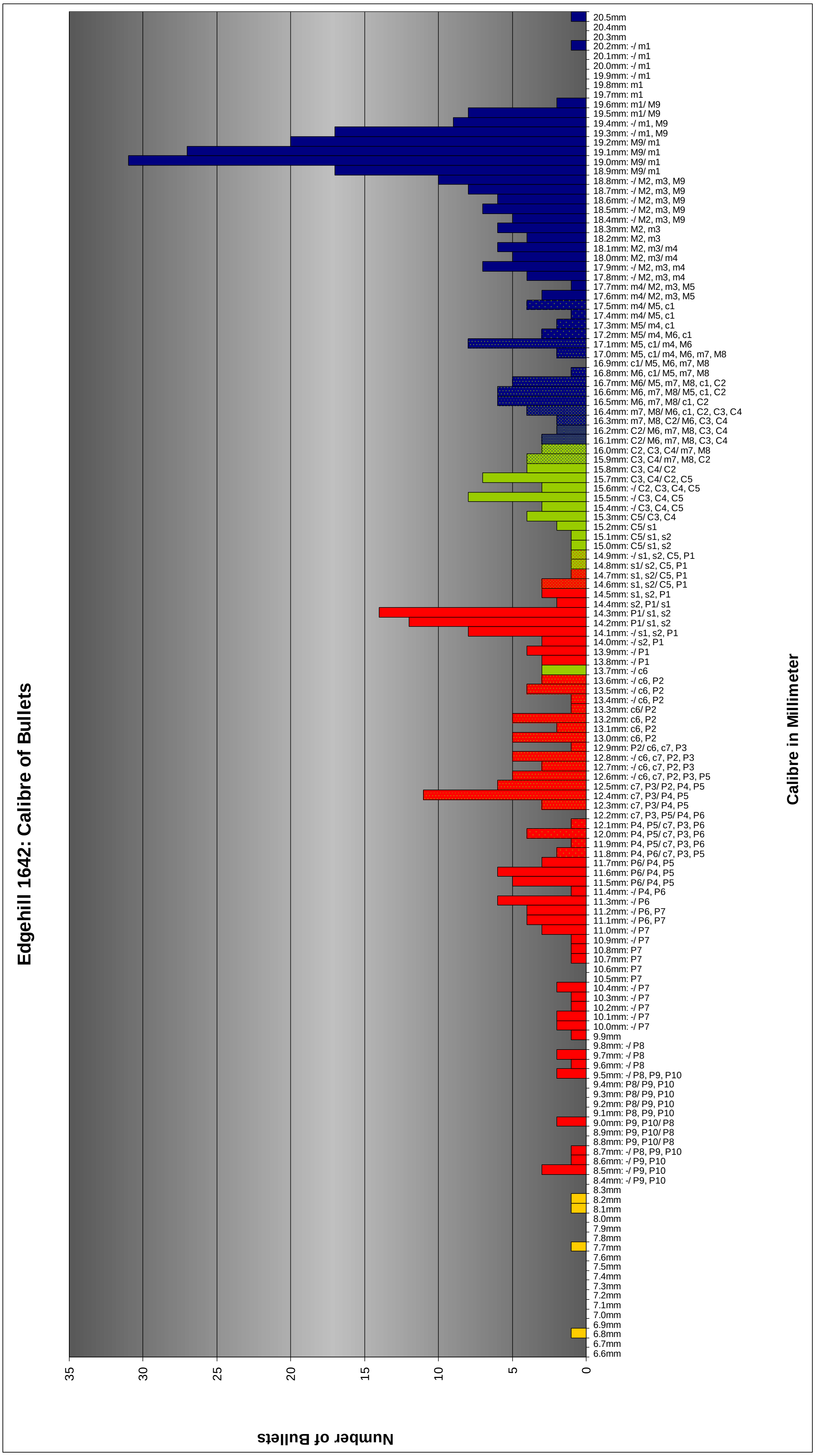

Figure 37: Edgehill calibre graph.

There are three distinct concentrations on the Edgehill calibre graph below the 19.7mm musket. These closely match the primary calibre of five different musket models. Nine bullets (1.9%) at 17.4mm to 17.7mm belong to the 18.8mm Augsburg musket (m4); fifteen bullets (3.2%) at 17.0mm to 17.3mm belong to the 18.3mm Augsburg/Nurnberg musket (M5); 24 bullets (5.1%) at 16.3mm to 16.8mm belong to the 17.7mm Amsterdam (M6) and the 17.5mm Suhl muskets (m7, M8). These five musket models were the main firearms of the Imperial and Swedish armies at Lützen. It is not coincidental that only 10.2% of the Edgehill bullets derive from these weapons as these musket models were obsolete by at least ten years. In addition, four of the five models were produced in Germany, which had a great demand for weapons during the Thirty Years War that was being met by southern German arms manufactures for the German theatre, although some weapons probably came to England with returning English and Scottish veterans of the Imperial and Swedish armies. However, many 24g bullets were found in the 31 August 1644 Battle of Tywardreath/Cornwall, indicating that Dutch M6 and German M8 muskets were widely distributed in some English Civil War regiments.[487]

The most distinct differences between the Lützen and Edgehill bullet distributions are the three conspicuous concentrations of pistol calibres at Edgehill. The reason is that standardisation and development of military pistols had started in the 1630's (section 3.2.2.5). While at Lützen, all kinds of pistols were in service, the English cavalry was equipped largely with three models: The 20 bore (P1) and the 35 bore (P3, P4) pistols, which can be seen at the 13.5mm to 14.7mm and at 12.3mm to 12.8mm peaks.

[487] Ferguson 2013, 167. See section 5.1.2.1 for an interpretation of bullet weight.

5.1.2 Firearms ammunition features and distribution patterns

While the calibre of firearms ammunition provides for an understanding of weapon types and models used in a battle, firearms ammunition features can add valuable interpretive information to the battlefield distribution patterns. Lead and tin are soft metals leaving many imprints on their surface, but some imprints, such as bite marks and others not entirely understood, are too infrequent to provide any clear distribution pattern.[488] The most important features supporting interpretation of bullet distributions on the calibre graph or the battlefield are firing evidence, intact casting sprues and modified ammunition. Since many fired, and most impacted, bullets are too deformed to measure their diameter, weight has to be introduced as means to enable an interpretation of firing evidence in the context of calibre.

Plate 2: Undeformed bullets from the Lützen.

5.1.2.1 Introducing weight for calibre analysis

Although weight is not the first choice for identifying calibres (section 5.1.1.2), there is obviously a connection between a bullet's diameter and weight. The different weights bullets with identical calibre can have can be calculated according to sample bullets from

[488] Bite marks might come from bullets chewed by animals, especially pigs after the battle, or by soldiers holding the bullet in the mouth ready for loading. Lavater wrote in 1644 (85-86) that very experienced musketeers filled their mouths full of bullets before battle; they took the gunpowder with their hands out of a pocket, poured it into the barrel, spit the bullet from their mouth directly into the barrel, stamped the musket butt twice on the ground, attached the match, and fired the musket without a rest (Engerisser 2007, 555). It is also suggested that some soldiers chewed bullets to promote salivation (Foard 2008, 152, Sivilich 2009, 92-93).

the battlefield if their number is large enough and therefore representative. This sample population must not be deformed, have no sprues, and only be made of lead. The result is a minimum and maximum weight for every calibre. There are two possible uses of this method:

1. Exclusion: To allocate bullets to a specific weapon model or type by calibre according bullet weight with a certain degree of probability, the maximum weight of the smallest bullet and the minimum weight of the largest bullet determine the lower and upper weight limit of this group of bullets. This method is effective, particularly when including deformed musket bullets, because the sample of undeformed bullets is large enough to provide representative data, and the upper weight limit is irrelevant as no bullets are heavier than musket bullets. Table 18 presents this information in easily compared form.
2. Inclusion: If the goal is to rule something out, for example, if the ammunition of a specific weapon type has no sprues (section 5.1.2.4), the minimum weight of the smallest bullet and the maximum weight of the largest bullet determine the lower and upper weight limit of this group of bullets.

#C	#B	#wmin	#wmax	#C	#B	#wmin	#wmax
6.6	1	1.50	1.50	14.6	2	15.00	17.25
6.7	1	1.75	1.75	14.7	8	15.75	18.50
7.4	1	1.75	1.75	14.8	10	15.25	18.00
7.9	1	2.50	2.50	14.9	4	17.25	19.00
8.4	1	3.00	3.00	15.0	6	17.00	20.75
8.9	1	3.75	3.75	15.1	12	16.50	19.75
9.0	1	4.25	4.25	15.2	12	17.75	20.50
9.1	2	4.00	4.25	15.3	6	16.75	20.00
9.6	1	4.50	4.50	15.4	13	17.25	21.25
10.0	1	5.00	5.00	15.5	18	18.00	21.25
10.1	1	5.25	5.25	15.6	27	17.75	21.75
10.2	1	4.00	4.00	15.7	28	18.25	22.00
10.4	2	6.00	6.25	15.8	22	18.75	22.50
10.6	2	6.00	6.25	15.9	22	18.50	23.00
10.8	1	7.00	7.00	16.0	55	18.50	24.00
10.9	3	6.50	9.25	16.1	36	19.75	24.00
11.0	2	7.25	7.50	16.2	78	20.00	25.00
11.1	1	7.75	7.75	16.3	72	20.50	25.50
11.2	3	7.25	8.50	16.4	190	19.50	26.00
11.3	1	8.00	8.00	16.5	96	22.25	25.25
11.4	1	8.50	8.50	16.6	156	21.00	27.50
11.6	2	7.50	8.00	16.7	128	22.00	26.75
11.7	2	8.25	8.50	16.8	120	22.75	28.50
11.8	4	8.00	9.50	16.9	51	21.50	27.75
11.9	3	8.25	9.50	17.0	65	22.75	27.75
12.0	6	8.25	11.00	17.1	24	22.50	27.50
12.1	3	9.00	9.50	17.2	26	23.50	28.50
12.2	6	8.00	10.00	17.3	15	25.25	29.50
12.3	2	8.75	9.75	17.4	21	23.00	30.00
12.4	5	10.25	12.00	17.5	17	25.50	32.75
12.5	2	9.75	10.50	17.6	19	25.25	20.25
12.6	3	9.00	11.00	17.7	13	24.75	31.50
12.7	2	9.25	11.25	17.8	16	26.50	31.50
12.8	3	10.50	11.50	17.9	2	24.00	30.25
12.9	1	11.75	11.75	18.0	10	29.25	32.50
13.0	8	10.00	12.50	18.1	8	29.75	32.75
13.1	2	11.25	12.50	18.2	12	29.75	33.25
13.2	3	10.50	12.50	18.3	5	32.25	34.25
13.3	3	12.25	13.00	18.4	10	30.50	34.50
13.4	4	11.00	13.50	18.5	7	30.00	35.25
13.5	5	11.75	13.50	18.6	8	31.50	36.25
13.6	4	13.00	13.75	18.7	6	29.25	36.50
13.7	1	13.75	13.75	18.8	7	32.50	37.00
13.8	6	13.00	14.50	18.9	1	35.50	35.50
13.9	4	13.00	14.25	19.0	4	33.25	36.50
14.0	6	14.00	15.50	19.2	2	37.00	39.00
14.1	2	13.00	13.75	19.3	1	39.75	39.75
14.2	9	13.25	15.75	19.4	1	40.25	40.25
14.3	3	14.25	16.25	19.5	1	40.50	40.50
14.4	2	17.00	17.25	19.8	1	41.75	41.75
14.5	5	16.25	17.00				

Table 18: Bullet calibre and weight. C: calibre, B: number of bullets, wmin: lightest bullet, wmax: heaviest bullet.

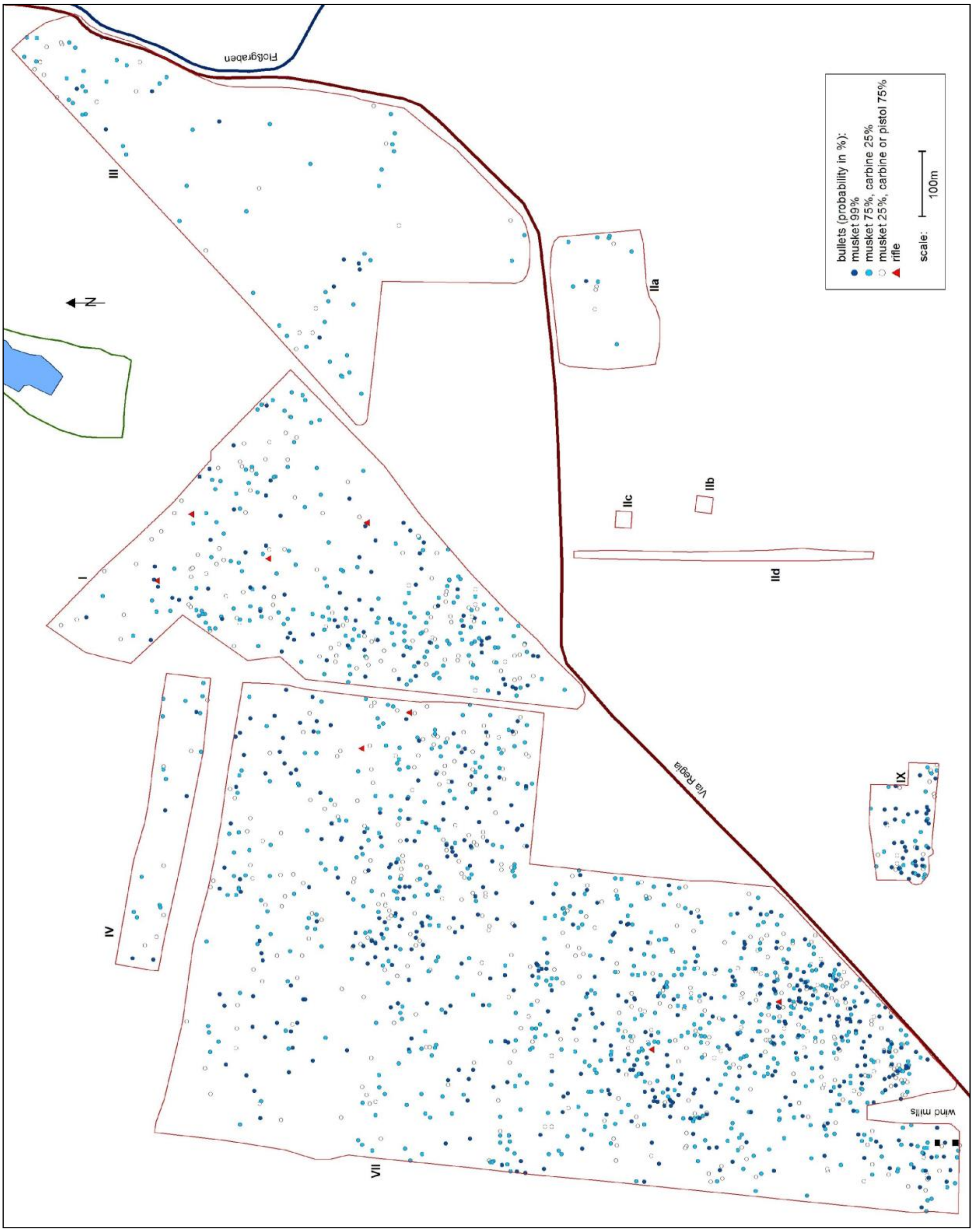

Figure 38: Distribution of musket and rifle bullets with calibres as follows: 99% musket – 16.8-19.9mm or 28.75-41.75g, 75% musket – 16.3-16.7mm or 24.25-28.50g, 25% musket – 15.9-16.2mm or 18.50-24.00g, rifle – 6.6-7.9mm or 1.50-2.75g.

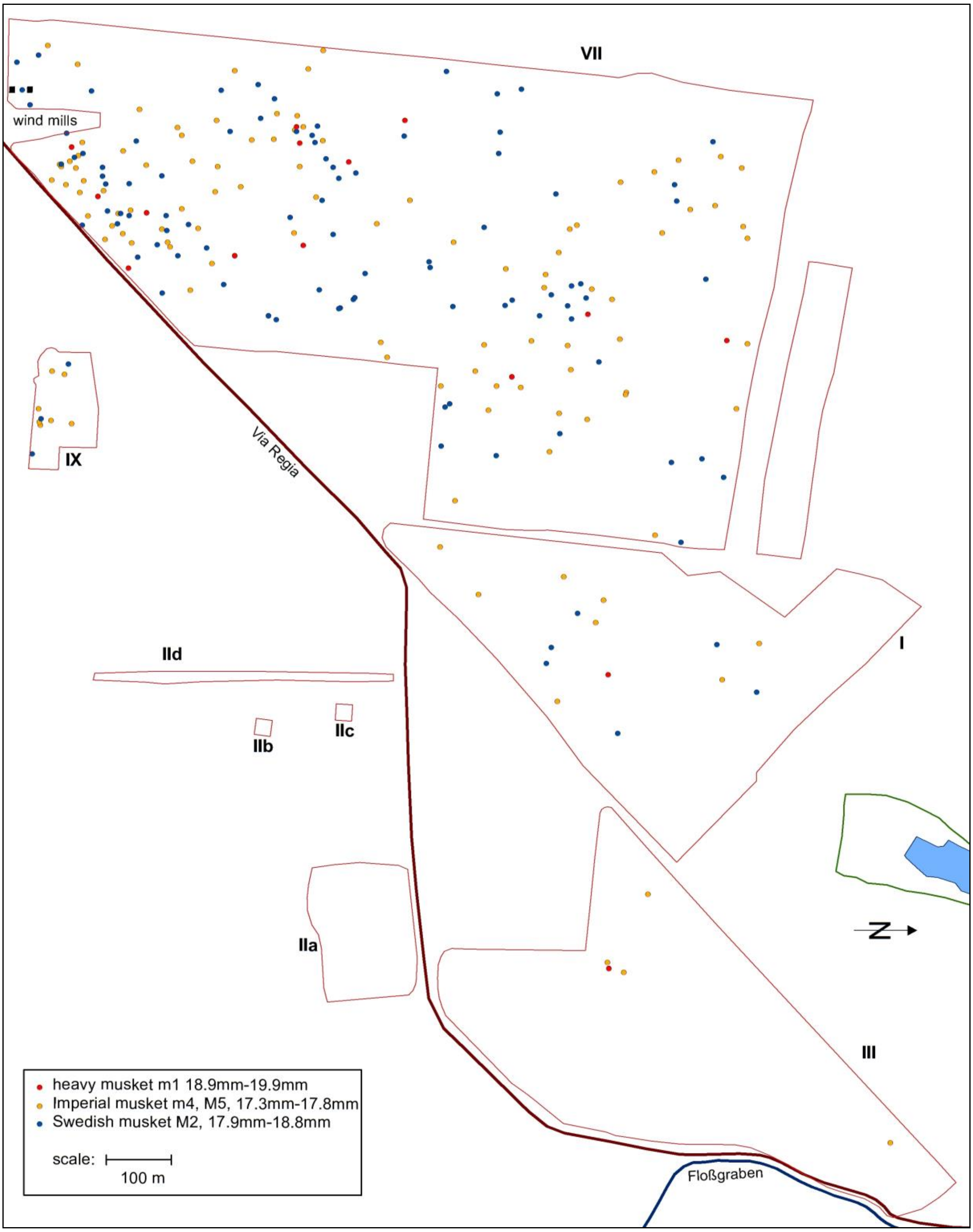

Figure 39: Distribution of musket bullets from the German/Imperial 13 bore (m4) and 14 bore (M5) muskets with calibres of 17.3-17.8mm, and the Dutch/Swedish 8 bore (m1) muskets with calibres of 18.9-19.9mm or 37.25-41.75g, and 10 bore (M2, m3) muskets with calibres of 17.9-18.8mm.

5.1.2.2 Distribution of firearms ammunition on the Lützen battlefield: An introduction

When evaluating small finds distribution patterns in general, the recovery rate, in comparison to initially deposited artefacts, must be considered. At Lützen the archaeological recovery rate was approximately 10% and a little higher for large calibre bullets. Another important fact is that Lützen was a static battle with overlapping small finds concentrations from different events. This makes small groups of finds almost undetectable because a concentration of less than twenty initially deposited artefacts is reduced to two actually found by the archaeologist or because a low density artefact scatter is mixed with artefacts from other events, making it difficult or impossible to detect. This section provides a general guideline for the interpretation of small finds distribution patterns, which will be discussed in detail in Chapter Eight.

The goal of interpreting bullet distribution patterns is to identify combat areas of single units. However, with so many different weapon models in use, and the overlapping calibres, it is extremely difficult to create clear ammunition patterning ascribed to a single weapon model or even a single weapon type. Distribution patterns relating musket and rifle bullets used by infantry and pistol and carbine bullets used by cavalry will be discussed in two separate maps over the course of this thesis. The latter two weapon types are combined because there are too many calibre intersections between them.

Infantry

Considering the small finds recovery rate, the long duration of the battle, and that Lützen was a static battle, it is not surprising that musket bullets distribution does not create a clearly visible pattern (Fig. 38). However, some general observations can be made. The highest bullet density representing the Imperial main battle line is in the southern part of field VII and the western part of field I. The area west and north of this line consists of high and low density areas, which are in the Imperial army's rear. The low density areas in fields II and III, and in the eastern part of field I, are skirmishing areas in front of the Imperial army. The musket bullets in the southwest half of field VII form linear patterns parallel to the Via Regia representing infantry battle lines, although they are somewhat obscured by intersecting events. The lines are slightly more apparent if the bullets from the Swedish M2 and m3 and the Imperial m4 and M5 muskets are considered. Bullets from these four musket types are concentrated on field VII, in particular the western part, and thin out eastwards (Fig. 39). Interestingly enough, the two linear bullet concentrations of these four weapon models also contain most of the heavy Dutch (m1) out-of-date model bullets.

Cavalry

Surprisingly, the densest pistol/carbine bullet concentration is in the southern part of field VII, the same area as the densest musket bullet concentration at the windmills, suggesting that the most intense action took place there (Fig. 40). Another surprise is the moderate pistol/carbine bullet concentration on field IX, south of the Via Regia, where no cavalry action was thought to have happened. The few pistol/carbine bullets on fields II and III support the interpretation of a skirmishing area here due to the low density musket bullet concentration. Altogether, pistol/carbine bullet concentrations appear to be less linear than musket bullets; if they are linear, then they follow a direction at a 90° angle to the Via Regia. Since this orientation is also at a right angle to the Imperial battle line, the bullets very likely represents a cavalry charge. This can be seen best by the distribution of the German/Imperial small calibre pistols P7 to P10, which form a linear concentration in the eastern part of field I (Fig. 41).

Figure 40: Distribution of pistol and carbine bullets with calibres as follows: pistol – 8.4-11.7mm or 3.00-7.75g and 13.8-14.5mm or 14.00-14.75g, pistol or carbine – 11.8-13.6mm or 8.00-13.75g and 14.6-14.9mm or 15.00-18.75g, carbine – 15.0-15.8mm and 13.7mm, 75% carbine – 15.9-16.2mm.

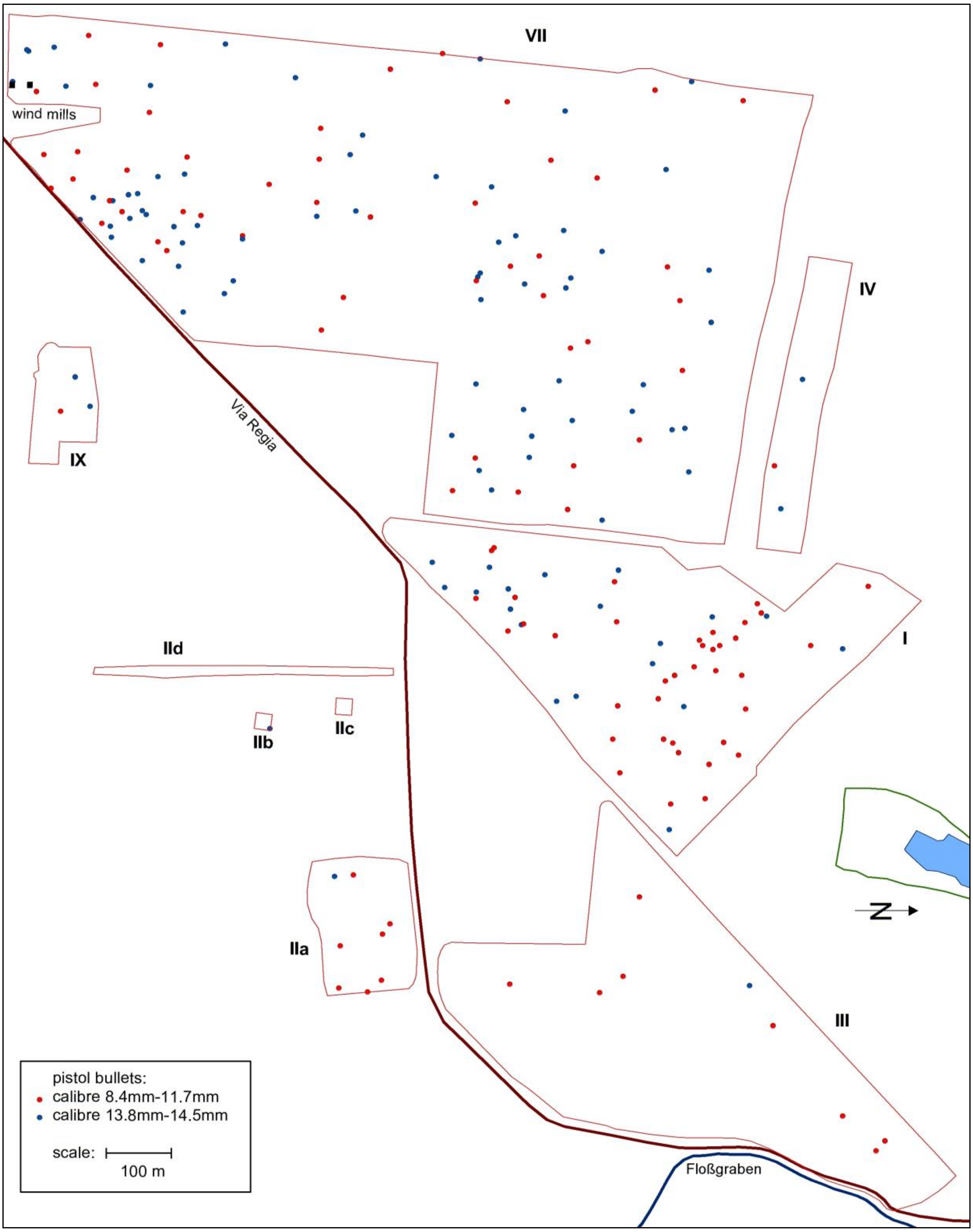

Figure 41: Distribution of pistol bullets from the German/Imperial small calibre pistols (P7-P10) with calibres of 8.4-11.7mm or 3.00-7.75g, and the Dutch/Swedish 20 bore (P1) pistol with calibres of 13.8-14.5mm or 14.00-14.75g.

5.1.2.3 Firing evidence

There are two groups of firing evidence: markings caused by the firing process and impact damage. There are no markings from ramrods on the Lützen bullets because the ramrods were typically wooden during the Thirty Years War.[489]

Experiments conducted in the USA and the UK whilst attempting to understand markings caused by the firing process revealed banding is the most significant feature (Plate 3). A flattened band forms around the circumference of the bullet by compression due to the gunpowder explosion.[490] The various degrees of banding range from very distinct around the whole bullet, to only barely visible on one side. At Lützen 545 bullets (20%) show a flattened band. There seems to be a slight increase of banded bullets toward the larger calibres, but groups of fewer than 30 bullets seem not to be representative (Fig. 42).

286 bullets (10%) have markings from the gunpowder combustion (Plate 4). These are not as distinctive as banding and it is possible that some have already corroded away.[491] A higher percentage of larger calibre bullets have markings from burning gunpowder explosion; this can be explained by the larger amount of gunpowder used in larger calibre firearms (Fig. 42).[492]

Plate 3: Firing evidence: Flattened band (Inv.-No. 2007:1478, Inv.-No. 2007:2622, 2007:2781).
(image has been removed due to copyright restrictions)

[489] Engerisser 2007, 551, Foard 2008, 88 and 155. This is confirmed by missing ramming rod markings on the bullets from Edgehill (Foard 2008, 158).
[490] Foard 2008, 157.
[491] Foard 2008, 160-161.
[492] If the quality of the gunpowder was high enough, an amount of half the bullets weight was used; on lower quality gunpowder the amount was up to 2/3 the bullets weight (Engerisser 2007, 553).

Lead and tin bullets deform when impacting hard materials such as stone, metal, bone or wood. The degree and nature of impact damage depends on many different factors, including bullet velocity, angle of impact, the shape and hardness of the material and its ability to bend, as iron, or break, as bone or wood. Unlike firing evidence, there is little precisely known about the degree and nature of impact damage and for interpreting what object a bullet could have hit. A great deal more analytical experimentation and data from different battlefields would be required to enable accurate interpreting of impact damage.[493] Even if comparable data from numerous battlefields were available, it is very likely that every battlefield have its own signature of impact damage according to the nature of battle, ground condition, vegetation etc.[494] It is, therefore, the intention here to provide a general analysis of the degree of impact damage to aid the interpretation of bullet distributions on the battlefield. This is particularly important where a volley might have hit a battle line.

Plate 4: Firing evidence: Gunpowder explosion marks on the lower left side (Inv.-No. 1946:16:1425).
(image has been removed due to copyright restrictions)

The ratio of the number of impacted to non-impacted bullets depends partially on ground condition, vegetation and the existence of houses and walls. For the Lützen battlefield, there are no contemporary reports mentioning walls, trees, or other vegetation such as hedges within the surveyed area. In November 1632 the field crop was already harvested leaving almost no vegetation on the battlefield. The only structures near the surveyed area which could have been responsible for causing bullet impact damage were three windmills and the fortifications erected by Wallenstein's two batteries.

[493] Foard 2008, 164-169.
[494] For impact damage see also Sivilich 2009, 88-91, Sivilich 2015. The Sivilich sample bullets are from a very different kind of battle with more trees and the absence of body armour.

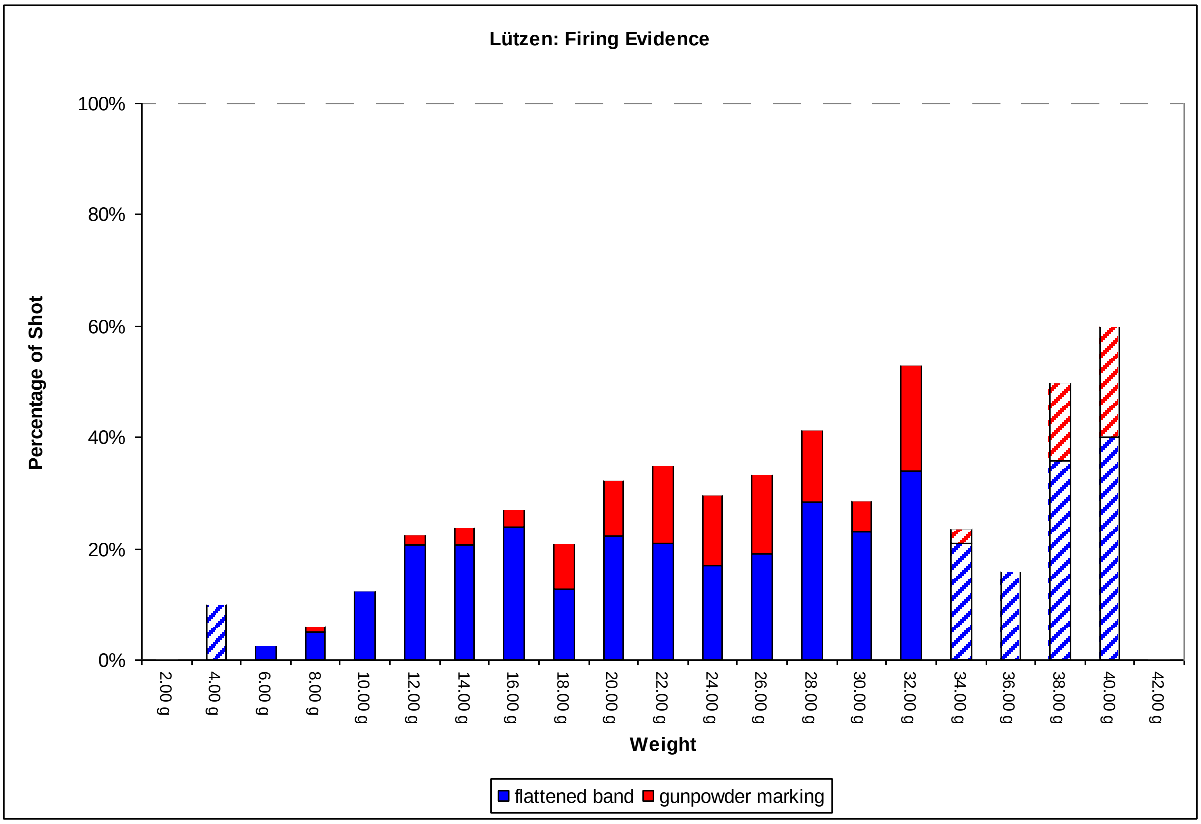

Figure 42: Distribution of firing evidence in percent: flattened band and gunpowder markings. The hatched bars have a too few bullets to be representative.

Plate 5: Bullet with severe impact damage caused by a hard, flat surface (Inv.-No. 1946:16:4476).
(image has been removed due to copyright restrictions)

At the present time, soil on the battlefield is not particularly stony and there was no significant difference between surveyed areas. The field conditions could have changed over time as all surveyed areas were in agricultural use from the Thirty Years War until the present. Stone removal from fields is a common practice, in particular with the 20th century mechanisation. Six m² of soil were sieved to a depth of 0.6m in the park of Lützen, which was created in the late 19th century and therefore was never ploughed by heavy machines. All stones were smaller than 1cm; these could not have caused massive impact damage on bullets.

In 2011 a 340m long and 4m wide trial trench was dug on the battlefield to a depth of 0.5m to 1.0m. It revealed three large stones of approximately 0.5m diameter and a few stones of approximately 0.1m to 0.2m diameter, slightly more than could be seen on the surface and which probably depicts the situation in 1632. Stones together cover less than 2% of the ground, which theoretically, should also be the percentage of bullets having hit stones, therefore, it may assumed that the battlefield was not much stonier in 1632 than it is at the present time and that most impact damage on bullets is battle related i.e. bullets hit soldiers, their weapons, armour or equipment, guns etc.

Presently, there is no practical objective method to classify impact damage in a way which would show any significant distribution pattern on a battlefield. Impact damage was subjectively classified according to the degree of deformation in ten percent steps from 10% (impact damage barely visible) to 90% (flat bullet showing no sign of its former shape); at 50% the shape of half the bullet is still intact (Table 19). It was hoped that this classification would show any distribution patterns, such as a battle line. This notion presumed that most heavily impacted bullets hit soldiers at point-blank range, in particular the armour of pikemen and cuirassiers.

light impact damage			moderate impact damage			severe impact damage		
10%	20%	30%	40%	50%	60%	70%	80%	90%
93	141	150	146	98	73	68	71	81

Table 19: Number of bullets with impact damage according to their degree of deformation.

At Lützen 921 bullets (33.5%) show various degrees of impact damage. Because of the subjective classification, and because most groups contain too few bullets to show any significant distribution patterns, distribution will be discussed according to three main groupings: light, moderate and severe impact damage. Many bullets have either a type of firing evidence or impact damage, but some have a combination of both features, demonstrating that the firing process does not necessarily create firing evidence (Fig. 43). Likewise a bullet landing on soft ground can show no sign of impact damage. Therefore, impact damage or firing evidence only demonstrates that a bullet was fired, but their absence does not prove that it was not.[495]

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[495] Foard 2008, 156.

The distribution patterns of bullets with impact damage can help to understand their significance. Musket bullets with severe or moderate impact damage seem concentrated on the Imperial centre's infantry battle line; they appear to have hit the armour of pikemen at point-blank range (Fig. 44). Bullets with light impact damage are distributed more widely on the battlefield. The reason for so few bullets with heavy or moderate impact damage on the Imperial left wing, where they were expected to have hit cuirassier armour, might be that musketeers tended to fire on charging cavalry at longer distances to prevent being overrun before they could deliver at least one volley or; that they were trying to aim at the horses so as to dismount the horsemen. Pistol/carbine bullets with severe impact damage are distributed over the whole battlefield with some even found in the skirmish area on field III. The distribution patterns of bullets with and without impact damage are visualised and interpreted in two separate maps.

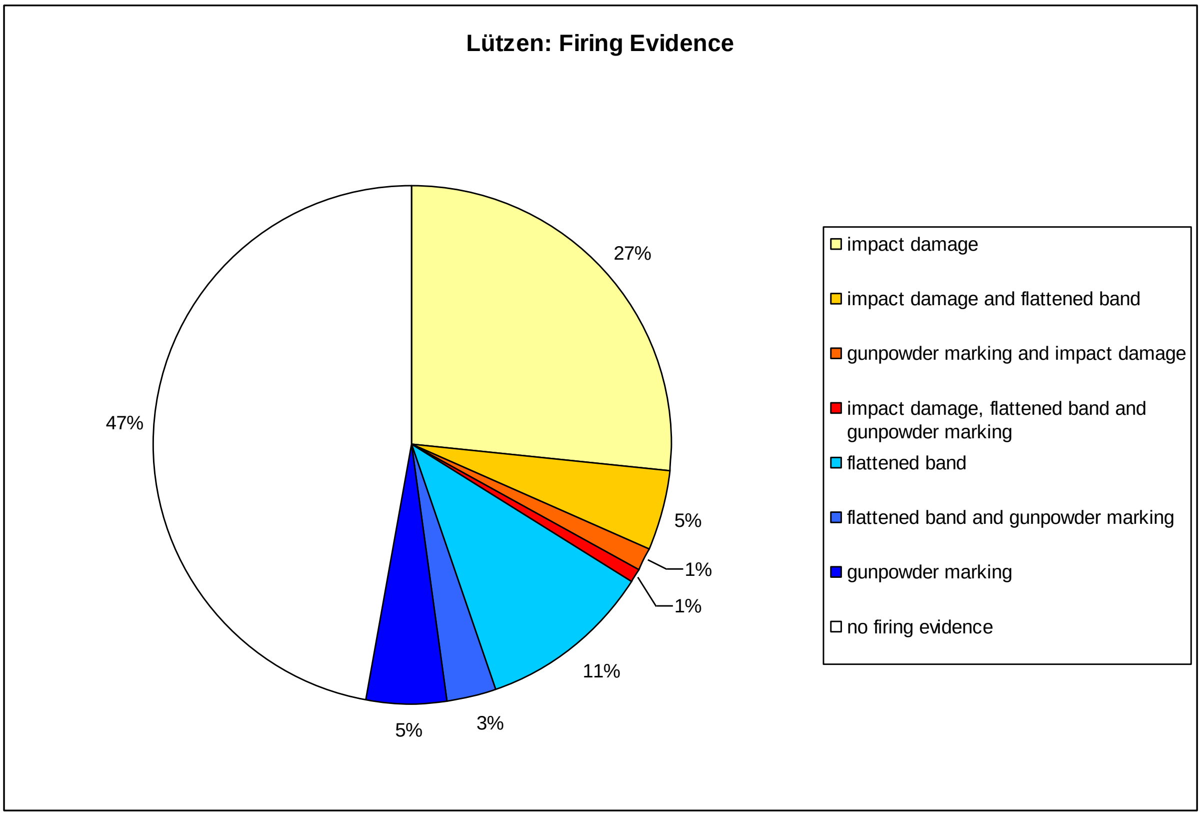

Figure 43: Firing evidence: Impact damage, gunpowder markings, and flattened band.

In general, there is a much higher percentage of pistol/carbine bullets than musket bullets with heavy impact damage when compared to bullets with moderate or light impact damage. It is possible that smaller bullets tended to deform more severely than larger bullets, but another reasonable explanation could be that, in particular, pistols were used much more often at point-blank range or in hand-to-hand combat.

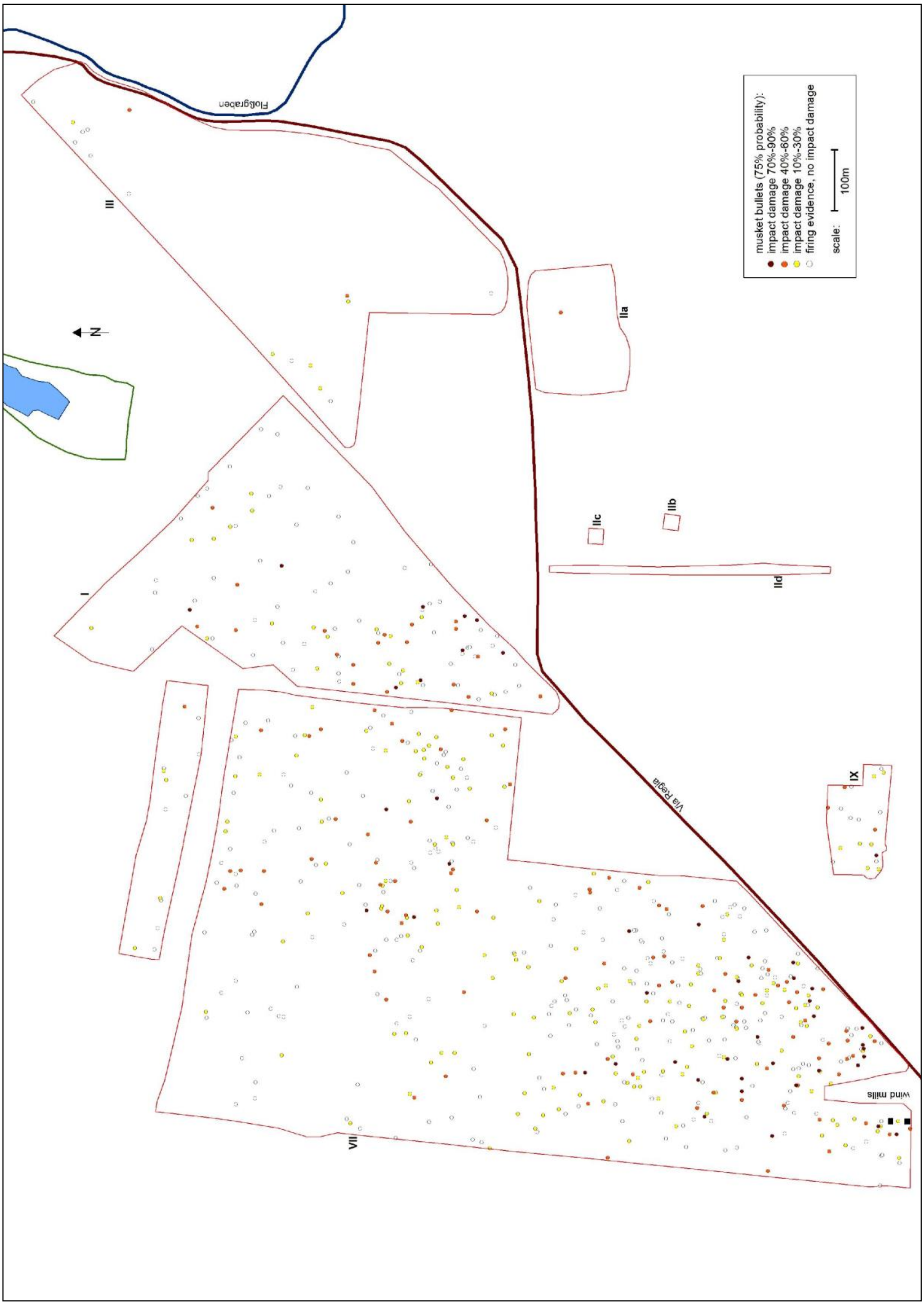

Figure 44: Distribution of musket bullets with impact damage (24.25-41.75g) and firing evidence (16.1-19.9mm).

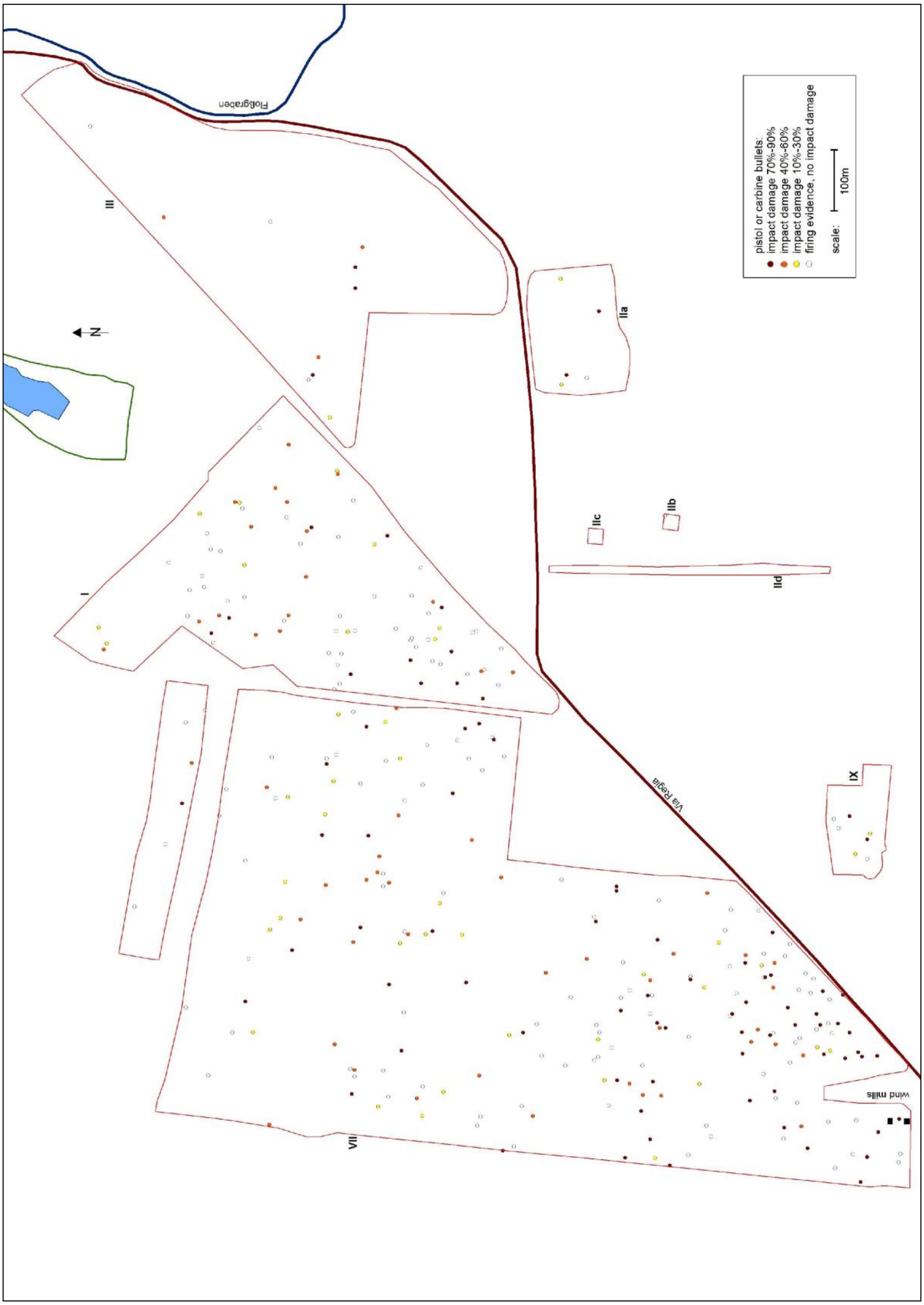

Figure 45: Distribution of pistol and carbine bullets with impact damage (3.00-18.25g) and firing evidence (8.3-15.8mm).

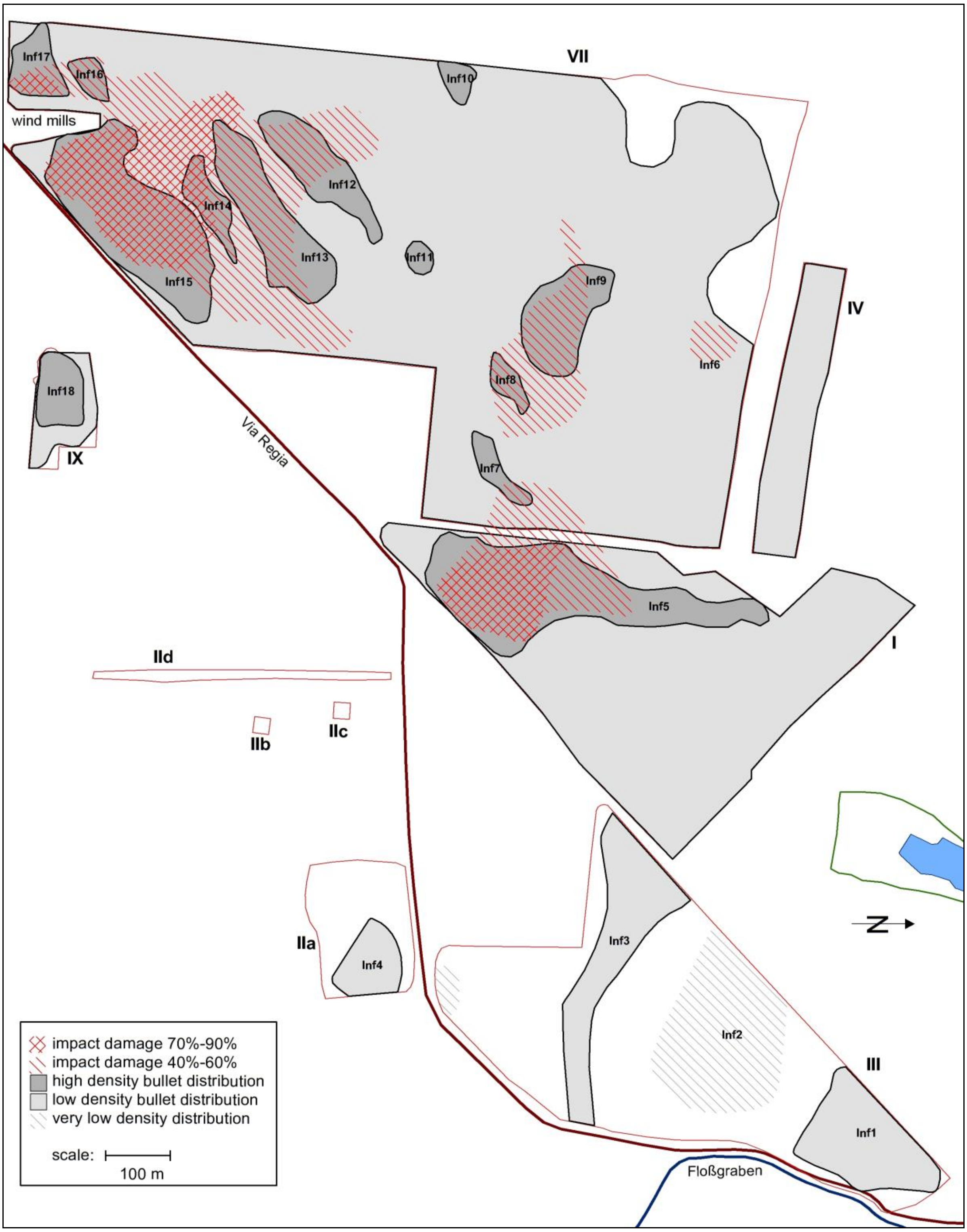

Figure 46: Interpretation of distribution patterns of musket bullets with and without impact damage.

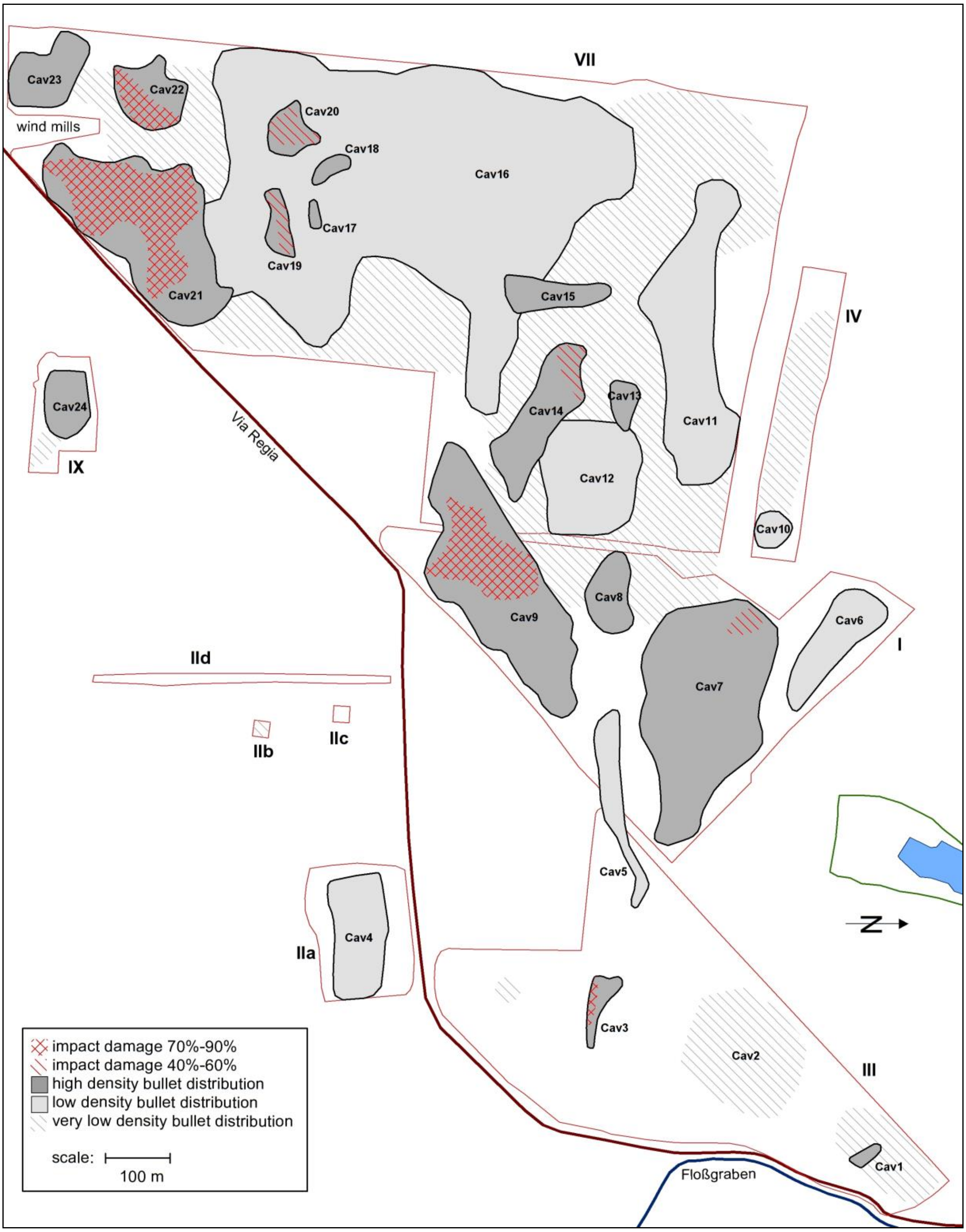

Figure 47: Interpretation of distribution patterns of pistol and carbine bullets with and without impact damage.

In addition, pistol/carbine bullets with heavy impact damage tend to be distributed more widely over the battlefield, creating fewer concentrations (Fig. 45). The exception is the southern part of field VII near the windmills, where the densest bullet distribution of all weapon types has been identified. This confirms that the most serious action took place near the windmills.

5.1.2.4 Casting sprues, paper cartridges and bandoliers

Casting sprues were the by-product of bullet manufacture and normally clipped or cut off after production. Nevertheless, bullets with remaining sprues can be found on 17th century battlefields. At Lützen 162 (5%) bullets with intact casting sprues were found. It is sometimes argued that bullets with sprues found on battlefields are unfinished or unfired bullets; however, 28 bullets with sprues show impact damage and 50 show firing evidence, suggesting that there must be another reason for leaving sprues on bullets.[496]

Plate 6: 12.0mm pistol bullet with casting sprue (Inv.-No. 1946:16:4029).
(image has been removed due to copyright restrictions)

Battlefield archaeologists and historians alike agree that sprues were sometimes left on bullets to attach a paper cartridge containing gunpowder from at least the early 17th century to the late 18th century. There is no historical evidence before 1707, when Pierre Surirey de Saint Remy claimed that this was done “previously”.[497] There are two approaches known to have been used to connect the bullet to a paper cartridge, either by wrapping the whole bullet into the paper or by tying the paper to the sprue. The advantage of tying bullets to the sprue over wrapping the bullet into the paper is unknown.

The origins of paper cartridges are almost as mythical as Gustav Adolf’s leather canons and it is still believed that he was also responsible for their development,[498] in particular for musketeers, based on a misunderstanding by Reverend Walter Harte in 1759.[499] Although it is possible that paper cartridges were invented in the late 16th

[496] Foard (2008, 145) suggests also that intact sprues are no indicator for unfinished or unfired bullets.
[497] Pirkl 1985, 27, Foard 2008, 145, Sivilich 2009, 95, Mandzy 2009, 201.
[498] Weigley 2003, 143.
[499] Brzezinski/Hook 2006, 87, Mandzy 2009, 202.

century,[500] neither Lodovico Melzo in 1611,[501] nor Giorgio Basta in 1612,[502] mentioned paper cartridges in their military handbooks.[503] The earliest European reference to paper cartridges in a military context is from Wallhausen in 1616, who claimed that harquebusiers should either use powder flasks and bullets from a bag or, alternatively, paper cartridges.[504] Cruso in 1632[505] and Vernon in 1644[506] already knew only paper cartridges were used as ammunition for cavalry, cuirassiers and harquebusiers alike.[507] Those sources seem to confirm that paper cartridges were adopted by the military in a very short period between the mid-1610's to the late 1620's, but exclusively for cavalry, evidently because the loading process on horseback was more difficult than for musketeers on foot. Therefore, it can be assumed that some cavalry troopers probably used cartridges at Lützen.

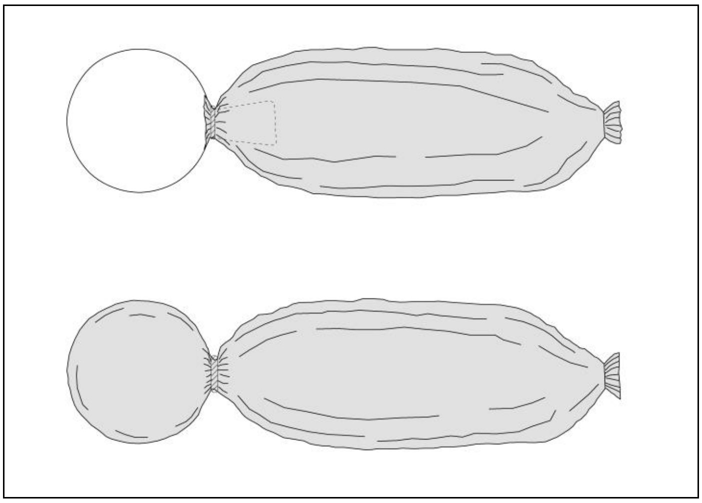

Figure 48: Paper cartridges. Top: Paper attached to casting sprue. Bottom: Bullet wrapped into paper.

During the Thirty Years War, musketeers (Fig. 8), but not calivermen (Fig. 7), usually used the bandolier, eleven to thirteen flasks each holding a single charge of gunpowder hanging from a leather belt, and a bag for bullets. In 1683 James Turner, who served in the Swedish army during the Thirty Years War and wrote his 'Pallas Armata' in that time, claimed that "it is thirty years ago since I saw these (bandoliers) laid aside in some German Armies", because they were exchanged for paper cartridges.[508] Although there is no reason to disbelieve his account, there are no other historical sources stating that

[500] Pirkl 1985, 27, Dolínek/Durdík 1996, 295, Mandzy 2009, 202.
[501] Melzo 1625.
[502] Basta 1614.
[503] Engerisser 2007, 560.
[504] Engerisser 2007, 560, Wallhausen 1616, 35.
[505] Cruso 1632, 37-42.
[506] Vernon 1644, 8. See also Turner 1683, 173.
[507] Engerisser 2007, 560 and 563.
[508] Turner 1683, 176, Brzezinski/Hook 2006, 22.

musketeers used cartridges in the Thirty Years War and it is not even certain if he was referring to that or a later time. The Armoury Stockholm provided bandoliers until 1670.[509] So it seems more likely that Turner relates to just one incident he saw and that probably a few musketeers were using cartridges toward the end of the Thirty Years War. However, it was not until 1670 that bandoliers were generally replaced by paper cartridges in the Swedish army, and not much earlier in other European armies.[510] Another explanation for leaving sprues on bullets is suggested by Mandzy and concerns the extra damage inflicted by the sprue when using low muzzle velocity weapons.[511] Some ballistic testing has been conducted in which the sprue was sometimes parted from the bullet when fired, which did extra damage, but it is not certain if sprues were left on bullets for that purpose.[512]

In evaluating the archaeological evidence from Lützen, the percentage of bullets with sprues according to weight shows a very distinct concentration at 5.25g to 17.50g on the graph (Fig. 49). These are almost exclusively pistol and carbine bullets, while there are very few musket bullets with sprues. The calibres from 15.0mm to 15.9mm, which are almost exclusively carbine bullets, have a weight of 16.5g to 23.0g. Very few of these bullets have sprues, which suggest that at Lützen carbine bullets tend to have no sprues. In comparison to other sites, the bullets from Stralsund have no significant sprues, because only four pistol or carbine bullets were found there. The musket bullets from the *Vasa* have also no sprues as expected, but of the eleven pistol bullets found in chest 14041, eight have sprues, although it could be argued that those pistol bullets were unfinished, because no one on the *Vasa* expected to go to battle soon.

509 Brzezinski/Hook 2006, 22.
510 Engerisser 2007, 546, Brzezinski/Hook 2006, 22.
511 Mandzy 2009, 203.
512 According to a paper held by Sivilich on the Fields of Conflict Conference in Osnabrück.

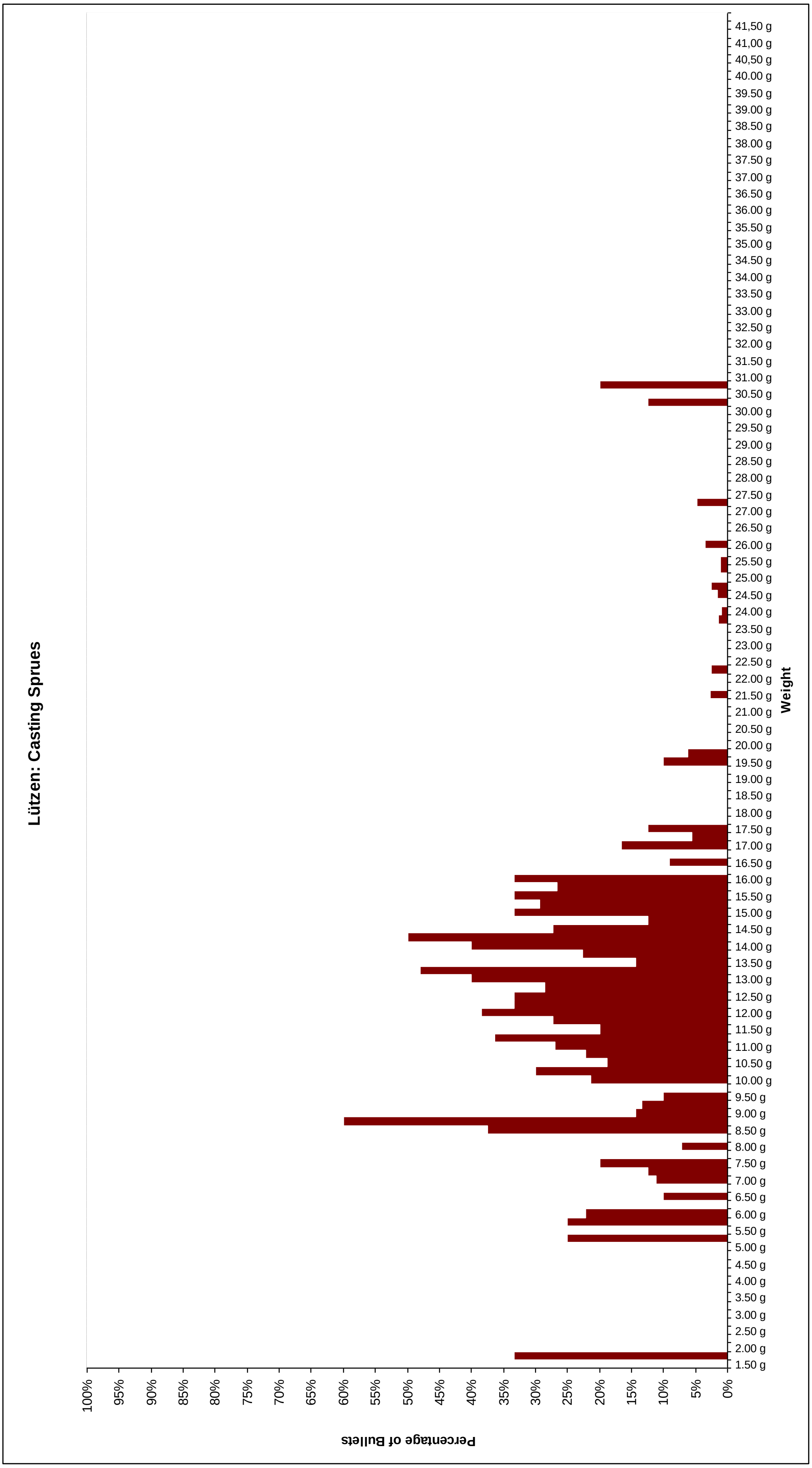

Figure 49: Distribution of bullets with intact casting sprues by percentage.

It is unclear why many, but not the majority, of pistol bullets had sprues, while carbine bullets tend to have no sprues. If intact sprues are an indicator for paper cartridges, a higher ratio of carbine bullets from Lützen should be expected to have sprues, because cavalry is reported to have used paper cartridges in the 1630's. It is also possible that for an unknown reason cartridges were attached to pistol bullet sprues, while carbine bullets were wrapped into the cartridge paper. Intact casting sprues on bullets must be seen probably in a context of the intended purpose of pistols, either their use at distances shorter than 5m, or because they were used more often by cavalry against cavalry than against infantry. At the present time there is not enough historical or archaeological evidence for a reasonable interpretation of sprues left on bullets. To demonstrate the connection between sprue and cartridge, comparative data from a 16th century battlefield, where no cartridges are expected to have been used, is required (see section 7.2.5). Musket bullets with casting sprues are known from battlefields dating after the Thirty Years War. They have been found at 1649 Zboriv, Ukraine, 1677 Landskrona, Sweden, and at several 1655-1675 Seneca village sites in upstate New York.[513] However, all bullets found at 1634-1695 St. Mary's City, Maryland, had no sprues.[514]

5.1.2.5 Tin bullets

Without material analysis it is difficult to distinguish lead from tin or tin alloy so the provisional determination of Lützen bullets material might be not entirely correct (section 5.1.1.1). The possibility that bullets were made of different materials seems too important to omit completely. Since there were no tin bullets on the *Vasa* it is likely that tin was not used for mass production of bullets, but it may have been used by individual soldiers. Tin bullets can be found in most calibres in the Lützen collection. However, carbine and, in particular, pistol shot have a much higher percentage of tin bullets than musket shot. There is a slightly higher percentage of larger calibre musket tin bullets than for the smaller calibre standard muskets.

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[513] Sivilich 2015, (82-84).
[514] Sivilich 2015, (90).

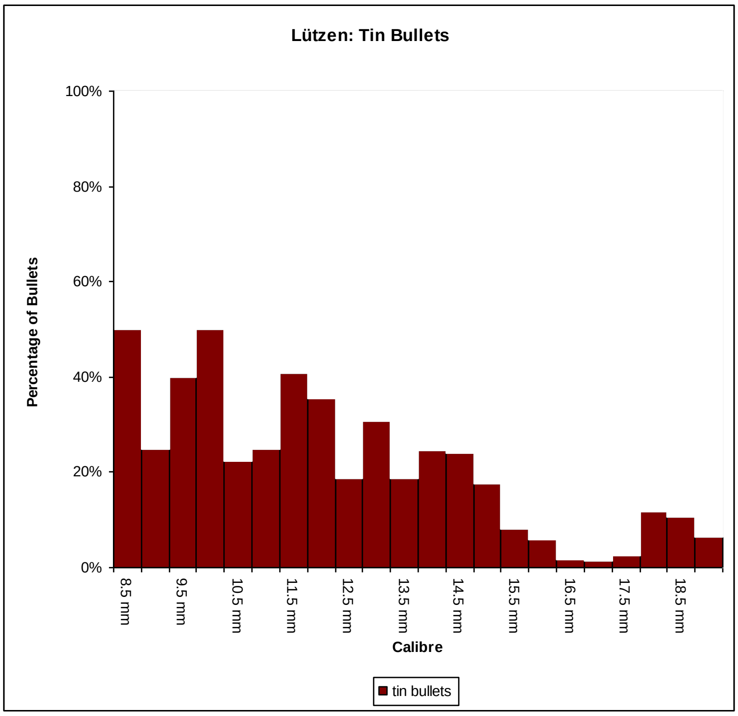

Figure 50: Distribution of tin bullets in percent.

The distribution of tin bullets on the calibre graph has some similarities to the casting sprue graph, which suggests that there might be a connection (Fig. 50). A possible explanation might be that there was sufficient supply of ammunition for standard weapons and therefore no need for individual bullet production, but not for uncommon weapons. Pistols, in particular, were far from being standardized at the time of the Battle of Lützen. This circumstance might have caused problems with ammunition supply and probably forced some cavalry troopers to produce their own bullets. The slightly higher percentage of larger calibre tin bullets and bullets with sprues might indicate that there was not sufficient supply for the largest calibre muskets, as well.

Tin and pewter was probably used instead of lead because there might have been a general supply shortage of lead in the Thirty Years War. The American army suffered a similar shortage during the War of Independence and used tin or pewter instead.[515] However, the connection between tin bullets, casting sprues, and individual bullet production does not rule out a possible connection between casting sprues and paper cartridges. It seems that horsemen were producing their own paper cartridges at Lützen. This might be seen as a normal development in a long war, where very experienced soldiers adjusted their equipment according to their needs before some innovations might have been officially produced sufficient quantity.

[515] Sivilich 2015, (198).

Note: Tin bullets or bullets with banding, gun powder combustion markings or intact casting sprues do not create any meaningful distribution patterns on the battlefield.

5.1.2.6 Modified ammunition

The most common type of 17th century firearms ammunition is round balls, but there are occasionally some bullets modified by individual soldiers prior to battle. These include parted bullets, slugs and nailed bullets.

Plate 7: Parted bullet, quarter (Inv.-No. 1946:16:1738).
(image has been removed due to copyright restrictions)

Parted bullets

Parted bullets are ordinary round balls cut into two, four or eight parts leaving a crosspiece at one end so that they split when fired, creating a spray pattern (Plate 7).[516] They are known from 17th and 18th century battlefields, but it is possible that they have a longer tradition and have not been discovered yet on earlier or later battlefields. In the 17th century, parted bullets are known to have been used as fragments in ceramic hand grenades, probably in sieges, but their use in a field battle should not be dismissed completely.[517]

[516] Foard 2008, 127, Sivilich 2009, 95-96.
[517] Foard 2008, 127.

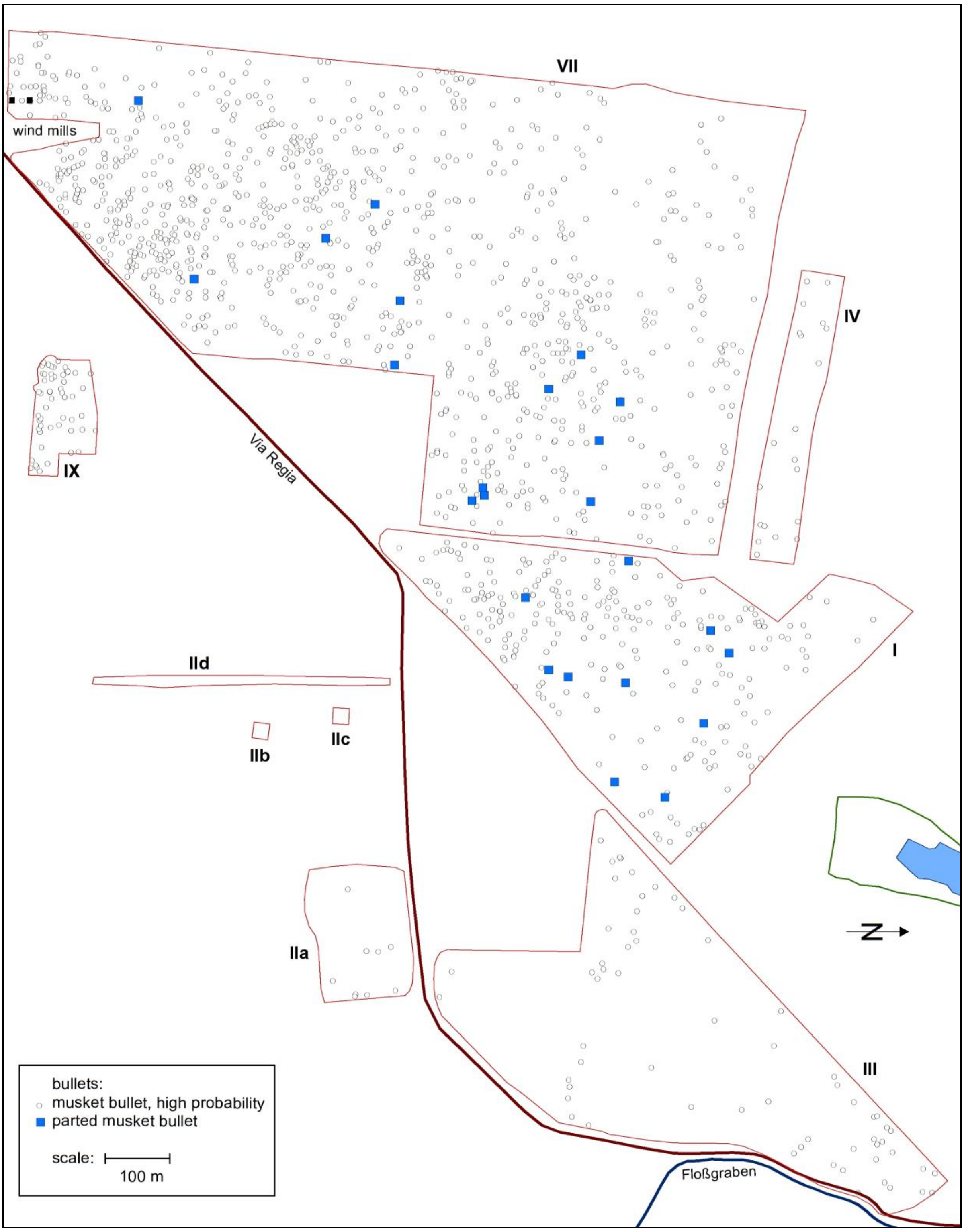

Figure 51: Distribution of parted musket bullets.

Pieces of 25 (0.9%) parted bullets were found in Lützen – five halves, twelve quarters and eight eighths. It is difficult to measure their exact calibre, because they are not symmetrically divided, but most of them seem to be originally musket or possibly large carbine bullets. A similar percentage of parted bullets (0.7%) with a similar distribution of halves (two), quarters (three) and eighths (two) were found at Edgehill, suggesting that this is a typical ratio of parted bullets on a 17th century battlefield.

Other than that they were certainly fired at point-blank range, there is not much known about them. A letter from the British General Lord Howe written in 1777 to General Washington complaining about the use of parted bullets suggests that they were used unofficially by soldiers, but not in what situations as they were found in campsites.[518] At Lützen, the majority (eighteen) of them are associated to the pistol bullet concentrations on the Imperial left wing, while only six were found in the centre; none were recovered from the cavalry skirmish area in front of the Imperial left wing or behind the Imperial centre (Fig. 51). This suggests that they were used by musketeers against cavalry where infantry-cavalry interaction was to be expected and thus probably by the interlined Swedish or Imperial musketeer companies on the wings.

Slugs

Slugs were originally round bullets altered by hammering them into cube-shaped, elongated cube-shaped (Plate 8), or cylindrical (Plate 9) bullets to be used as pistol and carbine shot by cavalry in 17th and 18th century battles.[519] Because most slugs are altered to a large extent, their calibre often can not be identified with certainty.

Plate 8: Elongated slug (Inv.-No. 1946:16:3577).
(image has been removed due to copyright restrictions)

36 (1.3%) possible slugs of different shapes with a calibre of 11.3mm to 16.2mm and 8.5g to 33.5g were found in Lützen. Most of them are elongated, cube-shaped or cylindrical, but some are short cube-shaped or cylindrical. The length depends on the former size of the bullet and the final size of the slug and there seem to be no obvious purpose for the different lengths.[520] It is more difficult to alter a bullet into a cylindrical form than into a cube-shaped slug, but cylindrical slugs seal the barrel more tightly and therefore have a higher velocity and, possibly, greater accuracy. Five bullets with casting

[518] Sivilich 2009, 96.
[519] Foard 2008, 121-122, Sivilich 2009, 95.
[520] Foard 2008, 123.

sprues look as if they were severely banded and are similar to those from the battles of Zboriv in 1649 or Monmouth in 1778, but they appear to be altered into a cylindrical shape to be used as slugs.[521]

Plate 9: Cylindrical slug (Inv.-No. 1946:16:4793).
(image has been removed due to copyright restrictions)

The asymmetrical shape caused the slug to tumble in the air, but it is unclear for what reason. Sivilich suggests that they were used because they caused more severe wounds than round bullets, but they are probably less likely to penetrate armour.[522] They might also have made a noise that might instil some uneasiness among the soldiers who were being shot at. At Lützen they were found almost everywhere on the battlefield except in the skirmish area to the front of the Imperial left wing suggesting that they were not fired by cavalry against cavalry (Fig. 52). Their distribution pattern concentrates more on the outer centre, where cavalry-infantry combat took place, suggesting that slugs were used in particular by cavalry against dense infantry formations, something that is also suggested by Foard for the Battle of Edgehill, where 34 (3.5%) slugs, a significantly higher percentage than at Lützen, were found.[523] The densest concentration of slugs is near the windmills in the southern part of field VII.

[521] Mandzy 2009, 201, Sivilich 2009, 95.
[522] Sivilich 2009, 95.
[523] Foard 2009, 124.

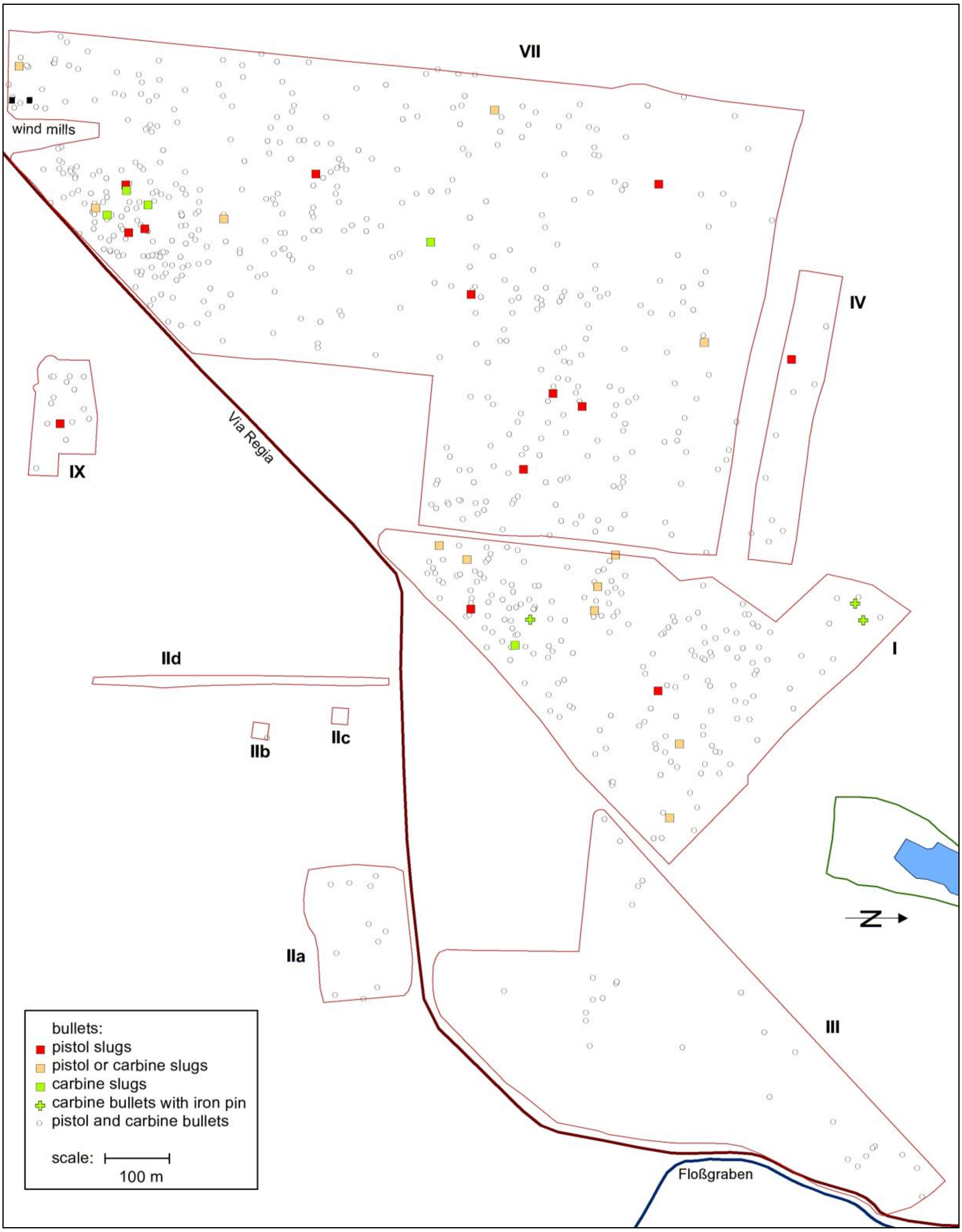

Figure 52: Distribution of pistol and carbine slugs and bullets with iron pins.

The origins of slugs are unknown. 17th century Turkish musketeers seem to have used slugs which they cut from lead bars in large quantities.[524] A mould for elongated cube-shaped firearms ammunition and a hunting musket with a square-shaped inner barrel

[524] Balázs 2012, 104-107.

from the 18th century Schwerin weapon collection suggest that slugs could have been used originally in hunting.[525]

Plate 10: Bullet with iron pin (Inv.-No. 2007:1716).
(image has been removed due to copyright restrictions)

Nailed bullets

Two carbine calibre bullets, and possibly a third (0.1%), have an iron pin or nail driven through their axis (Plate 10). This is also reported from the American War of Independence, and one example was recently discovered on the 1644 battlefield of Tywardreath.[526] If this low ratio of 0.1% is representative for 17th century battles, they would be almost invisible in archaeological collections. They probably served the same purpose as slugs to inflict extra damage against unarmoured soldiers. However, two of these bullets might be spring shot, two bullets wired together.[527]

The low number of modified bullets suggests that they were unofficially produced and fired by individual soldiers, rather than in official ammunition issues, and that the effect they achieved was not important enough to produce this ammunition in large quantity.

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[525] Waffensammlung 2008, 68 and 147.
[526] Sivilich 2009, 96, Ferguson 2013, 171.
[527] Sivilich 2015, (150).

5.2 Artillery ammunition

A total number of approximately 80 to 100 cannon were deployed in the Battle of Lützen. These should have left substantial evidence after six hours of fighting, but only a few small finds could be classified as artillery ammunition. One reason for the lack of artillery evidence might be that the surveyed area is limited largely to the initial Imperial deployment. This means that the Imperial artillery fired into areas that have not yet been surveyed. Another reason is certainly the type of ammunition used in the Battle of Lützen. A variety of different types of artillery ammunition were used in the 17th century, depending on the nature of engagement, but they can be subsumed into four categories: roundshot, grapeshot, case or canister shot and shells.

Figure 53: 4 bore (27mm) *Doppelhaken* from Suhl.

5.2.1 Roundshot

Iron roundshot was used at long distance, but was usually not very effective in terms of hitting soldiers.[528] As the rate of fire of 17th century heavy artillery pieces was low, only a few would be deposited during a battle. Because of their considerable size most were picked up during the clearing and looting process and, in fact, none were found during surveys on the battlefields of Lützen or Edgehill.

One lead roundshot (116.8g) was discovered on the Lützen battlefield. The bullet was almost certainly fired from a 4 bore *Doppelhaken*, possibly from Suhl as the bullet's weight is a perfect match to 1/4th Saxon pound (Fig. 53).[529] The 17kg to 19kg heavy and 2.3m long *Doppelhaken* were very heavy wheel lock muskets, sometimes combined with a match lock, and usually used during sieges against artillery crew. They were able to fire through earthwork and wooden planks, but it is not unlikely that they were also deployed in a linear battle, possibly on a mount and utilized together with regimental artillery, although there is no historic evidence. Some *Doppelhaken* are known to have rifled barrels, which makes them excellent, far reaching sniper rifles with a high striking force.[530] Generalleutnant Tserclaes Graf von Tilly was killed by a *Doppelhaken* in the Battle of Rain am Lech,[531] which suggests that they were sometimes deployed in battle to fire at officers.

5.2.2 Grapeshot

Grapeshot was a projectile with several iron balls of approximately 2-5cm size, which was very effective at medium range (Plate 11). Initially developed for naval warfare, possibly as early as 15th century, it is not entirely certain when it found its way into European land warfare, but it seems likely that the Swedish army used grapeshot during the Thirty Years War,[532] as some were found on the battlefield of 1677 Landskrona.[533] Chemnitz reported

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[528] Foard 2008, 129.
[529] Engerisser 2014. The *Doppelhaken* ('double hook') is similar to the 'rampart gun'. However, because of the unique design the German term is used in this thesis.
[530] Brooker 2007, 92.
[531] Junkelmann 2007, 38.
[532] Brzezinski 2001, 23. Grape shot was present on the *Vasa* (Foard 2008, 131).
[533] Knarrström 2009, 189.

that Gustav Adolf's 3-pounders fired mostly "Kartätschen" and "Schrot" instead of roundshot, which seems to have the meaning of 'grapeshot' and 'case shot'.[534]

Plate 11: Grapeshot (Inv.-No. 1946:16:2181).
(image has been removed due to copyright restrictions)

Five iron bullets with a diameter of 24mm to 30mm, which could have been grapeshot, were found on the Lützen battlefield. Grapeshot should produce a similar pattern as case shot, but the bullets of grapeshot projectiles are bigger and easier to find during the post-battle clearing and looting processes. Another factor is that iron objects were not specifically searched for at Lützen and thus most grapeshot might have been overlooked during the archaeological survey due to the use of discrimination on the metal detectors (section 4.3.1). Finally, without any distribution pattern or material analysis, the iron balls can not be classified as grapeshot or even be allocated to the battle with certainty. Another possibility is that the iron balls are roundshot from 'Falkonett'-type artillery pieces, which have a calibre of approximately 3.2cm to 5.5cm (section 3.1.3).

5.2.3 Case shot

A type similar to grapeshot, case shot or 'canister' was multiple ball artillery ammunition, but with smaller bullets and fired at close quarters with devastating effects against dense formations (Plate 12).[535] In the 17th century, one case usually consisted of approximately

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[534] Engerisser 2007, 584 and 590. The German word 'Kartätsche' is a general description of any multiple load ammunition, while at the present time 'Schrot' have the meaning of small shot used by huntsmen. As there are no adequate German terms for 'grapeshot' or 'case shot', Chemnitz possibly tried to circumscribe this type of ammunition.
[535] Foard 2008, 129.

70 or more musket bullets which, when fired, form a long triangular distribution pattern on a battlefield, as can be seen at Edgehill.[536] Bullets from case shot have very distinctive hexagonal facets, which distinguish them from firearms ammunition.[537] Since case shot projectiles were not standardized in the 17th century, it could contain a variety of projectiles, including non-metal material such as pebbles or cast off iron fragments.[538]

At Lützen, only one bullet with hexagonal facets was found. Since the battlefield was surveyed with 100% coverage, it is extremely unlikely that any other case shot bullets were overlooked, if they were part of an all-lead-bullet case shot. Although the Imperial artillery probably fired mostly into an area that has not yet been surveyed, the 40 Swedish regimental guns, which almost certainly fired case, were distributed along the whole Swedish front line and must have deposited case projectiles in the surveyed area. The only two reasonable explanations are that either small iron or non-metal projectiles were used as case in Lützen (langrage). It is uncertain how only a single bullet from case shot could have been deposited on the battlefield.

Plate 12: Case shot (Inv.-No. 2007:894).
(image has been removed due to copyright restrictions)

5.2.4 Artillery shells or hand grenades

Nineteen fragments of spherical cast iron shells, two of them with part of a fuse hole, were found at Lützen (Plate 13). Their form is not entirely spherical, which complicated measuring their calibre. Only two fragments were large enough to determine a fairly accurate calibre, while nine smaller fragments provided at least an approximate calibre, ranging from 50mm to 200mm (Table 20). Spherical cast iron shells are rarely found on

[536] Foard 2008, 132, Foard 2009, 124.
[537] Foard 2008, fig. 65 and 66.
[538] Foard 2008, 130.

17th century battlefields, as at Landskrona,[539] so these derive either from artillery shells or hand grenades.

Plate 13: Spherical cast iron shell with fuse hole (Inv.-No. 2007:745).
(image has been removed due to copyright restrictions)

Shells were usually fired by mortars during sieges. Their short firing range made them unsuitable for battles and there is no historical reference that they were used in that way in the 17th century, although it is not impossible. Shells were also fired by normal artillery pieces of any calibre. Although there is no account of their use in battle, it is more probable that they were used against the enemy's heavy artillery batteries. As the Imperial artillery positions in Lützen were fortified, which would have made a bombardment with roundshot ineffective, the Swedish heavy artillery possibly fired shells against them. Initially hand grenades were used in siege warfare in the 16th century when they were recommended for battle as early as 1590, but their use in battle became more common during the 17th century.[540] It is unknown if hand grenades were used at Lützen.

[539] Knarrström 2009, 189.
[540] Foard 2008, 139.

Calibre (mm)	Gauge (mm)	Artillery piece
164-180 f	17-20	24-pounder
164-170	16-20	24-pounder
140-180*	15-17	24-pounder
120-200*	15-16	24-pounder or 12-pounder
120-160*	16-20	24-pounder or 12-pounder
104-120*	14-15	12-pounder or 6-pounder
90-100*	9-19	12-pounder or 6-pounder
80-100*	11-14	12-pounder, 6-pounder or 3-pounder
70-100 f*	14-17	12-pounder, 6-pounder or 3-pounder
60-70*	12-16	3-pounder
50-70*	11-14	3-pounder

f = fuse hole
* = small fragment, approximate calibre

Table 20: Calibre of spherical cast iron shells.

At the present time, it is not possible to distinguish cast iron shells as hand grenades from those shells fired by artillery and both seem possible for Lützen. The very different calibres suggest that they were fired by artillery; however, two large calibre cast iron shells were found on the Imperial left wing. They were apparently too heavy to be thrown as hand grenade. Those two shell fragments very likely derive from a Swedish 24-pounder firing at the Imperial artillery (section 8.1.3).

Chapter Six

The Battlefield

6.1 Geography: Reconstruction of the historical battlefield

In 1632 Lützen, located between Weißenfels, 13km southwest, and Leipzig, 19km northeast, belonged to the Electorate of Saxony. The town itself was unimportant but it was sited on the Via Regia, one of Germany's most important medieval-early modern roads, running from Paris through Mainz, Erfurt, Leipzig, Görlitz, and on to Kiev. This road saw millions of soldiers; eight major battles were fought near it in the region of Leipzig alone: Auerstädt (1806), Roßbach (1756), Großgörschen (1813), Lützen (1632), Leipzig (1813), Breitenfeld (1631 and 1642) and Torgau (1760).

6.1.1 Landscape in general

The battlefield is located on a flat plain, 115.1m to 126.3m above sea level, with a maximum gradient below 1% and almost no visible heights. Holk mentioned that Gustav Adolf had the advantage of a wood and small hill on his right wing, one "musket shot from the battaglia."[541] There is only one barely visible elevation, Hill 126, which is 1,200m south of the Imperial first line (Fig. 55, Plate 14). As no Protestant eyewitness mentioned any hill, we can assume that Hill 126 played no major role in the battle; however, it blocks the line of sight from the Imperial battle line to the Floßgraben. This obstruction might have had an impact on early Imperial artillery fire against the deploying Swedish army (section 8.1.3). It is not entirely certain, which "wood" Holk meant in his account (section 6.1.3).

[541] Wittrock 1932, 308.

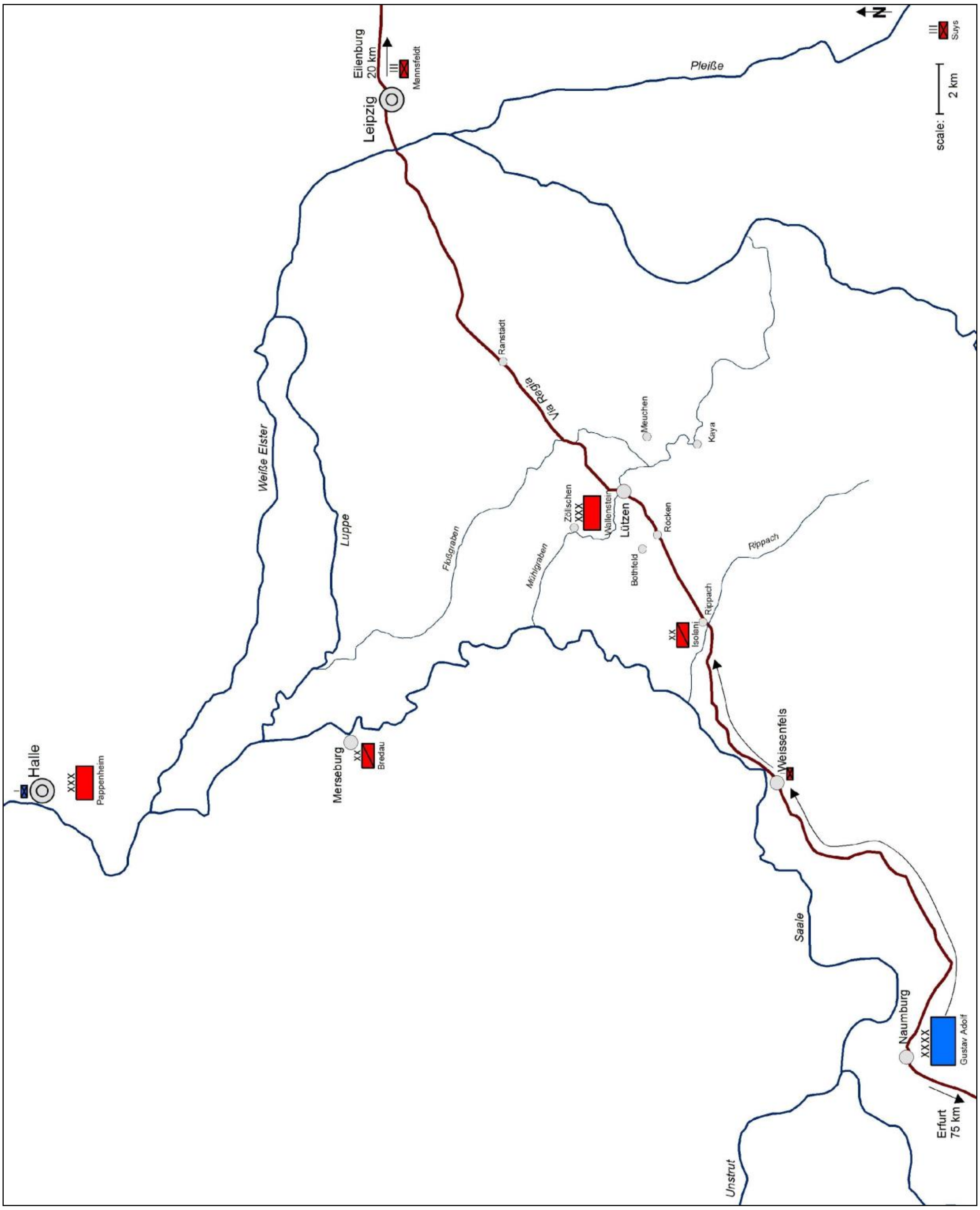

Figure 54: Approximate military situation 15 November 1632.

The main source for understanding the battlefield landscape is a 1710 field boundary map.[542] Although this map was drawn almost 80 years after the battle, the landscape generally did not change much during this period and it is very likely that it shows the battlefield as it was during the battle. There are no hills or woods on the map, but a few green areas, which are not farmland, are present.

542 Museum in the Castle of Lützen.

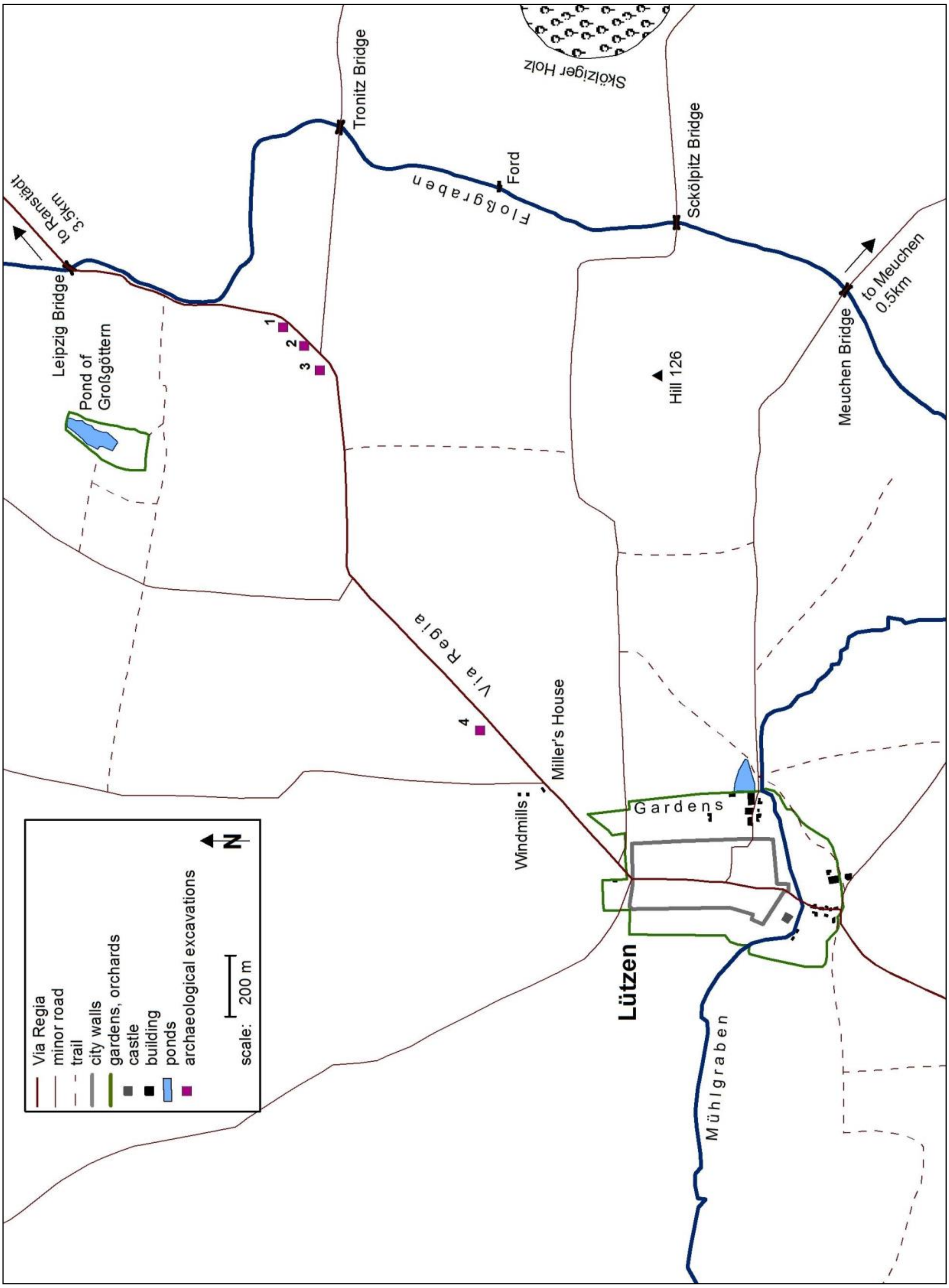

Figure 55: The battlefield according to a 1710 field boundary map.

6.1.2 The canals: Mühlgraben, Floßgraben and their bridges

The Floßgraben (‘Floß’ = raft, ‘Graben’ = ditch, Plate 15) is an artificial canal dug in 1578 for transporting wood to the Saxony salt mines.[543] Although very narrow, it has a steep embankment, making it a serious obstacle to movement and, considering the fact that the water was cold in November, it was very difficult to cross, except on the few bridges.[544] The Floßgraben has been not recognized as an obstacle by historians very often,[545] probably because the water level has dropped due to extensive brown coal mining operations in the last decades.[546] However, the canal presented a serious obstacle in the 1813 Napoleonic Battle of Großgörschen, 2km south of Lützen, too.[547]

Plate 14: View from the top of ‘Hill 126’ north toward the Imperial battle line. The last row of trees barely visible on the horizon at right is the Floßgraben.

The bridges and fords are known mostly from an 1809 map.[548] However, it is assumed that the road system has not changed substantially since 1632 and most crossings might have existed during the battle. The bridges were only 3m wide (Plate 16) forcing units to break formation before crossing with time lost to reorganize on the other side. Probably the major problem caused by the Floßgraben and its narrow bridges for Gustav Adolf was how to bring his heavy artillery pieces over, in particular his 24-pounders that weighed approximately 3.5tons and needed 20 to 25 horses to pull them.[549] As Gustav

543 Andronov 2006, 22.
544 Brzezinski 2001, 43, Sennewald 2013, 168. See also Richelieu 1823, 258.
545 Guthrie 2002, 202, Mortimer 2010, 173.
546 Andronov 2006, 94.
547 Bücker/Härtig 2004, 35-40.
548 Andronov 2006, 29.
549 Engerisser 2007, 579.

Adolf had only two bridges, the Meuchen and Sckölpitz, for his army to cross the Floßgraben, he put some effort into building additional makeshift bridges from float-wood, as the sketch from Stockholm suggests (Fig. 57).[550]

Plate 15: The Floßgraben had very steep embankments and would have been extremely difficult to cross during battle. There were almost certainly trees along its length in the 17th century, as suggested by copperplates. The water level in the picture is much lower than it was in 1632, as brown coal mining in the region has reduced the ground water level.

A more serious obstacle was the Mühlgraben, an artificial canal or mill race, for the water mills in Lützen. It had the same steep embankments as the Floßgraben, but no bridges crossed it outside the town. In addition, west of Lützen the Mühlgraben's bank was marshland and impossible to cross by artillery or cavalry. Gustav Adolf had little choice but to move south of Lützen and cross the Floßgraben twice.

6.1.3 The woods: Großgöttern orchard and Skölzig wood

Trees did not play a role as obstacle in the Battle of Lützen as there were only few. Nevertheless, there is a misunderstanding among historians regarding a small wood called

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[550] Float wood was stored along the entire length of the Floßgraben to ensure a constant supply for the salt production in Halle (Andronov 2006, 28-29, Brzezinski 2001, 47 and 52, Sennewald 2013, 168).

'Skölziger Holz' located 300m east of the Floßgraben.[551] This wood was often misidentified as the wood on the far left Imperial wing, where Holk wanted to deploy 1,000 musketeers, if he had a sufficient number of them.[552] Although Holk did not name this wood, it has been suggested that he meant the Skölziger Holz,[553] which is mentioned three times, in the *Relation from 1633, Theatrum Europaeum* and Khevenhiller, as an emplacement for the Swedish artillery.[554]

Plate 16: The Sckölpitz bridge over the Floßgraben. One of two still existing 17th century structures.

This wood was located 1,200m southeast of the Imperial battle line on the east side of the Floßgraben and was, therefore, some distance from the battlefield, which makes the wood neither an ideal position for Swedish artillery[555] nor for Imperial musketeers, as the distance would have left them cut off from their own lines and with no targets to fire at. However, Holk mentioned another wood on the Swedish right wing "one musket shot from the battaglia".[556] This wood could have been the 'Skölziger Holz'.

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[551] The 'Skölziger Holz' is completely gone today and is localised according to a plane table map, scale 1:25,000 from 1903.
[552] Wittrock 1932, 308.
[553] Guthrie 2002, 202, Seidler 1954, 34, Deuticke 1917, 66, Generalstaben 1939, 419, Mann 1971, 849.
[554] Abelinum 1646, 745 and Khevenhiller 1726, 190 copied this part from the *Relation from 1633* (Droysen 1880, 30).
[555] Incorrectly suggested by Mann 1971, 851.
[556] Wittrock 1932, 308.

Figure 56: Pond and wood of Großgöttern on 1710 field boundary map.

William Watts wrote that

"the king advanced, till he came with the end of the Right Wing, within Musket shot of a little wood: having all the way a full view of the Imperiall Army,"[557]

suggesting a wheeling manoeuvre by the Swedish right wing toward its left. This wheeling manoeuvre is also confirmed by Vitzthum/Berlepsch.[558] From the little wood Gustav Adolf would have had a full view of Wallenstein's army from the Imperial left wing (sections 7.1.1 and 8.2.2). Although Watts was no eyewitness, this is the only source mentioning the location of a wood. If Watts is credible, then this "little wood" could only have been the former village of Großgöttern, which was abandoned in the 15th century. This village's pond still exists and the former village is marked on the 1710 field boundary map as a small green area, which meant any form of vegetation other than farmland; it is possible that there was a small wood or an orchard (Plate 17). This location would have been an ideal position for Holk's musketeers out on the end of his left wing, giving flanking fire from a covered position as the right wing musketeers actually did from the gardens of Lützen.

[557] Watts 1633, 132.
[558] Glafey 1749, 13.

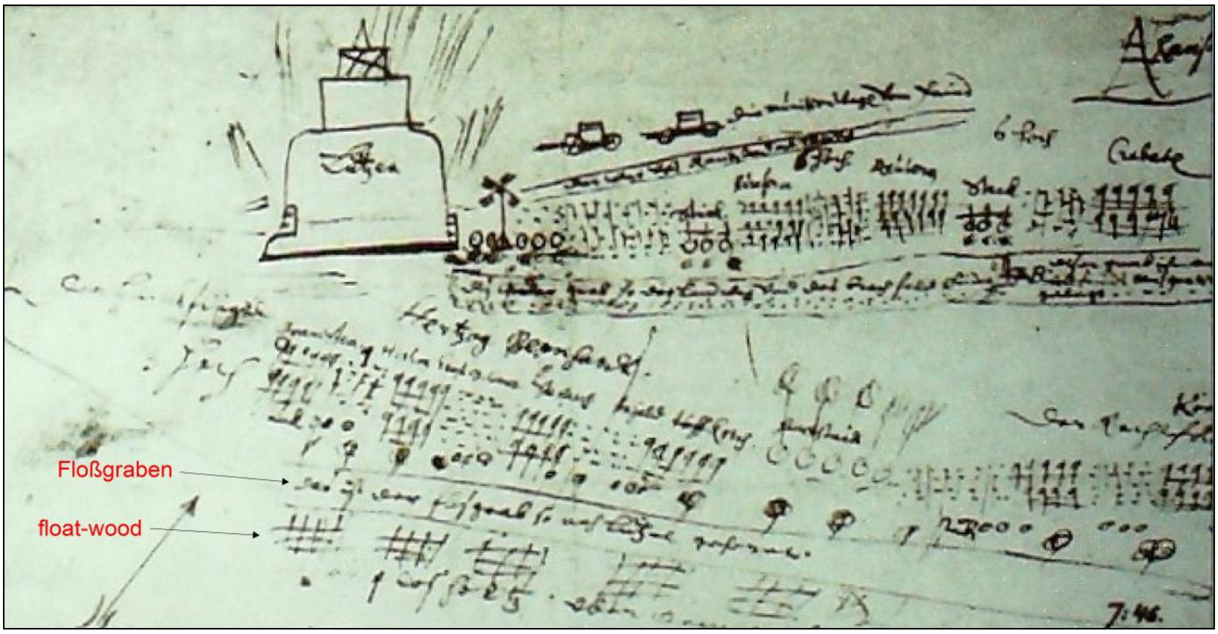

Figure 57: Sketch from Stockholm Krigsarkivet.

Figure 58: Lützen on 1710 field boundary map.

Plate 17: View from the Imperial left wing toward a small wood (trees in the front), the former village of Großgöttern, in which Holk failed to deploy 1,000 musketeers, and the Floßgraben (trees in the background).

6.1.4 The structures: City walls, enclosures, windmills and miller's house

When the Swedish army approached Lützen, they were fired at from the city walls and the castle of Lützen (Fig. 75).[559] According to Holk the Imperial army had 400 detached musketeers in Lützen, but he estimated that 1,000 would have been needed to defend the town.[560] To prevent the Swedish army from using the town, the musketeers set it afire and necessarily left it.[561] The only source which mentioned what happened to the musketeers after setting the town afire is William Watts:

"Between the Mills and the towne, were there divers gardens with mudd-walls round about them…"[562] and "…he [Bernhard von Weimar] must with the end of his Wing, even touch (as it were) the very walls with Muskettiers; they must needs have so sorely galled his Horsemen, that there had beene no coming neere: nor could horse and Pistols, have done any service against walls and Muskettiers."[563]

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[559] Vitzthum/Berlepsch (Glafey 1749, 13). The castle is one of the two still existing 17th century structures.
[560] Wittrock 1932, 308.
[561] Fleetwood 1632, 7.
[562] Watts 1633, 131.
[563] Watts 1633, 147.

The 1710 field boundary map does not show any walls around the gardens, nor does it show the city walls. It is, therefore, possible, that there was an enclosure defended by musketeers as Watts claimed.

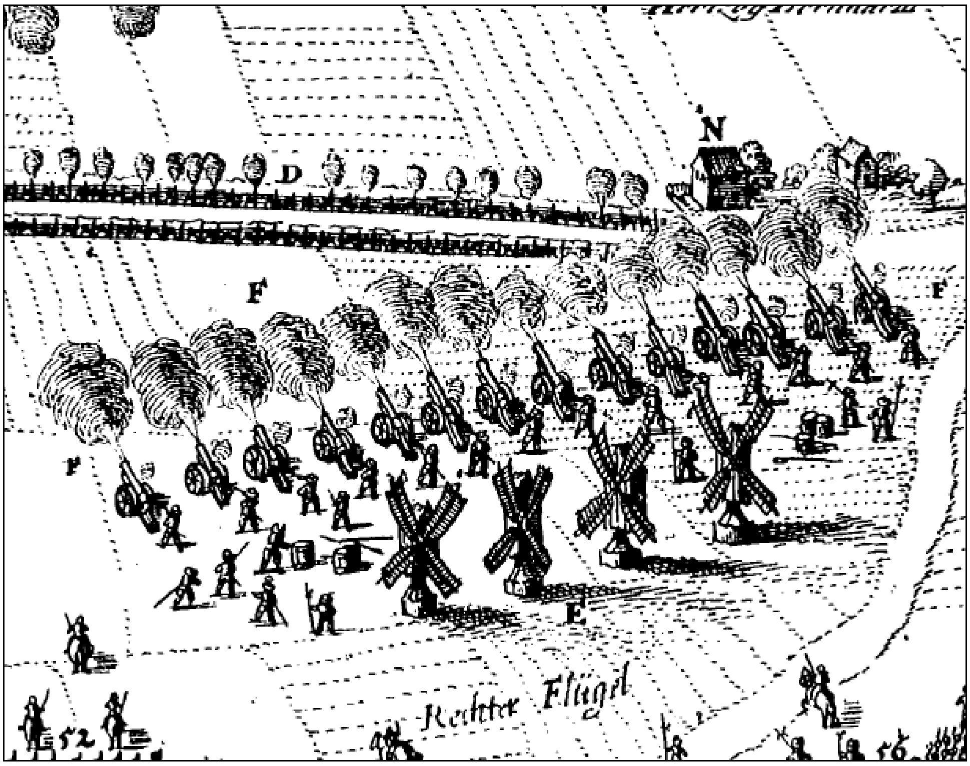

Figure 59: Miller's house N on van Hulsen's copperplate.

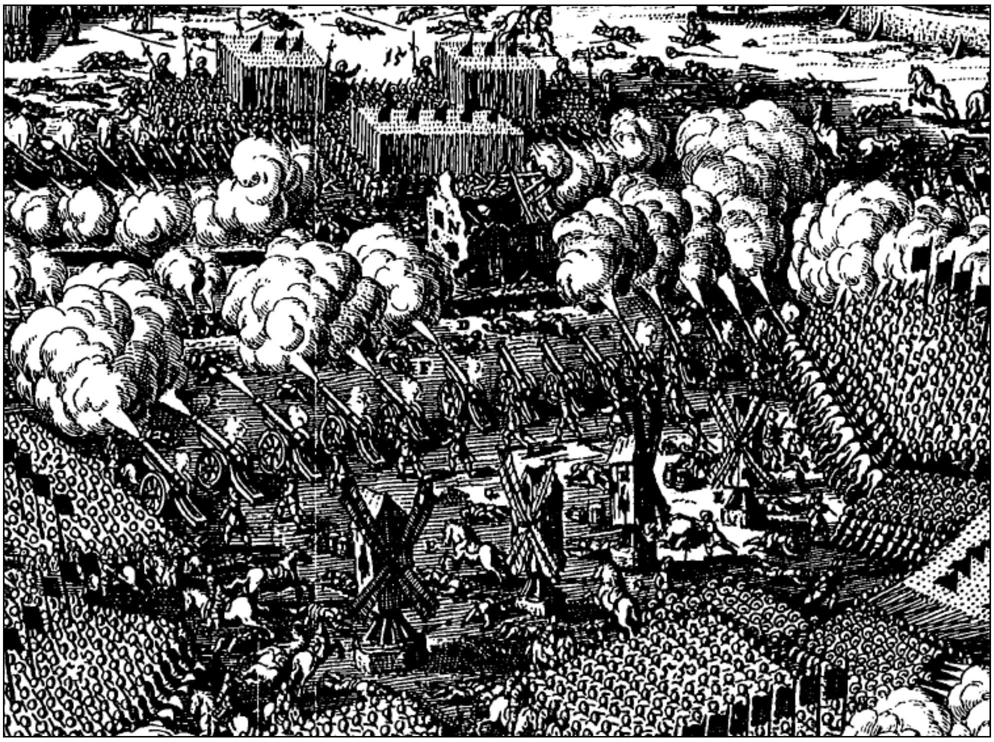

Figure 60: Miller's house N on Merian's copperplate.

Wallenstein's key defence point was his fortified large battery on the windmill hills.[564] Today there are no hills left and the last picture of the windmills made in the early 20th century show the hills were slight rises of a meter or less. Even if slightly higher in 1632, they would not have been much of a rise. There was possibly enough space to give three guns a slightly better field of fire. Although Fleetwood and Watts claimed that the hills were an advantage for the Imperial army, Holk did not mention them[565] and they were certainly not a decisive factor in the battle. There was also a miller's house near the mills which is mentioned by *Inventarium Sueciae*.[566] The van Hulsen (Fig. 59) and Merian (Fig. 60) copperplates show it south or on (sic!) the Via Regia, while the more reliable 1710 field boundary map shows it north of the Via Regia.

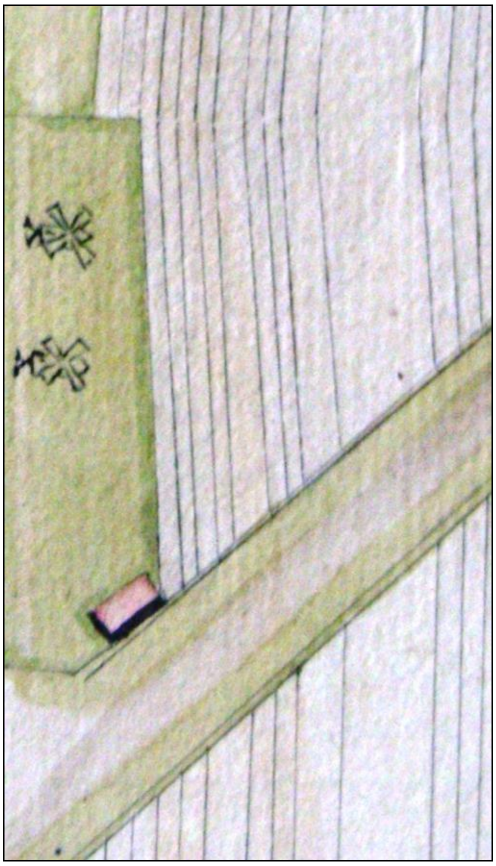

Figure 61: Windmills and miller's house on 1710 field boundary map.

[564] Vitzthum/Berlepsch (Glafey 1749, 13).
[565] Fleetwood 1632, 6, Watts 1633, 131. See also *Declaration from 1633* (Droysen 1880, 39) and Poyntz (1908, 72).
[566] Gottfried 1633, 25, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 750 and Chemnitz 1648, 465.

6.2 Via Regia and Wallenstein's trenches

According to the 1710 field boundary map, the Via Regia extended a distance of 1,350m in a straight line from Lützen to the northeast. It was not curved, as Deuticke believed, and this was demonstrated by trial trench 4 (see below).[567] Only after 1,350m did it turn, first east, and then north, where it crossed the Floßgraben, as shown by trial trenches 1-3. The road had drainage ditches on either side of which Wallenstein took advantage. He deployed his infantry centre and artillery behind those ditches. If there is one thing most historians[568] agree on, it is Wallenstein's fortification, a 2.5km long double trench system covering the whole Imperial battle line, dug into the road ditches of the Via Regia during the night of 15 to 16 November. It is believed that this position served detached musketeers as a first defensive line and caused a fierce engagement, while the trench posted a severe obstacle hindering Swedish troop movements.[569] The double trench system was never questioned by historians over the last 150 years, although its construction meant digging 5km of trench in one night which, although it seems possible, would have exhausted the Imperial army before this important battle. As such a fortification would have had a major impact on the course of the battle, it is important to discuss it in detail.

6.2.1 Historical sources

In the historical sources there seems little doubt about the existence of an Imperial trench system. Most contemporary non-eyewitness accounts agree that there was such a fortification and all copperplates show some kind of artificial trenches (see below). This picture changes if we look to the eyewitness accounts.

Protestant eyewitnesses

The Protestant eyewitnesses Vitzthum/Berlepsch and Fabricius did not mention any trenches or musketeers at the road.[570] Vitzthum/Berlepsch described Gustav Adolf's manoeuvre before the battle as wheeling around with his right wing against the refused

[567] Deuticke 1917, 58.
[568] Droysen 1865, 102 and Wedgewood 1938, 326 are exceptions. However, the latter is still suggesting heavy combat at the ditches of the Via Regia.
[569] Deuticke 1917, 65, Generalstaben 1939, 420, 431, Seidler 1954, 32, 45, 47, Mann 1971, 850, Brzezinski 2001, 39, 54, Guthrie 2002, 203, Eriksson 2006, 255, Mortimer 2010, 171 and Sennewald 2013, 169 are only a few out of a long list assuming trenches in Lützen.
[570] Glafey 1749, 12-14, Wittrock 1932, 305-307.

Imperial left wing and having no difficulties at all in getting over the Via Regia.[571] The only fortification Vitzthum/Berlepsch mentioned is a "retrengement" of the Imperial right battery at the windmills.[572] Similar to Vitzthum/Berlepsch, Fabricius wrote that "Gustav Adolf advanced over a ditch and attacked the enemy" without suggesting any delay or combat at the Via Regia.[573]

Dalbier stated that the enemy waited for the Swedes in a fortified and advantageous position behind a great ditch where they had placed their guns.[574] This great ditch could be one of the road ditches or even the Via Regia itself, which was a sunken road (see below), but Dalbier described neither trenches nor any other problems the Swedish army had in getting over the Via Regia so the fortified position is very likely the Imperial batteries.

Fleetwood's comment on the Imperial fortifications is difficult to understand. When he described the Imperial deployment, he wrote that

"the enimie had the advantage of Lypsicke highwaye, on either side of which a grafte."[575]

In discussing a skirmish just before the battle, he said:

"upon which the enimies they retyred again behinde the dike, where they had cast upp a kind of a brestworke."[576]

The "grafts" seem to have been simple road ditches[577] and have nothing to do with the "breastwork". At least Gustav Adolf did not seem to have any difficulty when "he leaped over the graft and charged the enimie."[578] The "brestworke" was very likely the fortified artillery position, as Vitzthum/Berlepsch and Dalbier described it.

The key to understanding the nature of the Imperial fortifications is probably the letter from Swedish headquarters, which states that

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571 Glafey 1749, 13.
572 Glafey 1749, 13.
573 Wittrock 1932, 306.
574 Dalbier 1632, 251.
575 Fleetwood 1632, 6.
576 Fleetwood 1632, 7.
577 According to Thesaurus 2009, 382, 'graft' is known to have been used from 1644 to 1737 as a term for 'field drain ditch.'
578 Fleetwood 1632, 7.

"…they [Imperial army] moved on a hill, with three windmills on top, digging a trench and a redoubt..."[579]

It seems rather obvious that this describes the fortified artillery position at the windmills, although it should be noted that this eyewitness was with the Swedish baggage train and had probably not seen the fortification himself, at least not from a close distance.

Imperial eyewitnesses

The Imperial eyewitnesses Münchhausen and Diodati did not mention any trenches or road ditches nor any musketeers on the Via Regia, which is surprising given the particular details in Diodati's substantial account.[580] Ottavio Piccolomini reported that the Swedes crossed a ditch and road and closed in on them, without having any difficulties and later he charged the enemy to a ditch and road, but he could not pursue them because of the "bad condition of the road."[581] The road was probably too muddy in November to charge on it, but it was not impossible to cross. His nephew Silvio Piccolomini, who served in his uncle's regiment, described an entirely different event when he wrote, that "we advanced to a small ditch and there we waited," by which he meant the whole army before battle and not his regiment only.[582] It is important that both Piccolominis did not mention any trenches or any fighting at the Via Regia.

Sydnam Poyntz wrote:

"In the front of his [Wallenstein's] Camp lay a long dry ditche which hee filled full of Musketiers."[583]

He is the only eyewitness, who mentioned Imperial musketeers in ditches, but he did not mention trenches. The meaning of the location "in front of his camp" is uncertain, but it seems possible that he meant the Imperial centre.

Holk, who was responsible for the deployment of the Imperial army, and therefore must have known the battlefield best, wrote that the Imperial army had a hollow road before their front, which served neither side as advantage once they stood together with the enemy pike to pike.[584] At this point Holk should have mentioned trenches if there were

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579 Söltl 1842, 346.
580 Wittrock 1932, 304-305, Fiedler 1864, 557-568.
581 Argang 1894, 89.
582 Archivio 1871, 240.
583 Poyntz 1908, 72.
584 Wittrock 1932, 308.

any. Even more important is that Holk listed the detached musketeers deployed in the town of Lützen and in front of the wings, but did not mention any on the road and it is not likely that he forgot them. In this circumstance, a reasonable explanation could be that Holk listed only independent units, while the musketeers in the road ditches were not an independent unit. The men in the ditches were likely detached musketeers from the front line infantry sent forward as skirmishers, but who otherwise fought as part of their squadrons.

Secondary sources

It is certainly not coincidental that no eyewitness to the Battle of Lützen mentioned artificial trenches made by the Imperial army,[585] nor did the early non-eyewitness accounts. A short account from 19 November[586] and *Relation I from Grimma* from 23 November[587] mentioned neither ditches nor trenches, and the 24 November *Extrakt Schreiben aus Berlin* stated that

“the enemy had the advantage of the pass and several ditches, which were occupied by musketeers.”[588]

Hallenus’ account from 30 November is one of the earliest accounts mentioning some kind of artificial trenches (löpgrafvar) occupied by Imperial soldiers in context with the small Imperial battery, but was otherwise not very specific about them, nor did he suggest that they were tactically important.[589] It is possible that his eyewitnesses actually reported trenches to him, but they had seen them in front of the small Imperial battery very close to their unit.

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[585] With the exception of Leubelfing’s account (Murr 1790, 122), which proves again that this account derived not from an eyewitness and is almost certainly a forgery (see section 2.2.3).
[586] Droysen 1880, 14.
[587] Studien 1844, 50-52.
[588] Mankell 1860, 658.
[589] Mankell 1860, 662.

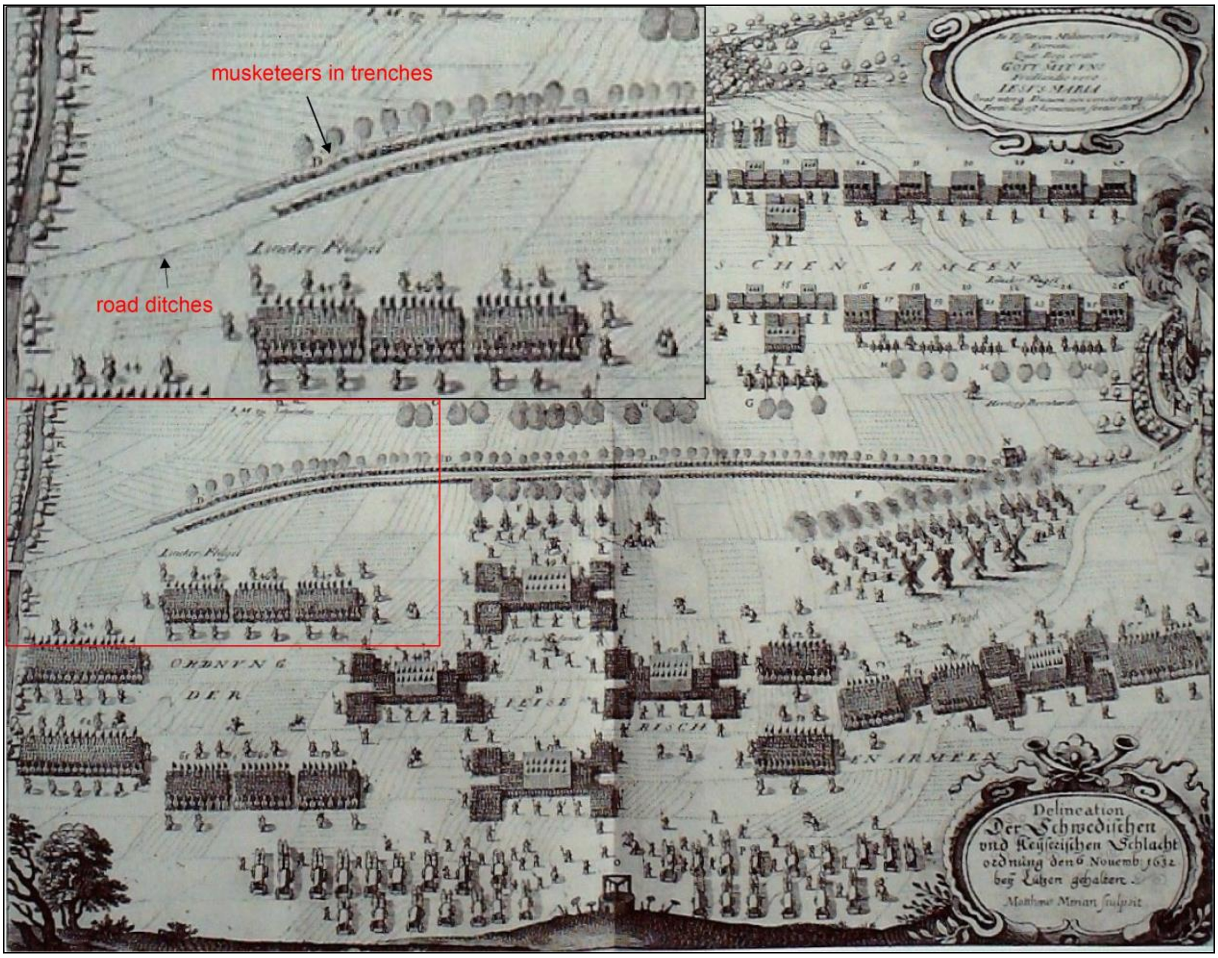

Figure 62: Most copied copperplate from van Hulsen showing a double trench system.

The turning point in the historic narrative concerning the road ditches was the 22 November *Relation II from Erfurt*, which stated that

“the enemy had built a breastwork at the Floßgraben during the night and occupied it to his advantage.”[590]

Shortly later, Adam Heinrich Pentz wrote a letter to Gustav Horn, describing two long ditches, which were impassable for cavalry except on a narrow “grass trail”, where Gustav Adolf could cross with his right wing in march formation only, suggesting that it took a long time to do so,[591] a circumstance also repeated by Watts.[592] For the first time, the impassability of two ditches and a fortification at a ditch is emphasized. The key to understanding what was changed and falsified in the historic narrative is the *Declaration from 1633*, which stated that “Gustav Adolf reached the Floßgraben occupied by Imperial

[590] Droysen 1880, 18.
[591] Fiedler 1864, 570.
[592] Watts 1633, 131 and 134.

musketeers, forced them out and used it to harass Wallenstein's troops with his own musketeers."[593]

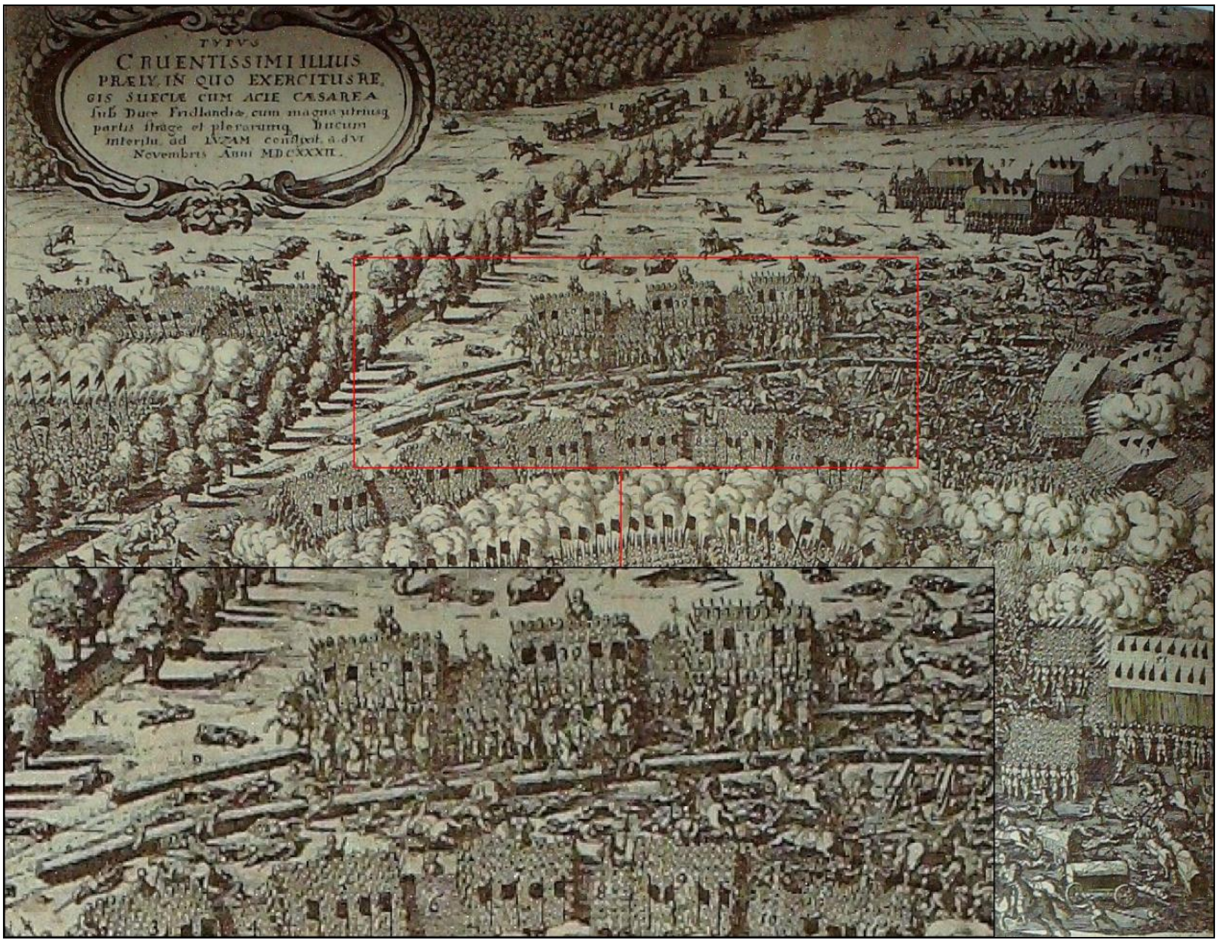

Figure 63: Detail of Merian's copperplate from *Theatrum Europaeum* following van Hulsen's plan. It shows the Swedish right wing crossing the trenches after heavy fighting.

The Floßgraben was certainly not occupied by Imperial musketeers, because it was filled with water and at 1.4km to 1.8km distance, it was too far away from the Imperial main battle line for an infantry skirmish line and was therefore certainly not fortified. These non-eyewitness accounts simply confused the Floßgraben, which was indeed an obstacle, with the road ditches.

The Swedish army had to cross the Floßgraben twice, the advance guard commanded by Gustav Adolf on a narrow bridge, to reach the battlefield and it seems very likely that Pentz misunderstood an eyewitness, believing that this event was the beginning of the battle and that Gustav Adolf had to cross an impassable ditch on a narrow "grass trail". The impassibility of the road ditches would contradict Fleetwood's statement that Gustav Adolf "leaped over the graft."

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[593] Droysen 1880, 39-40.

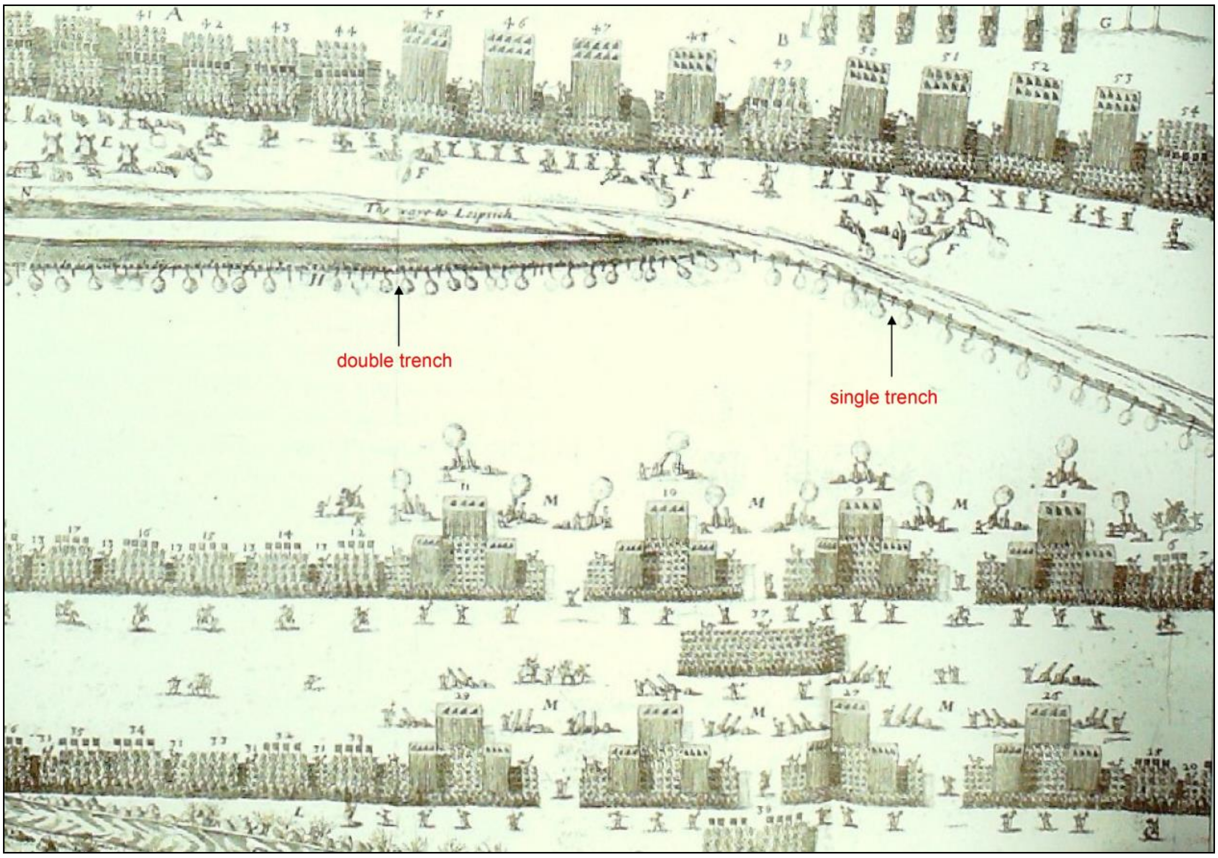

Figure 64: Copperplate from William Watts' *Swedish Intelligencer*.

Unfortunately, almost all later accounts[594] followed this erroneous historic narrative and gave a false impression of Wallenstein's fortifications. Khevenhiller,[595] Chemnitz[596] and *Inventarium Sueciae*[597] were very specific about artificial trenches made by the Imperial army. Watts, in particular, mentioned them:

"All night and next morning, his Dragooners and Pioners, wrought with thei: Spades about the High-way; and to make the Ditches, or Draine by it, serve them for a Breast-worke, to lodge their Muskettiers in."[598]

According to Watts, these trenches were man high and the Swedes had considerable problems getting over them.[599] Watts also described a trench erected around the artillery batteries.[600] This second trench is probably what Watts' eyewitnesses had seen, and was possibly one source for the misunderstanding that there was some kind of trenches along the front of the Imperial army.

594 Except for the *Spanish Relation* from 16 February 1633 (Watts 1633, 160).
595 Khevenhiller 1726, 188.
596 Chemnitz 1648, 464.
597 Gottfried 1633, 25, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 163 and Abelinum 1646, 749.
598 Watts 1633, 125-126, 131.
599 Watts 1633, 131.
600 Watts 1633, 125.

Although Priorato and Richelieu did not mention any artificial trenches, their accounts suggest that there was some kind of fortification, describing either the difficulty of the Swedish army getting over the ditches[601] or heavy fighting at the ditches.[602] Of the non-eyewitness accounts only Burgus is more specific in describing the fortification as one trench only in front of the infantry centre and not the cavalry wings.[603]

6.2.2 Pictorial representations: Copperplates and paintings

Most copperplates, following the most copied plan from Friedrich van Hulsen, continue the later tradition of historic narrative by showing a double trench system running from Lützen across the whole battlefield to the Floßgraben in front of the Imperial army (Fig. 62). Merian's copperplate combined the trenches with a fierce combat (Fig. 63).
A slightly different trench system is illustrated by the *Swedish Intelligencer*, showing a single trench in one of the road ditches in the eastern half and a double trench south of the Via Regia in the western half (Fig. 64). This configuration is even more unlikely, because it would have meant digging a whole new double trench instead of modifying the existing road ditches, not to say that there is no historical evidence supporting such a fortification. The only pictorial representation illustrating a completely different situation is the painting by Snayers, showing no trenches and no musketeers on the Via Regia; however, the road is in the painting's background, which makes it difficult to see details (Fig. 65). It seems that this painting shows the situation of the Imperial army more accurately than other copperplates and paintings.

[601] Priorato 1672, 120.
[602] Richelieu 1823, 258-259.
[603] Burgus 1641, 317.

Figure 65: Painting from Pieter Snayer with the Imperial army in the foreground.
(image has been removed due to copyright restrictions)

6.2.3 Archaeological sources: excavations

Because the historical sources are not entirely conclusive, four trial trenches were excavated in the area where the Via Regia is located according to the 1710 field boundary map (Fig. 55). Trenches 1-3 were positioned on the Imperial left wing (Fig. 66).[604] Only trench 1 covered the road entirely. Wheel tracks in two areas over a distance of 19.9m between the outer tracks at maximum depth of 1.02m from topsoil's surface[605] confirmed that the Via Regia was a shallow hollow dirt road, as Holk and Ottavio Piccolomini described it, which is a typical medieval-early modern major road in Germany (Plate 18).[606]

[604] Schürger 2009, 138-141.
[605] Depths from topsoil's surface means from modern and 1632 surface, which were almost identical.
[606] Schürger 2006, 190. Despite Holk's statement that the Via Regia was a sunken or hollow road, Deuticke (1917, 58) emphasized that the road had the same height as the surrounding fields, an observation that was neither challenged nor discussed by historians.

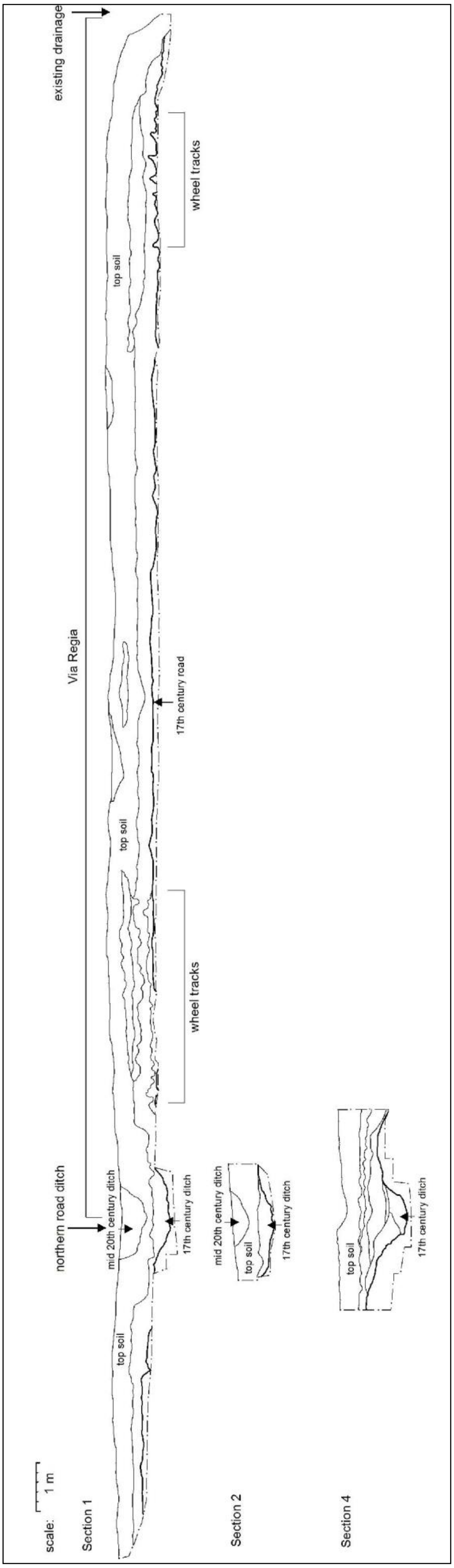

Figure 66: Sectional view of the Via Regia. Section 1: Entire Via Regia, Sections 2 and 4: Northern road ditch.


Plate 18: Sectional view section 1: Wheel tracks of the Via Regia.

A modern existing drain destroyed all archaeological evidence on the southern side, where the old road ditch was expected (Plate 19). While the northern road ditch was used until the mid-20th century, the bottom of the old ditch was still intact. This indicates a total width of 24m from road ditch to modern drain. The northern road ditch is 1.8m wide and has a depth of 0.32m to the old road and is 0.99m below the surface (Plate 20). In order to date the ditch, 10m of its filling was sieved, which produced 67 pieces of monochrome lead glazed pottery, dating to the 16th and 17th centuries. Since no more recent or older pottery was found, the bottom of the road ditch very likely represents the original 17th century ditch. The road ditch showed no traces of any attempt to reshape it into a trench. The shape of the northern drain was confirmed in sections 2 and 3, where it looked like the road ditch in section 1.

In the Imperial centre the Via Regia was built over by a modern road for most of its length and the southern road ditch was destroyed by a gas pipeline. Trial trench 4 revealed 15m of the northern road ditch and a very small part of the hollow way. It confirms that the Via Regia went in a straight line from Lützen to the Gustav-Adolf-Memorial, where it made a turn to the south, as shown on the 1710 field boundary map. In section 4 the road ditch is 1.6m wide and has a depth of 0.64m to the old road and 1.42m to the surface (Plate 21). Therefore, it is 0.43m deeper than in section 1, but it also did not show any sign of entrenchment. No battle related artefact was found anywhere in the road ditch.

Plate 19: Modern southern drain of the Via Regia, which destroyed all archaeological evidence.

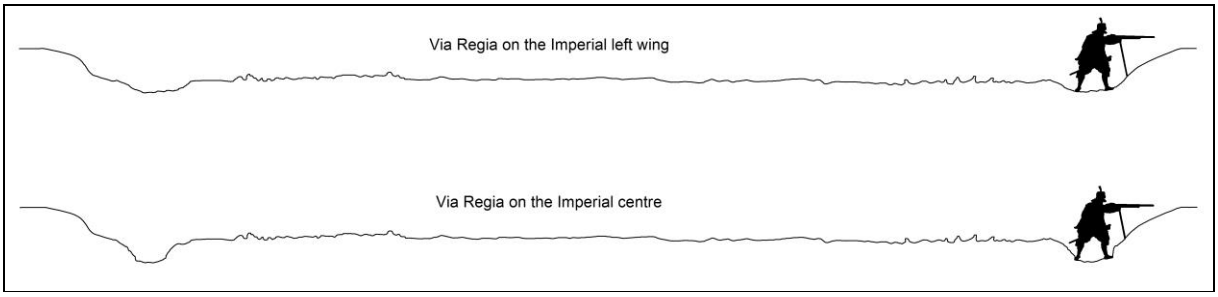

Figure 67: Reconstruction of the Via Regia in sectional view. The missing front (southern) ditch is reconstructed according to the known rear (northern) ditch to illustrate that it is deep enough to provide some cover.

The results from the archaeological excavations show that there was no double trench as well as demonstrating that a second musketeer line on the northern side would have been ineffective, because the Via Regia was a hollow road. Musketeers firing south from such a position would either have the protection of a trench but no line of fire or no protection, but still an ineffective line of fire against the backs of their comrades (Fig. 67).

Plate 20: Sectional view of the northern road ditch in section 1.
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Plate 21: Sectional view of the northern road ditch in section 4.
(image has been removed due to copyright restrictions)

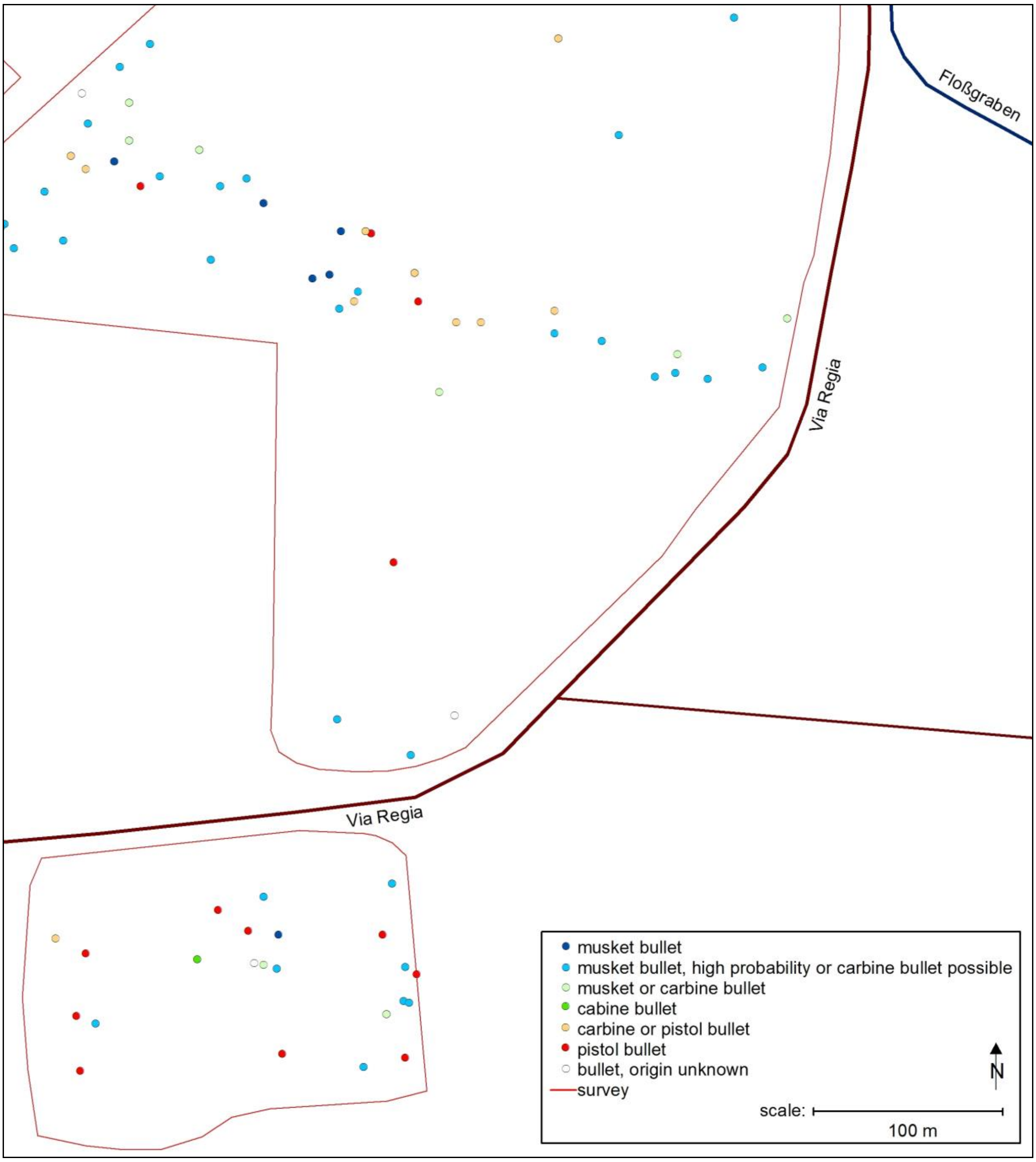

Figure 68: Bullet distribution near the Via Regia in front of the Imperial left wing.

If we assume that the southern road ditch looked similar to the northern, it would have provided average cover (0.99m) from distant fire on the Imperial left wing and good cover (1.42m) in the Imperial centre. Some brush could have provided additional concealment. The ditches, however, would have been insufficient for trench warfare, as it was often suggested by historians. Also, it would have been counterproductive to dig the road ditch on the Imperial centre even deeper, because such a trench would have been too deep for musketeers to fire from. The road ditches would have provided neither side with an advantage at point-blank range, as Holk mentioned, and it certainly would not have prevented the Swedish cavalry from crossing the Via Regia on the Imperial left wing, where the road ditches were shallower than in the centre. Still, the hollow road and the ditches were an obstacle to charging cavalry, as Ottavio Piccolomini described, because cavalry would loose momentum the instant they reached the road.

6.2.4 Archaeological sources: survey

As the southern road ditch is probably entirely destroyed by a modern ditch and gas pipeline, a survey was conducted to investigate the fighting at the Via Regia on the Imperial left wing. Imperial musketeers on the Via Regia would have fired southward against the advancing Swedish troops. In an area of 3ha, a maximum of eleven musket bullets were found 40m to 140m south of the Via Regia (Fig. 68). The widely scattered bullet distribution pattern and distance from the road could suggest that there were Imperial musketeers deployed on the road. However, if there were musketeers on the Via Regia, we could expect the Swedish troops to have returned fire and there would have been clearly visible bullet distribution patterns south and north along the road. But there are almost no bullets near the road reflecting such a combat; in fact, the bullets seem to avoid the road.

Musket bullets south of the road are mixed with nine pistol bullets. Four show impact damage and one shows firing evidence, confirming that it was a combat and not a unit reloading their pistols. The bullets are too far away to be related to any combat at the Via Regia. Their distribution pattern is similar to patterns 500m to the north, which can be related to skirmishes fought by light cavalry and musketeers on open ground (section 8.2.1). It is, therefore, very likely that the bullets south of the road derive from a skirmish too.[607]

Although the bullet distribution pattern is not entirely conclusive, it demonstrates that there was no heavy fighting along the Via Regia on the Imperial left wing and it is most unlikely that there were any Imperial musketeers deployed. However, the bullet distribution pattern south of the Via Regia in field IX, particularly the concentration of Imperial m4 and M5 musket bullets, is evidence for an Imperial skirmish line in the road ditches in front of the centre only.

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607 Schürger 2011, 103-120.

6.2.5 The dike

Deuticke claimed that the Via Regia was built on a 1.5m high dike near the Floßgraben without quoting any sources or explaining how he came to this conclusion.[608] In fact, only Fleetwood mentioned a dike on the battlefield, but in context of a breastwork, which was most likely the fortified artillery position.[609] At the present time, the area where the Via Regia crossed the Floßgraben is completely flat and it is almost impossible that any such extensive earthwork vanished without leaving traces in an area which has never been ploughed. Deuticke, who first created this story, was probably influenced by the modern road, which is built on a 1.5m high causeway dating to the late 18th century, which is now federal road B 81.

6.2.6 Tactical value of the Via Regia

The tactical value of the Via Regia and its ditches for Wallenstein was marginal. It certainly helped Wallenstein's infantry deploy and in defending the centre by providing a site for harassing the Swedes with skirmishing fire from the road's ditches. On the Imperial left wing, the Via Regia made a turn to the east, in the direction of the Swedish battle line, exposing it to Swedish artillery fire and attacks down its length, which made this part of the Via Regia useless as a defensive position for Wallenstein. In fact, he chose a defensive battle array with refused wings (section 7.1.1), which increased the distance between Via Regia and his left wing to 600m to 1,000m. Imperial musketeers on the road would have had to retreat this distance over open ground to reach the safety of the Imperial cavalry wing. An even more likely scenario would be that the Swedish cavalry charged to the trenches after the first Imperial volley and fired their pistols at the musketeers before they had a chance to fire a second time, killing all of them in seconds without risking many casualties or being seriously delayed. It is most unlikely that Holk, who was in charge of the Imperial deployment, would have wasted his musketeers so casually when he complained that he did not have enough to deploy some in the small wood to his right; it certainly would have been a waste of time to dig trenches without occupying them.

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[608] Deuticke 1917, 58 and 65, followed by Mann 1971, 847 and 849, Roberts 1958, 765, Generalstaben 1939, 431 and Eriksson 2006, 255.
[609] Fleetwood 1632, 7.

6.2.7 Conclusion

It is much more difficult to prove that something did not exist than to prove its existence, in particular when it has already influenced research for decades. Despite the numerous illustrations on copperplates and descriptions in secondary sources, archaeology has demonstrated that there was no double trench and no heavy fighting along the Via Regia on the Imperial left wing. The archaeological results are confirmed by eyewitness accounts, none of which suggest an entrenchment inside the road ditches or any delay the Via Regia might have caused the advancing Swedish right wing. In particular, Holk's silence about trenches is strong evidence that there were none. Building a 5km long trench system during one night would have exhausted the Imperial army, while it would have provided only a very limited advantage on the Imperial left wing. Instead, Wallenstein deployed three Croat regiments as a mobile skirmisher screen in front of the left wing (section 7.1.2).

According to the historical and archaeological sources, it can not be ruled out entirely that there was a single trench only in front of the Imperial centre, as Burgus described it. However, there was no necessity; the road ditch in this area was already deep enough to provide some cover for musketeers. Those musketeers very likely consisted of the first musketeer lines of the five forward infantry squadrons, delivering skirmishing fire at the advancing Swedish infantry. They certainly retreated behind their lines when the Swedes were closing in, as there was no tactical advantage to defending the ditches to the last man. It seems as if historians expected Wallenstein to have entrenched his army because he did so at Dessau Bridge (1626) and Nurnberg/Alte Veste (1632), and it became a topos or cliché in printed 'relations'. This new archaeological and historical interpretation changes all former interpretations of the battle and it seriously changes the assessment of secondary sources, written and pictorial.

Chapter Seven

Deployments

7.1 Imperial battle array

Probably one of the most discussed issues relating to the Battle of Lützen over the last 150 years has been the Imperial deployment, at least until Brzezinski published his substantial research in 2001. He re-evaluated all the known sources and in addition discovered some new material. Alas since then, a number of publications about the Battle of Lützen have failed to recognize his findings, but repeat the out-of-date work from Deuticke 1917, Generalstaben 1939 and Seidler 1954; it is therefore necessary here to re-evaluate all known historical sources and reassess the position of Wallenstein's initial battle lines in conjunction with the archaeological sources.

7.1.1 Alignment of wings and position of the centre

Historical sources

There are three basic eyewitness accounts giving valuable evidence about the alignment of the Imperial wings: Vitzthum/Berlepsch, Diodati and Ottavio Piccolomini. Although their accounts were published in 18th and 19th century, researchers tended not to take their statements seriously.

Deuticke believed the Imperial battle line was completely aligned with the Via Regia, which he incorrectly reconstructed as an s-turn, thus suggesting some kind of trench warfare. In doing so, Deuticke[610] ignored Diodati, the main source in this matter, who wrote:

"…the cavalry was deployed equally on the right and left wing in 'stairs' [It.: scala] order, well covering the one and the other flank of the army, advancing when necessary to attack the enemy, joined by the infantry…"[611]

Diodati meant quite literally that the cavalry wings were echeloned to the rear like stairs, so that the flanks of the army were covered and that cavalry had to advance to attack. This

[610] Deuticke 1917, 65, Mann 1971, 847-849.
[611] Fiedler 1864, 561-562.

is confirmed by Diodati's second statement that the right wing had Lützen to its front,[612] which is only reasonable if the right wing was echeloned to the rear, and by Ottavio Piccolomini's account that the Cuirassier Regiment Götz was to his right in front of him.[613]

Although Seidler[614] and Generalstaben[615] recognized Diodati's and Piccolomini's accounts, they did not believe that Wallenstein left a gap between his right wing and Lützen and therefore concluded only the left wing was echeloned to the rear, and then only slightly, while the right formed a straight line with the centre, leaning towards the town of Lützen. This is still the acknowledged view today.[616] To solve the contradiction between their reconstruction of the Imperial deployment and Diodati's account, Seidler and Generalstaben moved the centre and right wing 230m away from the Via Regia to the north so that parts of the right wing have Lützen to its front. Even after this adjustment, they still insisted on intensive fighting over the trenches, which would have been a serious tactical mistake, because the first line would have been too far away to effectively support the skirmish line in the road ditches.

Brzezinski was the only scholar to recognize Diodati's account. He moved the Imperial centre closer to the Via Regia and reconstructed the alignment of the Imperial wings as angled 45° towards the centre, an interpretation supported by other sources.[617] The Protestant eyewitness Vitzthum/Berlepsch reported:

"…but finally his Majesty [Gustav Adolf] advanced the right wing so far that he had almost turned his back towards Ranstädt, with which the encounter on both sides began on horse and foot,…"[618]

[612] Fiedler 1864, 561.
[613] Argang 1894, 89.
[614] Seidler (1954, 36) initially recognized the Imperial refused wings, but came to the conclusion that the Imperial right wing immediately advanced to the Via Regia upon the beginning of the battle.
[615] Generalstaben 1939, 417.
[616] Guthrie 2002, 203.
[617] Brzezinski 2001, 39-55.
[618] Glafey 1749, 13.

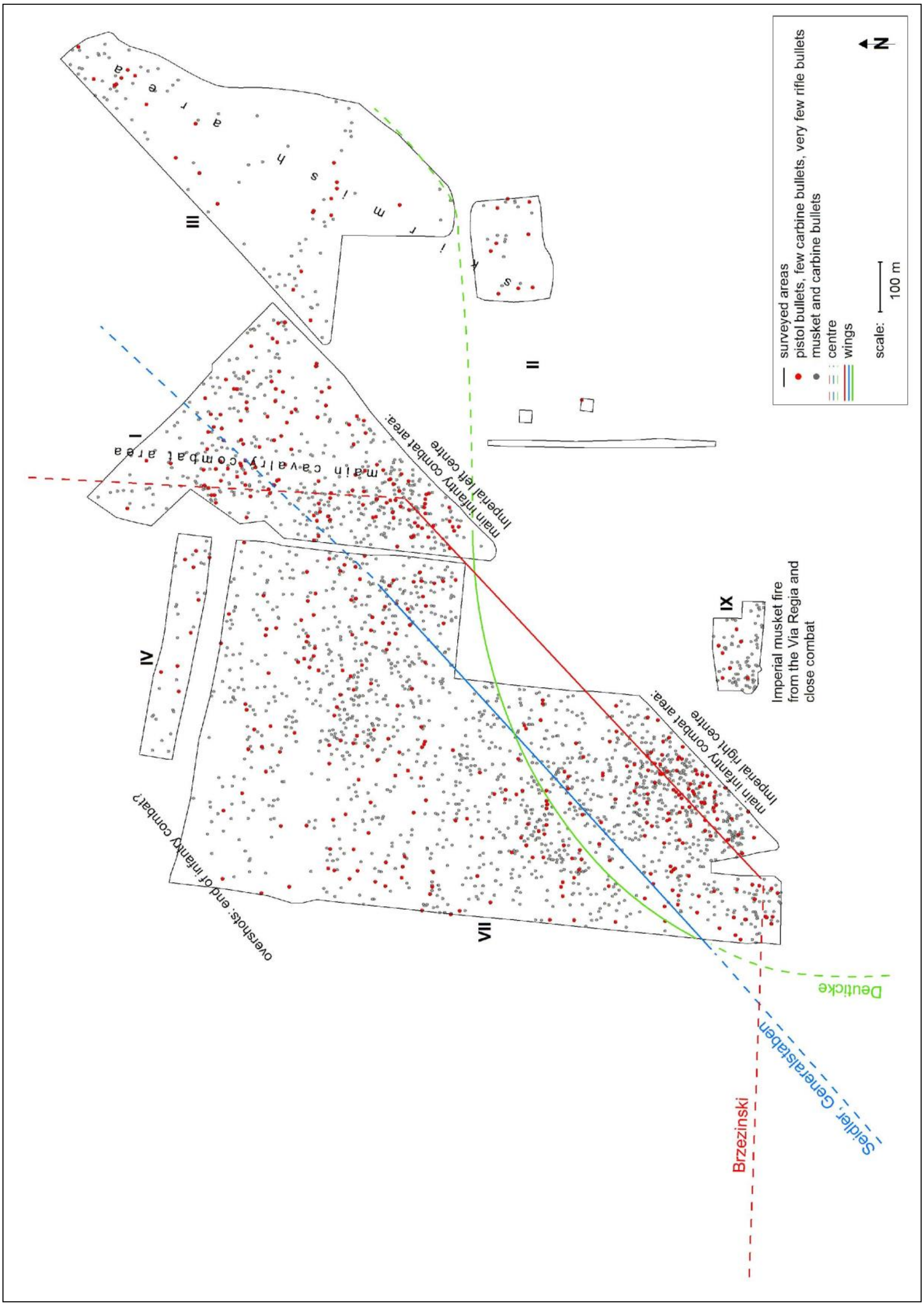

Figure 69: Bullet distribution. Pistol/carbine bullets according to calibre and weight: 8.4-14.5mm or 3.00-14.75g, musket/carbine bullets according to calibre: 14.6-19.9mm or 15.00g+.

Ranstädt was a town 3.5km northeast of the battlefield, which formed almost a straight line with the Swedish battle array. In order to have Ranstädt in its back, the Swedish right wing had to wheel to the left. Since the battle began after this manoeuvre, according to Vitzthum/Berlepsch, it must be assumed that the Swedish army had reached the left Imperial wing by this manoeuvre. If this is so, Vitzthum/Berlepsch implies that the Imperial left wing was refused at an angle of approximately 40° to 50° to the centre, which corresponds with Diodati's and Burgus' accounts.[619]

Supporting his arguments, Brzezinski presented two previously unknown pictorial representations, an equestrian portrait of Gustav Adolf by Bianchi (Fig. 123) and a painting by Snayer (Fig. 65).[620] Although copperplates and paintings are usually unreliable, both show refused wings and, in addition, almost the identical deployment of the Imperial centre as Holk and Diodati described it, suggesting they had access to Imperial eyewitness accounts.[621]

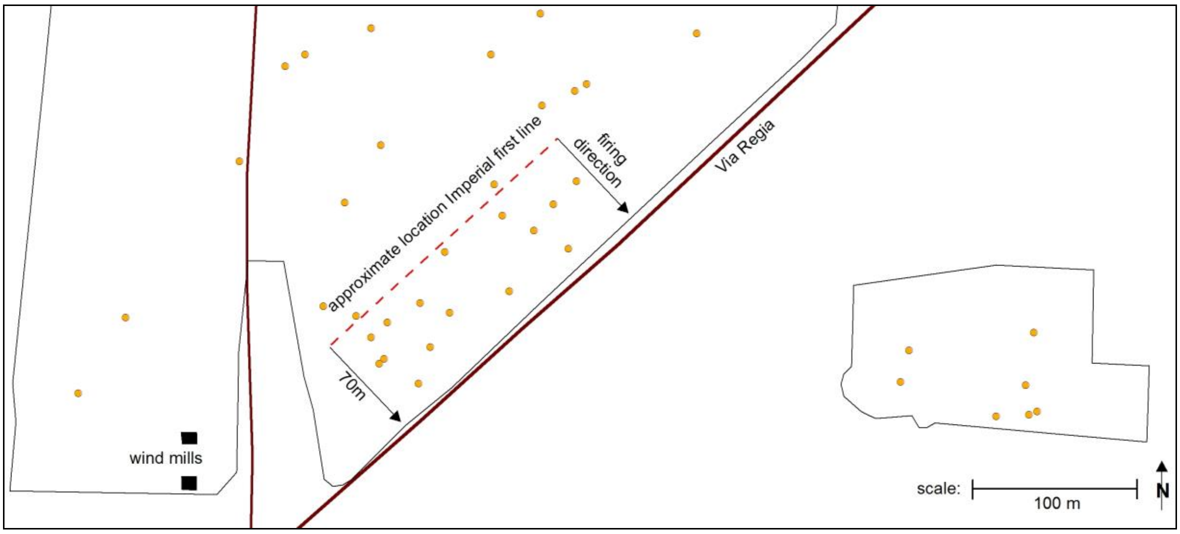

Figure 70: Bullet distribution on the Imperial right centre: Imperial muskets m4 and M5 (17.3-17.8mm), possibly mixed with few M2 and m3 musket bullets and very few c1 carbine bullets.

Archaeological sources

The bullet distribution on the battlefield provides some evidence for the Imperial deployment (Fig. 69). The densest bullet concentration of the survey is south of field VII; it is oval shaped and runs parallel to the Via Regia (Inf15). This concentration almost certainly derives from several different fighting episodes, but it clearly indicates the right centre of first Imperial battle line, which must have run somewhere through it.

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619 Burgus 1641, 317.
620 Brzezinski 2001, 47 and 55.
621 Brzezinski (2001, 46) suggests that Bianchi had information from one of Wallenstein's Italian officers.

The distribution pattern of the m4 and M5 musket bullets in the same area provides additional evidence to further pinpoint their position (Fig. 70). Those muskets were used mostly by the Imperial army and their bullets are scattered widely across the battlefield except south of field VII, where fifteen bullets were scattered in a 170m long and 70m wide zone parallel to the Via Regia. A distance of 170m is only slightly larger than the estimated length of an Imperial infantry squadron, suggesting that those bullets were fired by one unit. Therefore, the northwest end of this concentration very likely marks the first Imperial line as being 70m away from the Via Regia, a position that would have allowed a closer interaction between infantry squadrons and skirmishers in the road ditches.

The second bullet concentration is in the south corner of field I. This is not as distinctive as that in field VII, because it is blurred with other distribution patterns to the west (Inf5). To the northeast this concentration is limited because the bullet distribution pattern thins out, not only marking the end of the Imperial left centre, but suggesting it is very unlikely that cavalry was deployed on a straight line with the centre. It also suggests a distance of approximately 70m between the first line and the Via Regia. The total length of the Imperial centre, defined by the windmills and the bullet concentration in field I, is approximately 1,035m.

The bullet concentration at the Imperial centre’s northeastern (left) end continues spreading northward (Inf5). This might indicate the refused left wing’s position. Further east in field III, the bullet density diminishes rapidly, which suggests skirmishing rather than full scale combat. The low density bullet distribution pattern on field III definitely rules out Deuticke’s reconstruction of the Imperial battle array. Seidler’s and Generalstaben’s reconstruction of a first Imperial battle line 230m north of the Via Regia is also contradicted by the bullet distribution pattern, because their projections would run through low density areas, in particular on the right centre, where most of the fighting took place. In addition, most of the heavily impacted musket bullets are distributed near the Via Regia, suggesting point-blank musket fire near the road and therefore that the Imperial centre was closer to the road than Seidler and Generalstaben believed. Therefore, the archaeological resources, as well as the eyewitness accounts and pictorial representations, support Brzezinski’s thesis of the Imperial battle line with refused wings and a centre in close proximity to the Via Regia.

7.1.2 Battle array

As we have reliable eyewitness accounts from Holk and Diodati,[622] there is little doubt about the Imperial infantry deployment in eight squadrons: Five were in the first line, two in the second, and one as reserve. According to Holk, each first and second line squadron fielded approximately 1,000 men.[623] However, the reserve squadron consisted of 500 musketeers, not 2,500 as Holk stated accidently (section 3.1.2). There are very few hints about the precise positioning of units in the Imperial battle array. These known units are mentioned by their regimental name rather than by squadron composition. Only Diodati gives an approximate position for infantry regiments; Berthold von Waldstein's on the right centre and Grana's somewhere left of him.[624] There is only one eyewitness account about the centre's cavalry reserve. According to Holk, the infantry reserve squadron was flanked by two cavalry squadrons whilst the second line had either two or three cavalry squadrons, depending on interpreting Holk's statement that the two infantry squadrons and the six cavalry companies were mixed two by two.[625] It is not entirely certain, if Münchhausen refers to the cavalry reserve when he mentioned the Regiment Bredau, which he probably had seen in action near his Regiment Comargo.[626]

Five eyewitness accounts[627] concern deployment of the Imperial wings, but they remain relatively vague, which allowed historians to come to very different conclusions. Holk's statement, in particular, that the Duke [Wallenstein] fought for two hours against the Swedish infantry with the Cavalry Regiments Holk, Trcka, Piccolomini and Desfour has led historians into erroneously believing that those regiments were initially deployed together on the right wing. However, Holk actually described another event, which occurred at a later time during battle, when the Imperial cavalry had possibly changed wings.[628]

According to Diodati[629] and Ottavio Piccolomini,[630] the Cavalry Regiments Götz and Piccolomini were initially deployed on the left wing adjacent to the infantry centre.[631]

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[622] Wittrock 1932, 308, Fiedler 1864, 561.
[623] Wittrock 1932, 308.
[624] Fiedler 1864, 565.
[625] Wittrock 1932, 308.
[626] Wittrock 1932, 305.
[627] Holk, Diodati, Ottavio Piccolomini, court martial document, and Fleetwood.
[628] This part of Holk's account (Wittrock 1932, 309) was ignored by Generalstaben (1939, 418), who placed three of these four regiments on the left wing, which would have meant that most of the left wing moved to the right during the battle. It was also misinterpreted by Seidler (1954, 38), who believed that all those regiments were deployed initially on the right wing.
[629] Fiedler 1864, 563.

The document of the court martial at Prague states that the Regiments Hagen and Trcka were initially deployed adjacent to each other somewhere on the right wing but that Hagen later moved to the left near the Regiment Goschütz, the left wing reserve.[632] Fleetwood reported that "the crabates haveing the lefte wynge",[633] but some Croats were also deployed on the right wing.[634]

Trauttmansdorff's list without Pappenheim's corps	Author's notes
A Pertoldt von Waldstein und Alt-Sachsen B Coloredo und Chiesa C Grana und Fridrich Breiner D Alt-Preuner E Comargo	Infantry first line centre
F Baden G Jung-Breiner	Infantry second line centre
H Comandirte fändl	Infantry reserve centre
J Holckhe K Terzka und des Four L Haagen M Droost	Cavalry right wing
N Breda O Westpfalen P Tontinelli	Cavalry second line reserve
Q Isolani	Cavalry left wing screen
R Göz S Piccolomini T Leuderßhaimb V Loyers und Lohe	Cavalry left wing
Y Westromb X Gouschier	Cavalry wing reserve

Table 21: Trauttmansdorff's list.

Still the best sources about the Imperial wings are the accounts from Holk and Diodati. According to Holk, each wing consisted of 36 companies of cavalry with 150 detached musketeers,[635] a statement supported by Diodati, who mentioned an equal deployment of cavalry on both wings.[636] Vitzthum/Berlepsch reported that:

"four troops of cavalrymen have shown themselves on the side of the city." [637]

This statement led Deuticke to conclude that this is the number of cavalry squadrons on the right wing,[638] but it is more likely that Vitzthum/Berlepsch referred to a Croat skirmish

630 Argang 1894, 89.
631 Only Burgus (1641, 324) placed Götz incorrectly on the right wing.
632 Seidler 1954, 141.
633 Fleetwood 1632, 6. This is also mentioned by Gottfried (1633, 26), copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 750 and Chemnitz 1648, 466, which referred to an event in the early afternoon.
634 According to the document of the court martial the Regiment Hagen was routed by retreating Croats on the right wing (Seidler 1954, 141).
635 Wittrock 1932, 308.
636 Fiedler 1864, 561.
637 Glafey 1749, 13.

screen at the Floßgraben and Mühlgraben before the battle, although each wing did consist of four squadrons (see below).[639]

The Trauttmansdorff's list (section 2.2.4) was probably the most important discovery for reconstructing the Imperial deployment. Unlike the accounts, it lists complete squadrons with some consisting of two regiments as they were assembled to provide the necessary troop strength for a battle formation.[640] The squadrons on the list are marked with letters in alphabetical order, in case of Pappenheim's corps with symbols, and we can assume that they were marked on a now lost map in a specific order.[641]

In conjunction with eyewitness accounts, the list can be interpreted as follows (Fig. 72): Since Waldstein was in the right centre and Grana somewhere left of him, infantry squadrons A to E should be in the first line from right to left. Baden was very likely near Comargo so infantry squadrons F and G were in the second line from left to right and the detached musketeers H formed the reserve. Trcka and Hagen were deployed adjacent to each other on the right wing. Therefore, the cavalry squadrons J to M were on the right with Holk's squadron to the front. This deployment almost matches Holk's statement that the Regiments Holk, Trcka and Desfour were on the right, while Piccolomini must have moved from the left to the right during the battle. Götz and Piccolomini flanked the centre on the left, which puts the cavalry squadrons R to V on the left. Bredau was probably in reserve behind Comargo, which makes it likely that the cavalry squadrons N to P were the second line reserve from left to right. Isolani's Croats (Q) are listed between the second line reserve and the left wing and could have been deployed anywhere in front of the left wing and moved as circumstances dictated. The cavalry squadrons Westrumb (Y) and Goschütz (X) flanked the musketeer reserve with Goschütz on the left.

Wallenstein detached four musketeer squadrons from his infantry regiments. One squadron of five companies functioned as reserve. Two 'squadrons'[642] of 150 musketeers each were positioned "in front of each wing," probably deployed either as 50 men strong

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638 Deuticke 1917, 66.
639 Brzezinski 2001, 46.
640 There are eight infantry units marked as A to H on the list, which match the number of infantry squadrons mentioned by Diodati (Fiedler 1864, 561) and Holk (Wittrock 1932, 308).
641 Suggested first by Stadler (1991, 891-892) and utilized by Brzezinski (2001, 48) to reconstruct the Imperial deployment. Although it was acknowledged by Sennewald (2013, 158), he reconstructed the deployment in a mostly confused alphabetical order, by trying to tally it with Generalstaben's incorrect result.
642 The term 'squadron' is not used in historical sources for the musketeers deployed on the wings or in the gardens, but they certainly consisted of more than one company and were therefore commanded by an officer with a rank higher than captain, which made them de facto independently operating squadrons.

companies between cavalry squadrons to match the Swedish tactics,[643] or as one unit, but they were too few to form an effective skirmishing screen in front of the entire wing and they were certainly not deployed in the road ditches.[644] One 'squadron' of 400 musketeers was initially deployed in the city and castle of Lützen,[645] but were redeployed into the gardens of Lützen behind a mud wall at the beginning of the battle.[646] The musketeers in the Via Regia road ditch were not independent units, but very likely consisted of one or two ranks from the frontline infantry squadrons, who simply retired to their linear positions after they had performed their duty as skirmishers.

The centre was flanked by two batteries of heavy artillery pieces that were almost certainly in fortified positions. There is evidence for such a fortification at the windmills (section 6.2.1) and some hints about another fortified small Imperial battery. According to the only eyewitness, Dalbier, who provided the number of artillery pieces in the smaller, left centre, battery, it consisted of six pieces, four 24-pounders and two 12-pounders,[647] although most secondary sources mentioned seven pieces.[648] There is no historical evidence and no direct archaeological evidence to pinpoint this battery's position. Since the northeast end of the left centre's position is known, the battery must have been deployed in close proximity to this area. Secondary sources give a variety of different numbers of artillery pieces for the larger battery at the windmills on the right centre. These figures range from nine to seventeen.[649] If the document from Stralsund is correct, the battery had seventeen pieces: five 24-pounders, two 16-pounders, four 12-pounders, one 10-pounder and six 6-pounders.

Regimental guns, probably eight to sixteen pieces, were deployed in the first line between the infantry squadrons (section 3.1.2). The approximate spacing between the first line infantry squadrons at Lützen can be calculated because a 1,000 men strong infantry squadron deployed seven ranks deep had a frontage of 153m, assuming 5m spacing for officers between the bodies of pikemen and musketeers. That would leave a spacing of roughly 67.5m between squadrons, as the total length of the centre was approximately

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[643] Seidler 1954, 34.
[644] Suggested by Brzezinski (2001, 39) and Sennewald (2013, 169).
[645] Holk (Wittrock 1932, 308).
[646] Watts 1633, 129, 132 and 149.
[647] Dalbier 1632, 252, confirmed by Silvio Piccolomini (Archivio 1871, 240) and Burgus 1641, 321.
[648] *Declaration from 1633* (Droysen 1880, 40), Khevenhiller 1726, 191 and Gottfried 1633, 25, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 749-750 and Chemnitz 1648, 464.
[649] Nine pieces: Fleetwood 1632, 6, Watts 1633, 129. Thirteen pieces: *Declaration from 1633* (Droysen 1880, 42). Fourteen pieces: Dalbier 1632, 252, Gottfried 1633, 26, Chemnitz 1648, 464. Sixteen pieces: Burgus 1641, 321 and 327. Seventeen pieces: Priorato 1672, 119.

1,035m. This space was large enough to allow a cavalry squadron to advance through, as was common practice in 17th century warfare (section 3.3.3.1), but too small for a reserve infantry squadron, as it is often claimed for the Imperial army at Lützen.[650]

Based on Poyntz and the painting by Snayer, Brzezinski believed that Wallenstein deployed a 'fake' troop at the end of his left wing, consisting of camp followers and baggage handlers, to give the impression of a larger wing.[651] This episode is mentioned nowhere else and there remain some doubt. However, it is possible that Swedish eyewitnesses might not have noticed them, because they ran off before they could have been engaged and Imperial eyewitnesses probably tried to hide such an unworthy military deception in their accounts.

7.1.3 Command structure

It is curious that few sources designate the Imperial wing commanders and that they contradict each other, leading historians to believe that command changed during the course of the battle, according to Deuticke, several times.[652] However, it would have been a serious tactical mistake to make changes in command during a battle without reason, and this is not one Wallenstein is believed to have made.

Right wing

Holk, as second-in-command was certainly familiar with the command structure, and stated that Wallenstein commanded the right wing.[653] This is confirmed by the record of the court martial at Prague, according to which Hofkirchen, when he arrived at the right wing, was guilty of disobeying a direct order from Wallenstein.[654] Therefore, there is no reason to doubt that Wallenstein actually commanded the right wing.[655] Unfortunately, Generalstaben followed Watts' unreliable account that Colloredo commanded the right wing, which made an impact on even recent research.[656]

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[650] Deuticke 1917, 66, Generalstaben 1939, 416, Seidler 1954, 35.
[651] Poyntz 1908, 126, Brzezinski 2001, 54, Wedgewood 1938, 325.
[652] Deuticke 1917, 68.
[653] Wittrock 1932, 308.
[654] Seidler 1954, 143.
[655] See also Seidler 1954, 40 and Brzezinski 2001, 42.
[656] Watts 1633, 129-130. Guthrie 2002, 202-203, Eriksson 2006, 239, Wolke 2007, 64, Reichel 2009, 129 and Sennewald 2013, 169 are the most recent publications following Generalstaben's (1939, 417) incorrect assertion.

Left wing

Holk, supported by Watts, stated that he commanded the left wing, which has never been doubted after publication of Holk's letter; indeed this seems to be one of the few generally accepted facts about the Battle of Lützen.[657] However, it is believed by most historians,[658] following Seidler, that Holk had to hand over command of the left wing to Pappenheim on his arrival. For some unknown reason, Seidler[659] desperately tried to prove that the unreliable Khevenhiller[660] account was correct stating that Gustav Adolf died on the left instead of the right Swedish wing, a detail contradicting Holk's account among others.[661] To prove his point, Seidler strongly suggested that Pappenheim received an order from Wallenstein on the evening 15 November to reinforce the left wing upon his arrival, thus taking command from Holk, who in turn was moved to assist Wallenstein on the right. Seidler's assertion is based on the incorrect assumption that the left wing was weaker than the right, and his interpretation was grounded on a flawed translation of Holk's account, and on Watts' and Khevenhiller's unreliable accounts, as well as being influenced by the Weissenfels battle plan, which he believed was some kind of provisional battle plan for Lützen.[662]

Although it is likely, but not certain, that Pappenheim carried the Weissenfels battle plan together with Wallenstein's order with him, both are marred by bloodstains,[663] Wallenstein's Lützen battle order was perfectly symmetrical and Pappenheim's missing units on the left wing, as shown on the plan, were substituted by other units at Lützen (section 7.1.2). Therefore, there was no need to plan ahead with reinforcements for the left wing. The flaw in his argument is that Wallenstein could not possibly have anticipated the battle's development before the arrival of Pappenheim's corps. In the end, it remains unknown if Pappenheim carried the Weissenfels battle plan, and the reason for doing so, if he actually did. Wallenstein's 15 November written order to Pappenheim states:

"The enemy is marching towards us. Your honour shall drop everything, and route himself hereto with all troops and guns, to be with us tomorrow morning (Fig. 71)."[664]

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[657] Wittrock 1932, 308, Watts 1633, 130.
[658] Deuticke 1917, 68, Generalstaben 1939, 417, Mann 1971, 850, 854, Junkelmann 1993, 455, Brzezinski 2001, 42, Guthrie 2002, 203 and Mortimer 2010, 173 are a few examples.
[659] Seidler 1954, 58-77, followed by Diwald 1969, 500.
[660] Khevenhiller 1726, 191.
[661] Wittrock 1932, 309.
[662] Seidler 1954, 121-122, ref. 31.
[663] Holl 1976, 63. The traces of blood on both papers do not match, which seems to prove that Pappenheim did not receive the battle plan together with the order.
[664] Translation by Brzezinski, (2001, 37), slightly modified by the author.

If it would have been so important for Wallenstein to order Pappenheim to the left wing as early as the 15th, we could expect him to have included that order in the letter.

Figure 71: Blood stained letter carried by Pappenheim when he was shot at Lützen.
(image has been removed due to copyright restrictions)

Seidler's main argument was that Holk's account states:

"Hertzogen commenderede och förde self den Rette Flügel imod Weimar. Holche, som commenderede I Feldt Marschalls sted, förde den Venstre."[665]

which he translated: "The Duke [Wallenstein] commanded and led himself the right wing against Weimar. Holk, who commanded instead of the Field Marshall, led the left." and he interpreted this as meaning Holk commanded the left wing instead of Pappenheim [the Field Marshall] until his arrival.[666] However, there is one mistake in Seidler's argumentation: He assumed that the second sentence describes one subject. Both sentences consist of a main and a subordinate clause using two different verbs to express command, 'commenderede' and 'förde', which have a slightly different meaning. 'Förde' is used here

[665] Wittrock 1932, 308.
[666] Seidler 1954, 58-59.

in context of the actual field command and therefore expresses the command of a wing during the battle. The meaning of ‘commenderede’ is more difficult to comprehend, because the object in the first sentence is missing. But in the second sentence ‘commenderede’ is used in the context of a rank: “Holk commanded instead of the Field Marshall”, which means that Holk was second-in-command of the army in the absence of Pappenheim, expressing his rank inside the command structure of the army. We can assume the same meaning of ‘commenderede’ in the first sentence “Wallenstein commanded”, which implies that he commanded the army. Therefore, both sentences describe two different subjects at a time: Wallenstein commanded the army AND the right wing; Holk commanded the left wing AND was second-in-command. It was important to him to mention the latter to King Christian IV of Denmark that he, just recently been promoted from Oberst to Feldmarschall Leutnant, and now held a high command in the Imperial main army, even if it was only temporarily, which was indeed a successful career step. There is no connection between “Holk commanded instead of the Field Marshall” and “Holk commanded the left wing”, as Seidler suggested.[667]

[667] The author’s new interpretation of Holk’s account was approved by the Danish Professor Jens Olesen, Institute for Nordic History, University of Greifswald.

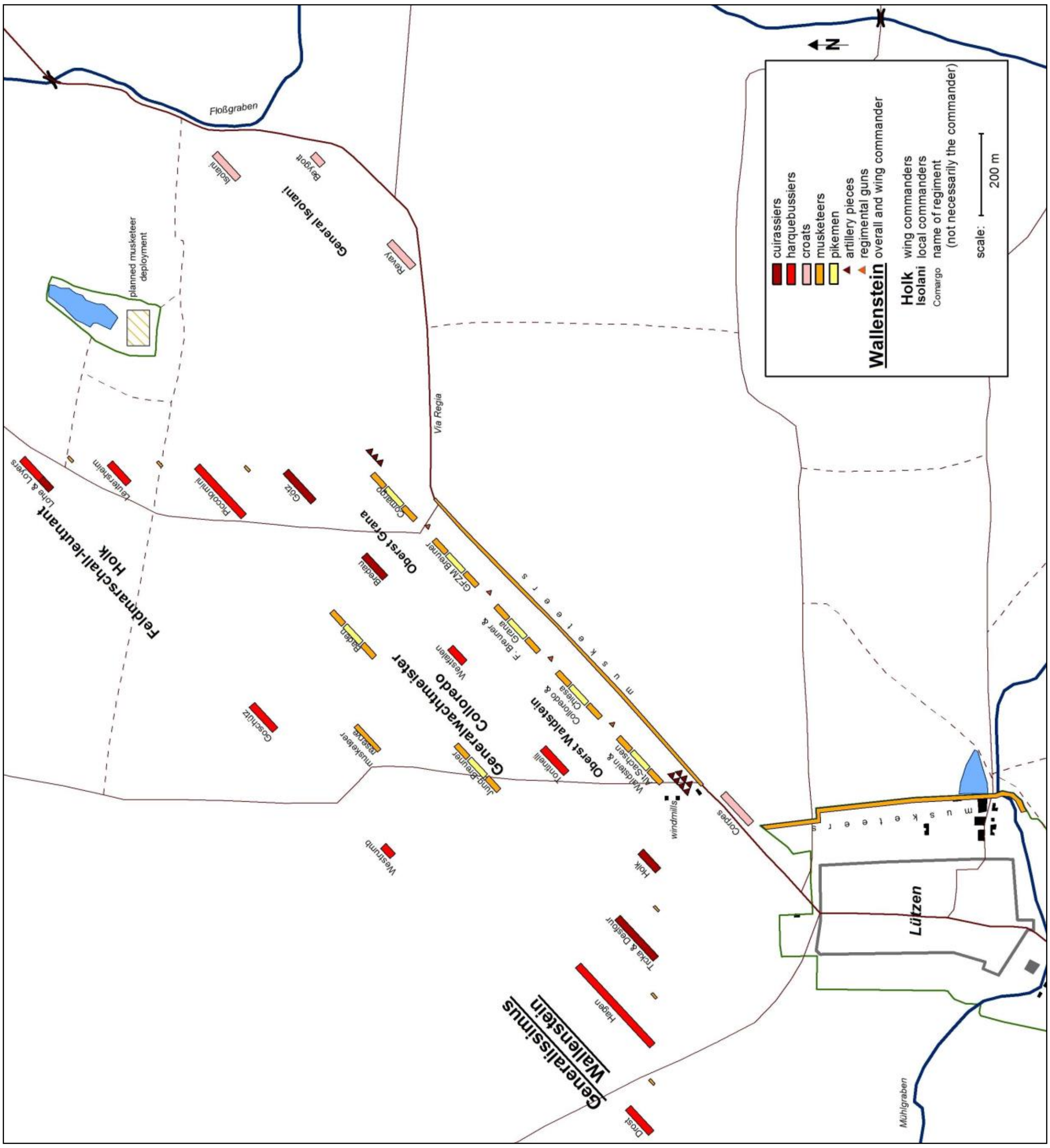

Figure 72: Imperial battle array with all units in actual scale. The positioning of the first line infantry squadrons, the artillery batteries and the alignment of wings is almost exact. The distance between squadrons of the wings and between reserve squadrons is estimated. The position of Croat regiments is not known and is an approximation. Note: All battle maps in this thesis are only models to explain the course of the battle. To prevent complicating matters, all maps contain all units which were presumably in the shown area, even though some unit locations are speculative.

Watts' statement that

"The left wing … was led by Colonel Hendrick Holck; newly made Lieftenant-Felt-Marshall unto Pappenheim: who but commanded till Felt. Marshall Pappenheim should be comne into Field"[668]

has a similarity to Holk's statement, in particular the different use of the words 'led', to express command of a wing, and 'command', to express his rank inside the army, which suggests, although not clearly, that Watts had access to Holk's account. However, even if there is no connection and we interpret Watts' statement according to Seidler's basic idea, Watts confused the commanders of the centre and the right wing, leaving his statement about command on the left wing somewhat questionable at the least. A hint on the left wing action is given by Diodati, who wrote that Pappenheim, when arriving on the battlefield, counterattacked the left wing, "because there it seemed that the King [Gustav Adolf] attacked most stubborn."[669] This is not a description of an attack planned a day ahead.

There is no hint in the historical sources suggesting that there was a plan for Pappenheim to take over command of any wing, nor that there was any plan for the corps under his command to reinforce any specific wing,[670] as no one could possibly have anticipated how the battle would have developed by the time he arrived. As an experienced field officer, it was Pappenheim's decision to counterattack immediately upon arriving because that was where the crisis developed. The best fit with the evidence is that Holk kept command of the left wing during the battle. There is no hint in the Silvio or Ottavio Piccolomini accounts, or anywhere else,[671] that Ottavio Piccolomini took command on the left wing after the death of Pappenheim, as Seidler claimed;[672] Ottavio Piccolomini certainly would have mentioned such an important leadership role in his letter to the emperor. Since Pappenheim outranked Holk, he would have ordinarily assumed his position as second-in-command had he not been killed soon after his arrival.

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[668] Watt 1633, 130.
[669] Fiedler 1864, 562.
[670] Only Khevenhiller (1726, 190-191) claimed, that Wallenstein gave orders for Pappenheim in the morning before battle to take position where the baggage train stood (i. e. in reserve), which he had sent to Leipzig. Besides the fact that Wallenstein did not sent the baggage train away, Khevenhiller's unreliable account is not enough evidence to suggest such an order, although it would have been reasonable to order Pappenheim's corps, which had marched all night, into reserve first.
[671] With the exception of Khevenhiller (1726, 194), who claimed that Piccolomini rallied the Imperial left wing, because he did not realise that Holk was in command, whom Khevenhiller (1726, 187) mentioned only once, when he ordered the Imperial battle array in the night before battle.
[672] There is no hint of Piccolomini taking command in the letter of his nephew Silvio Piccolomini (Archivio 1871, 239-242) as Seidler (1954, 59 and rem. 132) claimed.

Centre

Holk did not mention who was in charge of the centre and there is no clear evidence in other historical sources. Diodati did write that “Sargente Maggiore di battaglia” Colloredo always assisted the infantry[673] and Silvio Piccolomini mentioned that “sergente generale di bataglia” Colloredo fought well with the infantry.[674] Although it is not entirely certain that “bat(t)aglia” could be interpreted as ‘centre’,[675] both sources demonstrate that Colloredo was in the centre and did not command the right wing as Watts claimed.[676] Diodati’s account also suggested that there were some kind of Imperial brigade commanders, Berthold von Waldstein on the right and Grana on the left centre,[677] leading three infantry squadrons according to the Swedish example, but ordered in a more defensive battle array similar to Basta’s brigade (two front and one reserve squadrons).[678] Officially there were no Imperial brigades in 1632 and there is no further evidence apart from Diodati’s account, but it seems possible that the wing commanders Wallenstein and Holk extended their commands toward the centre with Waldstein and Grana as local commanders to assist them. If this is so, then Colloredo was only commander in an emergency situation, similar to the Swedish command structure at Lützen. Generalfeldzeugmeister Hans Philipp von Breuner commanded the artillery and as commanding officer of the Imperial artillery, was very likely at the windmill battery.[679]

7.1.4 Conclusion

The Imperial battle array, with five infantry squadrons in the first line and four cavalry squadrons on each wing echeloned back, is also illustrated in the painting by Snayer and the copperplate by Bianchi. Bianchi shows the reserve as consisting of one infantry squadron and seven cavalry squadrons. Snayer shows the reserve according to Holk’s account and the Trauttmansdorff list with the regimental guns between the first line infantry squadrons, making his painting probably the most accurate pictorial representation. The distribution of cavalry on each wing according to the Trauttmansdorff list is also supported by the number of companies: 36 on each wing according to Holk, and 37 on the left and 36 on the right according to Brzezinski’s calculation (section 3.1.2). On

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673 Fiedler 1864, 565.
674 Archivio 1871, 241.
675 Khevenhiller (1726, 195), whose account is based partially on Diodati, interpreted it this way. Also, Monro (1637, part II, 25) used the term “Battaile” for ‘centre’ of a Swedish brigade formation.
676 Watts 1633, 129.
677 Fiedler 1864, 565.
678 Generalstaben 1939, 416. See also Brzezinski 2001, 42.
679 Khevenhiller 1726, 195.

the other hand, the number of cavalry reserve companies, fifteen in the second line and eight as wing reserve, does not match Holk's account, which lists six in the second line and twelve as wing reserve. These discrepancies leave some unanswered questions about the cavalry reserve.

To understand what Wallenstein had in mind with the Lützen battle deployment, a comparison with the Weissenfels battle plan bears some resemblances concerning the regimental positioning. In comparison with Weissenfels, the Lützen first line centre is reduced by one squadron; the cavalry reserve was reduced by one squadron as well, but they were stronger than in Weissenfels to compensate for the weaker second line and reserve consisting of only two and one squadron compared to five and two at Weissenfels. If there was any hint of a plan for Pappenheim's corps, the weak second line and wing reserves were to be filled up by his forces should they arrive in time to get some rest from the march before being committed to action, as the Regiments Tontinelli and Bredau actually did.[680] It has to be pointed out that Imperial units were probably still arriving during the morning and filling up the reserve; this could explain the discrepancy between Holk's count and the actual number of reserve cavalry companies. The 6:5:2 infantry deployment at Weissenfels contradicts Generalstaben's suggestion that Wallenstein's infantry was deployed as Basta's brigades, but does not exclude the existence of local commanders. The two rear cavalry squadrons were almost certainly not a reserve for the centre but for the wings and could have easily supported either wing from their rear position.

In both battle arrays, the weak points at the ends of the infantry centre were protected by Wallenstein's crack troops, the cuirassiers and Piccolomini's equally armoured harquebusiers, while the less reliable lightly armoured cavalry units were deployed at the wings' extremities. It has to be noted that Lohe's cuirassiers were deployed at the end of a wing in both battle arrays, probably because the regiment was only recently raised and was not fully armoured. It was often argued that the Weissenfels battle plan was no battle line, but a square[681] and therefore nothing more than a stereotype sketch[682] or a night deployment;[683] but with the evidence from Lützen, it seems most likely that it actually shows Wallenstein's defensive battle tactics.

680 Brzezinski 2001, 48.
681 Philippi (Holl 1976, 60).
682 Droysen 1865, 112. He admitted that the Weissenfels plan has a resemblance with Diodati's description of the refused wings.
683 Guthrie 2002, 202 and 227.

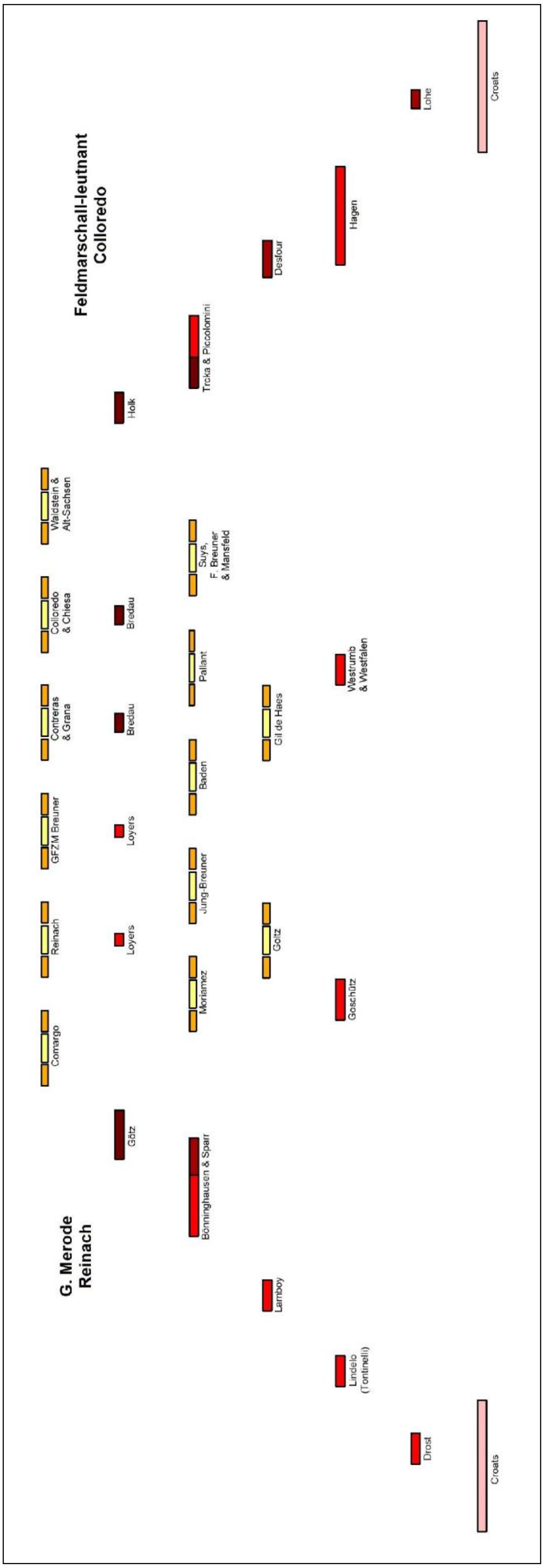

Figure 73: Weissenfels battle plan from 12 November 1632. It is not certain if the names G. Merode, Reinach, Feldmarschall Leutnant (i.e. Holk) and Colloredo are wing commanders.

The Imperial battle array at Lützen was perfectly balanced, as far as it was possible for such a small army, with a similar number of heavy cavalry on both wings. The left Imperial wing was not weaker than the right and it was not planned to be reinforced by Pappenheim's corps as Seidler, and after him so many others, suggested.[684] Although the right centre had almost three times the number of artillery pieces than the left and 400 musketeers behind the mud walls of the Lützen gardens, this was compensated by the many more Croats on the left, giving the left wing less firepower, but more mobility, a necessity because of the open ground. The deep deployment would allow reinforcing the most endangered wing, as it is the best tactical solution for a defensive battle array.

A final observation concerns the distance of 70m between Imperial skirmishers in the road ditches and the first line, which is not coincidental. The distance is too far to allow the Swedes to effectively fire at the Imperial first line from the cover of the hollow road. At the same time it seems to have been the range at which Imperial musketeers usually opened a constant caracoling fire (section 3.3.3.3).

7.2 Swedish battle array

In contrast to the Imperial battle array, the Swedish deployment is well documented, although it should be noted that almost all information is based on secondary sources. Nevertheless, there seems to be little doubt about the Swedish battle positions, with some minor exceptions (Fig. 74).

7.2.1 Cavalry and interlined musketeers

Most sources state that the Swedish wings consisted of six first line and six second line cavalry squadrons each. The squadrons of the right first line consisted of the six national Swedish Regiments Smaland, Östgöta, Uppland, Södermanland, Västgöta and Finland, but

[684] Seidler (1954, 38), who placed all heavy cavalry except Götz on the right wing and explained his interpretation with reference to the Battle at Nurnberg/Alte Veste, where Gustav Adolf attacked the best protected place and he assumed that Wallenstein 'knew' Gustav Adolf would do the same at Lützen. This notion contradicts all military principles, in particular for a defensive battle array, where a commander has to react to an attack and therefore needs sufficient reserves. Roberts 1958, 767, Mann 1971, 850, Holl 1976, 69-70, Stadler 1991, 730, Doughty/Gruber 1996, 25, Neuhold 2011, 98 and Mortimer 2010, 173 followed Seidler's thesis. Generalstaben (1939, 417) placed all heavy cavalry except Desfour on the left wing. Strangely Junkelmann 1993, 454 and Guthrie 2002, 203-204 followed Generalstaben's thesis, but still suggested a weak left wing, which was planned to be reinforced by Pappenheim.

Fleetwood reported that the Finish cavalry was divided into two squadrons, which would, technically, have given this wing seven squadrons instead of six.[685]

The question about the number of right wing first line cavalry squadrons is connected to the question about the strength of the detached musketeers interlined between the first line cavalry squadrons on both wings, which is not mentioned by any eyewitness. According to Khevenhiller[686] and the *Relation from 1633*[687] each of the ten musketeer companies consisted of 50 men, a strength they had also at Breitenfeld (1631) according to Monro,[688] while Hülshorst[689] and Richelieu[690] reported a strength of 200 per company. Most historians assume that those companies were formed by musketeers from several regiments, but Langmann's list suggests that all regiments were at their combat strength on 15 November and it is unlikely they released musketeers before the battle (section 3.3.3.1), except, possibly, as skirmishers to their immediate front. In addition, the Regiments Löwenstein and Brandenstein, consisting of musketeers only, were already designated to form the interlined musketeer companies.[691] Together with a total of 798 musketeers, they had the necessary troop strength and a total number of eleven companies, exactly the number needed assuming that the left wing's front line consisted of six cavalry squadrons with five musketeer companies and the right wing of seven squadrons with six companies, averaging a reasonable 72 men each.

7.2.2 Battle array and command

The Swedish battle array consisted of two almost equally powerful lines,[692] a strong alignment that enabled the Swedish army to attack over a period of 6 hours. Four brigades

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685 Fleetwood 1632, 7.
686 Khevenhiller (1726, 189) had copied this part from the *Relation from 1633*.
687 Droysen 1880, 29.
688 Monro 1637, part II, 64.
689 Wittrock 1932, 303.
690 Richelieu 1823, 257.
691 Brzezinski 2001, 22. See also Hülshorst (Wittrock 1932, 303), who stated that the interlined companies were formed by the 9th Brigade's Regiments Löwenstein and Brandenstein (Henderson was likely part of the brigade, but formed the 1st line reserve). This would exclude Leslie's Scots, who, according to Monro (1637, part II, 164), formed the musketeer companies on the left wing and charged the Imperial windmill battery (See Brzezinski 2001, 23, rem. 15). Monro very likely misunderstood a report, probably from Leslie himself. It is almost certain that the Scots charged the battery as part of the Green Brigade, which would have been short of one squadron otherwise. The Scots did fight in close proximity to the left wing cavalry.
692 This thesis follows Brzezinski's (2001, 19-23 and 43-49) results, which is largely based on Watts (1633, 128-129) and Gottfried (1633, 27-28) with the copperplate from van Hulsen, copied by Abelinum 1646, 751-752 with the copperplate from Merian, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633 and Chemnitz 1648, 463-464. The lack of information from eyewitnesses prevents verification at the present time.

and one musketeer squadron in reserve with a total of 6,170 infantrymen and sixteen to twenty regimental guns formed the first line centre. In theory under command of Generalmajor Nils Brahe Greve till Visingborg,[693] it seems that the wing commanders, Gustav Adolf and Bernhard von Weimar, extended their command over the two centre brigades adjacent to their wings, and in effect commanded the first line centre.[694] The brigades were not deployed randomly. As Brahe had no cavalry reserve at his disposal, the two centre brigades, the Yellow and the Old Blue, had substantially more pikemen than any other brigade. It was hoped that this would enable them to survive an Imperial cavalry charge, while the two outer brigades, the Swedish and Green, could have been supported by cavalry from the wings and thus had fewer pikemen. As it turned out pikemen were no substitute for a cavalry reserve; of all units of the Swedish army, the Yellow and Old Blue Brigades took the most damage inflicted by the combined Imperial infantry-cavalry counterattack.

Likewise, the second line centre was formed by four brigades and one cavalry squadron in reserve with 6,512 infantry and 300 cavalry under command of Generalmajor Dodo von Innhausen und zu Knyphausen.[695] It is not entirely certain whether he also had control over the second line wings,[696] six cavalry squadrons each. These horsemen were probably under the local commanders Oberst Ernst von Sachsen-Weimar on the left with 1,430 men and Oberst Claus Conrad Zorn von Bulach with 1,080 on the right.[697]

Six cavalry squadrons with five musketeer companies interlined with approximately 1,550 cavalrymen, 423 musketeers and ten regimental guns formed the first line's left wing under Generalleutnant Bernhard von Sachsen-Weimar[698] with Oberst Hans Abraham Graf von Gersdorf in field command of the musketeers.[699] The first line right wing was under command of King Gustav Adolf[700], with Överste Torsten Stalhandske probably as second-in-command.[701] This force consisted of seven squadrons with six

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[693] Only confirmed through secondary sources from Chemnitz 1648, 464, Watts 1633, 129, Abelinum 1646, 746 and Khevenhiller 1726, 189, who copied the *Relation from 1633* (Droysen 1880, 29).
[694] The two left brigades, Green and Old Blue, followed the left wing (Fleetwood 1632, 7). See also Brzezinski 2001, 47.
[695] Fleetwood 1632, 6, Abelinum 1646, 746, Chemnitz 1648, 464, Khevenhiller 1726, 189, *Relation from 1633* (Droysen 1880, 29).
[696] Suggested by Brzezinski 2001, 48 according to Watts 1633, 132.
[697] Only mentioned by Watts 1633, 129.
[698] Fleetwood 1632, 6, Dalbier 1632, 252 and almost all secondary sources except Hallenus (Mankell 1860, 662), who incorrectly led Brahe command the left wing and Leubelfing (Murr 1790, 122), who has got the Swedish command structure completely wrong.
[699] Watts 1633, 129.
[700] Confirmed by all sources except for the account of Leubelfing (see above).
[701] Only based on an obscure story of Gustav Adolf giving personally command to Stalhandske at the beginning of the battle (Watts 1633, 134; see also Brzezinski 2001, 21). Certainly incorrect is Khevenhiller's

musketeer companies interlined between cavalry squadrons, commanded by Oberst Caspar Graf von Eberstein,[702] with 1,850 cavalrymen, 507 musketeers, twelve regimental guns and probably 30 mounted riflemen of the *djurskyttar* company. With a total of 2,930 horse, 507 foot and twelve regimental guns, the right wing was just as strong as the left with a total of 2,980 horse, 423 foot and ten regimental guns. Gustav Adolf did not concentrate his forces on one wing and the troop quality was equally good on both wings, with the best units in the first line.[703] The twenty Swedish heavy artillery pieces were very likely delayed by the Floßgraben and the narrow bridges. According to Vitzthum/Berlepsch, Gustav Adolf opened the battle with only three 24-pounders (section 8.1.3), which were probably deployed between the two central brigades.

The deployment of the Swedish army was restricted to a frontal width of less than 2,600m by the Mühlgraben and Lützen to the west and the Floßgraben in the east. This space was barely enough to deploy the army in two lines, if the Swedish cavalry was deployed four ranks deep and the brigades still served with reserve musketeers. If the wings touched the Mühlgraben and the Floßgraben, this linear distance would have left a gap of not much more than 60m between the brigades. A gap this size would have been sufficient space to bring forward reserves or let retreating squadrons through, but not for deploying an entire brigade on line as it has often been suggested.[704] The limited space on the Lützen battlefield is also evidence that the Swedish brigades were deployed with reserve musketeers. The baggage train was very likely left south of the Floßgraben near Meuchen, where it was threatened with capture by Croats.[705]

In comparison to Breitenfeld (1631), where the ratio of first to second lines was 2:1 on the wings and 4:3 in the centre, the Swedish second line was much stronger at Lützen. This strength might have been at least partially the result of the limited space available on the battlefield. Regardless of whether it was planned or not, such a strong and dense

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(1726, 191) statement that Fältmarskalk Horn, who took not part in the battle, was second-in-command of the right wing.

[702] Watts 1633, 129.

[703] A quantitative or qualitative concentration of forces on the right wing is sometimes suggested by historians (Doughty/Gruber 1996, 25, Brzezinski 2001, 53, Seidler 1954, 48, Deuticke 1917, 70).

[704] Monro (1637, part II, 64) clearly stated that at Breitenfeld the space between brigades were large enough to move a cavalry squadron forward, for which a space of 60m would be sufficient. A copperplate showing the Battle of Pfaffenhofen 10 August 1633 actually shows a cavalry squadron filling the space between two brigades (Brzezinski/Hook 2006, 83). It is unclear why Watts (1633, 130) believed that this space was large enough to move another brigade between them. This would have meant a space of 120m to 150m, which would have exposed the brigades to flank attacks and, moreover, the space was not available between Lützen and the Floßgraben. Note: The spacing between Imperial infantry squadrons seem to have been similar to the spacing between Swedish brigades and were very likely common Thirty Years War practice.

[705] According to Swedish HQ (Söltl 1842, 347). See also Brzezinski 2001, 49.

reserve needed to be committed as early as possible to prevent both lines from being beaten separately, or the second line from being put to flight due to a routed first line retreating through the second. Although there is no historical evidence, it is very likely that Gustav Adolf's tactics were based on an early second line commitment. This assumption will play a crucial role in interpreting the early stages of the battle.

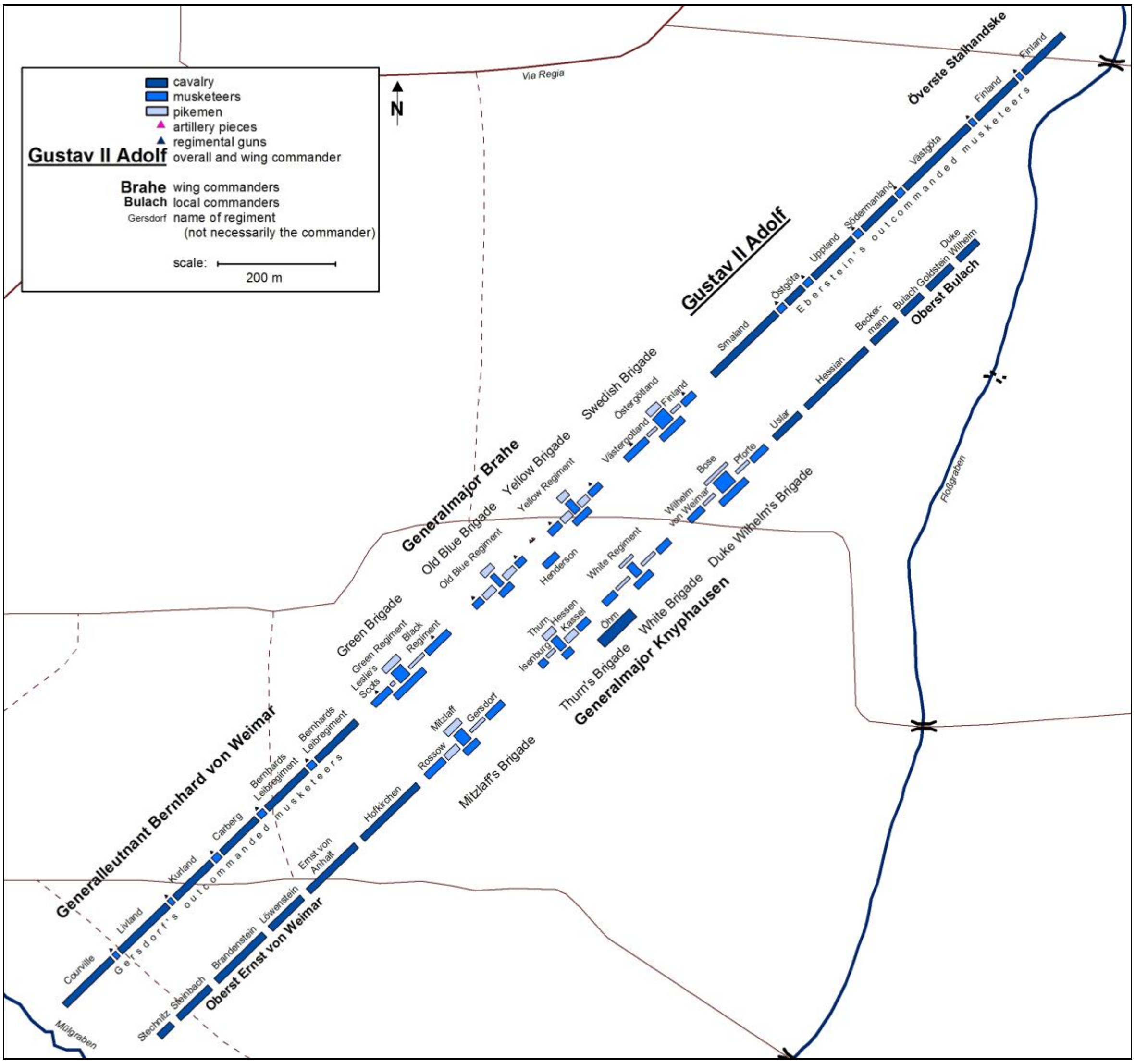

Figure 74: Swedish battle array with all units in actual scale.

Chapter Eight

The battle according to archaeological and historical sources

Archaeology provides a substantial and valuable addition to the historical sources, but, on the other hand, makes an evaluation of the battle's events even more complicated. Therefore, single events of the battle are discussed in chronological order, first according to **historical sources**, then according to **archaeological sources**. Both sources are then combined to reconcile and reconstruct **the events**. Some important events, such as the movement of the Old Blue Brigade, are discussed in several different sections because of this complexity. This chapter is much longer than any other, because there was no practical way to divide it into several chapters without interrupting the argumentations. However, this chapter is subdivided into four sections representing the four main stages of the battle – Swedish approach, Swedish attack, Imperial counterattack and second Swedish attack.

8.1 Swedish approach

8.1.1 The 'Lützen fog'

It is believed by most historians, chiefly based on secondary sources, that fog influenced the battle decisively, by delaying the battle in the morning and, when returning around midday, concealing the Imperial or Swedish rout.[706] This fog, into which the Swedish King disappeared and was not seen alive again, became legend as the 'Lützen fog' and is still a local expression for thick fog in autumn. This fog is a local meteorological phenomenon caused by high humidity. It appears on the plain of Lützen most commonly in November and was observed by the author whilst coming from Leipzig on a clear day and encountering fog 5 to 7km before Lützen. Although this is additional evidence, the historical sources and even the eyewitness accounts are very inconsistent about the duration and nature of this fog during the battle.

[706] Deuticke 1917, 68 and 73, Seidler 1954, 44 and 52, Wedgewood 1938, 324, Roberts 1958, 767, Diwald 1969, 498, Doughty/Gruber 1996, 25, Englund 1998, 130, Wolke 2007, 64-65, Neuhold 2011, 98-99. Although Brzezinski (2001, 43 and 74) suggested fog in the early morning, he had some doubt about returning fog in the afternoon.

Only two eyewitnesses, Dalbier and the Swedish HQ (Table 22), reported fog in the morning, but only after it first appeared to be a clear day; according to Dalbier it lasted until 9am, but returned at 10.30am. This contradicts Fleetwood's account, who stated that there was a clear day until 10am, just when the battle began, while Diodati and Fabricius reported fog around midday and thirteen eyewitnesses did not mention any fog at all.

Plate 22: A typical morning haze on the Lützen battlefield. View from the Imperial baggage train looking towards the advancing Swedish army's position.

Despite the differences, all eyewitnesses agree that there was no fog at dawn and it is highly unlikely that Gustav Adolf would have dared trying to move his army in thick fog or before dawn without intelligence about an enemy who knew and controlled the terrain with light cavalry.[707] Fleetwood, in particular, mentioned no delay of the Swedish army by fog in the early morning 16 November.

"The six of November the Kinge at break of the day marched his army…"[708]

and Vitzthum/Berlepsch

"The other morning, the 6th as soon as it was dawn, one had started to move against the enemy…"[709]

[707] Suggested by Seidler 1954, 44.
[708] Fleetwood 1632, 6.

Generally, it seems unlikely that a fog appeared after a clear morning – this never happened once during the five years of the archaeological project in Lützen, despite a lot of foggy days. There was either fog already in the early morning or there was no fog the whole day, but fog never appeared once the sun was up and fog never reappeared once it was gone.

The most likely scenario is that there was no fog but that there was haze in the morning, something not thought to be worth mentioning by the eyewitnesses (Plate 22). The first shooting and skirmishing, followed by Imperial artillery fire, began long before the battle started. The high humidity of the Lützen plain would have caused gun smoke to stay along the battle line, especially if there was no wind.[710] Then the Imperial forces set Lützen on fire. A small fire was observed by the author on a calm and hazy November day, when a farmer burned leaves in his garden. This little fire soon covered a large part of the battlefield with a smoky film. Burning Lützen would have created a massive fire; very soon after this broke out, the battle started and the increasing smoke of musket and artillery fire, as well as the smoke from the burning town, mixed with the haze, giving the impression of fog building up during the morning, and reducing the visibility severely. Due to the unusual circumstances of a combination of high humidity, haze, gun smoke in a static battle and smoke from a burning town, visibility was reduced more than usual in a battle; the eyewitnesses referred to it as ‘fog’ or ‘mist’.[711] That would also explain the different times given by eyewitnesses about the returning and disappearing fog.

The first account mentioning an actual delay of the Swedish advance by fog in the morning was the *Relation II from Erfurt*, which unfortunately was copied by the *Relation from 1633*, *Inventarium Sueciae*, with its great influence on other sources, Chemnitz and Khevenhiller; it still has a great influence on modern research. However, even in the secondary sources a clear morning is mentioned by the *Declaration from 1633*.

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[709] Glafey 1749, 12.
[710] Babits 1998, 80.
[711] Brzezinski 2001, 52.

Eyewitness accounts	**Morning fog before battle (*page*)**	**Fog during the battle (*page*)**	**Start of battle (*page*)**
Swedish HQ - Söltl 1842	Clear dawn?, then fog in the morning (346)		11am (346)
Dalbier - 1632	Clear dawn, then fog until 9am (251)	Fog returns at 10.30am (251)	9am (251)
Fleetwood - 1632	Clear morning (7)	Fog after 10am (8)	8am (first shot) to 10am (7)
Fabricius - Wittrock 1932		Fog midday (306)	
Diodati - Fiedler 1864		Fog midday (563)	
Wallenstein - Lorenz 1987			10am (256)
Holk - Wittrock 1932			11am first 'salvo' (308)
Knyphausen - Studien 1844			10am (49)
S. Piccolomini - Archivio 1871			2 hours before midday (240)
Münchhausen - Wittrock 1932			9am (304)
Secondary sources, letters			
Hallenus - Mankell 1860	Fog the whole day (662)		After 9am (662)
Pentz - Fiedler 1864		Fog midday (570)	
Relation I Grimma - Studien 1844		Fog 1pm (51)	
Hülshorst - Wittrock 1932			11-12am (303)
Gallas -Förster 1844			11am (95)
Secondary sources, 'relations'			
Relation II Erfurt - Droysen 1880	Fog all morning delayed Swedish advance (18)		9-10am (19)
Relation 1632 - Droysen 1880	Fog the whole day (10)		After 10am (7)
Relation 1633 - Droysen 1880	Fog in the morning (30)	Fog 1pm (31)	11am (30)
Declaration 1633 - Droysen 1880	Clear morning (40)	Smoke and fog midday (41)	Before 10am (40)
Spanish Relation - Watts 1633		Fog midday (161)	
Watts - 1633	Fog until 8am delayed Swedish advance (126)	Fog after 11am (137) Fog in afternoon until 3-4pm (147)	9am (132)
Gottfried - 1633	Fog all morning delayed Swedish advance		9-10am (25)
Burgus - 1641		Fog early afternoon (326)	
Chemnitz - 1648	Fog all morning delayed Swedish advance (464)	Smoke and fog midday (466)	11am (465)
Khevenhiller - 1726	Fog all morning delayed Swedish advance (188)	Fog midday (194)	11am (190)
Richelieu - 1823	Clear dawn?, then fog in the morning until 10am (258)		

Table 22: The 'Lützen fog' and commencement of battle in historical sources.

8.1.2 First skirmishes

Marching 23km along the Via Regia from Naumburg on 15 November, the Swedish army was delayed until nightfall at the Rippach by Imperial Croats and Dragoons. They camped in full battle order not far from the eastern bank of the stream only 5km from the Imperial army, encamped at Lützen.[712] Vitzthum/Berlepsch reported that they had seen Imperial army watch fires in several villages during the night.[713] As Zöllschen, Kaya and Meuchen can-not be seen from the Swedish camp, the only reasonable explanation is that there were still outposts or scouting parties in Bothfeld and Röcken less than 2km away, creating a tense situation for the Protestant soldiers. This also seems to be the reason why the Swedish army camped in battle order. Well protected against a Swedish surprise attack behind Lützen, Mühlgraben and Floßgraben, Wallenstein sent for Pappenheim and all other forces he could get to gather at Lützen after he decided that "he would rather die than retreat one foot."[714]

Reports about the Swedish approach towards Lützen on the morning 16 November are only vague, sparse and mostly from non-eyewitnesses. Explaining the Swedish approach is the key to understanding the delay, which proved so fateful for Gustav Adolf, and it seems necessary to figure out the events from what little is reported. After a cold November night on an open plain with probably not much more than a blanket – most of the baggage train was left in Naumburg to allow faster movement for a surprise attack – the Swedish army was set to march at first light of dawn at about 7am[715] on a hazy and calm day. Knowing that Pappenheim was on his way to reinforce the Imperial army, Gustav Adolf was in a hurry. With the Imperial army near, the Swedish army certainly moved as they had camped in battle order in two columns, the eventual two battle lines, 2km to 2.3km long right wing head on, which might have caused some wheeling in the morning, assuming that they camped in battle order across the road to prevent an Imperial surprise attack.

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[712] The skirmish at the Rippach is not an issue in this thesis. See Brzezinski 2001, 34-38. Fleetwood (1632, 6) gave a distance of one English mile between Lützen and the Swedish camp, but that would have meant marching another 4km in dark night against an enemy, who was familiar with the terrain. More reliable is Holk's account (Wittrock 1932, 308), giving a distance of "four canon shots", which translates roughly as 6km.

[713] Glafey 1749, 12.

[714] Holk (Wittrock 1932, 308).

[715] At "daybreak" according to Vitzthum/Berlepsch (Glafey 1749, 12), Fleetwood 1632, 6 and Dalbier 1632, 251. All time in this thesis is given according to our modern standard European time. 7am is the first and 5pm the last light on 16 November at Lützen. Time given in historical sources for single events sometimes vary substantially, but it was not possible to establish if both armies used the same or a different time at Lützen.

The Imperial scouting parties at Röcken and Bothfeld certainly did not try to resist and retreated behind the Floßgraben. The Swedish army advanced 5km along the Via Regia towards Lützen blinded by the rising sun at 7.30am, when musket fire from the walls of Lützen stopped the advance guard at around 8am.[716] The approach towards Lützen and the musket fire can be seen as a hint that Gustav Adolf was not entirely familiar with the situation at that time. It took Gustav Adolf probably another half an hour before he made the decision to move south around Lützen, based on reconnaissance reports that the Mühlgraben to the north had boggy river banks, "uncomfortably places", and no bridges.[717]

Although Tontinelli and Bredau had just arrived that morning[718] and were tasked as reserve behind the centre to rest from their night march, Wallenstein still had to wait for the rest of Pappenheim's corps and had to play for time. According to Vitzthum/Berlepsch

"Four troops of cavalrymen have shown themselves on the side of the city"[719]

after the Swedes were fired at from the city walls. The Swedish HQ reported that when the Swedish army advanced towards Lützen,

"the Imperials had shown and presented themselves there, but did not fire."[720]

Those troops were very likely Isolani's four Croat regiments deployed as a skirmisher screen at the Floßgraben and Mühlgraben to secure the bridges and delay the Swedish advance.[721] This disposition would concur with Gallas' report[722] of Croats skirmishing during the Swedish advance, which is confirmed by the *Relation from 1633* reporting skirmishes all morning.[723]

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[716] Vitzthum/Berlepsch (Glafey 1749, 13). Fleetwood (1632, 7) reported the first shot at 8am. Hallenus (Mankell 1860, 662) mentioned the Swedish arrival at Lützen at 9am, which seems too late.
[717] Mentioned first by the *Relation from 1633* (Droysen 1880, 30), copied by Abelinum 1646, 748 and Khevenhiller 1726, 190.
[718] According to Watts (1633, 124) "some horse that were Quartered very farre off, being not able to reach up, till ten a clocke next morning", which probably could have been seen and reported by his eyewitnesses.
[719] Glafey 1749, 13.
[720] Söltl 1842, 346.
[721] Deuticke 1917, 68, Seidler 1954, 40, Brzezinski 2001, 45.
[722] Förster 1844, 95.
[723] Droysen 1880, 30, copied by Abelinum 1646, 749, Chemnitz 1648, 464 and Khevenhiller 1726, 190, and was possibly also used by Priorato 1672, 120.

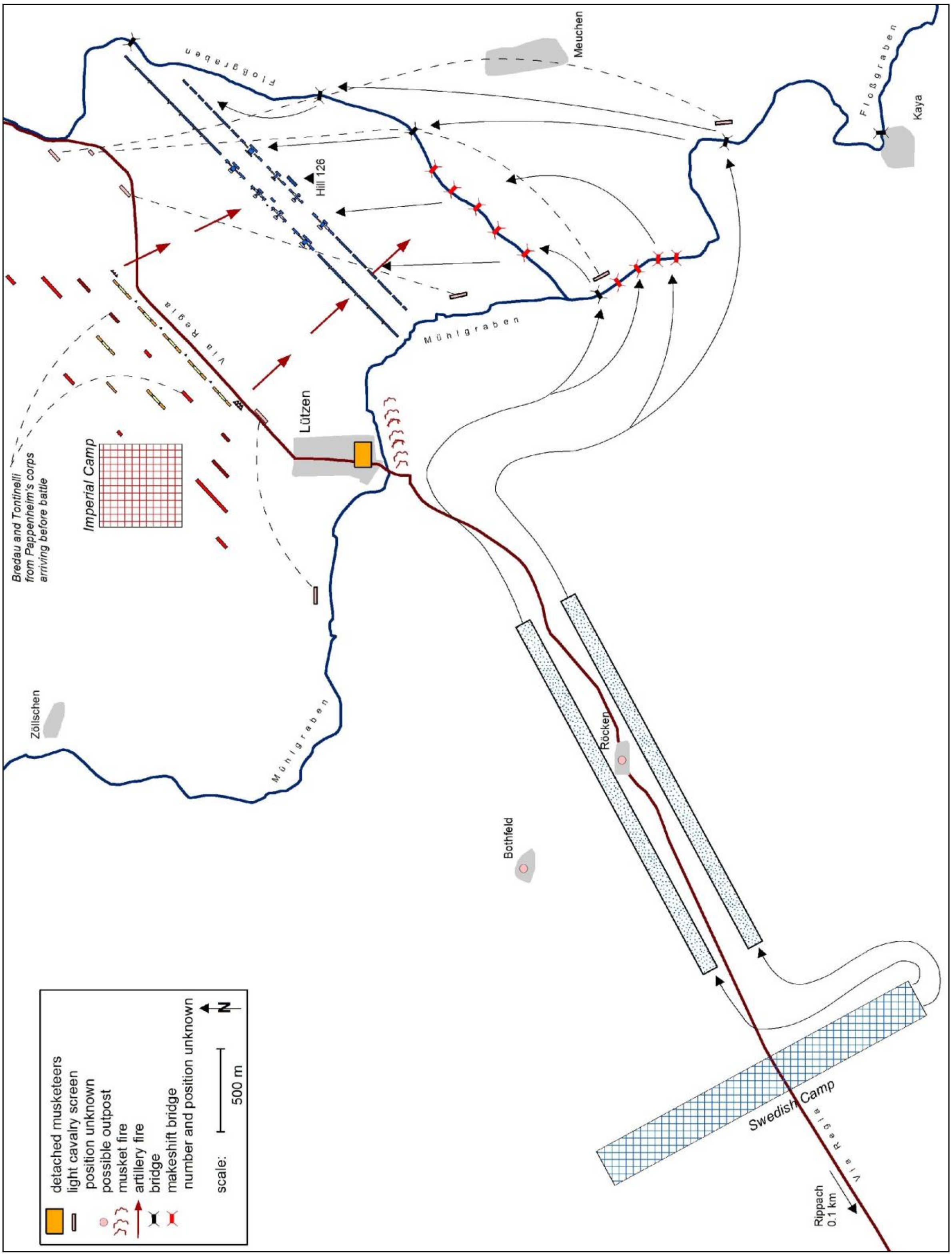

Figure 75: Imperial and Swedish camps on evening 15 November and Swedish approach in the next morning.

The Croats had already suffered some losses at Rippach 15 November[724] and were not supposed to hold the bridges for long. There were only two bridges, and possibly a third further south near Kaya at the first crossing and two at the second, which might have enabled them to delay the Swedish advance for a short while. After clearing the bridges, Gustav Adolf had to build makeshift bridges from float wood stored near the Floßgraben, to bring his 18,000 soldiers over as quickly as possible without letting the infantry suffer from cold water by wading.[725] It was this crossing and skirmishing, and not a fog, which was responsible for the considerable delay of the main battle's commencement and Gustav Adolf had to sacrifice his battle formation to cross the Floßgraben.[726]

8.1.3 Swedish deployment and Imperial artillery fire

Historical sources

Some historians believed that the fog prevented artillery fire before the battle.[727] In fact, it is almost certain that artillery fire was a key factor creating the 'fog' in the first place. In addition, early artillery fire is also reported by eyewitnesses. According to Fleetwood[728] and Münchhausen,[729] it lasted "a while" before the main battle started.

The artillery fire is described best by Vitzthum/Berlepsch, who reported that

"…one [the Swedes] had started to fire several salvos with three half-cannons, which the enemy answered with a battery, which he had cast up [the fortification] at the windmills near the town, and which he continued with the other batteries, he had at the side of Scheiditz [Skölzig] … and there was heavy firing with pieces but one hour on both sides…"[730]

According to Vitzthum/Berlepsch the Swedes opened fire with only three 24-pounders, almost certainly because the other pieces were delayed crossing the Floßgraben. The commander of the Imperial artillery, Generalfeldzeugmeister Breuner, answered first with the windmill battery and later with the smaller left wing battery. The artillery fire went on for one hour. In particular the sequence of fire is an important consideration, because the line of sight from the small battery was blocked by Hill 126 at a distance of

724 Brzezinski 2001, 37.
725 Hülshorst (Wittrock 1932, 302) reported that the Swedish army could not advance in battle order because of the "narrow passage" probably meaning the difficulties at the Floßgraben.
726 Brzezinski 2001, 46-47.
727 In particular Seidler 1954, 44-45 and Guthrie 2002, 208.
728 Fleetwood 1632, 7.
729 Wittrock 1932, 304.
730 Glafey 1749, 13.

1,200m. This suggests that the wind-mill battery started firing at a longer distance and the small battery joined the firing when the Swedes came into sight.

In contradiction to Vitzthum/Berlepsch, the Swedish HQ reported that the Imperial artillery was first to open fire,[731] which is supported by secondary sources, though of lesser reliability;[732] in particular Hülshorst[733] and Hallenus[734] mentioned that the Imperial artillery fired during the Swedish deployment. Many eyewitnesses including Diodati and Holk[735] did not report any prebattle artillery fire, probably because it was just common practice in the early stage of any battle, one which inflicted few casualties. Still, their lack of reporting can not be seen as evidence that there was no such fire.

Only two secondary sources explicitly state that there was no extensive prebattle artillery fire. According to the *Relation II from Erfurt*, the Swedish Blue and Yellow Regiments advanced against the trenches, while supported by five shots from large pieces, which was answered by 80 shots.[736] We find this story changed, but certainly based on the *Relation II from Erfurt*, in the *Declaration from 1633*, which states that the Swedish army fired one round with five 24-pounders and advanced against the trenches, while the Imperial artillery held their fire to acquire better targets.[737] This whole episode was fictitious; there were no trenches, the Blue and Yellow Regiments did not advance first (see section 8.2), and prebattle artillery fire is reported by four eyewitnesses and several secondary sources.

Nevertheless, some historians have given priority to the two second-hand accounts over eyewitness accounts.[738] Seidler also based his argument on the Swedish HQ account that

"the Imperials had shown and presented themselves there [Lützen], but did not fire,"[739]

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[731] Söltl 1842, 346.
[732] *Relation from 1632* (Droysen 1880, 7-8) and *Relation from 1633* (Droysen 1880, 29), copied by Khevenhiller 1726, 189. An early artillery fire, without specifying who fired first, is mentioned by Gottfried 1633, 25 (for two hours), copied by Monro 1637, part II, 163-164, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, and used by Burgus 1641, 321 (one and a half hours) and Abelinum 1646, 749 (some time).
[733] Wittrock 1932, 302.
[734] Mankell 1860, 662.
[735] Fiedler 1864, 562, Wittrock 1932, 308.
[736] Droysen 1880, 18.
[737] Droysen 1880, 40.
[738] Seidler 1954, 45, Brzezinski 2001, 49-50.
[739] Söltl 1842, 346.

which he interpreted as meaning there was no artillery fire, although the account made clear that this event did not occur during the Swedish deployment but earlier during the Swedish advance from Rippach to Lützen.[740] Although the reports about an early artillery fire are not entirely conclusive, there are some facts to consider:

1. The Imperial heavy artillery was already deployed in well chosen positions, which certainly would have enabled them to fire first if they wanted to.[741]
2. The main task of heavy artillery in a field engagement was to deliver long range harassing fire either to keep the enemy at distance or force him to quick action, which makes it likely that the Imperial artillery opened fire as soon as the Swedish army entered firing range. In addition, heavy artillery had a low rate of fire and there was no point in holding fire until the enemy was in point-blank range.
3. Gustav Adolf could not afford to lose more time with an artillery duel and very likely advanced as soon as his army was deployed.[742]

Under these circumstances, all early Swedish artillery fire was certainly covering fire directed against the Imperial artillery positions while the Swedish army reformed after passing through the choke points over the canal.[743] This interpretation is supported by Vitzthum/Berlepsch's statement that only three Swedish pieces opened fire although they had twenty which were delayed at the Floßgraben.

Archaeological sources

Additional evidence for this early artillery fire is provided by the distribution pattern of shell fragments, although with appropriate caution, because the patterns might be influenced by the unmethodical search for ferrous material, which resulted most definitely in a much lower recovery rate and density of patterns. Two pieces from one or two 24-pounder shells were found 190m north of the small Imperial battery, which derive very likely from the three Swedish 24-pounders that Vitzthum/Berlepsch mentioned firing against the fortified artillery position in a futile attempt to silence them.

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740 Seidler 1954, 45.
741 Droysen 1865, 119.
742 Dalbier 1632, 251. See also Seidler 1954, 44.
743 Firing at the enemies artillery positions was probably common practice in the Thirty Years War. The Swedish army used this tactic successfully in the Battle of Rain on the Lech 15 April 1632 (Brzezinski/Hook 2006, 82).

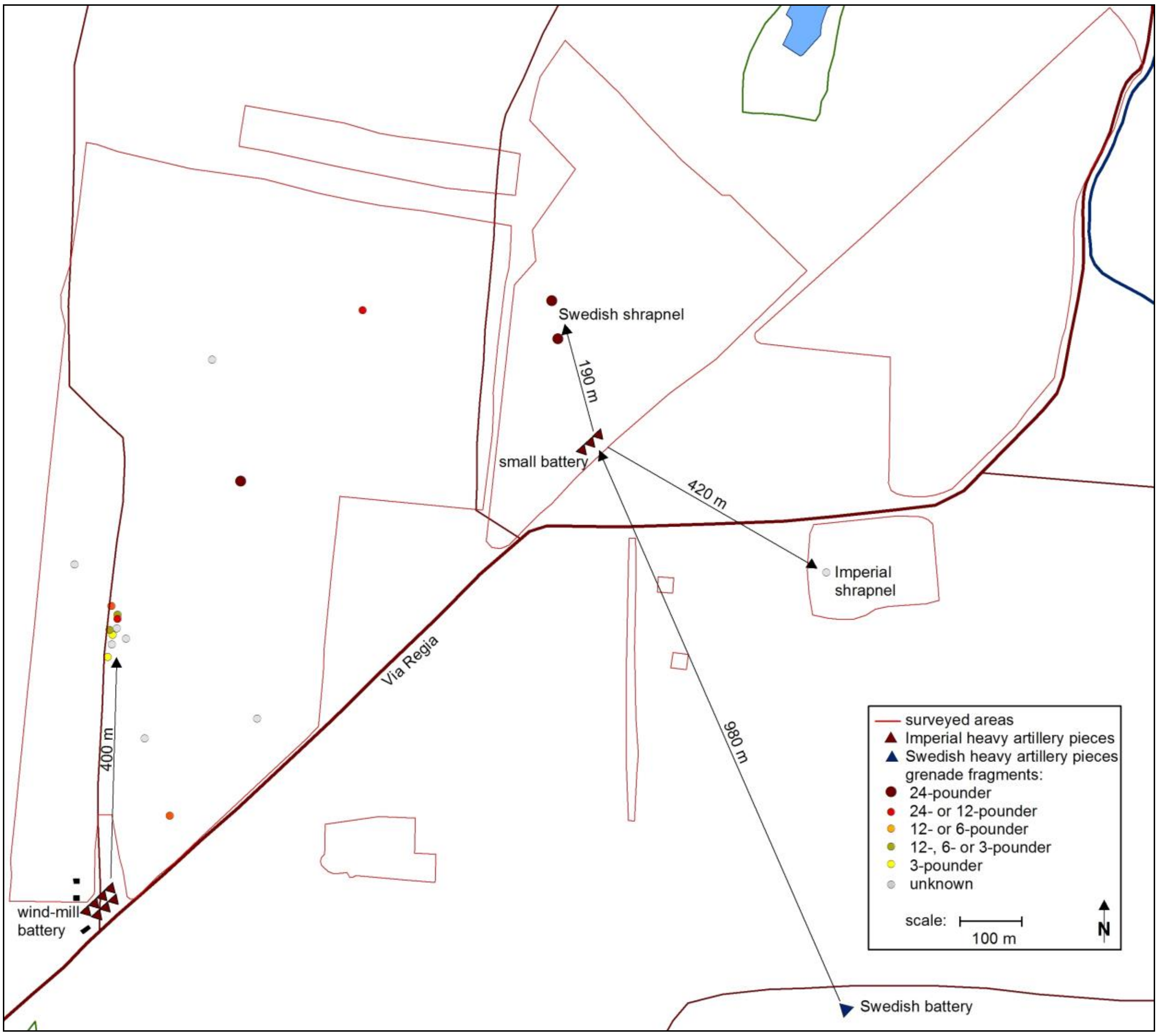

Figure 76: Distribution of spherical cast iron fragments.

The location of the small Imperial battery and the Swedish battery was pinpointed according to the length of the battle lines. While there is historical and archaeological evidence for the approximate position of the Imperial battery, it is only suggested that the three Swedish pieces were initially deployed between the two central brigades, which would have enabled them to provide covering fire for the forming and advancing Swedish army against both Imperial batteries. This position puts the Swedish pieces in an almost straight line with the small Imperial battery at a distance of 980m and the two shell fragments found further north suggesting an overshot (section 3.3.4). It can not be ruled out entirely that those two fragments derived from Imperial guns, which were captured by the Swedes and turned, but by a distance of only 190m the Swedes were more likely to have fired grape or case shot instead of shells, as they would be difficult to be detonate in such a short distance with a dangerously short fuse.

One piece of spherical cast iron 420m southeast of the small battery very likely derives from the early stage of the battle. It suggests that the Imperial heavy artillery also fired shells against the advancing Swedish cavalry. All other shell fragments are located between the first and second Imperial lines and were almost certainly fired by the Swedes in a later stage, although possibly by captured Imperial guns (section 8.4.3).

The events

It took the Swedish advance guard at least until 9am to arrive on the battlefield, now having the sun in their back.[744] The Imperial windmill battery had a good view on the Swedish army crossing the Floßgraben some 1,750m away and a clear line of fire after the Croats had retreated to their designated places in front of the wings. To avoid clustering at the crossing and to be able to form a line between Mühlgraben and Floßgraben, the Swedish army had to advance slowly but steadily as new units arrived on the northern side of the Floßgraben.

Approximately between 9am and 9.30am,[745] as the Swedish lines were slowly forming and advancing, the 24- and 12-pounders at the windmills opened fire with round shot at a distance of possibly less than 1,500m.[746] At that distance it was ineffective, but it unnerved the forming Swedish soldiers, who were still waiting for their own heavy artillery to come up and return fire.

When they reached Hill 126 between 9.30am and 10am, 1,200m south of the Imperial battle line, they came into sight of the small Imperial battery, which now joined the firing. Meanwhile, the Swedes had deployed three 24-pounders at a distance of less than 1,000m and returned fire, which was even more ineffective than the Imperial fire.[747] Single units came over the Floßgraben, formed under artillery fire, and joined the slowly advancing and growing army, giving the impression of an attack. Diodati reported that the Swedes seemed trying to attack the Imperial left and then their right wing, and it must have looked that way to an observer from the Imperial battle line.[748] Fleetwood had also seen that

[744] According to Pentz (Fiedler 1864, 570) the whole army arrived at 9am on the battlefield, but that seems too early.
[745] There is no reliable information about when the firing started.
[746] A maximum firing range for 24- and 12-pounders is estimated at 1,500m to 2,000m, for 6-pounders at 1,150m to 1,600m (Engerisser 2007, 586).
[747] According to Watts (1633, 133) the Imperial artillery had the advantage of being deployed already and caused more damage than the Swedish artillery.
[748] Fiedler 1864, 562. Copied by *Spanish Relation* (Watts 1633, 160) and Khevenhiller 1726, 191. A manoeuvring Swedish army is also reported by Poyntz (1908, 72). However, it is highly unlikely that Gustav

"The enimie at first seemed to advance, which soe soone as the Kinge perceaved, he gave presently orders to advance; upon which the enimies they retyred again behinde the dike,"[749]

suggesting that the Imperial army was not entirely deployed upon the arrival of the Swedish army and that there was a lot of movement on both sides prior to battle.

Although there is no notion in any account, the Imperial artillery fire, regardless of how ineffective it was, might have been at least partially responsible for the delay of the Swedish deployment and the beginning of the battle as well as it might have had a negative influence on morale,[750] at least for the less experienced Protestant soldiers.

8.1.4 Beginning of the battle

The time given by eyewitnesses and secondary sources alike for the onset of battle varies between 8am and 12am (Table 22). Except for the general observation that time was different in every town, not all participants had a clock or watch at hand and sense of time is very personal, this discrepancy can be explained with the personal opinion on what event marks the beginning of the battle, as it might have been the first shots from the city walls, the skirmishing, the initial Imperial artillery fire, the final Swedish deployment, their advance, or the first combat at the Imperial battle line.

Two eyewitnesses referred to this interpretive conundrum when they reported that

"about 8 of the clock, first shott his looseninge … and the battaile ioyned aboute tenn of the clock (Fleetwood)"[751] and that "the first salvo was fired at 11am (Holk)."[752]

The "first shot" might indicate musket fire from the city walls or the first Imperial artillery fire, while the "first salvo" is more likely to mean the first musket volley after the Swedish army had already advanced, than it means the first artillery fire; "the battaile ioyned aboute tenn of the clock" probably means that the Swedish army had deployed and was ready to

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Adolf, after being delayed substantially, wasted any time with feint attacks, as it is sometimes claimed (Weigley 2003, 140, Wedgewood 1938, 326, Deuticke 1917, 69).

[749] Fleetwood 1632, 6.

[750] Sennewald 2013, 168.

[751] Fleetwood 1632, 7.

[752] Wittrock 1932, 308.

advance. A beginning at 11am[753] better explains the sequence of events of Pappenheim's arrival and the death of Gustav Adolf around midday than an earlier commencement would. This suggests that the Swedish army was finishing their deployment around 10.30am and was ready to advance, approximately 1.5 to 2 hours later than they would have if they could have moved in a straight line, rather than making a detour south to cross over the bridges.

As soon as the Swedish army had deployed, Wallenstein ordered Lützen set on fire to avoid the town to be taken by the enemy and posing a threat to his right wing. The musketeer garrison, which had fired on the Swedish advance guard from the city walls in the morning, were redeployed into the town's gardens behind a mud wall. Two eyewitnesses, Fleetwood and the Swedish HQ,[754] and several secondary sources[755] reported this incident. All agree that the fire in Lützen started just before battle.

Gustav Adolf's plan of a surprise attack had utterly failed the day before at Rippach. Unable to make a quick move in the morning of 16 November, facing unexpected problems, he lost the opportunity to overwhelm the Imperial army before the arrival of Pappenheim's corps. The distance from Rippach to Lützen is only 5km, but being forced to make a detour to the south, it became an 8km to 9km march through an area controlled by Croats, delayed by the narrow but deep Floßgraben, where makeshift bridges had to be built. When the Swedish army finally arrived on the battlefield, they had to deploy under Imperial artillery fire.

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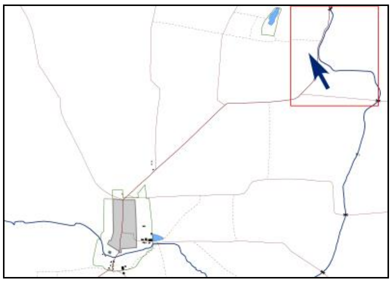
[753] 11am is the accepted view for begin of the battle. See Deuticke 1917, 69, Generalstaben 1939, 430, Seidler 1954, 44 and Brzezinski 2001, 52.

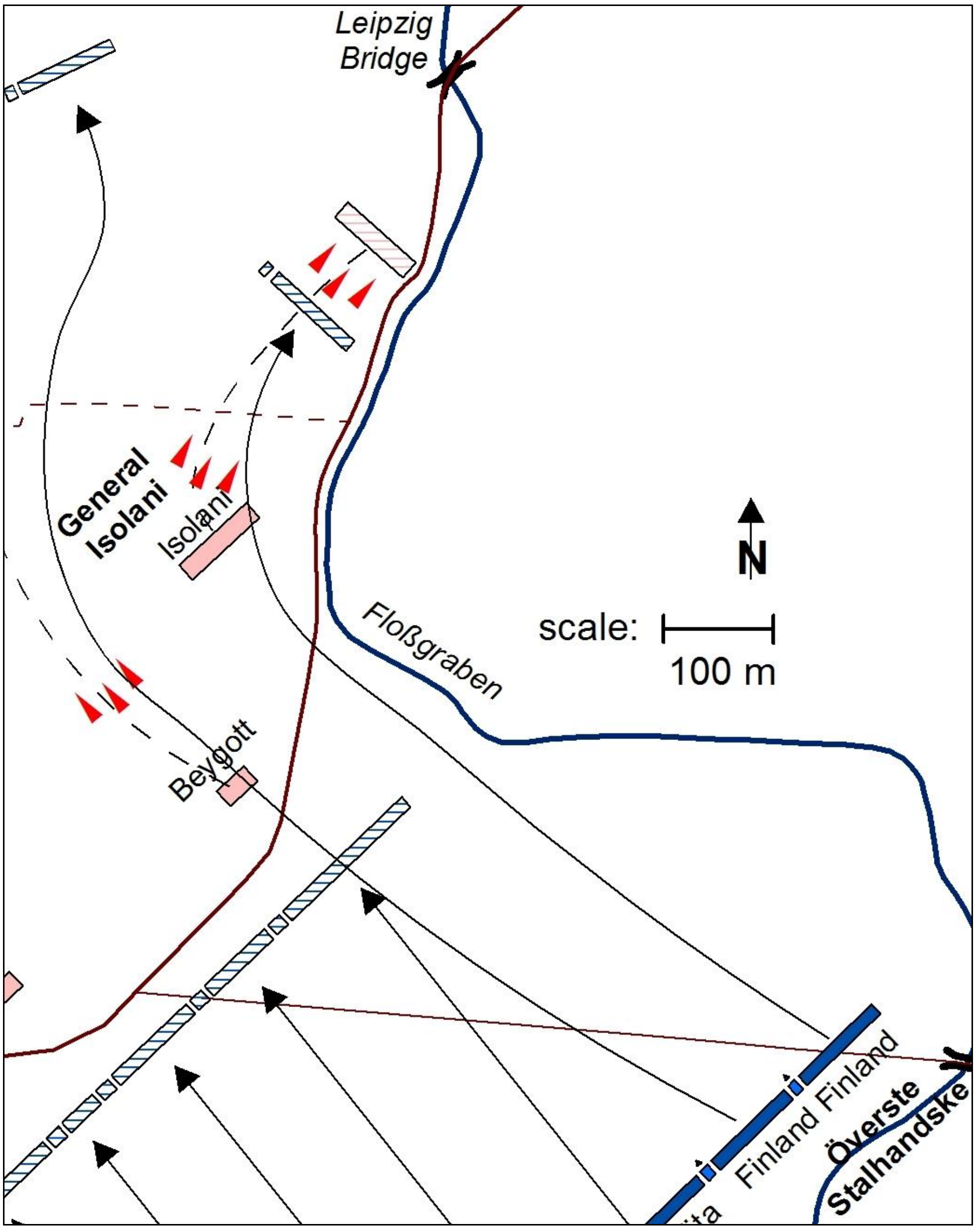
[754] Fleetwood 1632, 7, Söltl 1842, 346.

[755] Hallenus (Mankell 1860, 662), *Relation II from Erfurt* (Droysen 1880, 19). The latter was copied by Gottfried 1633, 25, which in turn was copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 163, Abelinum 1646, 749 and Chemnitz 1648, 465.

8.2 Gustav Adolf: First Swedish attack

8.2.1 Stalhandske's charge 10.30-11.00am





Note: For better orientation, most sections contain two maps below the headline, showing the location on the battlefield with the attack vector (arrow) and combat details of the discussed events.

Historical sources

When the Swedish army was deployed around 10.30am, Gustav Adolf opened the battle with his right wing.[756] The first action of the battle is reported by Fleetwood:

"…the enimie had ordered the crabates to fall rounde about upon our rere, which the Kinge perceaving gave command to the ffynes [Finns] under the command of Statehomes [Stalhandske] to march upon them, which hee did diligentlie. And haveing eighte companies, hee charged them with fower companies, putting them to flighte; but, upon his retreateing (according to expectation) they charged him soe that they putt him to the worst, till being received by his fower companies (sett for the purpose) hee charged them soe sore that he soe rowted them that the whole day wee were noe more troubled with them."[757]

Although Fleetwood is imprecise about when this incident occurred, combat between Finns and Croats is also reported by the *Relation from 1633* to have occurred at 11am during the battle's earliest phases.[758] This should be expected as the Croats were primarily skirmishers and flankers rather than main force troops.

Figure 77: Left: Överste Torsten Stalhandske. Right: General Ludwig Johann Hector Graf von Isolani.

[756] It was not Bernhard's left wing, which opened the battle, as Richelieu (1823, 258) suggested.
[757] Fleetwood 1632, 7.
[758] Droysen 1880, 30. This combat is also reported by Burgus (1641, 322) and Khevenhiller (1726, 191).

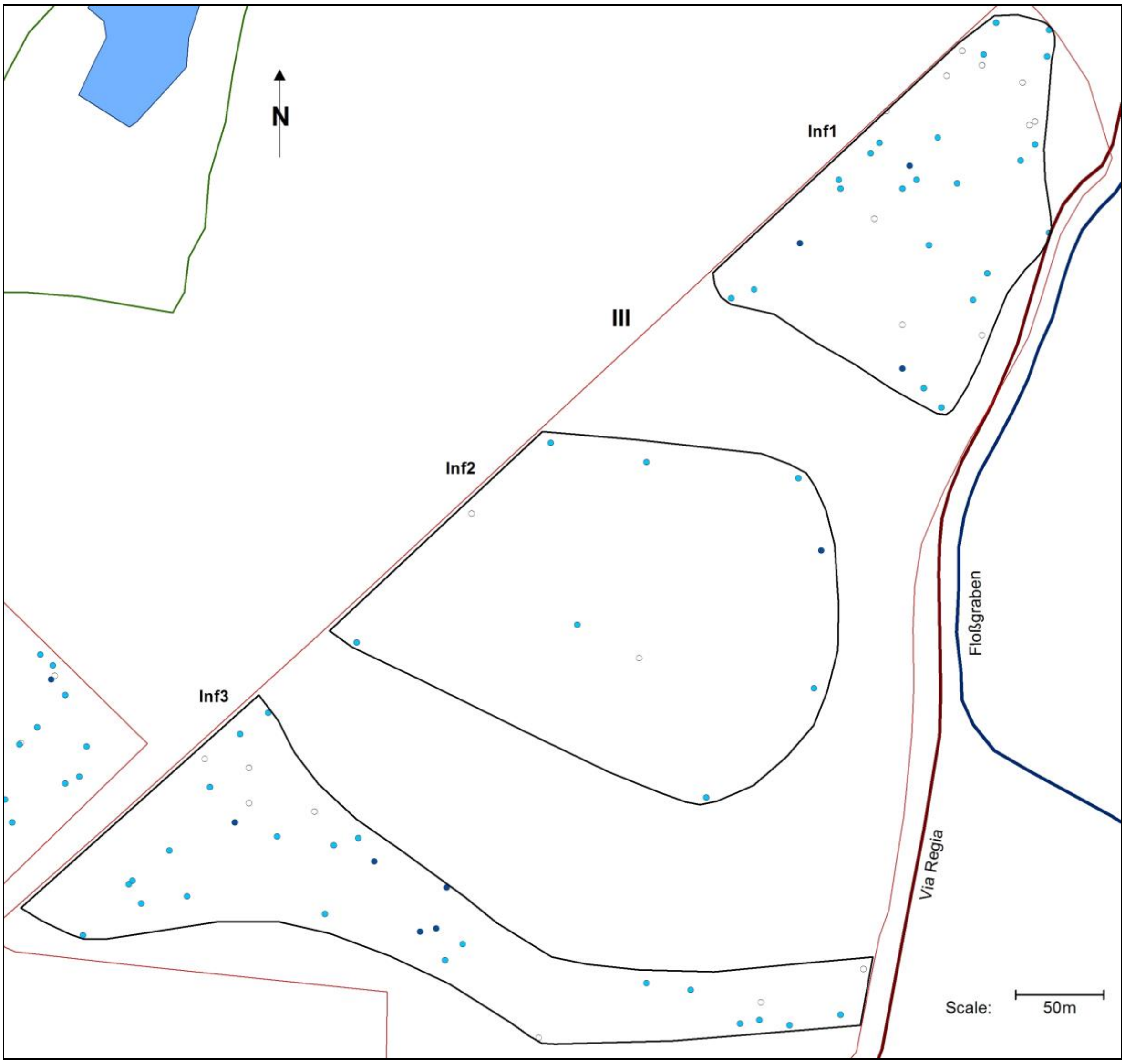


Figure 78: Detailed musket bullet distribution map, Imperial left wing skirmish area (dark blue 99% musket, blue 75% musket, white 25% musket).

Archaeological sources

Fields IIa and III contain low density distribution patterns with a pistol/carbine and musket bullet mix suggesting cavalry-infantry skirmishes, which might have resulted from Stalhandske's charge.[759] The lowest density bullet concentrations, Inf2 and Cav2, on the battlefield with only one pistol bullet with moderate impact damage derive very likely from a cavalry pursuit with minimal or no hand-to-hand combat. Slightly more dense are bullet concentrations Inf1 and Cav1. A similar density occurs with Inf3, Cav3 and Cav5, which certainly derive from only one combat episode, but these concentrations have an oddly elongated form, which could be the result of an east to west moving combat and pursuit. All three concentrations very likely represent Stalhandske's charge against the retreating Croat screen. The relatively high number of musket bullets can not entirely be explained by the two musketeer companies in Stalhandske's task force, but in this case

[759] See Schürger 2011 for details.

most of the uncertain musket bullets might actually be bullets from larger calibre carbines. That would also explain why there is only one certain carbine bullet, although the Croats are expected to be equipped with them. Even if most of the uncertain bullets derive from carbines, their number is too low if we assume that carbines were the standard weapons for Croats. It is more likely that the Croats were still in the process of being equipped with carbines in 1632, when their main arms were pistols and thrusting weapons. Strangely, bullet concentrations Inf4 and Cav4 are located south of the Via Regia in an area where no combat is reported. They contain a greater portion of pistol bullets than other field III concentrations. The different bullet composition, suggesting different kind of units, and the exposed position make it more likely that they derive from a later event.

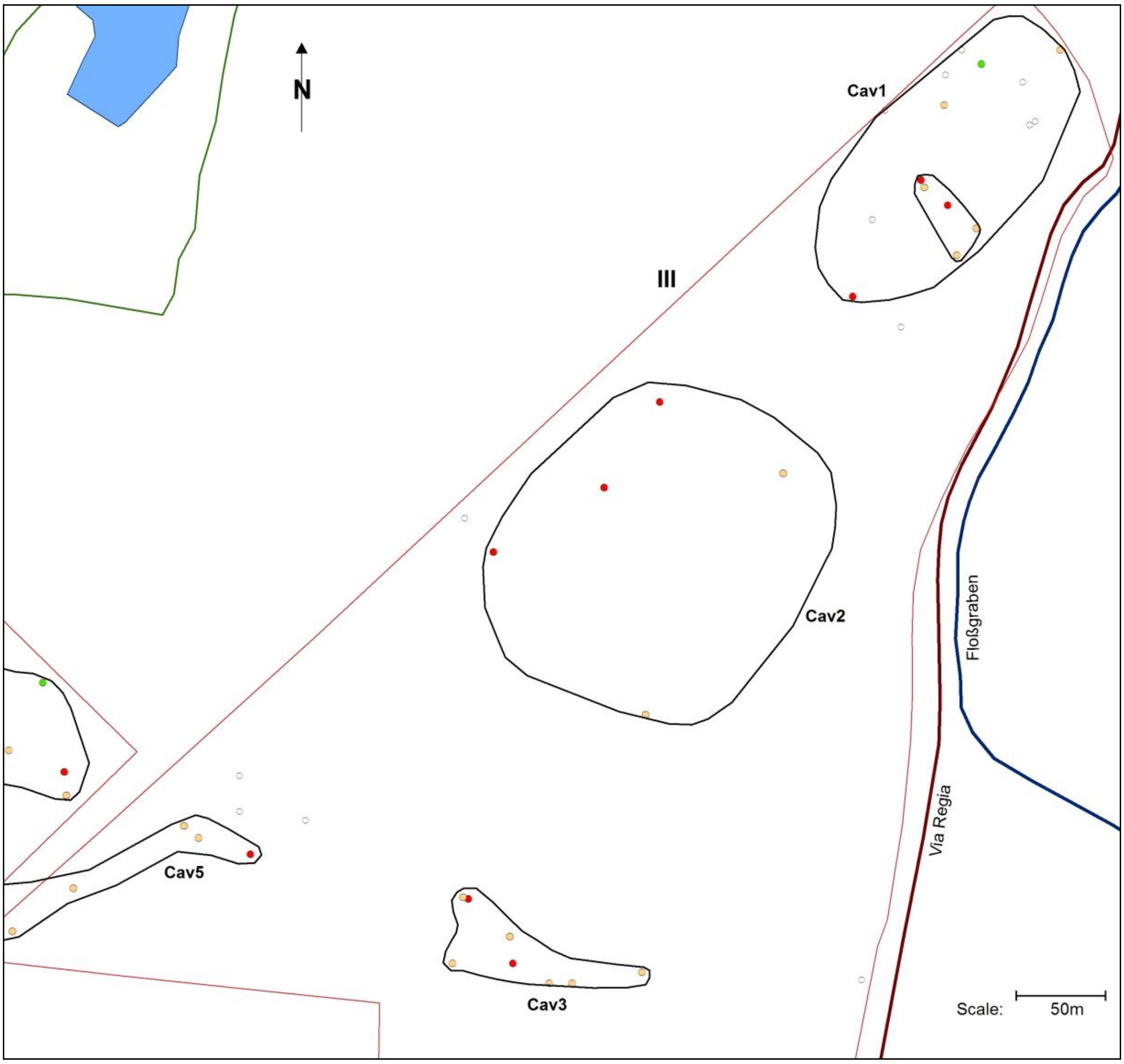


Figure 79: Detailed pistol/carbine bullet distribution map, Imperial left wing skirmish area (red: pistol, beige: pistol or carbine, green: carbine, white: 75% carbine).

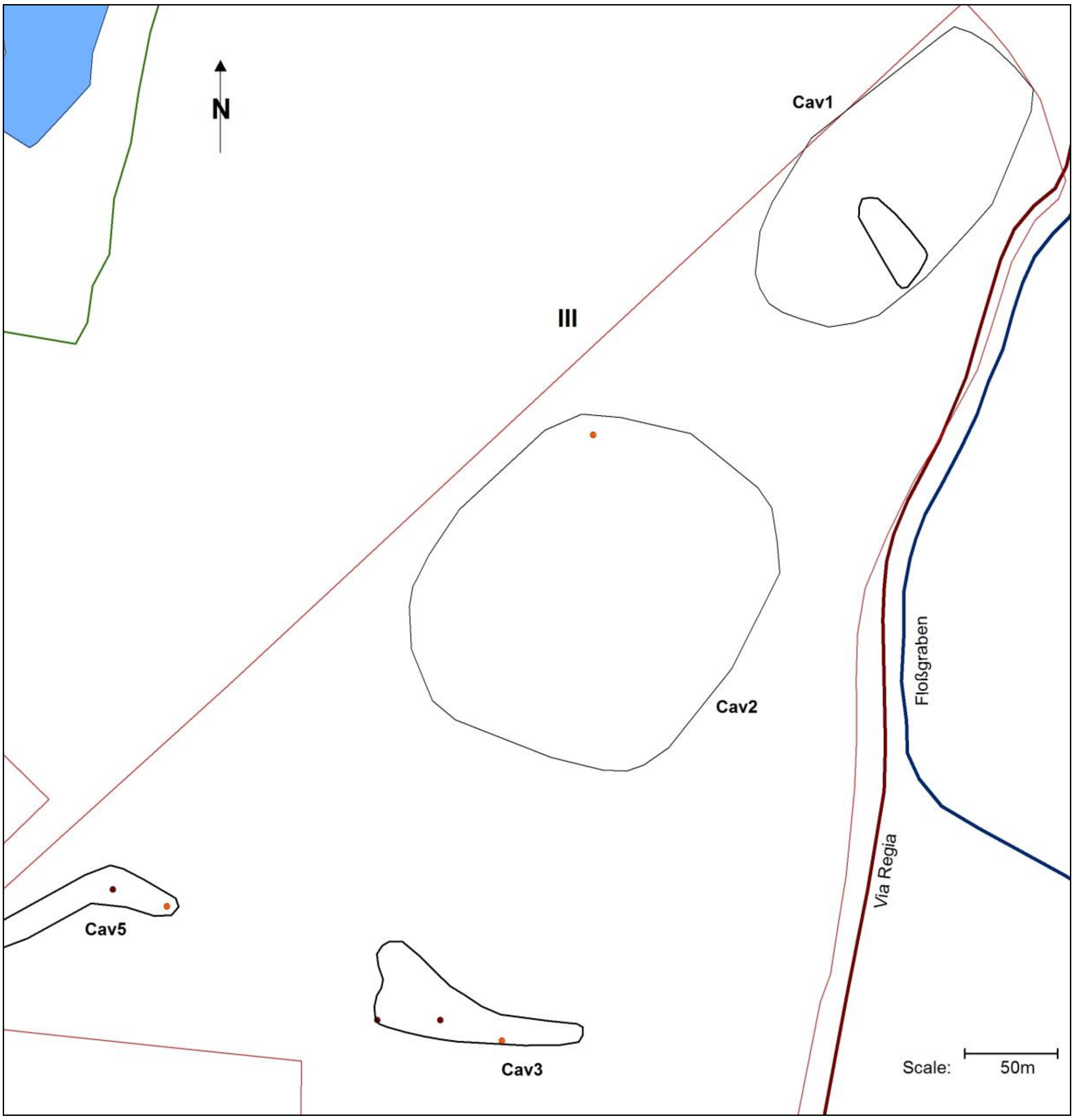


Figure 80: Detailed impacted pistol/carbine bullet distribution map, Imperial left wing skirmish area (impact damage: dark brown 70-90%, orange 40-60%).

The events

Rather than letting his whole battle line lose cohesion due to the Croat skirmisher screen, Gustav Adolf sent Överste Torsten Stalhandske with two Finish squadrons and one or two musketeer companies to drive them away. Even against 500 horse, 150 foot and four regimental guns, the approximately 500 Croats did not give up without a fight and made a stand with one regiment positioned 100m north of the road, the other near the Leipzig Bridge, where one Croat regiment possibly was cornered and forced to retreat over the bridge.[760] Commanded by the experienced General Isolani, it seems unlikely that all three Croat regiments left the battlefield completely, as Fleetwood claimed, which certainly

[760] Croats have not disrupted their own line on the left wing, which Burgus (1641, 322) and Khevenhiller (1726, 192) have confused with an event on the right (section 8.2.4).

would have been an issue in the court martial at Prague. The more likely scenario is that Stalhandske chased them a good distance, but eventually returned to the battle, while the Croats were rallied somewhere safe and probably returned to the fight with Pappenheim's corps.[761]

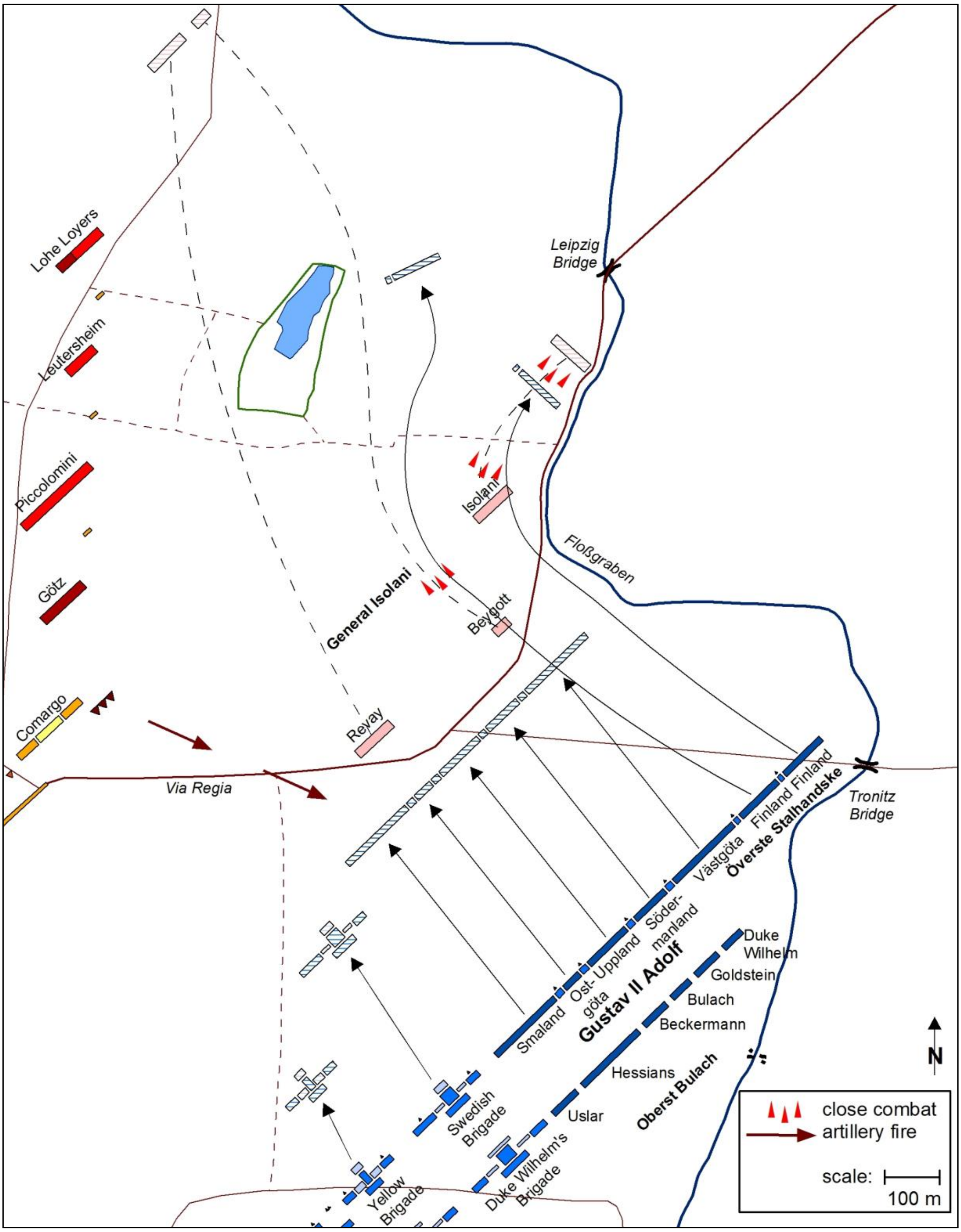
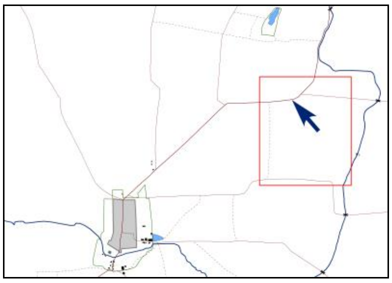


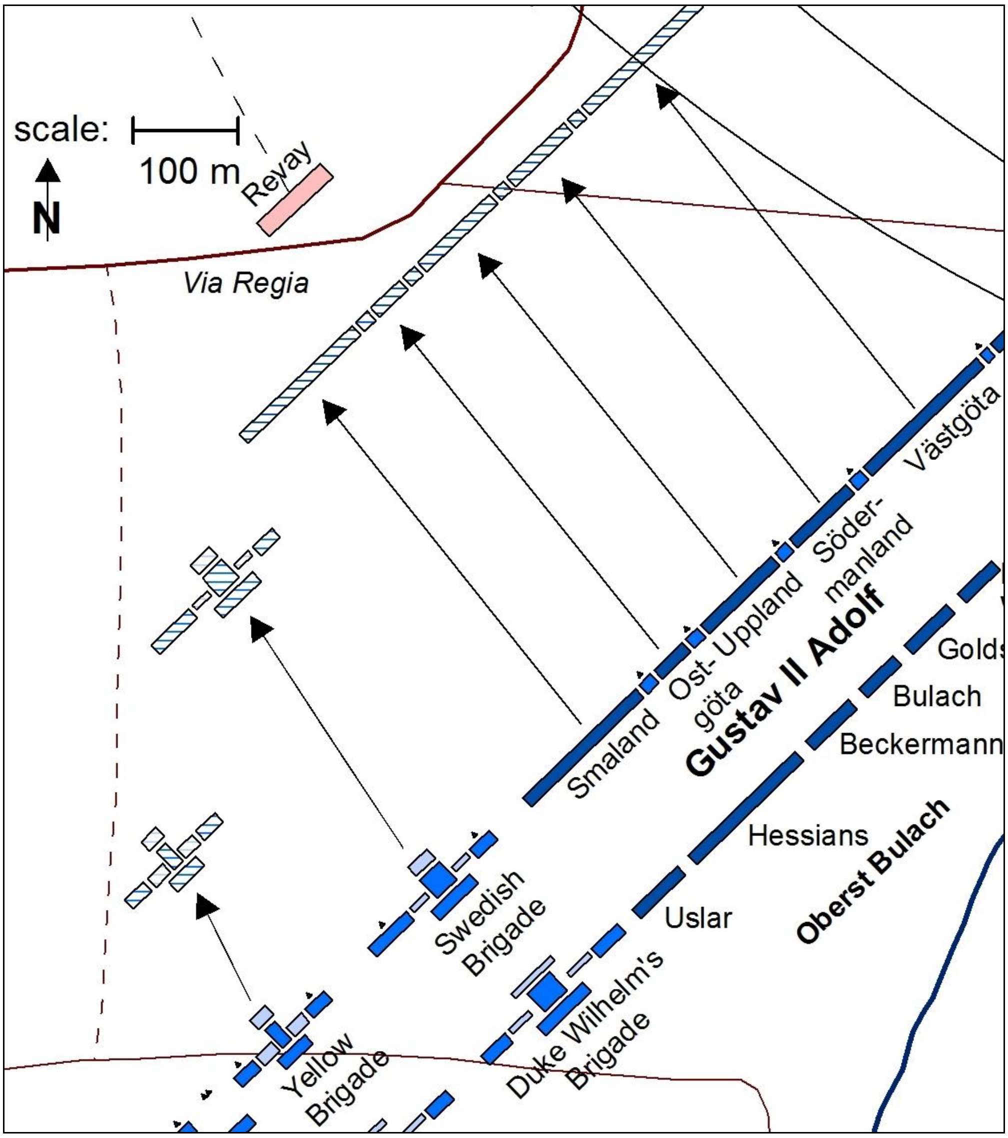
Figure 81: 10.30am to 11am: Stalhandske's attack on the Imperial light cavalry screen.

[761] It is a myth that Gustav Adolf had ordered Stalhandske to charge the cuirassiers, as Watts (1633, 134) claimed. The Finns were more a light cavalry than the other Swedish cavalry. As such they were deployed on the outer wing because of their higher mobility. If Gustav Adolf wanted them to attack the cuirassiers, for which they were not suited, he would have deployed them on the inner wing.

After Stalhandske cleared the way, "Gustav Adolf did not loose any time"[762] and advanced at the head of his remaining five right wing cavalry squadrons Smaland, Ostgöta, Uppland, Södermanland and Västgöta and two infantry brigades, the Yellow and Swedish, from the centre, probably in echelon as flank protection.

8.2.2 Swedish right wing advance 10.45-11.15am





762 Dalbier 1632, 251.

Historical sources

The traditional view, based on secondary sources, is that the Swedish right wing advanced basically in a straight line to the front and, while the Swedish Brigade attacked the small Imperial battery first and then the Imperial infantry, the Swedish cavalry engaged the Imperial cavalry.[763]

This interpretation is contradicted by Ottavio Piccolomini's account:

"…comincio una furiosa salua di moschettate da due Regim:i d'Infanteria et maniche de moschettieri che ogni squadrone de cavalleria conduceva et uno di quelli uenne à occupare un fosso è strada che era auanti li nostri squadroni et cominciando à passare quel fosso è strada si auicinauano à Noi. Io uedendo questo et hauendo tenuto il mio Regim:to un quarto d'hora alle descritione di tutte le moschettate di due squadroni, doue mi ammazzorno infinite soldate et officiali, li andai ad inuestiri et ribbutai uno di essi di la dal fosso è strada,…" [764]

He described that the battle began with a furious Swedish musket volley from two "Regimenti d'Infanteria" and the interlined musketeer companies ("maniche de moschettieri", i.e. rabble of musketeers), after which "one of those" – the demonstrative pronoun "quelli" relates to "Regimenti" – "crossed the road (i.e. Via Regia) in front of our squadron and approached us [Piccolomini's Regiment]." Piccolomini's Regiment then came under musket fire from two "squadroni" for a quarter of an hour. The musketry killed many of his soldiers and officers, so he decided to charge one of the opposing squadrons.

Ottavio Piccolomini used three different terms to describe types of units; he explained adequately that the "maniche de moschettieri" are the musketeer companies interlined between the cavalry. The "due Regimenti d'Infanteria" in this context means 'two infantry brigades', which are the Yellow and Swedish Brigades, which he could see from his position. One of those units, which could have been only the Swedish Brigade on the right centre, occupied a ditch and a road, which is certainly the Via Regia, and by crossing it the brigade advanced towards Piccolomini's Regiment.

The following musket fire from two "squadroni" in this context can only describe the squadrons of the Swedish Brigade and not the interlined musketeer companies, as

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763 Generalstaben 1939, 439, Seidler 1954, 47, Brzezinski 2001, 55. *Relation II from Erfurt* (Droysen 1880, 19), Burgus 1641, 321, Chemnitz 1648, 465, Khevenhiller 1726, 191 and Gottfried 1633, 25, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164 and Abelinum 1646, 749.

764 Argang 1894, 89.

Brzezinski suggested, for several reasons.[765] The musketeer companies are referred to as "maniche de moschettieri" and there is no reason to believe that Ottavio Piccolomini switched terms. When he described the charge against one of the two "squadroni", he did not mention any Swedish cavalry being involved and it seems highly unlikely that two Swedish interlined companies of 150 musketeers alone would have been able to pin down Piccolomini's 500 heavily armoured harquebusiers for 15 minutes on open ground and inflict heavy casualties. It is also highly unlikely that Piccolomini would advance 400m south to the Via Regia at the start of the battle, as that would have opened a huge gap in the Imperial battle line, and put his regiment in the line of fire of Swedish musketeers in the road ditches, an act which would contradict also his previous statement that the unit in question had already crossed the road.[766] Following the example of Diodati's Imperial infantry "squadroni", who looked very similar to Swedish infantry squadrons, the two "squadroni" in Piccolomini's account are very likely two Swedish Brigade squadrons, which did not attack the Imperial artillery and infantry but engaged the Imperial cavalry instead.

This incident is reported slightly differently by Silvio Piccolomini:

"And it is certain that we can thank God and Holy Madonna for not all being dead, because basically we were standing a quarter hour at a distance of twenty paces from an infantry squadron, having the colour of this ditch, escaping miraculously and because of the cuirasses of proof, saving the lives of all those, who were spared."[767]

In contradiction to his uncle, Silvio mentioned only one squadron, which is very likely one from the Swedish Brigade, but it is uncertain, what he mends by saying that it had the colour of the ditch. No unit with brown colours or uniforms is known to have participated in the battle.

Excursus: 'Winckel's Old Blue' and 'Eric Hand's New Blue Regiments' in historical sources

There is one misconception in the historical sources concerning the New Swedish and the Old Blue Brigades, which is deeply embedded in modern research and needs to be

[765] Brzezinski 2001, 59.
[766] Suggested by Brzezinski 2001, 59. Silvio Piccolomini's statement (Archivio 1871, 240) that "the General [Wallenstein] decided to accept battle and we advanced a little to a small ditch, and there we waited" refer to the entire Imperial army, specifically to the infantry, and not to Piccolomini's Regiment.
[767] Archivio 1871, 242.

clarified. Diodati reported that the yellow casacks[768] ("casacche gialle") were attacked by infantry and the blue casacks ("casacche turchine") were attacked by the Regiments Piccolomini and Götz.[769] He is the only Imperial eyewitness who was not speculating about enemy units, but reported what he saw of the uniform colours. The yellow casacks are clearly the Yellow Brigade, while the meaning of 'blue casacks' is unclear, but was imprecisely translated by Fiedler as 'Blue Regiment'. The Old Blue Regiment, which formed the Blue Brigade, as well as Eric Hand's New Blue Regiment, which was operating as part of the Swedish Brigade, had blue uniforms and colours.[770]

Münchhausen, who fought in Comargo's Regiment near Götz and Piccolomini noted in his 19 November letter that his unit destroyed "three regiments, which remained in one", which is the description of a Swedish three squadron brigade, and they took fifteen colours,[771] while he specified in his 6 December letter that his unit destroyed the Yellow and Old Blue Regiments, taking fourteen colours from them.[772] The change between those two letters, only seventeen days apart, is evident; in the first letter he stated to have fought against one brigade, while in the second he had fought against two brigades, which are now described as Yellow and Old Blue Brigades. However, Münchhausen could not have seen the Old Blue Regiment, because it advanced together with the Swedish left wing against the windmills (section 8.2.4), and it seems very likely that Münchhausen had confused the Old Blue with the New Blue, also called Swedish, Brigade, which can also be seen in Gallas' account.[773]

That the 'Blue Regiment' in Imperial eyewitness accounts was, in fact, Eric Hand's New Blue Regiment of the Swedish Brigade becomes clear in Ottavio Piccolomini's account. He described that, after he had chased one infantry squadron to the Via Regia, the "Blue Regiment, the king's most appreciated (Regimento torchino [sic: turchino] il più stimato dal Re)" advanced against Götz's Regiment, which was to his right. This event happened at the beginning of the battle when Piccolomini's and Götz's Regiments could not possibly have met the Old Blue Regiment. Further more "the king's most appreciated regiment" is more likely a description of the only national Swedish infantry which took part in the battle, than it is of a German unit. Excepting the *Declaration from 1633,* most

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768 A 'casack' is a shawl-like coat for musketeers to protect the gunpowder and musket from rain (Brzezinski/Hook 2006, 34).
769 Fiedler 1864, 563.
770 Brzezinski/Hook 2006, 46.
771 Wittrock 1932, 305.
772 Münchhausen 1632.
773 Förster 1844, 95.

secondary sources, based on the *Inventarium Sueciae*, seems to have repeated this mistake by reporting that the Swedish, Yellow and Old Blue Brigades advanced together with the Swedish right wing.[774] This scenario is contradicted by the results from the archaeological survey (section 8.3.5). Although the eyewitness accounts are unclear about the Swedish right centre, not one explicitly reported that the Swedish Brigade attacked the Imperial battery and left centre.

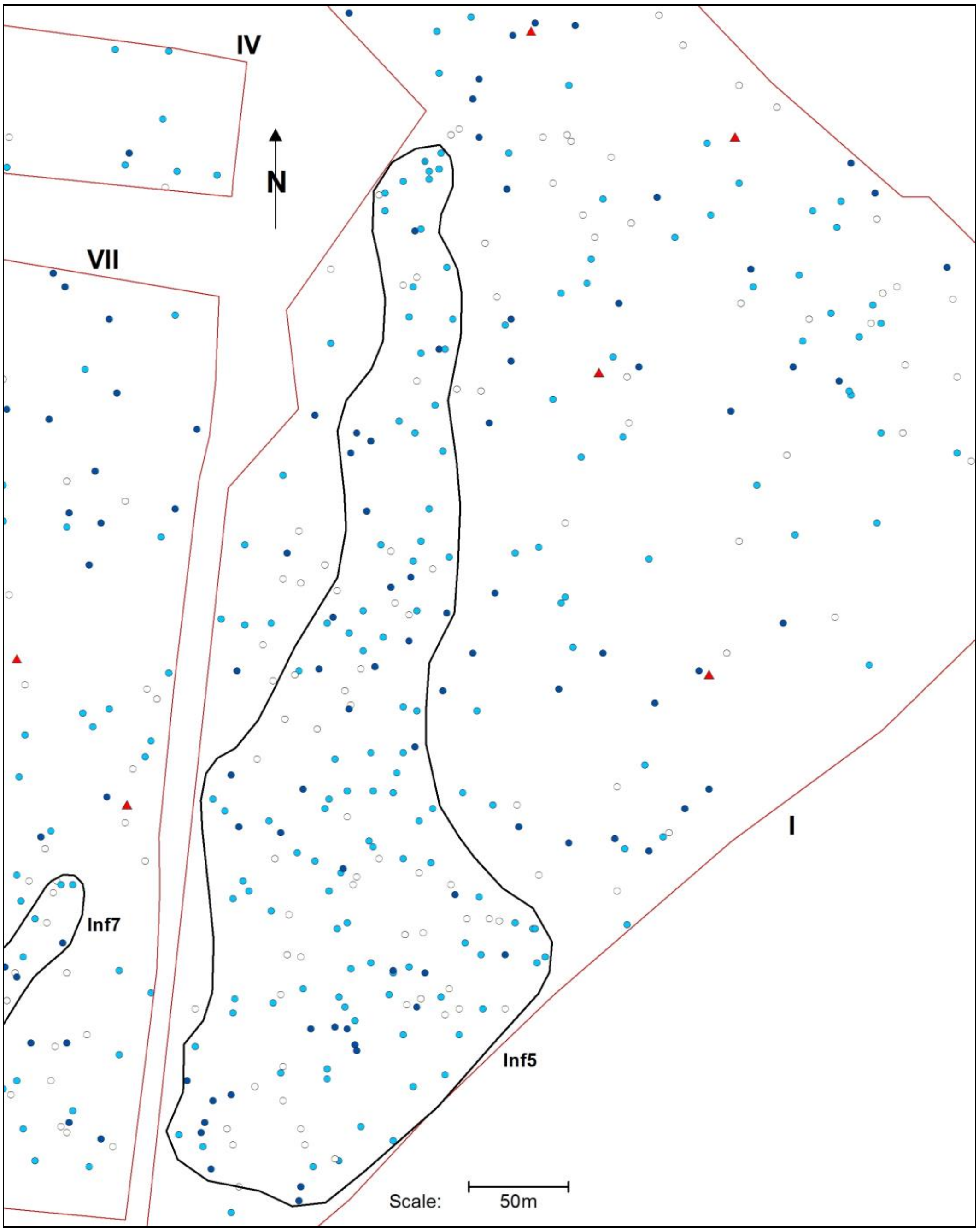

Figure 82: Detailed musket bullet distribution map, Imperial left wing and left centre (dark blue 99% musket, blue 75% musket, white 25% musket, red: rifle).

[774] The *Declaration from 1633* (Droysen 1880, 40) reported the 'Blue Regiment' on the Swedish right centre, aware that it was the Swedish Brigade. It was Gottfried (1633, 26), who seems to have confused the two Blue Brigades first, reporting both incorrectly to have advanced against the Imperial left centre, which was copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 750, Chemnitz 1648, 465, and from there entered modern publications. See also Generalstaben 1939, 436.

Archaeological sources

Ottavio and Silvio Piccolomini's reports of fighting between their regiment and a Swedish infantry brigade are confirmed by the elongated concentration Inf5 of musket bullets, running north-south, which contains the second highest concentration of bullets with impact damage in its southern area.

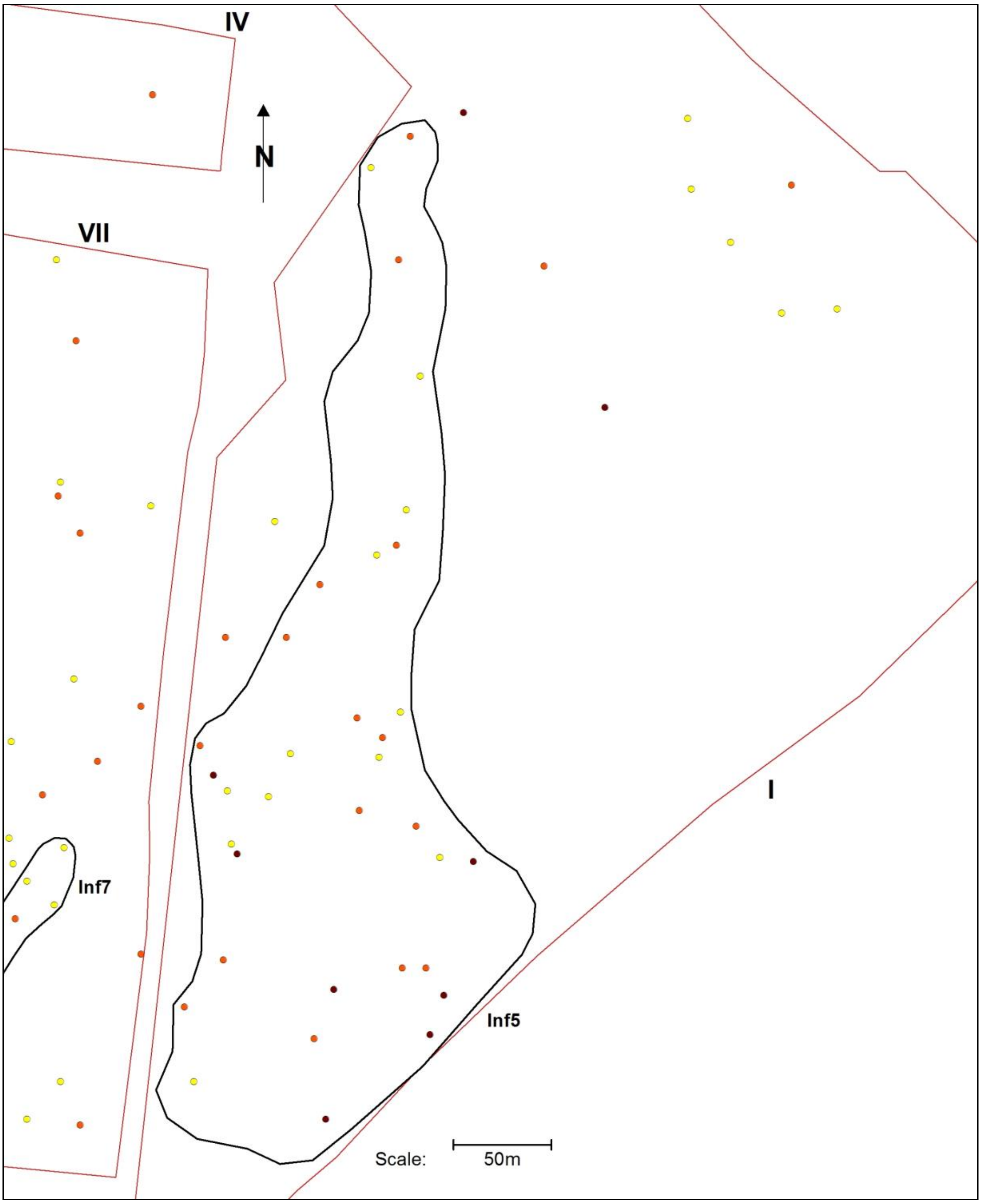

Figure 83: Detailed impacted musket bullet distribution map, Imperial left wing and left centre (impact damage: dark brown 70-90%, orange 40-60%, yellow 10-30%).

In comparison with the low density concentrations Inf1 to Inf4 deriving from skirmishing, Inf5 represents major combat involving large infantry formations rather than single musketeer companies. Therefore, the northern part of concentration Inf5 very likely derives from the advancing Swedish Brigade, while the even denser concentration in the southern part probably represents two different infantry fighting episodes involving the Yellow Brigade in the late morning and a second attack on the Imperial battery in the afternoon. The location of the Swedish Brigade on the battlefield is of major importance, because the Swedish cavalry was to its right and the length of this wing shows the extent of Gustav Adolf's outflanking manoeuvre.

One shell fragment found on field II suggests that the small Imperial battery initially did not fire straight on at the Swedish infantry, but on the cavalry, probably because they advanced first, while the Swedish infantry followed them in echelon formation.

Six of eight small calibre rifle bullets were found on the Imperial left wing, suggesting that Swedish rifles were used in particular on this wing. They derive possibly from Gustav Adolf's *djurskyttar*.

The events

While the Finns were very likely still chasing the Croats, five Swedish cavalry squadrons[775] crossed the Via Regia without any difficulties,[776] wheeled around in a wide outflanking manoeuvre until they had Ranstädt in their rear.[777] They were followed by the Swedish Brigade as direct left flank protection. The Yellow Brigade had a more difficult approach as they attacked the small Imperial battery frontally, and were probably being fired on by a musketeer detachment of Comargo's Regiment from the road ditches.[778] A total force of 1,350 horse and 3,150 foot advanced "in the most beautiful order."[779] The rightmost Regiment Västgöta had to cover 1,700m. For cavalry only, this manoeuvre could

[775] According to Fleetwood (1632, 7) Gustav Adolf attacked with four regiments. Although he reported four instead of five regiments, his statement seems to prove that the Finns were somewhere else at that time.
[776] Fabricius (Wittrock 1932, 306), Fleetwood 1632, 7. However, the latter stated incorrectly that the King was shot at the road as there was no major combat there.
[777] Vitzthum/Berlepsch (Glafey 1749, 13).
[778] Münchhausen (1632 and Wittrock 1932, 306) of Comargo's Regiment reported that they had fought against the Yellow and Old Blue (sic: New Blue) Regiments.
[779] Silvio Piccolomini (Archivio 1871, 240).

have been achieved in a short time, but the musketeer companies towing regimental guns made a slower advance of approximately 28 minutes.[780]

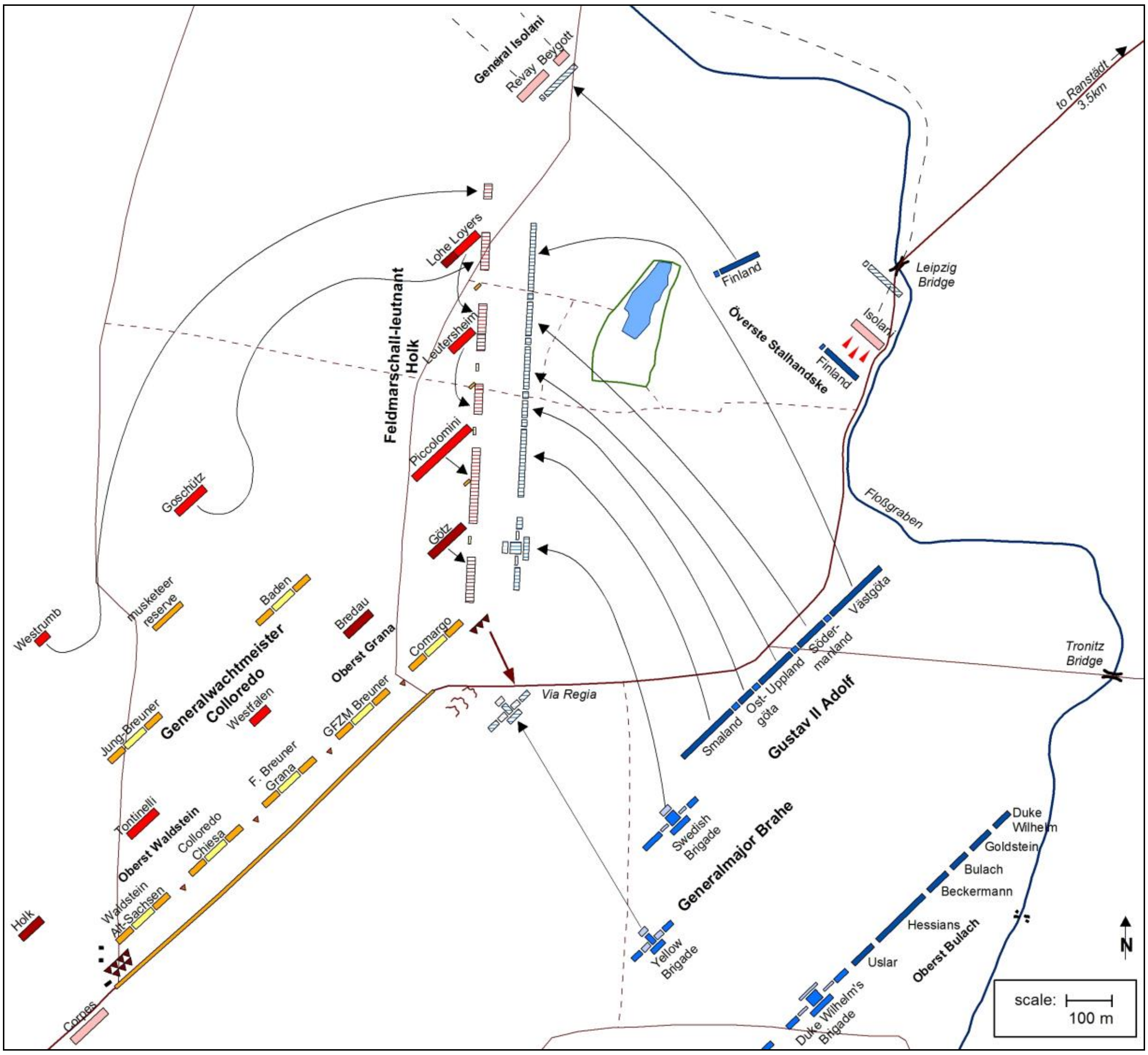

Figure 84: 10.45am to 11.15am: Advancing Swedish right wing.

It is possible that this shift to the right was not deliberate, but the result of the rightmost Swedish cavalry following the line of least resistance and simply moving too far; the rest had to follow to maintain the line. However, it seems more likely that it was Gustav Adolf's plan to pin the dangerous Imperial armoured cavalry with his infantry, while the Swedish cavalry engaged the weaker harquebusiers.

Although there is no direct evidence, it is likely that Holk, with only 1,450 horse and 1,150 foot, outnumbered and threatened to be out flanked, reacted by extending his line with reinforcements, probably consisting of the two wing reserve squadrons Goschütz

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780 There is no historical evidence on the speed of formations in 17th century. However, it is assumed that 17th century infantry with regimental guns could not move faster than late 18th century infantry in common step, which is 60m per minute (Babits 1998, 114).

and Westrumb, the latter sent by Wallenstein to assist Holk on the left, "because there all the fury began."[781] Holk, now having 1,800 horse, gained cavalry superiority, but was still severely outnumbered by infantry. The Swedish outflanking manoeuvre must have looked so impressive that the Imperial baggage train was relocated to the right Imperial wing to avoid capture.[782] The right wing reserve Westrumb moving to the left at the commencement of the battle is an important indicator for Holk's situation, which would not have been so desperate if he were facing only the Swedish cavalry and musketeer companies, without the Swedish Brigade pinning down his crack units Götz and Piccolomini.

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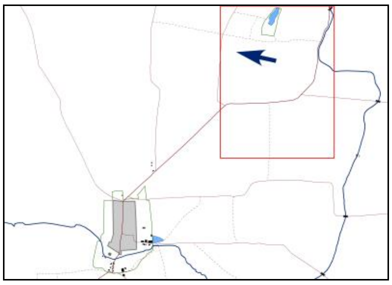
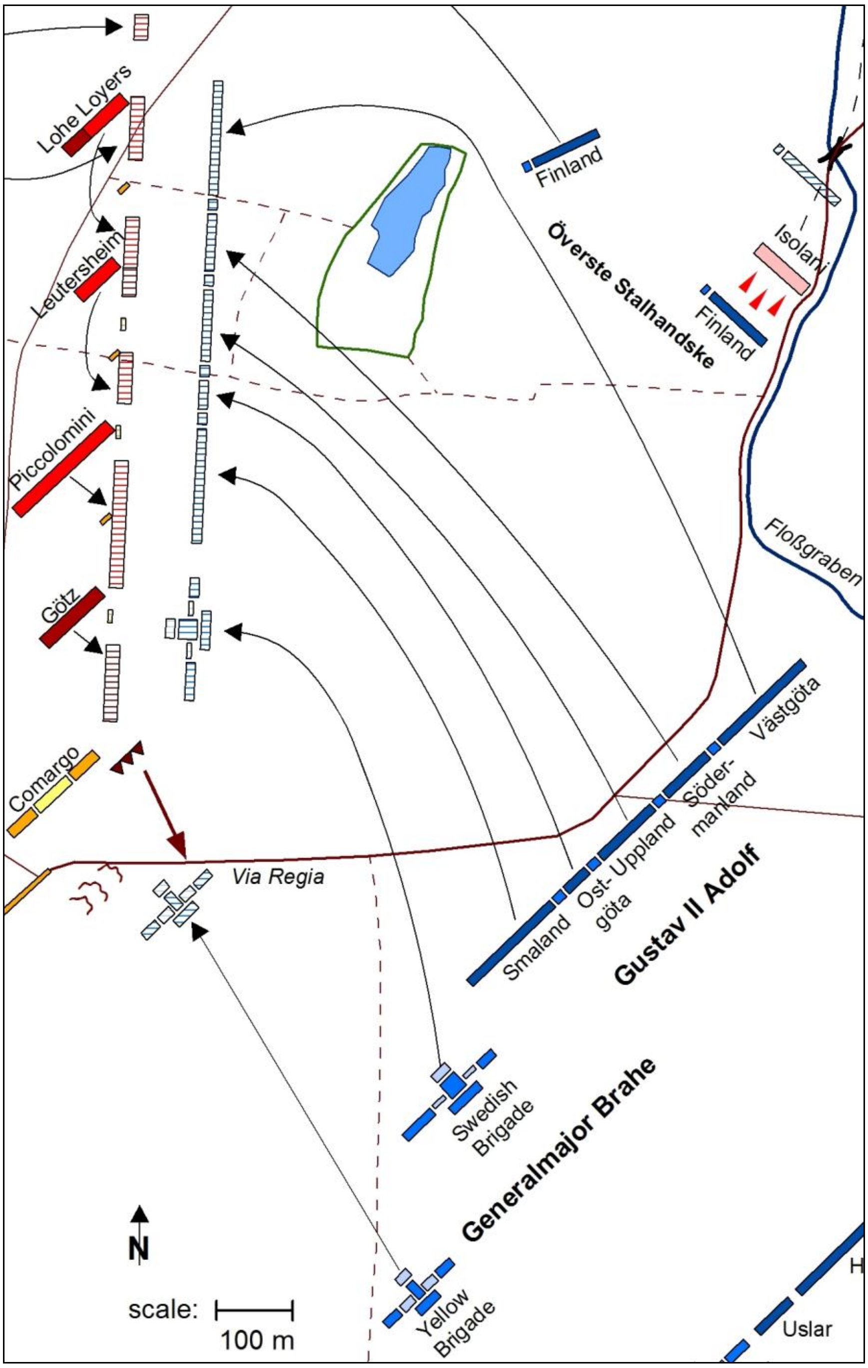
781 Holk (Wittrock 1932, 308) reported that he was reinforced by five cornets from the right wing at the battle's beginning, which is mostly overlooked by historians. This cavalry was certainly not pulled out of the frontline, which still awaited a Swedish attack, but Wallenstein's right wing reserve squadron Westrumb. Although there is no historical evidence it seems likely that Holk brought in his own reserve too. The commencement of the battle on the left Imperial wing, at the instance when the Swedish right wing had wheeled around is reported by Holk (Wittrock 1932, 308) and Vitzthum/Berlepsch (Glafey 1749, 13).

782 Diodati (Fiedler 1864, 562), copied by the *Spanish Relation* (Watts 1633, 160).

8.2.3 Swedish right wing attack 11.00-12.00am





Historical sources

There is not much historical evidence for the early stage of the Swedish right wing attack. According to Ottavio and Silvio Piccolomini, the Swedish Brigade pinned down their regiment, and very likely that of Götz, by musket fire for 15 minutes.[783] Münchhausen's account started at a later time, when his regiment (Comargo) made a counterattack, together with Baden's Regiment of the second line, after his Oberst was mortally wounded and his Oberstleutnant killed.[784] Although he avoided mentioning a retreat, it is pretty clear that his regiment was forced to withdraw after taking heavy casualties. Fleetwood stated that the small Imperial battery, deployed in front of Comargo's Regiment, was soon taken and its guns spiked.[785] However, there is no historical evidence of the achievements of the Swedish cavalry or the Imperial harquebusiers.

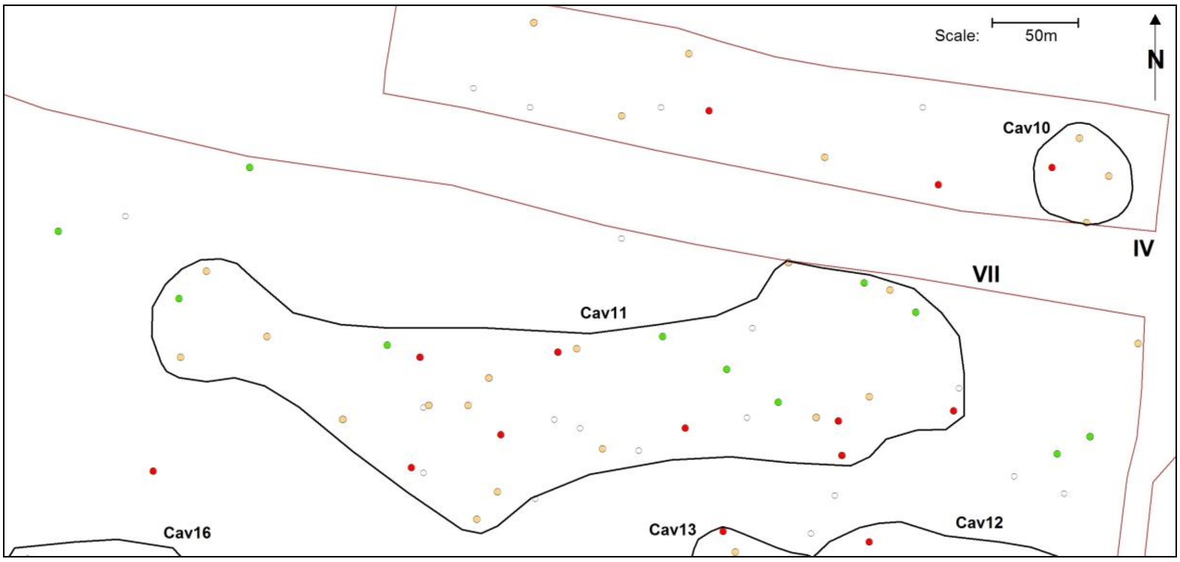


Figure 85: Detailed pistol/carbine bullet distribution map, Imperial left wing and left centre rear.

Archaeological sources

The low density pistol and carbine bullet distribution patterns on field IV and the northern part of field VII (Cav10, Cav11), as well as the small concentration of musket bullets Inf6 with medium impact damage suggest that there was some cavalry action including detached musketeers 300m behind the Imperial left wing's initial deployment. Most of the cavalry combat took place further north in an area not yet surveyed. The musket bullet concentrations Inf7, Inf8 and Inf9, in combination with some medium and a few heavily impacted bullets, clearly show a Swedish brigade breaking through the Imperial left centre and advancing 300m towards the second infantry line, slightly shifting to the left.

[783] Argang 1894, 89, Archivio 1871, 242.
[784] Wittrock 1932, 305.
[785] Fleetwood 1632, 7.

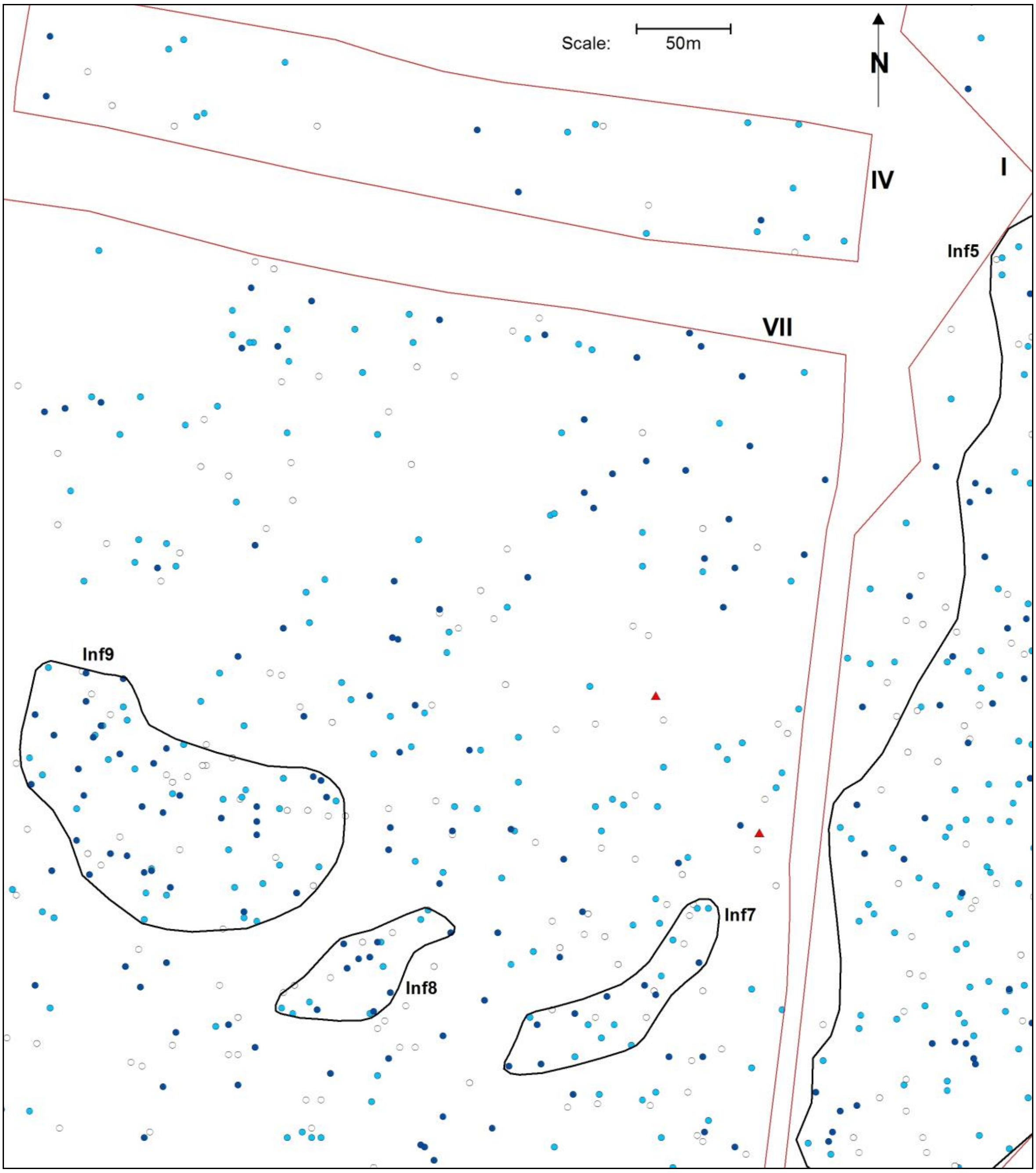


Figure 86: Detailed musket bullet distribution map, Imperial left wing and left centre rear.

Two distribution patterns showing infantry and cavalry combat so far behind the Imperial left wing and left centre came as a surprise, as most historians believed that Gustav Adolf's right wing was not able to achieve a substantial break through.[786] It is not entirely certain if this Swedish success was achieved during the first or second attack. At the present time it seems more likely that both the cavalry and infantry combat in the Imperial rear occurred during the battle's first stage. First, the Swedish right wing cavalry was not in condition to perform decisive action after Pappenheim's counterattack. The Swedish infantry breakthrough concurs with Münchhausen's report of an Imperial

[786] Brzezinski 2001, 62 and 67, Seidler 1954, 56 and 77, Deuticke 1917, 75. Generalstaben (1939, 433) suggested a more successful Swedish infantry attack, but not to this extend.

counterattack by two infantry squadrons, for which there would have been enough space, only if the Yellow Brigade had not remained at the Via Regia, but advanced towards the Imperial second line.

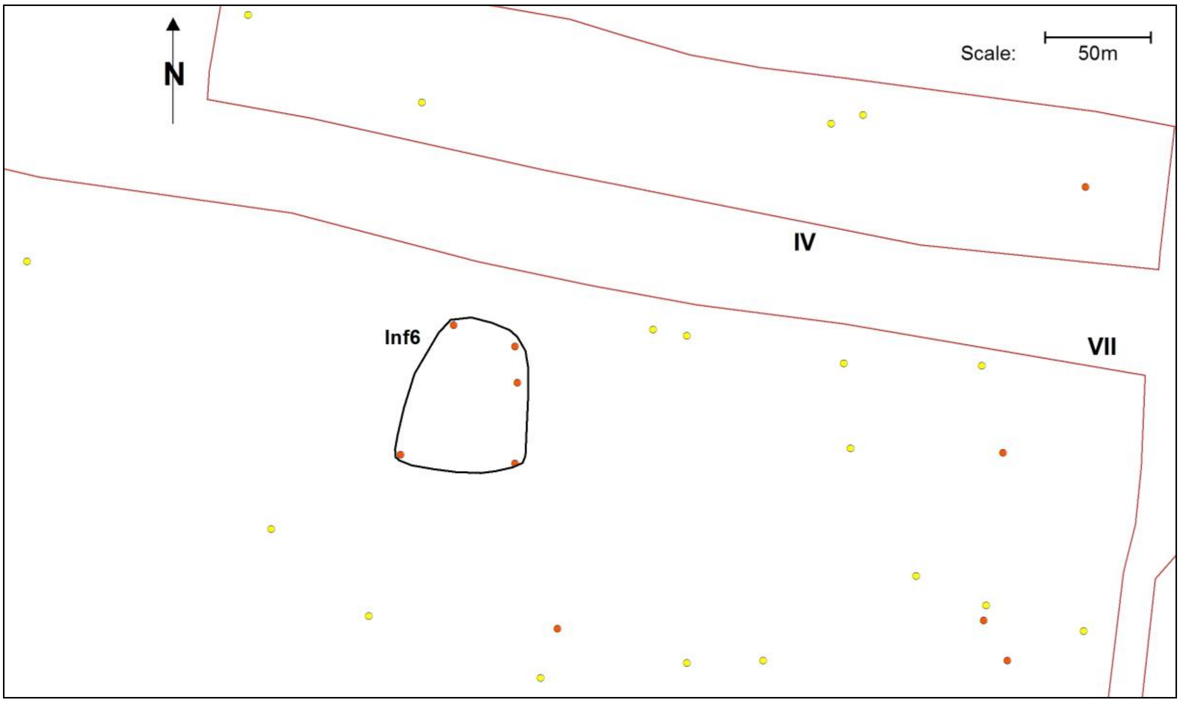


Figure 87: Detailed impacted musket bullet distribution map, Imperial left wing and left centre rear.

The events

Harassed by Imperial skirmishing fire from the road ditches, the Yellow Brigade, commanded by Generalmajor Nils Brahe, crossed the Via Regia and advanced against the Imperial small battery with its four 24-pounders and two 12-pounders. Seeing Gustav Adolf's guard in their yellow (Life Regiment) and grey (Lifeguard) uniforms approaching without being much affected by their artillery fire,[787] some Imperial gun crews did not offer much resistance and left their guns. Ordnance officers Hauptmann Johann Burg and Hauptmann Maximilian Kleeblatt were executed a few months later at Prague for desertion.[788] After Brahe had taken and spiked the guns,[789] possibly with help from the left squadron of the Swedish Brigade, he turned to the Imperial left centre, where Oberst Theodor Comargo commanded one of Wallenstein's most experienced infantry regiments; some of these soldiers had served for thirteen years. After a bitter fight in which Oberst

[787] According to the *Spanish Relation* (Watts 1633, 161) "…our (Imperial) Artillery being never able to disorder it (Swedish infantry) though many a shot was made upon it."
[788] Seidler 1954, 56 and Seidler 1962, 17.
[789] The early capture of the small Imperial battery is mentioned by Fleetwood (1632, 7), Hallenus (Mankell 1860, 662) and Hülshorst (Wittrock 1932, 303), but not by which unit.

Comargo was mortally wounded with four shots and the Oberstleutnant killed,[790] Obristwachtmeister Münchhausen took command[791] and ordered a retreat behind the second line to reform, probably covered by Bredau's Cuirassiers.

Meanwhile, Överstelöjtnant Gabriel Kyle's Swedish Brigade, possibly assisted by Överste Stenbock's Smaland cavalry, arrived in front of Götz's and Piccolomini's Regiments and began delivering musket fire, which was probably returned by Piccolomini's harquebusiers with their carbines and by one or two Imperial musketeer companies. Only their armour prevented them from being annihilated,[792] but they held the line.[793] With the heavily armoured Imperial cavalry held off by the Swedish Brigade, Gustav Adolf's national Swedish cavalry turned with 950 men on the 900 Imperial harquebusiers of the outer wing. Watts described that the Swedish wing delivered a preparatory fire, first by regimental guns, then by musketeers, and followed it up by a cavalry charge, which was a Swedish standard cavalry tactic.[794] The Imperial harquebusiers were neither equipped nor trained to resist a cavalry charge of this magnitude and many fired their carbines and pistols in the air and retreated (see section 3.3.2.2).[795] Although the Imperial left wing was not entirely beaten, the situation, which Diodati played down as a stalemate,[796] must have become increasingly desperate, in particular if Stalhandske's Finns returned to the battlefield.

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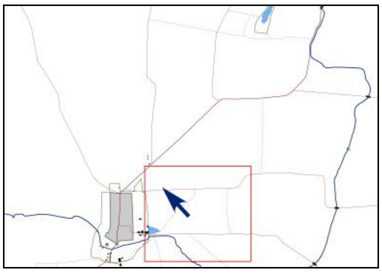
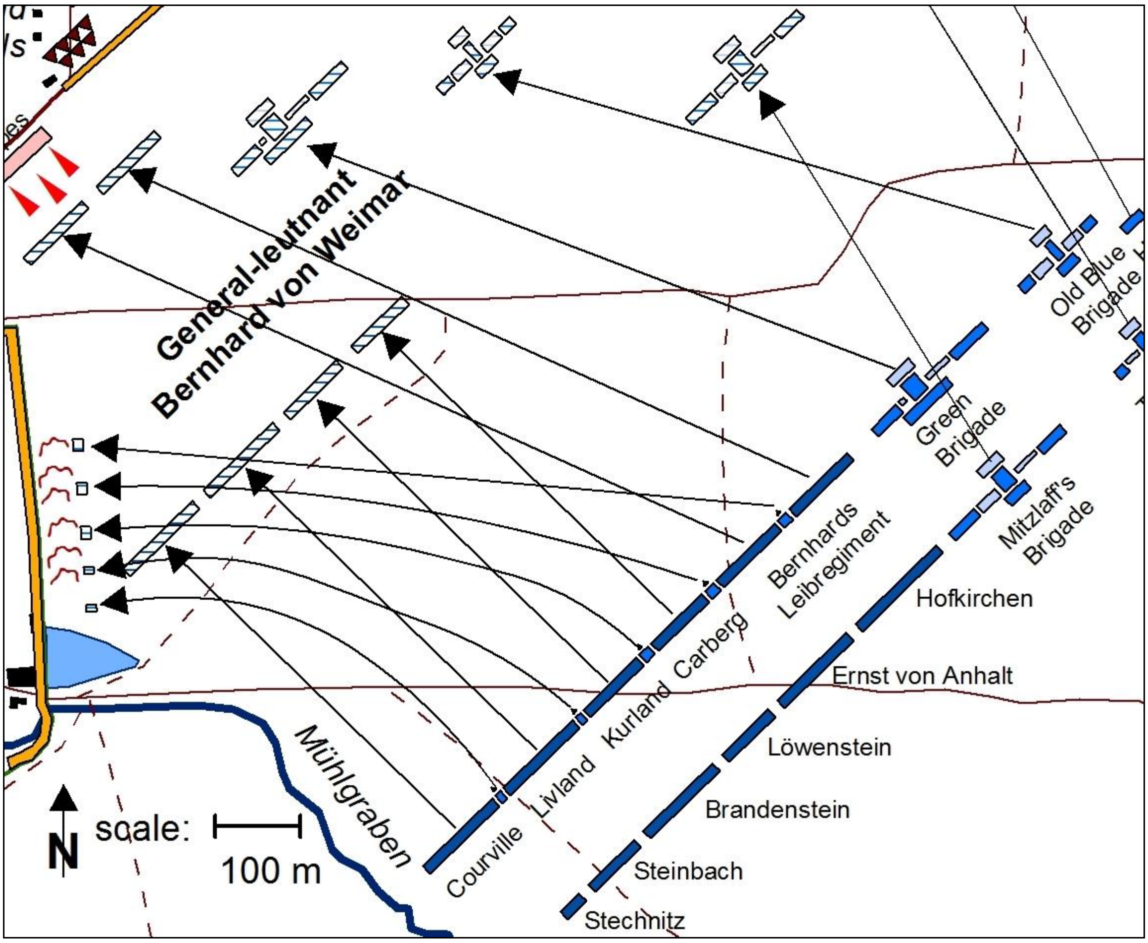
[790] Wittrock 1932, 305.
[791] Münchhausen was still in command of Comargo's Regiment in December 1632 (Hallwich 1912a, 617).
[792] Silvio Piccolomini (Archivio 1871, 242).
[793] Diodati (Fiedler 1864, 563).
[794] Watts 1633, 134.
[795] Poyntz 1908, 74.
[796] Diodati contradicts himself by reporting that "everyone tried to advance to force the enemy from his position" on the Imperial left wing, while stating at the same time that the baggage train was in danger of being cut of and that Pappenheim on his arrival immediately moved to the left wing, where it seemed that the King charged most stubborn (Fiedler 1864, 562).

8.2.4 Swedish left wing advance 11.00-12.00am





Historical sources

Reports about events on the Imperial right wing are sparse and short, even in the otherwise more informative secondary sources, and no eyewitnesses reported cavalry fighting. However, there is one indirect eyewitness account in the form of the death sentence against Oberst Johann Nicolaus Hagen von Sauwenbein at the court martial in Prague. It states that his harquebusier regiment was disordered by routed Croats and as a result he retreated to a safe position, disobeying several orders to return.[797]

Fleetwood's report is crucial to understanding the battle in that

[797] Seidler 1954, 141-142.

"Hertzoke Bernerds and Winckles regimentes were comaunded upon the cannons at the mills,"[798]

which he possibly could have seen himself. Fleetwood's account contradicts the *Inventarium Sueciae* and all secondary sources depending on it,[799] reporting incorrectly that the Old Blue Brigade advanced along with the Swedish right wing.

There is almost no report of what happened to the Imperial musketeers in the Lützen gardens except Watts' short note that they were finally taken by Swedish troops before dusk.[800] It seems most unlikely that Bernhard von Weimar left them unchallenged and able to deliver flanking fire at his cavalry, which had to advance in close proximity to the mud walls.

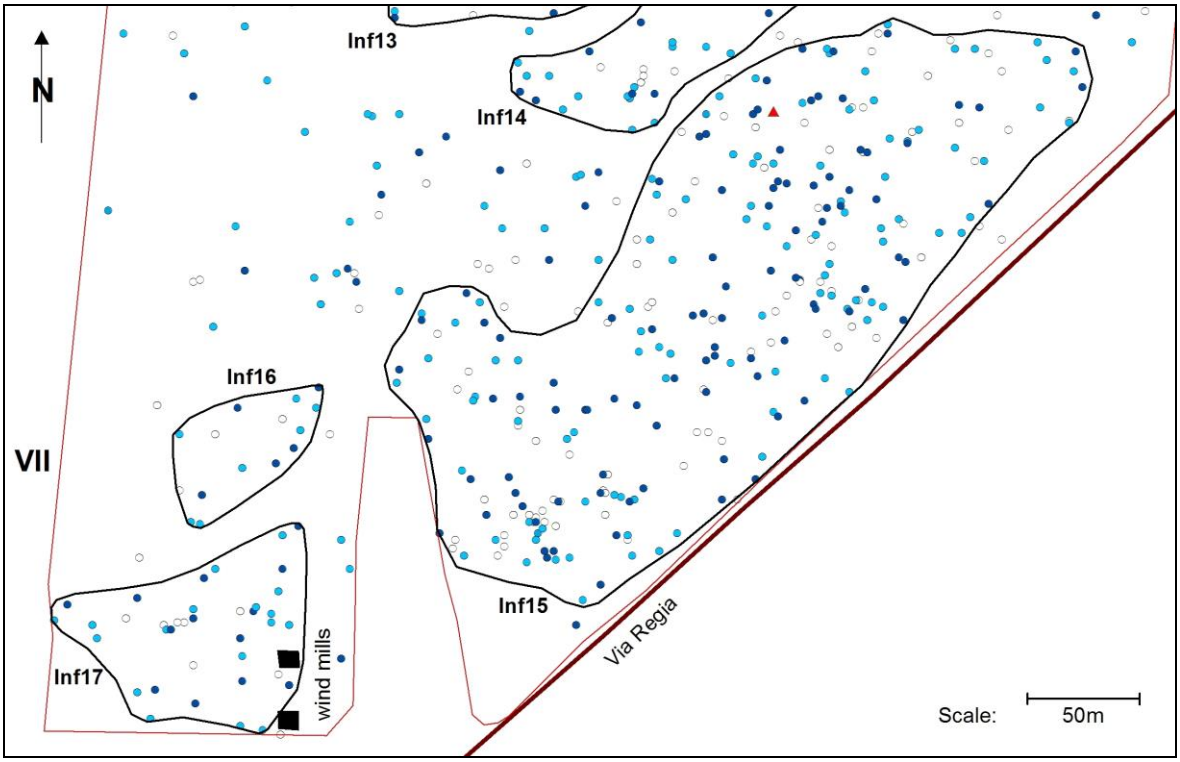


Figure 88: Detailed musket bullet distribution map, Imperial inner right wing and right centre.

Archaeological sources

Unfortunately, most of the archaeological potential on the Swedish left wing is destroyed by house development and, in addition, a part of the Imperial centre is at least disturbed by gardens. However, there are distribution patterns near the windmills concerning the

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[798] Fleetwood 1632, 7.
[799] Gottfried 1633, 25, copied by Monro 1637, part II, 164, Abelinum 1646, 750, Chemnitz 1648, 465, *Wahrhaftige Beschreibung* 1633 and *Glaubwürdiger Bericht* 1633.
[800] Watts 1633, 149.

fighting on the Imperial right centre. The densest distribution patterns of musket, pistol and carbine bullets with the highest number of impacted bullets on the battlefield are in the southern area of field VII. Interpreting those patterns is complicated, because they derive from at least two, but probably more, different combat episodes.

In comparison to concentration Inf5, which we know derives from two combat episodes, the musket bullet concentration Inf15 is denser and seemingly derives from three different engagements, although it is possible that one, or two, lasted a longer time, thus producing more bullets. If we consider concentration Inf17 as part of Inf15, it has a length of 500m, which is sufficient space for up to three infantry formations, either Imperial squadrons or Swedish brigades, to manoeuvre, and it is likely that the Swedes advanced with at least two brigades during any attacks on the Imperial right centre.

The archaeological findings not only support Fleetwood's statement about the Old Blue Brigade advancing together with the left wing, but would also suggest that this brigade actually engaged the enemy, a key point crucial to understanding the historical sources. The concentration demonstrates that the *Inventarium Sueciae* is incorrect in its assumption that the Old Blue Brigade advanced with the right wing, in part because there is no extension of concentrations on the Swedish right centre that would support the concept that the Old Blue Brigade went forward with the right wing. Under the circumstances it would have been also hazardous to redeploy the brigade from the left to the right wing to replace the Swedish Brigade once it was engaged in combat, as Brzezinski suggested, to explain the contradiction in the historical sources.[801] A retreating Swedish Brigade would have been replaced by a second line brigade, if necessary. In any case, it is additional evidence that Diodati and Münchhausen had seen the New Blue or Swedish Brigade on the Swedish right wing and not the Old Blue Brigade.

The events

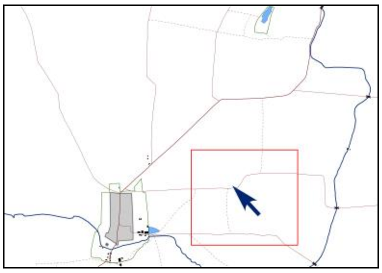
Generalleutnant Bernhard von Weimar faced a difficult situation. Seventeen pieces of heavy artillery and musketeers in the road ditches to his front and behind a mud wall on his flank made any advance difficult. In addition, there was only a small 150m gap guarded by Croats between the fortified artillery position and the Lützen gardens, through which he could advance with his cavalry. While Gustav Adolf conducted his outflanking manoeuvre,

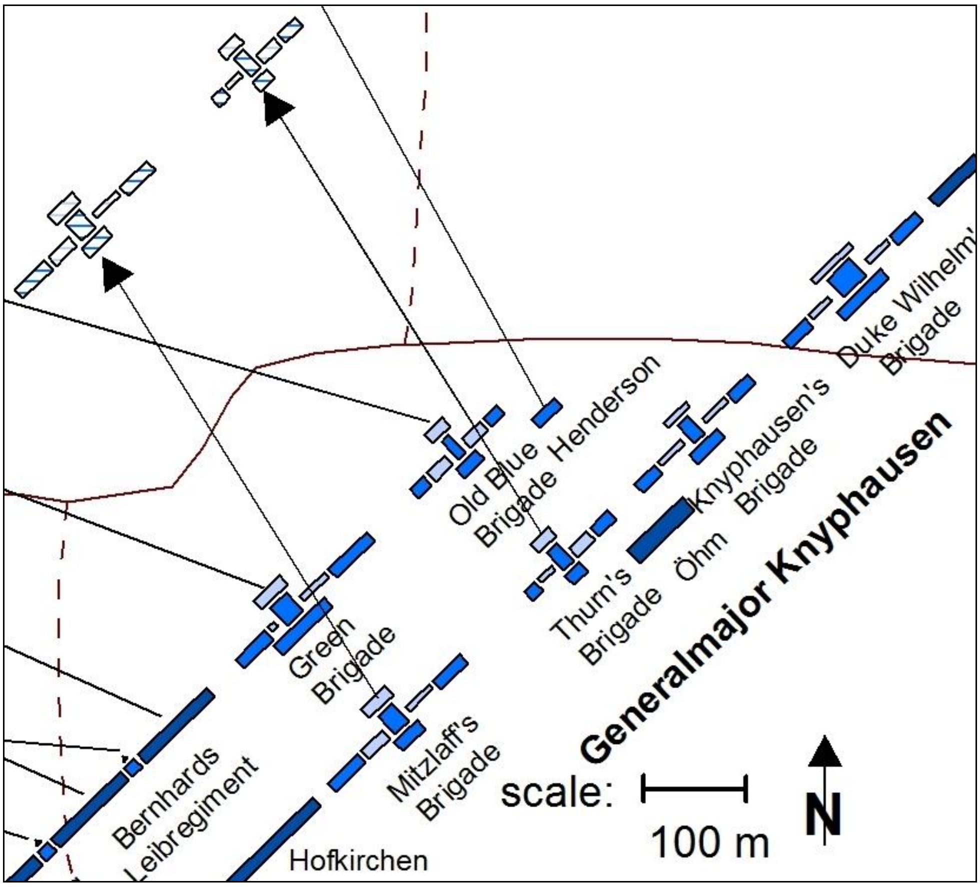
[801] Brzezinski 2001, 67. His suggestion is based entirely on the *Declaration from 1633* (Droysen 1880, 40), which noted that "they (Swedes) got the enemy's seven pieces, which rather weakened the Blue Regiment, and had to be replaced by others." The "Blue Regiment" in this text is certainly the Swedish Brigade, while "others" is not specified.

Bernhard von Weimar waited until the Swedish right wing was engaged in combat, probably hoping that Wallenstein would commit some of his reserves to the Imperial left.

In order to avoid clustering cavalry immediately in front of the Imperial artillery at point-blank range, it seems likely that Bernhard von Weimar left most of his cavalry behind to advance when the Green and Old Blue Brigades reached the Via Regia and began attacking the windmill battery. Probably, as did Gustav Adolf on the right, he sent some cavalry to clear the way. The Croats were easily defeated, but with the limited space and the Swedish cavalry at their heels, the Croats did not retreat around the wing as Wallenstein had planned, but crashed into one of their own regiments, Hagen's harquebusiers, which they put to flight. With his largest regiment gone, opening a huge hole in the battle line, and his reserve of Westrumb's harquebusiers committed to the left, Wallenstein was in an awkward position. Probably at the same time, Bernhard von Weimar ordered Oberst Gersdorf to attack the gardens with his five musketeer companies and ten regimental guns.

8.2.5 Swedish second line 11.00-12.00am





With 9,000 men, almost half the Swedish army, the second line was unusually strong. However, the significance of such a large second line is not reflected in the historical sources, which ignore its existence almost completely. Without sufficient reports of when and where the second line troops were committed, it is almost impossible to understand the battle. It is, therefore, crucial to develop at least a hypothesis of how the second line might have been used, based on reports from Watts and Dalbier and on the development of the battle during the early stage.

Watts claimed that Oberst Bulach was sent with three second line right wing cavalry squadrons over the Floßgraben further to the right to "imp out the feathers" immediately after the battle began.[802] Watts' account of the battle has already been shown as unreliable in general and, because there is no other report confirming this incident, there remains at least some doubt that it occurred. After the Finns routed the Croats, there was no immediate threat to the Swedish far right flank and no reason to move units so far away from the central battlefield. In addition, it would have been much easier to have deployed those three units there in the first place, instead of letting them cross the Floßgraben three times. It would appear that Watts simply made up the story, because he assumed, incorrectly, that the Imperial battle line was much longer than the Swedish.[803] In order to secure the outer right wing to avoid being outflanked, Gustav Adolf could have easily moved these three cavalry squadrons at the end of the right wing's wheeling manoeuvre. The Swedish HQ reported the Croats as threatening the Swedish baggage train near Meuchen in a later stage of the battle[804] and it seems reasonable to suggest that Swedish second line cavalry intercepted them by moving over the Floßgraben around midday.

Oberst Dalbier reported that Generalmajor Knyphausen, his commanding officer, still had two brigades, his own and Duke Wilhelm's, as well as the cavalry reserve Öhm at his disposal, when the Swedish first line collapsed around midday.[805] The other two second line brigades, Mitzlaff and Thurn, must have been committed some time before midday, which means that they had advanced during the first Swedish attack together with, or in very close support of, the first line. The newly discovered first hand account from Dalbier contradicts Watts, who described the same event as the Brigades Mitzlaff and Thurn being released from reserve at a later time, when the Swedish first line was already in full retreat,[806] a sequence of events most historians agreed on.[807] It even seems possible that Watts had access to Dalbier's account, but did not fully understand it.

The reason for the early commitment of two second line infantry brigades becomes clear when the situation of the Swedish army around 11.30am is evaluated. In the delayed double outflanking manoeuvre, Gustav Adolf's right wing was already engaged in close combat when Bernhard von Weimar's left wing began its advance, creating a gap of approximately 400m in the Swedish centre. At this stage, the battle was certainly going

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[802] Watts 1633, 132.
[803] Watts 1633, 132.
[804] Söltl 1842, 347.
[805] Dalbier (1632, 252) reported this event after he made a note on the second Swedish attack in the afternoon. However, Dalbier made clear that those three units were responsible for rallying fleeing soldiers, an event, which took place after the collapse of the first line around midday.
[806] Watts 1633, 145-146.
[807] Brzezinski 2001, 71 and 75, Seidler 1954, 77, Deuticke 1917, 80-81, Generalstaben 1939, 442.

according to Gustav Adolf's plan and he must have envisioned a separation of his centre, which would have endangered his entire operation, if this gap were not filled by other units. The Brigades Mitzlaff and Thurn did not have to actually attack; their mere presence in close proximity would hold the Imperial centre infantry squadrons Breuner/Grana and GFZM Breuner in place.

The entire Swedish troop movement suggests that its main purpose was to play on their advantage of greater numbers, deploying their troops on a spatially limited battlefield, outflanking and outnumbering the Imperial army on its wings, and destroying it with one decisive blow before Pappenheim's corps could arrive and even the odds. This scenario would have been an appropriate strategy in this situation, in particular because Gustav Adolf could not anticipate when Pappenheim's infantry would arrive, so there was an emphasis on speeding up the Swedish attacks once the battle was joined.

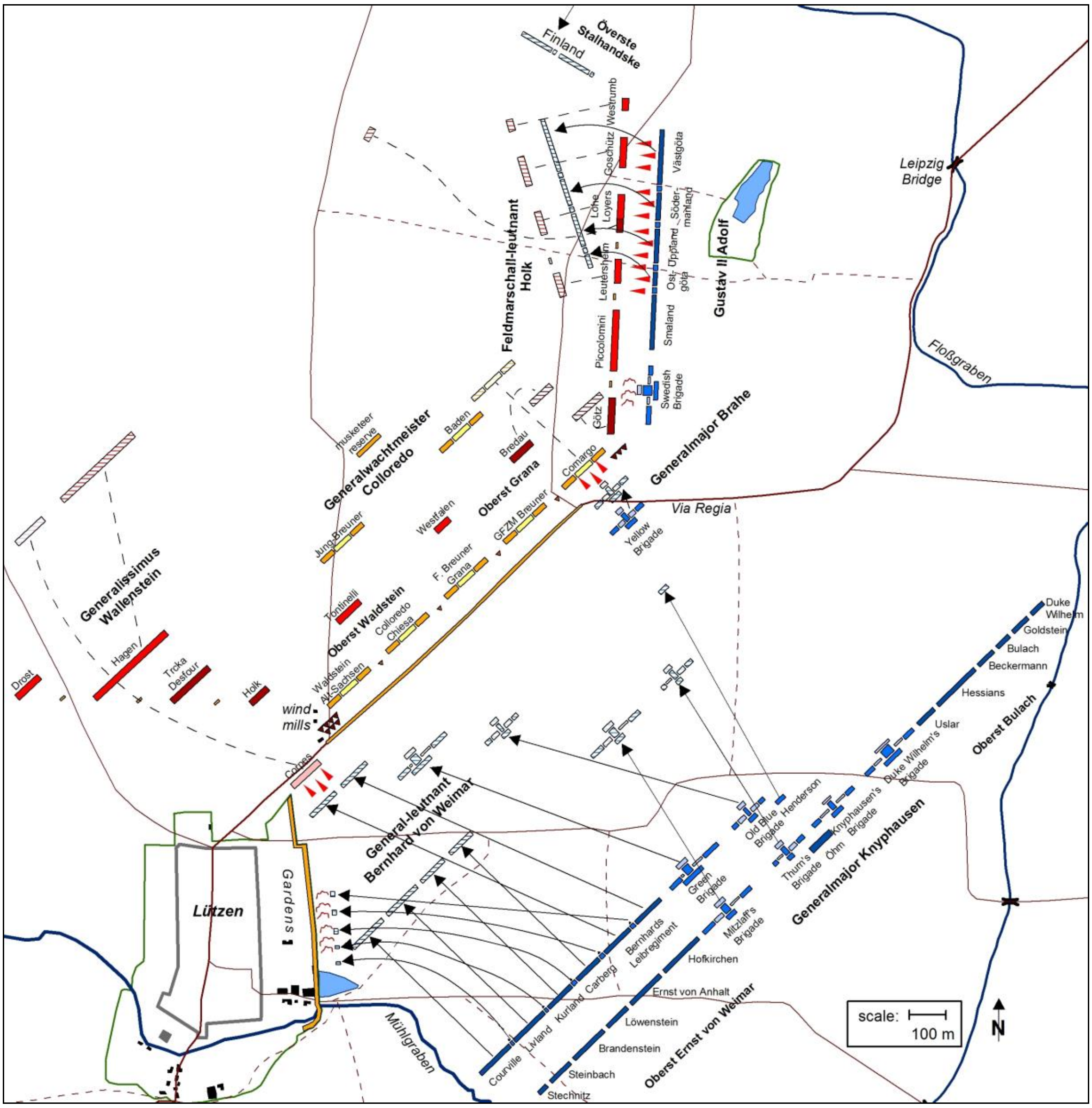
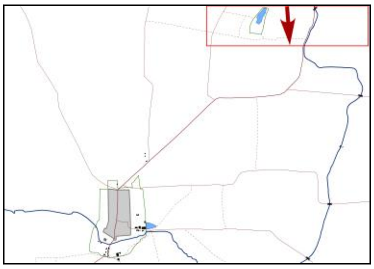
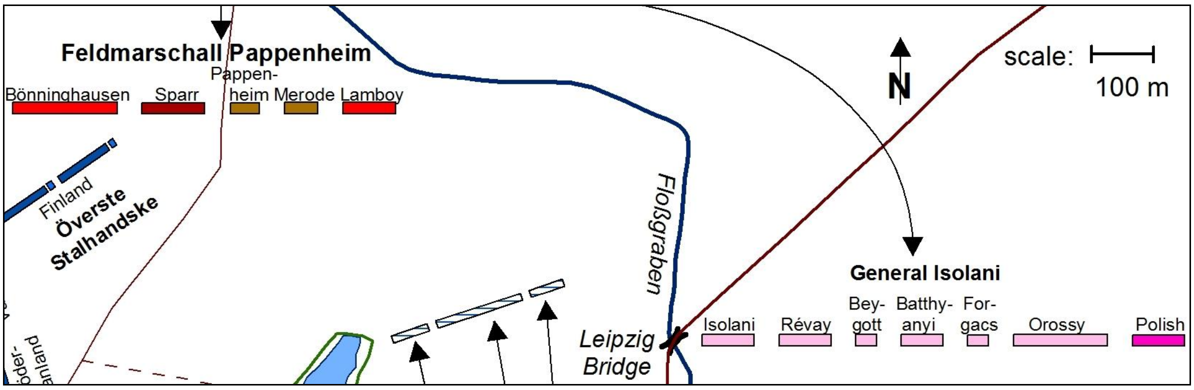


Figure 89: 11.00am to 12.00am: Swedish army in preparation for a double outflanking or enveloping manoeuvre.

8.3 Pappenheim’s and Piccolomini’s counterattacks

8.3.1 Imperial left wing: Pappenheim’s arrival 11.30-12.30am





Historical sources

With eight regiments, a total of 2,400 horse, Pappenheim’s cavalry was an impressive force and its arrival marked the turning point of the battle. The exact arrival time is not entirely certain and varies not as much between primary and secondary sources as it does between Protestant and Imperial sources.

The Protestant sources give a wide time range for Pappenheim’s arrival, from before the battle to 3pm and some sources seem to have confused counterattacks by Imperial reserves with the arrival of Pappenheim’s infantry.[808] Imperial sources provide a much narrower period in which Pappenheim’s cavalry might have arrived, shortly after the battle commenced according to most eyewitnesses (Table 23). Of the Imperial eyewitnesses, only Wallenstein stated that Pappenheim arrived before battle, trying to hide the fact that he was not able to assemble his entire army in time. For the same reason, Diodati described the circumstances of Pappenheim’s arrival so vaguely, apparently on purpose, that some historians were under the false impression he meant the Feldmarschall had actually arrived before battle.[809] Surprisingly, the early Imperial non-eyewitness

[808] Fleetwood 1632, 8.
[809] Diemar 1890, 4. See Seidler (1954, 15 and 49-50) for the interpretation of Diodati’s statement.

accounts of Gallas and the *Relation from 1632* agree on an early arrival as reported by Imperial eyewitnesses.

Figure 90: Left: Feldmarschall Gottfried Heinrich Graf von Pappenheim. Right: Oberst Ottavio Piccolomini di Aragona.

Most historians follow Holk's account, as he is the only eyewitness giving an exact time of 12am. [810] However, we should not take Holk's exact time too literally, which should be understood more as a rough timeframe, meaning that Pappenheim arrived not long after the battle had begun. It is likely that Pappenheim met and rallied at least parts of Isolani's left wing Croats, increasing his force to over 2,800 cavalry. After Isolani's Croats had joined Pappenheim, half his cavalry consisted of light cavalry and it seems to be a consensus among historians that Pappenheim divided his force into two columns. All cuirassiers, harquebusiers and dragoons, the heavy and medium cavalry, attacked the Swedish right wing directly under his own command, while he sent the Croats and Polish Cossacks, the light cavalry, east of the Floßgraben toward the Swedish rear.[811] Although this is a reasonable tactical assessment, and might actually have happened, there is no historical source supporting this suggestion directly.

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[810] Droysen 1865, 122, Deuticke 1917, 71, Generalstaben 1939, 435, Seidler 1954, 49-50, Brzezinski 2001, 58.

[811] Deuticke 1917, 72, Seidler 1954, 57, Generalstaben 1939, 435, Roberts 1958, 768, Brzezinski 2001, 59 and 73.

Imperial eyewitness accounts	**Arrival of Pappenheim's cavalry (*page*)**
Wallenstein -Lorenz 1987	Shortly before the battle had begun (256)
Holk -Wittrock 1932	12am, shortly after the battle had begun (309)
Münchhausen -Wittrock 1932	Midday (305)
Diodati -Fiedler 1864 =*Spanish Relation* -Watts 1633	Shortly after the battle had begun (562) (160)
Silvio Piccolomini -Archivio 1871	Shortly before the battle had begun (240)
Poyntz -1908	Shortly after Piccolomini's counterattack (72)
Protestant eyewitness accounts	
Dalbier -1632	Before battle (251)
Fleetwood -1632	2pm (6 and 8)
Fabricius -Wittrock 1932	After Gustav Adolf's death and Swedish rout (307)
Vitzthum/Berlepsch -Glafey 1749	After windmill battery was captured (13)
Secondary sources, letters	
Gallas -Förster 1844	11am, shortly after the battle had begun (95)
Hallenus -Mankell 1860	After small battery was captured (662)
Hülshorst -Wittrock 1932	After Gustav Adolf's death (303)
Pentz -Fiedler 1864	3pm (571)
Secondary sources, 'relations'	
Relation II Erfurt -Droysen 1880	After 3pm (20)
Relation 1632 -Droysen 1880	Shortly after the battle had begun (8)
Relation 1633 -Droysen 1880	After 1pm, when small battery was captured (31)
Declaration 1633 -Droysen 1880 =*Wahrhaftige Beschreibung* 1633	Cavalry before battle (39). Infantry after second Swedish attack, afternoon (42)
Gottfried -1633 =Monro 1637 =*Glaubwürdiger Bericht* 1633 =Abelinum 1646 =Chemnitz 1648	Late afternoon (26) (164) (750) (467)
Burgus -1641 =Richelieu 1823	Before battle (319) (260)
Khevenhiller -1726	After Gustav Adolf's death (193)
Watts -1633	2pm, after second Swedish attack (133)

Table 23: Pappenheim's arrival according to historical sources.

Most secondary sources stated that Croats outflanked the Swedish right wing and plundered the baggage train before Pappenheim arrived.[812] However, this interpretation is doubtful for several reasons. An early Croat outflanking manoeuvre is contradicted by Fleetwood, whose statement is supported by archaeological information (see above); the overwhelming Swedish superiority on the right wing would not have allowed it. In addition, the description of this event in all secondary sources is based on *Relation II from Erfurt*, so that we are really dealing with only one source, which is not the most reliable.

Only one eyewitness to this event, from the Swedish HQ, described that he heard Swedish soldiers shouting the army was in confusion and Croats were attacking the rear on two sides, after which he got out of danger and returned to Naumburg in the evening.[813] Although this account confirms that Croats actually did attack the Swedish rear, he puts the event at the end of the battle, which is not entirely reliable, because the eyewitness might have tried to hide the fact that he left the battlefield well before the fighting ended. The most logical conclusion is that the Croat's attack on the Swedish rear occurred when Pappenheim's reinforcement arrived, as most historians believe, but without additional evidence the time of this event can only be approximated as being in the middle of the battle.

The events

Feldmarschall Gottfried Heinrich Graf von Pappenheim almost certainly used the shortest route from Halle to Lützen,[814] allowing his cavalry to arrive in the rear of the Imperial army's position around noon. Here he very likely met and rallied parts of Wallenstein's left wing Croats, increasing his force to over 2,800 cavalry. The Croats might have provided intelligence, but even without, it must have been obvious to Pappenheim that the battle was not going well on the Imperial left wing, "where it seemed that the King [Gustav Adolf] charged most stubborn."[815]

Probably dividing his forces into one light cavalry flanking force of approximately 1,400 horse, possibly commanded by Isolani, General of all Croats, and one equally strong heavy cavalry striking force under his own command, Pappenheim did not waste any time. Although his troops were certainly tired from the last two day's march, he charged

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812 *Relation II from Erfurt* (Droysen 1880, 19), Watts 1633, 135, Gottfried 1633, 26, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 750, Chemnitz 1648, 466.

813 Söltl 1842, 347.

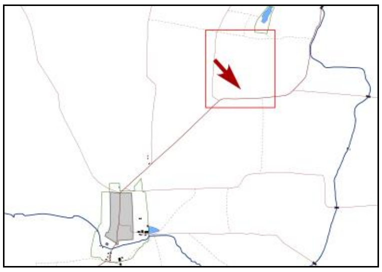
814 Brzezinski 2001, 46 and 58.

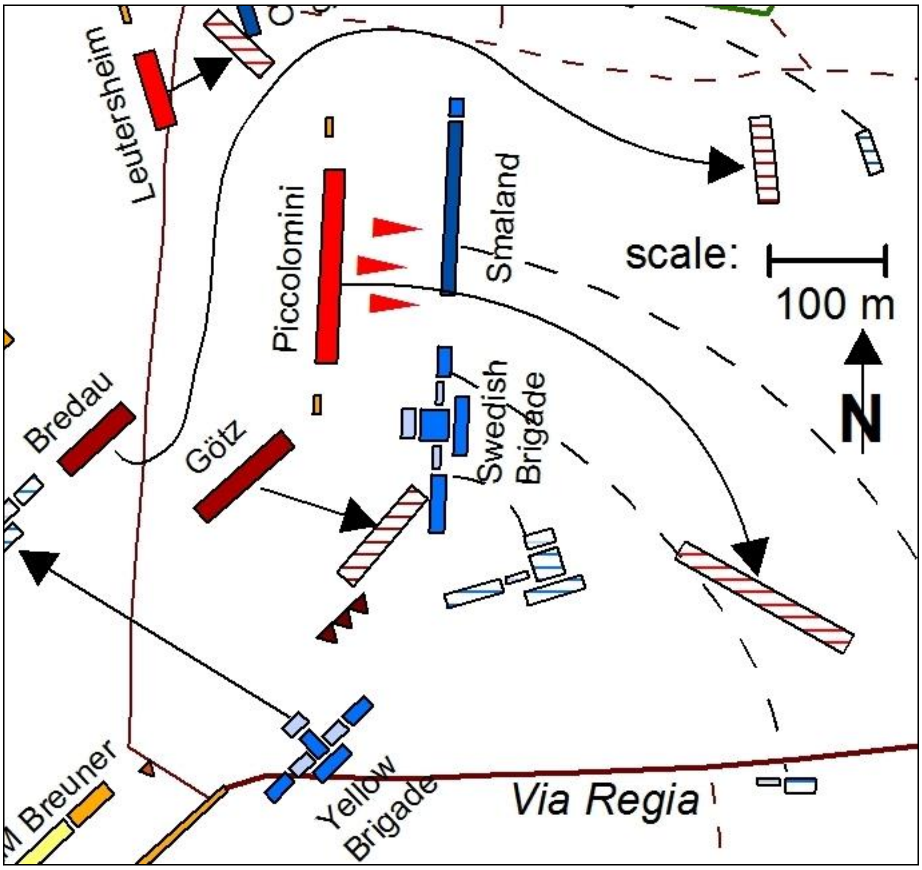
815 Diodati (Fiedler 1864, 562).

immediately at the head of his ‘Rennfahne’ Lifeguard and Dragoons, followed by Merode’s ‘Obwacht’ Lifeguard and Dragoons, Sparr’s cuirassiers, Bönninghausen’s harquebusiers and Lamboy’s harquebusiers.[816] The Imperial left wing now consisted of 3,200 regular and 1,400 irregular cavalry versus 1,800 Swedish first line soldiers. The sudden pressure on the Swedish right wing must have been immense and certainly restored order to the Imperial side,[817] presenting an opportunity to Holk to rally his forces, while Piccolomini was able to escape the deadly musket fire by counterattacking the Swedish Brigade.

[816] It is a myth, created by Khevenhiller (1726, 193) and Poyntz (1908, 73), that Pappenheim interrogated Swedish prisoners first to figure out where Gustav Adolf was, hoping he could challenge the King to a personal duel.
[817] Brzezinski 2001, 59.

8.3.2 Imperial left wing: Piccolomini’s counterattack 11.30-12.30am





Historical sources

In their accounts, both Piccolomini’s referred only to their regiment, which makes it difficult to time the sequence of events. Diodati stated that Piccolomini’s counterattack took place after the death of Pappenheim,[818] which was later repeated by other sources.[819] He certainly could have seen Piccolomini’s and Pappenheim’s troops, but not the death of Pappenheim. However, it does show that Piccolomini’s counterattack took place after Pappenheim’s arrival. That would also explain why he withstood the musket fire for 15 minutes, after which he attacked. The arrival of reinforcements supported him and enabled

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818 Fiedler 1864, 563.

819 Watts 1633, 143, Burgus 1641, 324, Khevenhiller 1726, 194.

him to attack without leaving a gap in the Imperial battle line or exposing his flanks to any extent.

Münchhausen made a strange comment that the Bredau cuirassiers "took apart" two horse regiments, although Bredau's position behind the left centre would suggest that he fought against infantry.[820] Bredau must have moved to the left wing, possibly supporting Piccolomini in his counterattack.

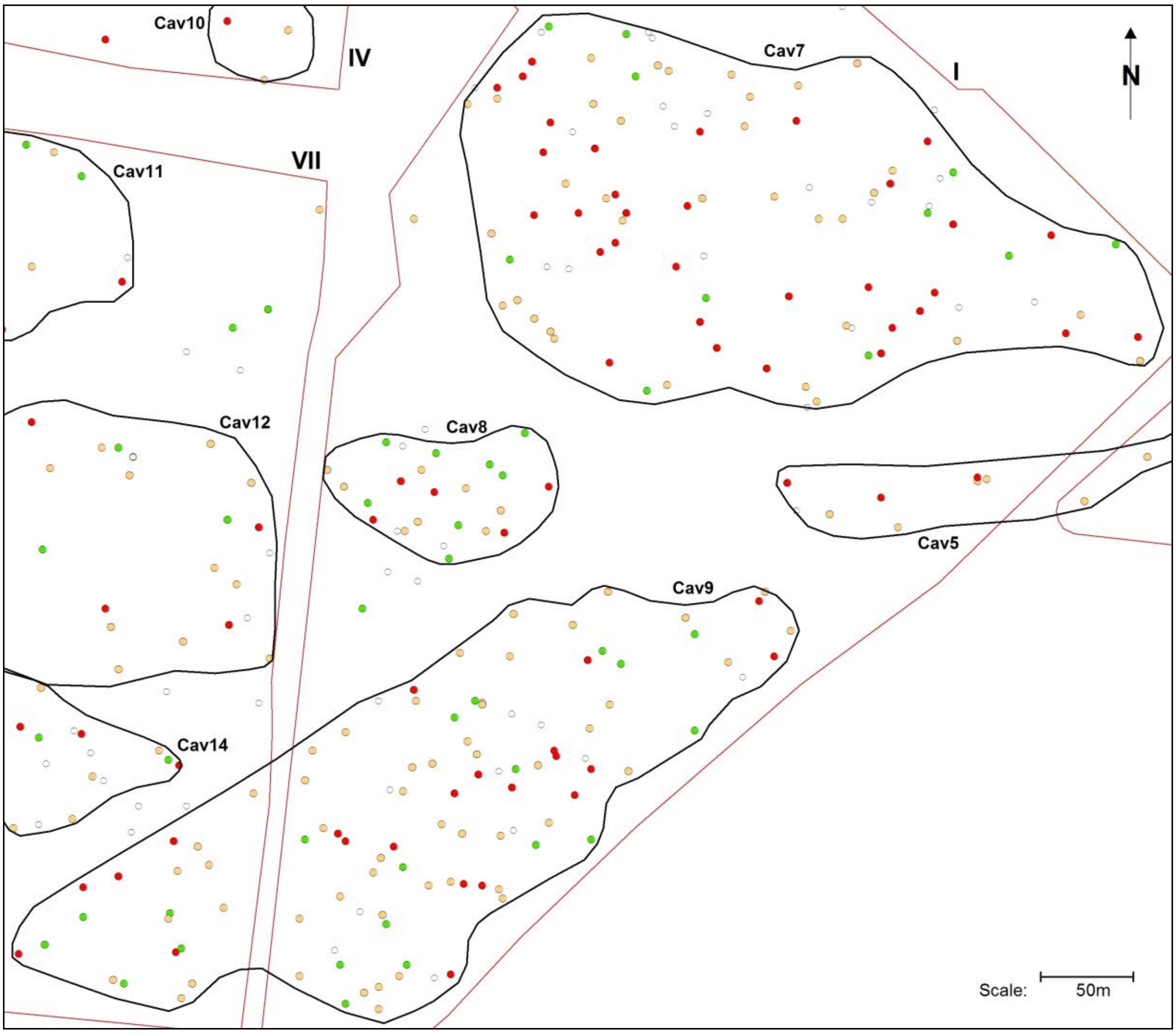


Figure 91: Detailed pistol/carbine bullet distribution map, Imperial left wing (red: pistol, beige: pistol or carbine, green: carbine, white: 75% carbine).

The only other eyewitness telling the story of Piccolomini's counterattack is Poyntz. According to him, Piccolomini first routed the Finnish cavalry, then attacked a larger infantry formation, but was stopped by a musket volley, in which moment the rallied Finns attacked them from the rear.[821] Only the latter event shows some similarities to Ottavio Piccolomini's report of a Swedish cavalry counterattack, which caught him in the

[820] Wittrock 1932, 305.
[821] Poyntz 1908, 72.

rear just as he attacked a brigade; after which some of his soldiers told him that the king had died.[822] The Swedish regiment was almost certainly the Smaland cavalry, the last unit seeing the king alive, and not the Finns, who were probably fighting against Pappenheim's cavalry at that time, and were certainly quite some distance from Piccolomini on the outer wing. Whether Piccolomini first attacked Swedish cavalry before his attack on the infantry squadron is unknown, but it is possible that Poyntz confused Piccolomini's cavalry with another armoured cavalry unit, which could have been Götz or Bredau.

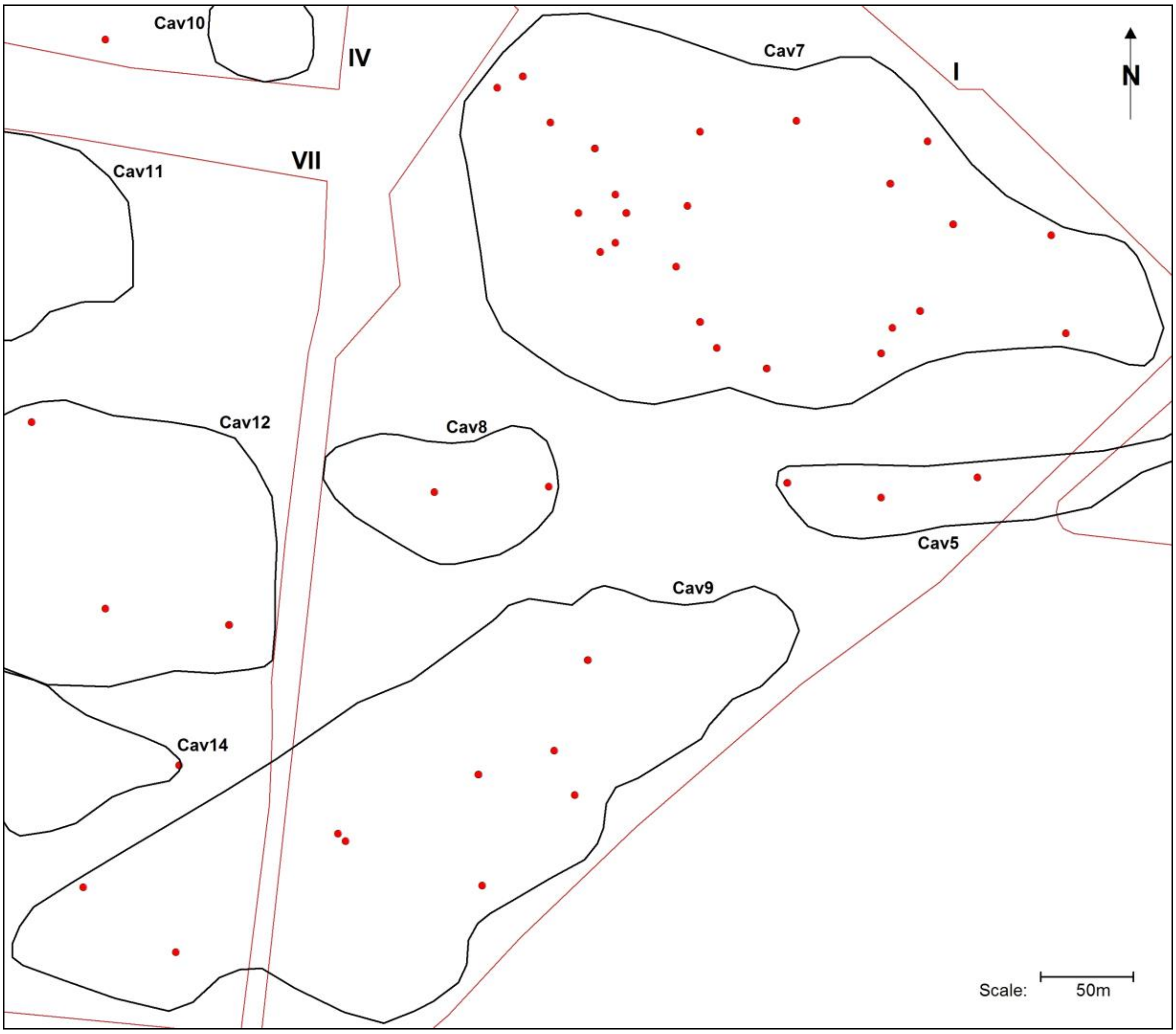


Figure 92: Detailed small calibre pistol bullet distribution map (8.4-11.7mm und 3.00-7.75g), Imperial left wing.

Archaeological sources

One of the biggest, although not densest, pistol/carbine bullet concentrations (Cav7) has an elongated form of 350m to 220m in east-west alignment suggesting a cavalry charge along this axis. The concentration consists of 21 carbine/musket, eleven carbine, 36 pistol/carbine and 30 pistol bullets. The latter consists of an unusually high number (24) of

[822] Argang 1894, 89.

small calibre (8.4-11.7mm) pistol bullets of South German-Austrian origin, suggesting that they derive from an Imperial unit. The Swedes might have had some smaller calibre pistols, as the 11mm bullets found on the *Solen* and *Vasa* suggest, but their lowest calibre is 11mm, which points to other weapon models. The location of bullet concentration Cav7 and its breadth of 220m make it likely that the bullets derive chiefly from Piccolomini's Regiment, the largest cavalry unit on the left wing, with a frontage of 125m. According to their location, the other two high density bullet concentrations on the left wing (Cav8 and Cav9) might derive partially from Götz's and Bredau's cuirassiers, but the relatively large amount of carbine bullets suggests participation by at least one harquebusier regiment, possibly Piccolomini's, which was the nearest. Swedish cavalry did not have a significant number of carbines to create such a bullet distribution. The concentration Cav9 of pistol/carbine bullets with severe impact damage suggests some intensive cavalry combat in that area, possibly the charge of Götz's cuirassiers against the Swedish Brigade.

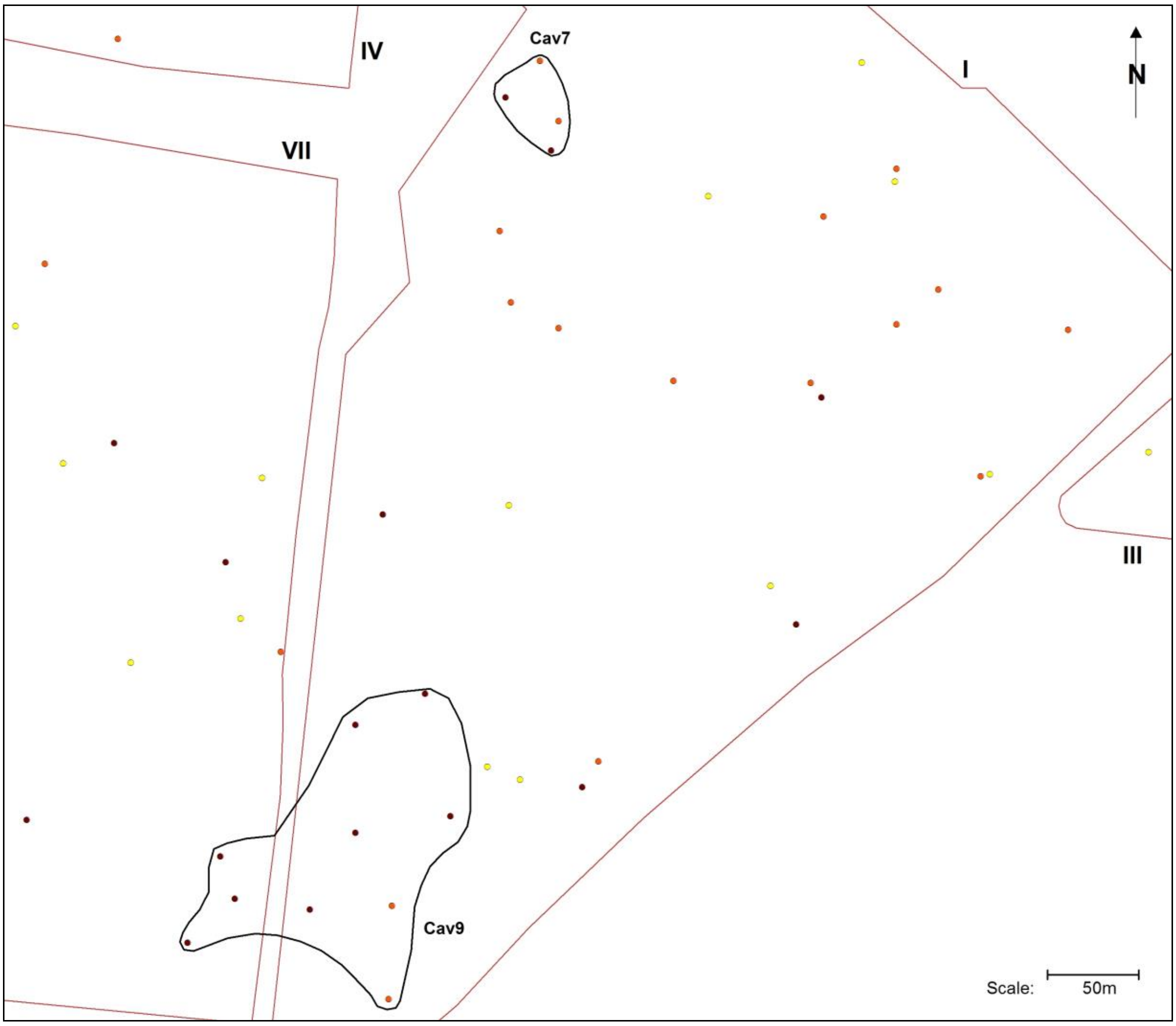
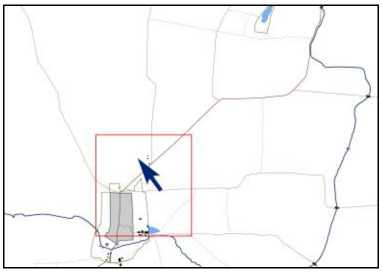


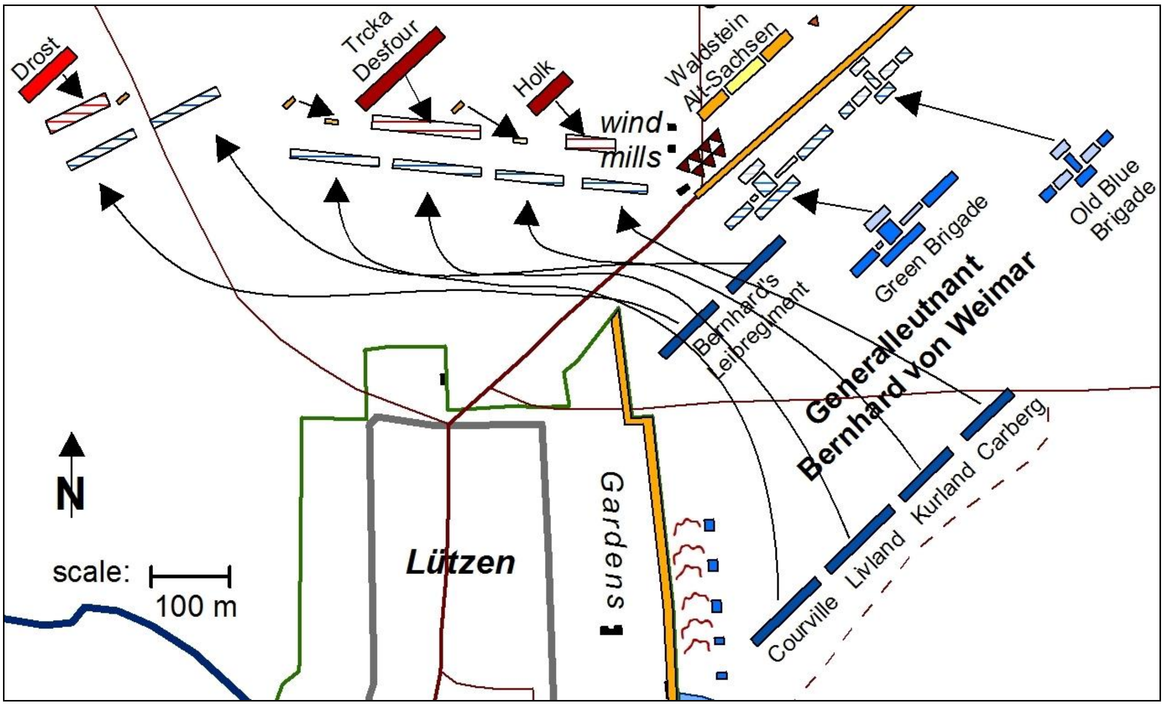
Figure 93: Detailed impacted pistol/carbine bullet distribution map, Imperial left wing (impact damage: dark brown 70-90%, orange 40-60%, yellow 10-30%).

The events

The arrival of Pappenheim's cavalry on the outer left wing might have relieved Piccolomini's harquebusiers and Götz's cuirassiers on the inner wing. Probably at the same time, Bredau's cuirassiers changed their position from the left centre to the left wing, after they covered Comargo's retreat. This new situation enabled Piccolomini to charge the right squadron of the Swedish Brigade, which he pursued to the Via Regia,[823] while Götz's cuirassiers attacked and occupied the rest of the brigade. Meanwhile Bredau's cuirassiers possibly protected Piccolomini's left flank, attacking the Smaland and Ostgöta cavalry. By then, the Överste of the Smaland cavalry, Fredrik Stenbock, had been shot in the foot and the Överstelöjtnant Lennart Nilsson Baat of the Ostgöta cavalry was shot in the head,[824] making it very likely that both Swedish regiments had taken heavy casualties.

8.3.3 Swedish left wing attack 11.30-12.30am





[823] Ottavio Piccolomini (Argang 1894, 89).
[824] Hülshorst (Wittrock 1932, 303) and Pentz (Fiedler 1864, 571). At least Stenbock must have been wounded before Gustav Adolf took command of his regiment around midday (Brzezinski 2001, 62).

Historical sources

Reports about Bernhard von Weimar's attack on the windmill battery are inconsistent. Influenced by the *Inventarium Sueciae*, most secondary sources report that the Swedish attack broke down in the Imperial artillery fire that forced the Green Brigade to find shelter behind the miller's house,[825] the accepted view of modern research.[826] However, this point of view leaves some unanswered questions.

The miller's house is shown in different places along the Via Regia in the battle's imagery; south of the Via Regia on van Hulsen's copperplate, on (sic!) the road in Merian's copperplate, and north of the road in the 1710 field boundary map. If the more reliable 1710 map is correct, the miller's house was located very close to and in front of the Imperial battery, providing almost no cover for Swedish soldiers. Even if it was located south of the road, one single building could not have provided sufficient cover for the Green Brigade's 2,000 soldiers.

Holk wrote at the end of his account that

"The Duke [Wallenstein] … fought two hours against infantry with four horse regiments, namely Holk, Trcka, Piccolomini and Desfour, and he was encircled completely until Holk sent the cavalry to 'second' him."[827]

Although the timeline in Holk's account is unclear and he had not seen the event personally, it seems that he described the first half of the battle. Bernhard von Weimar eventually achieved a breakthrough by the Swedish left wing that surrounded the Imperial right wing, which was then rescued by Holk after he was victorious on the left with support from Pappenheim's reinforcements.

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[825] Gottfried 1633, 25, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Abelinum 1646, 750 and Chemnitz 1648, 465. Watts (1633, 147) reported that Bernhard von Weimar found shelter and Monro (1637, part II, 164) translated incorrectly from the *Inventarium Sueciae* that the Swedes forced the Imperial cannons to find shelter behind the miller's house. Khevenhiller (1726, 191) stated that the Swedish left wing was disordered and forced to retreat by Imperial artillery fire.

[826] Wedgewood 1938, 326, Generalstaben 1939, 432, Seidler 1954, 56. Brzezinski (2001, 58) suggests a successful cavalry charge, while the infantry was stopped.

[827] Wittrock 1932, 309.

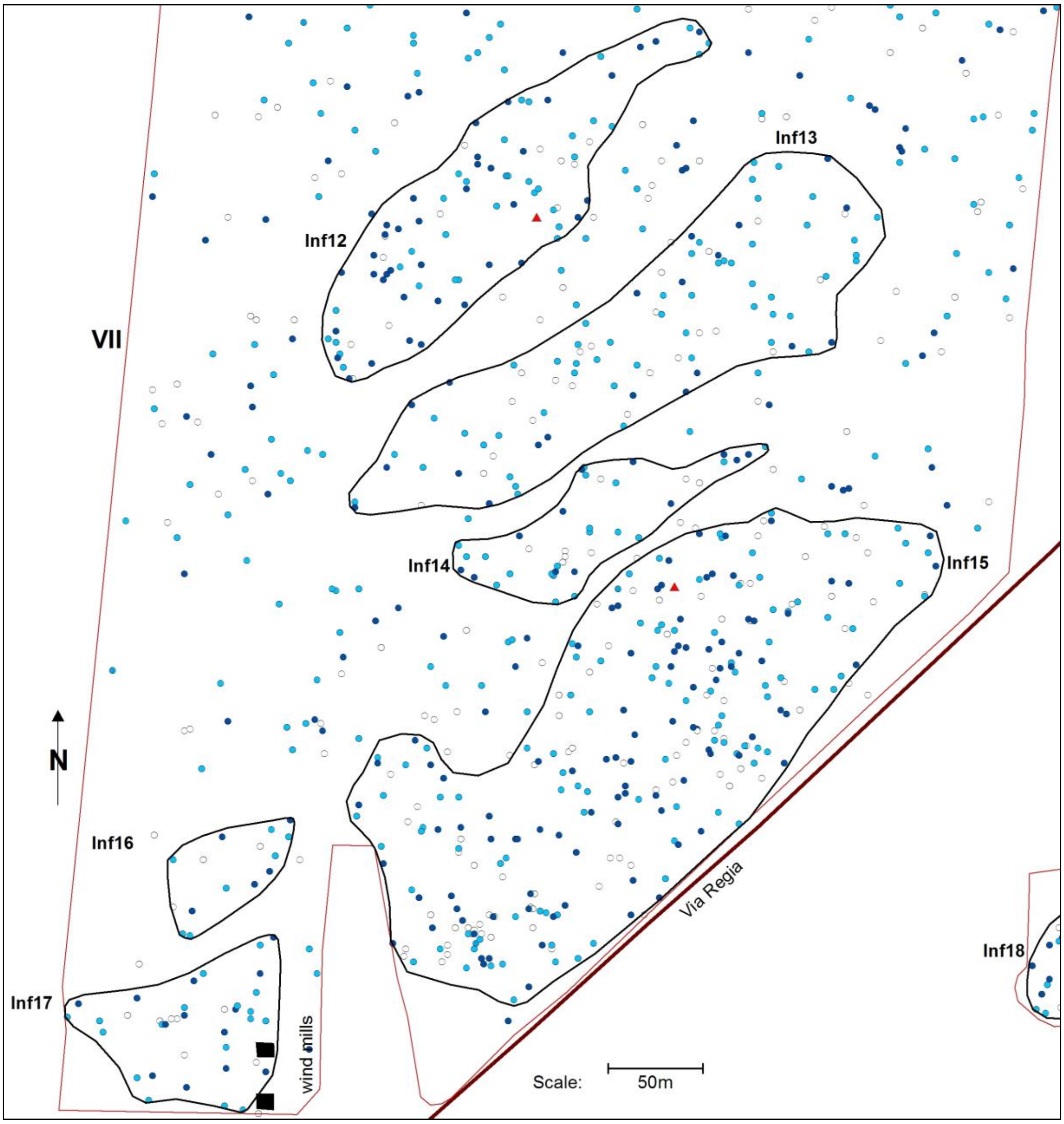


Figure 94: Detailed musket bullet distribution map, Imperial inner right wing, right centre and rear (dark blue 99% musket, blue 75% musket, white 25% musket, red: rifle).

This interpretation also corresponds with the troop numbers. After Hagen's rout and the temporary loss of his reserve Westrumb, Wallenstein's right wing was down to 1,000 horse and 150 musketeers with only Tontinelli's 250 horsemen as a reserve against 1,550 Swedish horse, 423 musketeers and ten regimental guns of the first line with a second line reserve of 1,400 horsemen. Despite the seventeen Imperial heavy pieces, 400 musketeers behind the garden walls, and the quality of the Imperial cuirassiers, it seems highly unlikely that Wallenstein was able to completely stop Bernhard von Weimar's cavalry charge with his limited forces. On the other hand, however, there is no reliable report from any eyewitness about any infantry fighting on the Imperial right centre.

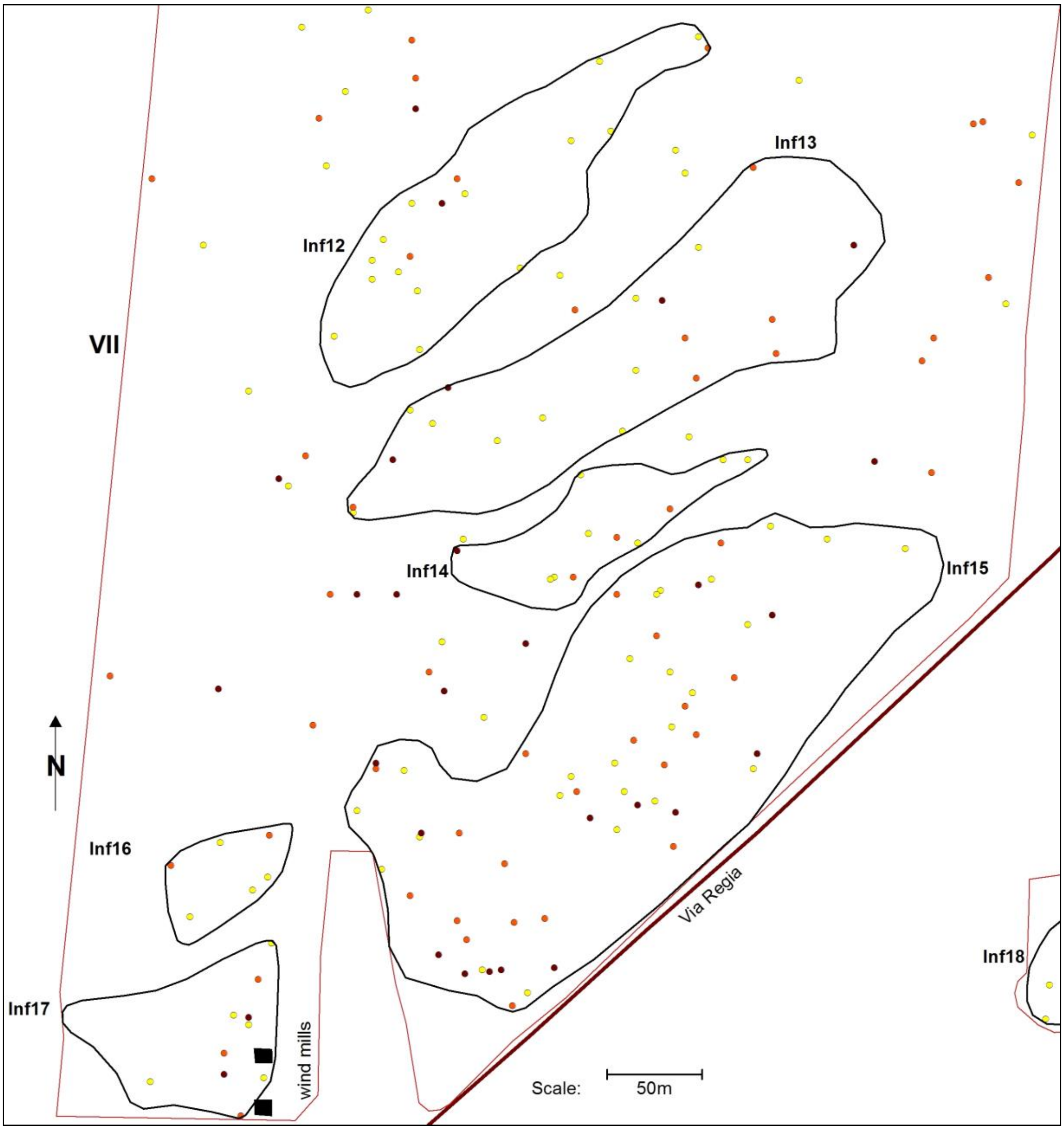


Figure 95: Detailed impacted musket bullet distribution map, Imperial right wing, right centre and rear.

Archaeological sources

The multiple combat episodes on the Imperial right centre throughout the battle complicate interpretation of the bullet distributions. There are two main lines visible; concentrations Inf15/17 mark the Imperial main line, while Inf12 very likely represents the Imperial second line. The concentrations Inf13 and Inf14 mark the attack vector. At least once during the battle, Swedish infantry broke through the first line and advanced towards the second line shifting slightly to the right.

The bullet distribution patterns of 12 bore bullets fired from 10 bore muskets add some additional details to the interpretation of fighting at the Imperial right centre. Those bullets mostly derive either from the old Dutch (m3) or the new Dutch/Swedish (M2) musket models. The distribution shows a clear concentration on the Imperial right centre. There are only three concentrations of 12 bore bullets, one smaller, non-linear concentration (Inf9) on the Imperial left and two larger, linear distributions Inf12 and Inf15/17 on the Imperial right. Concentration Inf12 has a width of 200m, which is slightly larger than the average frontage of a Swedish brigade, suggesting that one Swedish infantry unit was equipped with far more 10 bore muskets than any other infantry unit. At the present time, it seems that the insufficient availability of new firearms had forced commanders to equip newly raised units with new weapons as they came in rather than equip veteran troops with the more advanced weapons. Dehner's report of a Swedish company, very likely recruits, arriving on 6 May 1632 at Rothenberg ob der Tauber equipped with the new 10 bore musket might be a hint in this direction.[828] On the other hand, the numbers of older weapon models decreased very slowly in an active army; the Spanish/Dutch late 16th century 8 bore musket was used half a century later in the Battle of Edgehill. That would imply that bullets from new firearms are more likely to be concentrated in smaller areas, while bullets from older firearms are likely to be scattered on the whole battlefield and are less likely to create any meaningful patterns. The distribution pattern of the 12 bore bullets with three concentrations and a wide scatter seems to confirm this assumption.

According to this interpretation, the Swedish breakthrough to the second Imperial line (Inf12) was not achieved by the veteran regiments of the Green or Old Blue Brigades, but by a more recently raised Swedish infantry unit, which must have been one of the second line brigades attacking during Bernhard's second or third assault. Another observation is that the density of concentration Inf15 and the impacted bullets in that area does not decrease towards the Via Regia. This might be a hint that an Imperial infantry tactic was that the first rank opened fire at 70m when the Swedish crossed the road.

[828] Engerisser 2007, 546-547.

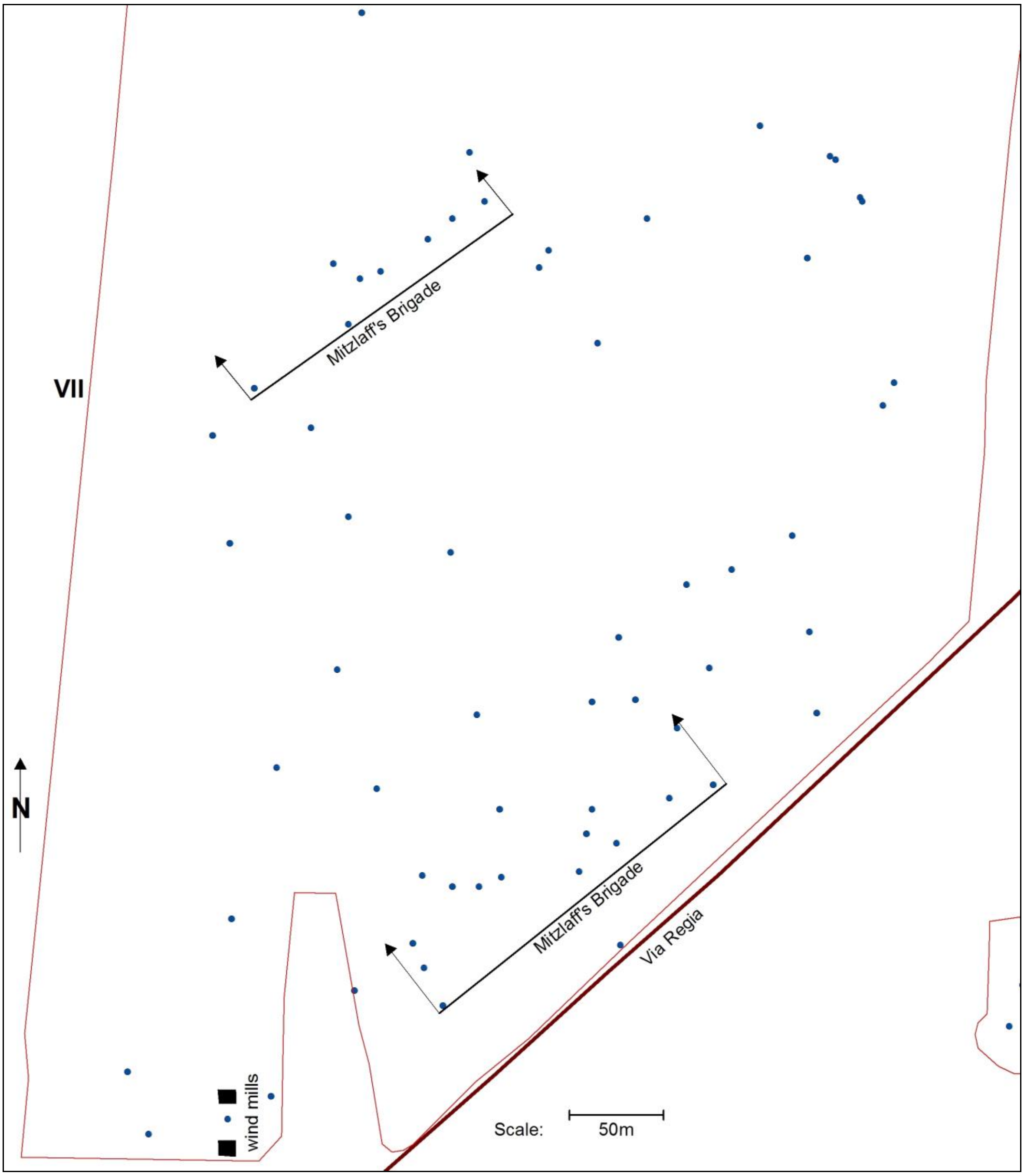


Figure 96: Detailed distribution of musket bullets from the Dutch/Swedish 10 bore (M2, m3) muskets with calibres of 17.9-18.8mm or 30.25-32.50g.

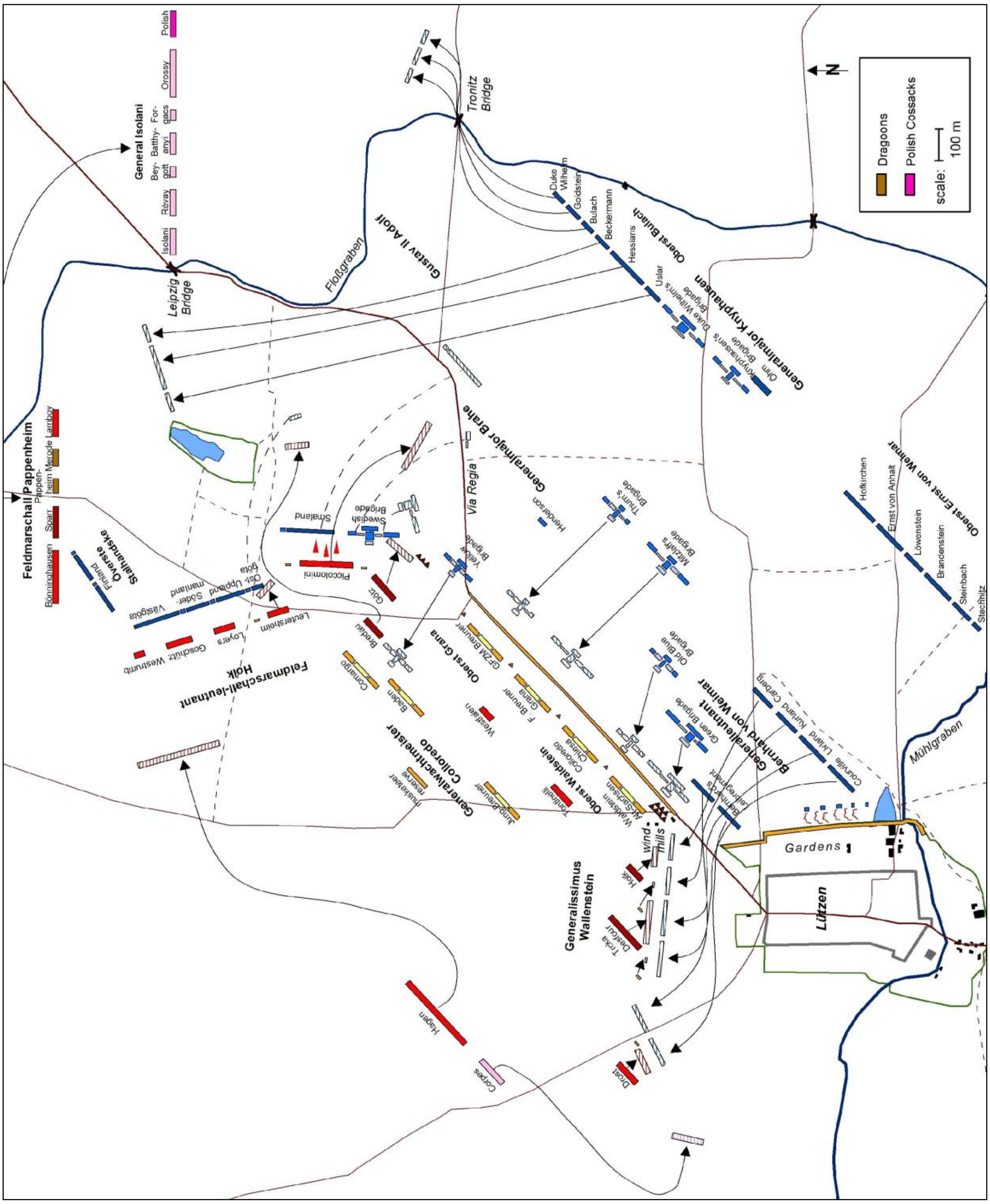


Figure 97: 11.30am to 12.30am: Pappenheim's arrival and Piccolomini's counterattack.

The events

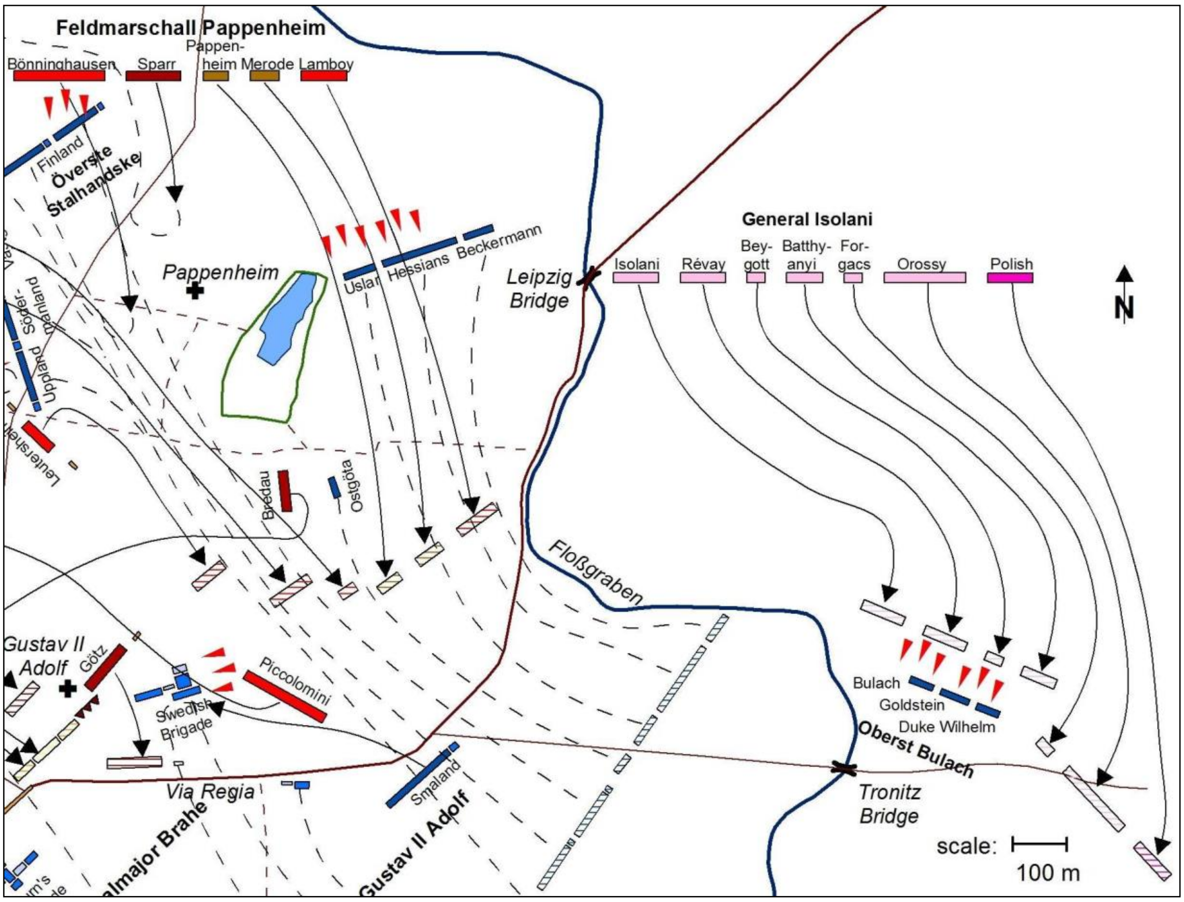
Outnumbered by 1,500 Swedish horse against 1,000 Imperial, it was only a matter of time, before Wallenstein's right wing would collapse. The situation grew worse when Oberst Hagen, who retreated from the front line, but was still on Wallenstein's right, saw the Swedish cavalry closing in on him and retreated. His 800 harquebusiers moved from the right to the left wing in full view of Wallenstein, disobeying a direct order, hoping that it would be quieter there.[829] Only the inner two Imperial squadrons, Holk's and Trcka/Desfours' cuirassiers, stood firm,[830] while the Swedish cavalry was now able to outflank the much shorter Imperial line and threatened to attack the Imperial army from the rear.

Meanwhile, the Scots and Germans of Bernhard's Green Brigade reached the Via Regia and were about to assault the 'retrangement' of the windmill battery, commanded by Generalfeldzeugmeister Hans Philipp von Breuner. These artillerists did not give up easily and it is possible that the artillery fire was so severe that some Green Brigade soldiers found cover behind the miller's house. It seems that the Swedes needed more than one assault to capture the Imperial battery,[831] which was covered by Wallenstein's nephew, Oberst Berthold von Waldstein, who was mortally wounded[832] during the fighting. To its right, the Green Brigade was flanked by Oberst Winckel's Old Blue Brigade, but the attack lost momentum and was stopped by the squadron Colloredo/Chiesa, probably led by Oberst Andreas Matthias Kehraus.

Although there are no clear reports, it seems that Oberst Gersdorf's 423 detached musketeers and ten regimental guns were not very successful against the 400 Imperial musketeers behind the garden walls of Lützen.[833] This means the Swedish left flank here was in the air.

[829] Seidler 1954, 141-142.
[830] According to Diodati (Fiedler 1864, 565) and Holk (Wittrock 1932, 309). Holk was referring to the whole combat at the Imperial right wing and Piccolomini was not there at that time.
[831] Vitzthum/Berlepsch (Glafey 1749, 13) reported, similar to Holk, a whole series of events, when he wrote that "the Imperial wing was pushed back at first, but stood firm then, until the Swedes forced their way into the 'retrangement' and turned the artillery pieces." Although the meaning of this sentence is not entirely clear, it refers probably, first to the rout of the Croats and Hagen, then to heavy fighting at the windmills and finally the battery's capture. The *Spanish Relation* (Watts 1633, 161) reported a stalemate on the Imperial right.
[832] It is not certain when he was wounded. See Holk (Wittrock 1932, 309), Diodati (Fiedler 1864, 565), Fleetwood 1632, 10, Hülshorst (Wittrock 1932, 303) and *Relation from 1632* (Droysen 1880, 11).
[833] Only Richelieu (1823, 258) reported that the Swedes cleared the gardens at the battle's start, while Watts (1633, 149) claimed that the gardens were captured in the afternoon. However, both accounts are unreliable and an exact time can not be estimated.

8.3.4 Imperial left wing: Pappenheim's death and Imperial 'Fahnenflucht' 12.00am-1.00pm



Historical sources

The historical sources are inconclusive about the impact Pappenheim's attack might have had, except that when the Feldmarschall died at the head of his charging cavalry, his fall caused the Imperial 'Fahnenflucht'. Most historians[834] followed Holk's account[835] in stating that Pappenheim's attack was entirely unsuccessful. However, the otherwise reliable Holk seems not to have been entirely honest here and possibly tried to discredit the success of Pappenheim's cavalry in order to look better himself.

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[834] Brzezinski (2001, 59) believed that Pappenheim's attack stabilized the crumbling Imperial left wing for a while, but was not successful otherwise.

[835] Holk exaggerated when he stated that Pappenheim was killed before he could gain a foothold and 3,000 regular cavalry and Croats were routed, which disordered the right wing (Wittrock 1932, 309).

A rout of the Imperial left wing would have been a serious setback, but it contradicts development of the battle, in particular the collapse of the Swedish army an hour later, and the numerical superiority of that Imperial left wing. The main sources of the Imperial ‘Fahnenflucht’ are the court martial verdicts from Prague, where this incident was examined. Four regiments on the left wing were accused of ‘Fahnenflucht’. The key to understanding the sequence of events is Sparr’s Cuirassier Regiment, commanded by Oberst Albrecht von Hofkirchen, which refused to fight upon their arrival with Pappenheim’s corps, which caused “others” to retreat. It is important to note the statement that Hofkirchen ‘caracoled’ (sic: fired and retired), even when the left wing was victorious, and was caught in the rear by Swedish cavalry.[836] Pappenheim’s trumpeter Conrad Ehinger reported that the Feldmarschall was wounded and taken prisoner. Ehinger had to free him on his own, because Hofkirchen refused to help.[837] Seeing Pappenheim was mortally wounded, Hofkirchen left him and moved from the left to the right wing.[838] Hofkirchen’s insubordination caused Oberst Lothar von Bönninghausen to retreat with his harquebusier regiment.[839] According to this sequence of events, Pappenheim’s counterattack was successful for a while but started to fall apart after the Feldmarschall was wounded. Concerning Pappenheim’s counterattack, Protestant sources,[840] as well as the printed ‘relations’,[841] reported completely different and largely invented stories, certainly repeating the circulating rumours, and can be disregarded.

Archaeological sources

Most of Pappenheim’s counterattack is located east of the surveyed area. However, one 4 bore bullet from a *Doppelhaken* was found on the Imperial left wing, which is evidence that these weapons were deployed on the wings and were probably used by sharpshooters against officers, because those weapons were able to penetrate any armour. It is reported that Pappenheim was hit by a ‘Falkonett’-bullet, but these cannon were not very accurate. In any case, bullets from a ‘Falkonett’ were not much larger than those from a *Doppelhaken* and could easily be confused in the heat of a battle.[842] Therefore, it seems

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[836] Verdict vs. Hofkirchen (Seidler 1954, 142-143).
[837] Ehinger’s testimony (Hallwich 1912b, 135).
[838] Verdict vs. Hofkirchen (Seidler 1954, 143).
[839] Ehinger’s testimony (Hallwich 1912b, 136).
[840] Poyntz 1908, 73: Personal duel between Pappenheim and Gustav Adolf. Fleetwood 1632, 8: Pappenheim was killed in the morning and his corps was commanded by Merode. Hallenus (Mankell 1860, 663): Pappenheim was killed by Stalhandske.
[841] The story of Pappenheim’s death in printed accounts originates from the *Relation II from Erfurt* (Droysen 1880, 20) and the *Relation from 1633* (Droysen 1880, 31-32) and was retold by Gottfried 1633, 26, Monro 1637, part II, 164-165, Abelinum 1646 750 and Chemnitz 1648, 466-467, but not copied as usually done.
[842] Diodati (Fiedler 1864, 562), followed by the *Spanish Relation* (Watts 1633, 160) and *Relation from 1632* (Droysen 1880, 8).

more likely that Pappenheim was hit either by a *Doppelhaken* or a grape shot ball from a 3-pounder instead.

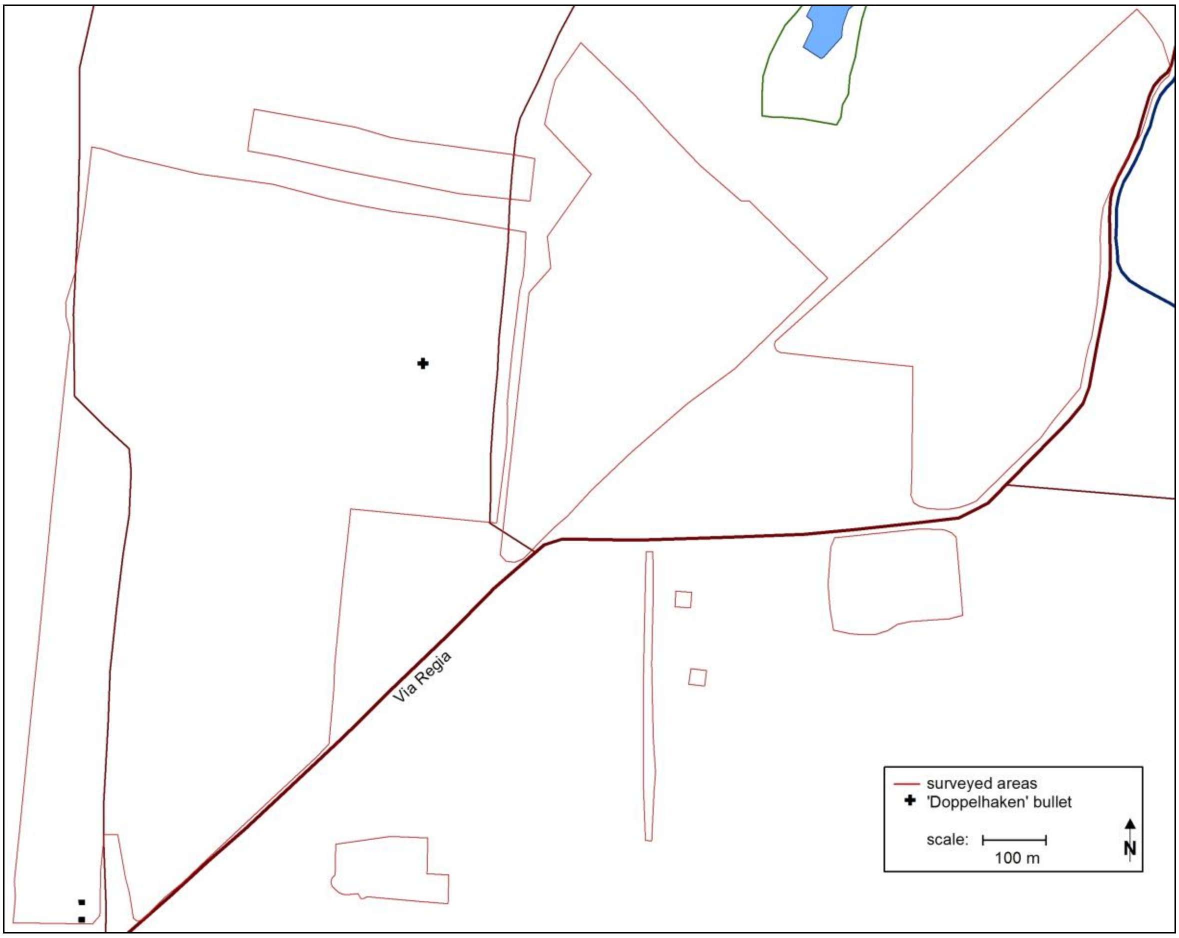

Figure 98: *Doppelhaken* bullet.

The events

Given the length of the front line, the Swedish right wing cavalry must have been fully engaged in the fighting, possibly excepting only Stalhandske's Finns, when Pappenheim's main force hit their flank with 1,400 horse. This attack certainly ripped the Swedish outer wing apart,[843] even though Hofkirchen stayed away from the fighting. At the same time, 1,400 Croats outflanked the Swedes even farther to their right.

Although there is no evidence, this was the time when all 1,200 Swedish second line right wing cavalry must have been committed to avoid total destruction of the entire wing. While Uslar, the Hessians and Beckermann possibly supported Gustav Adolf's right wing, the squadrons Bulach, Goldstein and Duke Wilhelm, commanded by Oberst Claus Conrad Zorn von Bulach, probably crossed the Floßgraben to counter the Croats as Watts

[843] The *Relation II from Erfurt* reported that the first Imperial counterattack "ruined several (Swedish) cavalry regiments, which had retreated" (Droysen 1880, 19), but did not connect this event with Pappenheim's attack.

claimed.[844] However, it is doubtful that less than 400 Swedish horsemen could have stopped 1,400 Croats[845] and they must have got some kind of reinforcements. It is likely that the three Swedish cavalry squadrons were disordered[846] and suffered heavy casualties, among them was Oberstleutnant Marx Conrad von Rehlinger, commanding officer of Goldstein's Regiment, who was shot in the arm.[847]

It was probably not long before the Swedish right wing would have started to fall apart, when Pappenheim was hit by a 4 bore bullet from a rifled *Doppelhaken*, fell off his horse and was taken prisoner. Rescued by his 22 year old trumpeter Conrad Ehinger, the mortally wounded Feldmarschall is reported to have cried out:

"Oh brothers, that god has mercy! Is there no one, who fights faithful for the emperor!"[848]

He said this because he saw Bönninghausen's harquebusiers retreating after Sparr's cuirassiers were already gone, retreating because they were caught in their rear by a Swedish cavalry attack, after they had fired and retired. Hagen's harquebusiers, realising that the left wing was not as quiet as they first thought, returned to the right wing.[849] Lohe's cuirassiers did not perform well either; but his Oberstleutnant, who was accused of cowardice, escaped execution at Prague due to Holk's intervention.[850]

The wounding of Pappenheim and the confused withdrawal of some Imperial units took some pressure from Gustav Adolf's right wing. However, he still had to deal with Piccolomini's and Götz's cuirassiers of the Imperial inner left wing and Isolani's 1,400 Croats behind the Swedish right rear, and Holk's wing was far from disintegration.[851]

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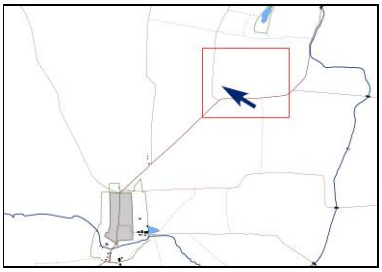
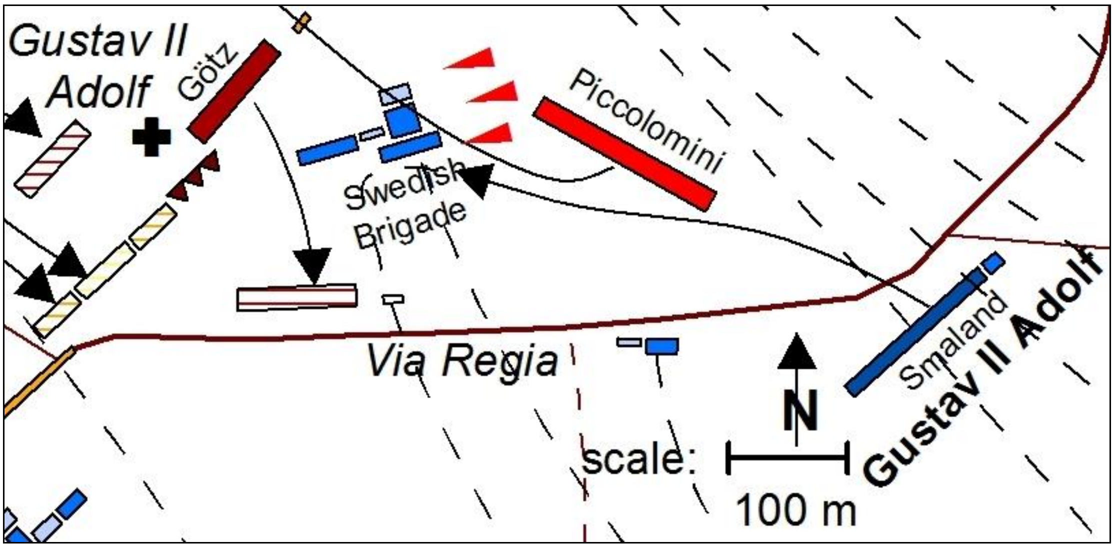
[844] Watts 1633, 132.
[845] This story was made up by the *Relation II from Erfurt* (Droysen 1880, 19), retold similar by Gottfried 1633, 26 and copied from there by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, and Abelinum 1646, 750, again retold by Chemnitz 1648, 466.
[846] Mentioned only by the *Relation II from Erfurt* (Droysen 1880, 19).
[847] However, it is at least suspicious that this story was first mentioned by Gottfried 1633, 26, copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 750, Chemnitz 1648, 466.
[848] Ehinger's testimony (Hallwich 1912b, 135).
[849] Verdict vs. Hagen (Seidler 1954, 142).
[850] Holk's 8 December 1632 letter to Wallenstein (Hallwich 1912a, 588).
[851] Diodati reported that Pappenheim's death "almost" disordered the left wing (Fiedler 1864, 563).

8.3.5 Imperial left wing: Gustav Adolf's counterattack and his death 12.00am-1.00pm





Historical sources

The death of Gustav Adolf is the most discussed event of the Battle of Lützen. The contemporary, as well as the modern literature, is correspondingly extensive, diversified and colourful. At the same time, however, Gustav Adolf's death had surprisingly little effect on the battle; it is, therefore, not necessary to discuss it in detail. In addition, no one who saw his death survived to tell the story and the facts are superimposed by rumours. In particular, it is suspicious that the high-ranking officers Herzog Franz Albrecht von Sachsen-Lauenburg and Oberstleutnant Falkenberg were reported to have been directly involved in the events that have led to Gustav Adolf's death. Very few authors seem to have tried to take advantage of it, like Ottavio Piccolomini, while most just embellished their stories to make them more interesting, not believing that Gustav Adolf was just another casualty.[852]

[852] Herzog Franz Albrecht von Sachsen-Lauenburg had defected from the Imperial army to Gustav Adolf and was suspected of murdering the king (Fleetwood 1632, 12, Hülshorst – Wittrock 1932, 303). Some reported him as trying to save the king (Dalbier 1632, 251, *Extrakt Schreiben aus Berlin* – Mankell 1860, 658, Watts 1633, 137, Chemnitz 1648, 466). The Imperial Oberstleutnant Falkenberg was reported to have killed Gustav Adolf (Khevenhiller 1726, 192).

Gustav Adolf was last seen taking command of the Smaland cavalry.[853] After that his whereabouts are unknown until he was found dead.[854] Ottavio Piccolomini reported that after he retreated from the Via Regia:

"in this moment the Blue Regiment, the king's most appreciated, advanced, and that made it happen that the Regiment Götz, which was to the right in front of me, got damaged by a volley. Hearing this, I immediately charged it, which let down the pikes, but making halve a caracole, I took them from the flank, where I cut it to pieces and took their colours. The king, hearing that this regiment [New Blue] got the 'load', felt the impulse to counter this disorder and crossed my squadron; after I had dispersed this infantry, I attacked again a cavalry regiment and dispersed it and at that time many of my soldiers [i.e. Innecentius Buccela][855] came to me telling me the king is dead…"[856]

Piccolomini could not have known that the king was attacking him. His intention was to get a reward from the emperor for killing Gustav Adolf, yet it is one of the more credible stories that soldiers came to him and Holk showing trophies from the dead king, as Diodati confirmed. [857] A short while later, Jacobus Fabricius saw the Smaland cavalry returning without the king and shortly thereafter the regiment's preacher reported to him "Rex vulneratus est."[858]

Gustav Adolf had refused to wear armour at Lützen, because a bullet he received in Poland during the Battle of Dirschau 8 August 1627 was still in his shoulder and wearing armour apparently irritated the wound a great deal.[859] The reason for taking personal command of the Smaland Cavalry Regiment and charging the enemy was certainly the immediate necessity to do so, not that it was Gustav Adolf's nature to take such an enormous risk.[860] It is more likely that he had to, because the commanders of the Smaland and Ostgöta cavalry were killed or wounded. Seeing his Swedish infantry dying, he could not wait for reinforcements.

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853 Fabricius (Wittrock 1932, 306) and Hallenus' eyewitnesses (Mankell 1860, 662) were close enough to have seen this incident. See also *Relation I from Grimma* (Studien 1844, 51), Watts 1633, 137, Richelieu 1823, 259.

854 Even the story of the recovery of the king's body is unclear. According to Hallenus (Mankell 1860, 662), a boy spotted his horse, while the *Relation I from Grimma* (Studien 1844, 51) reported that he fell of his horse and was dragged hanging in one stirrup. Certainly unreliable are the stories of Bernhard von Weimar (Fleetwood 1632, 8) or Stalhandske (Watts 1633, 142) heroically charging the enemy, finding and recovering the king's body.

855 *Spanish Relation* (Watts 1633, 163).

856 Argang 1894, 89.

857 Diodati (Fiedler 1864, 564).

858 Wittrock 1932, 306. Hülshorst reported that the king was missing for two to three hours (Wittrock 1932, 303).

859 Bursell 2007, 95.

860 It is often claimed that Gustav Adolf attacked the Imperial left wing at the head of his cavalry right from the start of the battle, which seems to be only another myth about the king: Dalbier 1632, 251, Fleetwood 1632, 7, Hülshorst (Wittrock 1932, 303), Hallenus (Mankell 1860, 662). See also Brzezinski 2001, 62.

This new interpretation suggests a timeline for the events, because it must have occurred after the Swedish cavalry took heavy casualties. The heavy casualties place this episode after Pappenheim's arrival and Piccolomini's counterattack. This scenario agrees with both Piccolomini's account that the king died after Piccolomini attacked the New Blue Regiment, and also with Fabricius' statement that there was not much time between the Smaland cavalry advancing with, and then returning without the king. In turn, the sequence means that Gustav Adolf could not have gone very far from his position on the inner right wing.[861] The death site of Gustav Adolf on the Imperial left wing is confirmed by Holk[862] and Diodati.[863]

Plate 23: Lion seal handle.
(image has been removed due to copyright restrictions)

Archaeological sources

Unusual physical evidence includes Gustav Adolf's elk-skin buff coat, which was taken as trophy and was returned to Sweden after the First World War. The buff coat was penetrated by pistol bullets and rapier thrusts, clear evidence for a cavalry fight.[864] Another rather unusual piece of physical evidence for locating Gustav Adolf's death is a large stone, which according to legend, was moved to the place where the king's body was found wearing only his underwear. Although it is possible that soldiers who found the king

[861] This clearly contradicts Seidler (1954, 58-77), who believed, based mostly on Khevenhiller's (1726, 191) unreliable account, that the king rode off on a rescue mission for the left wing with only one cavalry regiment, a decision which would have left the right wing without strong leadership, which would have endangered the success on the right, and would have come too late and with too few forces to change the fate of the left.
[862] Wittrock 1932, 309. Holk reported that Gustav Adolf was killed and the battle won "on this side", which means the left wing commanded by Holk.
[863] Fiedler 1864, 564. Diodati claimed that Holk's trumpeter showed him Gustav Adolf's spurs.
[864] According to Brzezinski (1989, 53-55 and 2001, 66) the holes in the buff coat suggest that Gustav Adolf was only hit by pistol or carbine bullets rather than musket bullets. This is consistent with historical sources reporting that Gustav Adolf was killed by cuirassiers or at least by armoured cavalry: Vitzthum/Berlepsch (Glafey 1749, 14), Ottavio Piccolomini (Argang 1894, 89), Hallenus (Mankell 1860, 662), Hülshorst (Wittrock 1932, 303), Pentz (Fiedler 1864, 570), *Declaration from 1633* (Droysen 1880, 41), Watts 1633, 137, Khevenhiller 1726, 192, Richelieu 1823, 259.

could have remembered the place and marked it, the entire story seems to have been made up. After 6 hours of battle, soldiers were exhausted, many wounded, and they had more urgent things in mind, like surviving. In addition, the Swedish army left the battlefield the next morning before clearing it. Finally, it was not necessary to mark the exact place but to mark any place so that people could visit the battlefield to mourn their king.[865]

A small bronze statue of a lying lion with a globe in one paw was found 130m north of the ‘stone’ in 2006. The lion was a handle for something attached below, possibly a seal, which is now lost. This portrayal of a lion is the coat of arms of the ‘Vasa’ and could have been in Gustav Adolf’s possession. Unfortunately, it was a very popular coat of arms element throughout Europe. So, the lion statue is at best only a clue for siting the king’s death.

The events

Presently, there is little real evidence for the events that led to the king’s death. Refusing to wear armour because of the pain caused by a bullet in his shoulder, it was not Gustav Adolf’s intention to personally lead the right wing cavalry into combat. Pappenheim’s and Piccolomini’s counterattacks caused such serious casualties among the Swedish cavalry and its leadership that, when Gustav Adolf saw his fellow countrymen being slaughtered on the right centre, he took command of the Smalanders and came to their rescue. It seems that he arrived in time to cover the Swedish Brigade’s retreat, as it was fighting next to him[866] and because the pikemen were covering the retreat of their musketeers at all cost (section 9.1.1). When he crashed into Piccolomini’s harquebusiers or Götz’s cuirassiers before he could reach his Lifeguard, he was separated from his men in the chaos of the melee and the thickening gun smoke; finally he fell somewhere on the Imperial left wing or left centre.[867]

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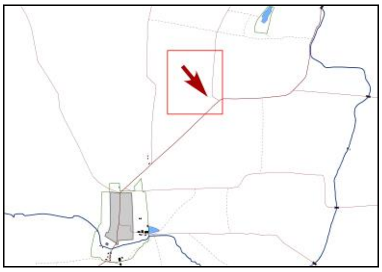
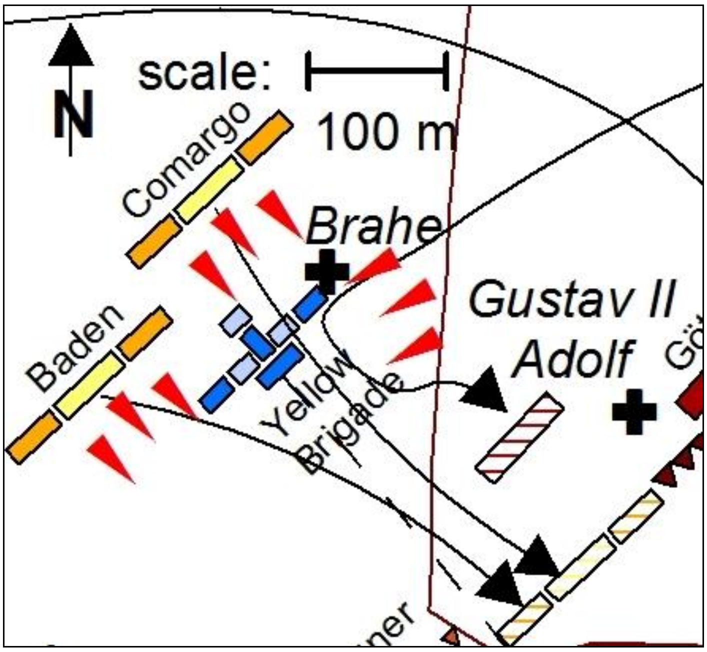
[865] Another kind of mystification of killed soldiers happened on the 1746 battlefield of Culloden. There, the Scottish soldiers were incorrectly reported to have been buried in mass graves by clan affiliation, although all evidence points to mixed burials (Pollard 2009, 9-10).

[866] There is little evidence for this interpretation. However, the Swedish Brigade took relatively low casualties of 35% in comparison to the 68% of the Yellow Brigade (Brzezinski 2001, 87 and 89), except for their pikemen, because they were closer to the Swedish cavalry, according to Watts (1633, 145).

[867] Under the circumstances that no one had seen the death of Gustav Adolf, it is almost certainly a made up story that the king was killed by Oberstleutnant Moritz von Falkenberg, commanding officer of Götz‘s Regiment, as Khevenhiller (1726, 192) claimed.

8.3.6 Imperial left wing: Destruction of the Yellow Brigade 12.00am-1.00pm





Historical sources

The destruction of Gustav Adolf's Lifeguard, the Yellow Brigade, was so impressive that most historical sources reported the event, changing and embellishing it so as to give the king's guard a more heroic end.[868] Although there is a lot of historical evidence, the sequence of events does not become entirely clear.

[868] Originally only noted briefly by *Relation from 1632* (Droysen 1880, 9), the *Inventarium Sueciae* (Gottfried 1633, 25) was the first 'relation', which made up the story of the Yellow Brigade forcing two huge Imperial *cuadros* (sic) to retreat and finally, exhausted from the fighting, was destroyed by two other Imperial *cuadros*, which would have meant that the Yellow Brigade had fought alone against almost the entire Imperial infantry. This story was copied by *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Monro 1637, part II, 164, Abelinum 1646, 749-750 and Chemnitz 1648, 465 and retold by Khevenhiller 1726, 191-193.

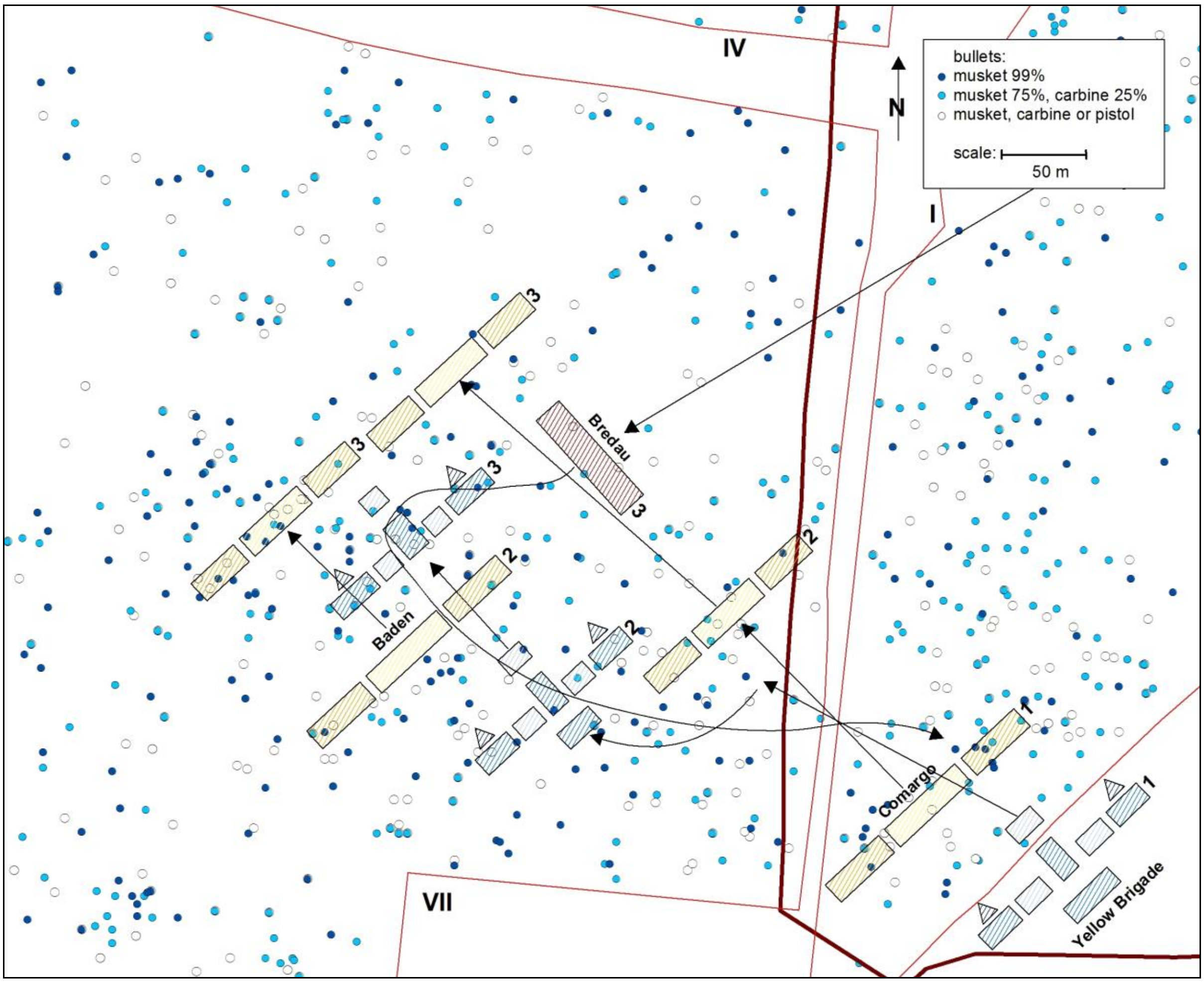


Figure 99: Yellow Brigade's attack vector 11.00am to 1.00pm on musket bullet distribution map.

The most reliable source is certainly the account from Münchhausen, who was involved in the fight. He reported that

"we [Münchhausen and Oberstleutnant Stolper], with the two regiments [Comargo and Baden], had beaten and 'separated' three regiments, which remained in one,"[869]

meaning three squadrons fighting as one brigade. In another letter Münchhausen stated that the Regiments Comargo and Baden captured fourteen colours from the Yellow and Old Blue Brigades, confusing the latter with the Swedish Brigade.[870] This is supported by Diodati, who fought in Grana's Regiment and certainly saw what happened, reporting the Yellow Brigade to have been destroyed by Imperial infantry.[871] Hallenus, whose account is based on two eyewitnesses who fought next to the Yellow Brigade, probably referred to the same event, when he wrote that Brahe was attacked from the flank by an Imperial cuirassier regiment, although Hallenus confused Brahe's command, which was the first

[869] Wittrock 1932, 305.
[870] Münchhausen 1632. Probably based on Münchhausen's report, Gallas noted incorrectly that Comargo had destroyed the Old Blue Brigade (Förster 1844, 95).
[871] Fiedler 1864, 563.

line centre and the Yellow Brigade, and not the left wing (section 2.2.2.1).[872] The "cuirassier regiment" in Hallenus' letter could have been Piccolomini's harquebusiers or, what is more likely, Götz's or Bredau's cuirassiers.

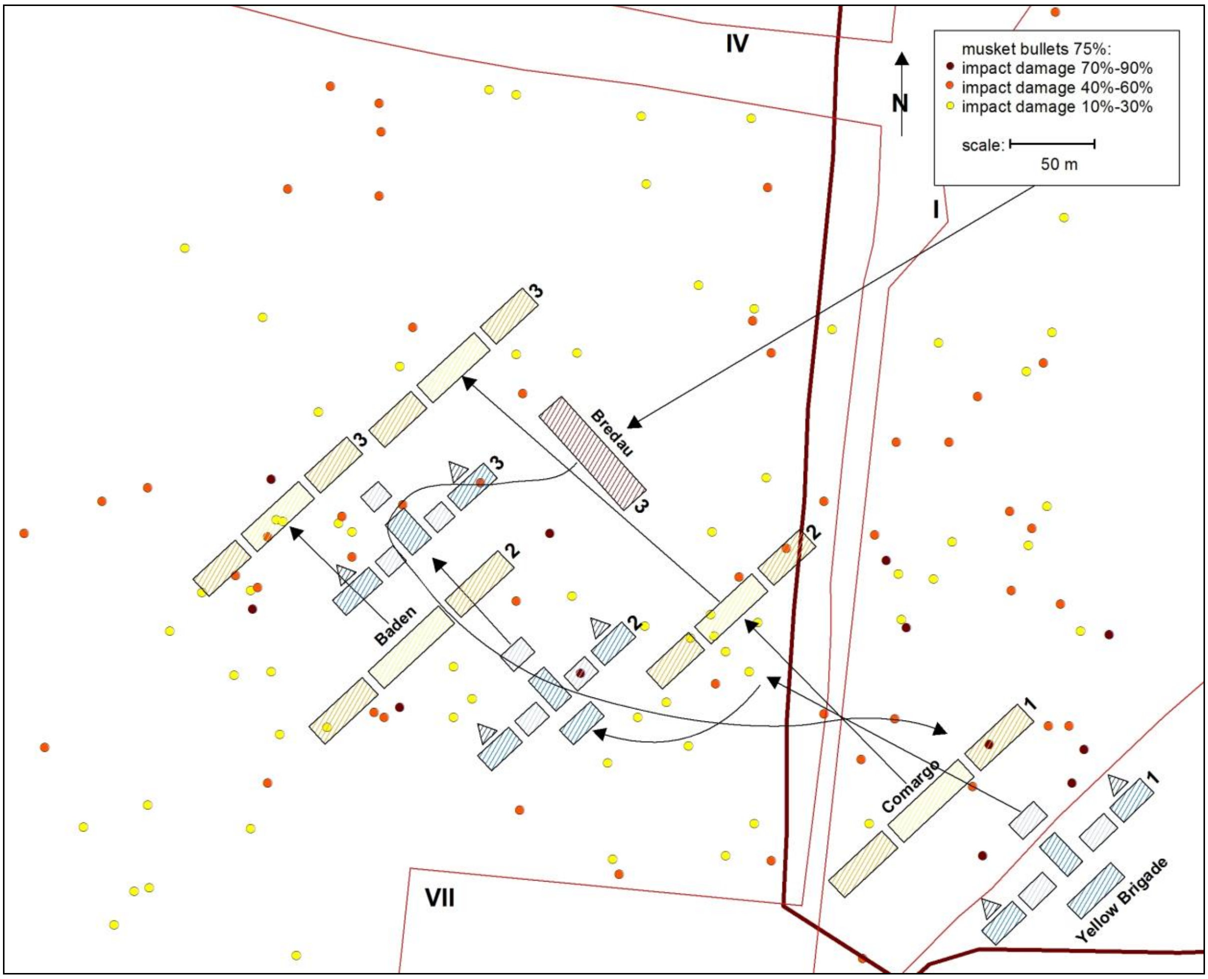


Figure 100: Yellow Brigade's attack vector 11.00am to 1.00pm on musket bullet impact damage distribution map.

Archaeological sources

The track, over which the Yellow Brigade fought its way through the Imperial lines, can be reconstructed according to musket bullet distributions. There is a distinctive concentration, originating at the south corner of field I (Inf5), reaching 300m to the northwest (Inf7/8) passing through the second Imperial centre's line (Inf9). This area includes several bullets with severe and medium impact damage, indicating several encounters at point-blank range. Approximately 200m to 250m to the north, the bullet density thins out, containing only a few lightly impacted bullets. They are very likely overshots or deflected bullets from this combat episode. There are no bullets north of these overshots, marking probably the northern end of the infantry combat. Concentration Inf9 represents the furthest advance

[872] Mankell 1860, 662.

of a Swedish infantry brigade. Given the positioning this can only have been the Yellow Brigade.

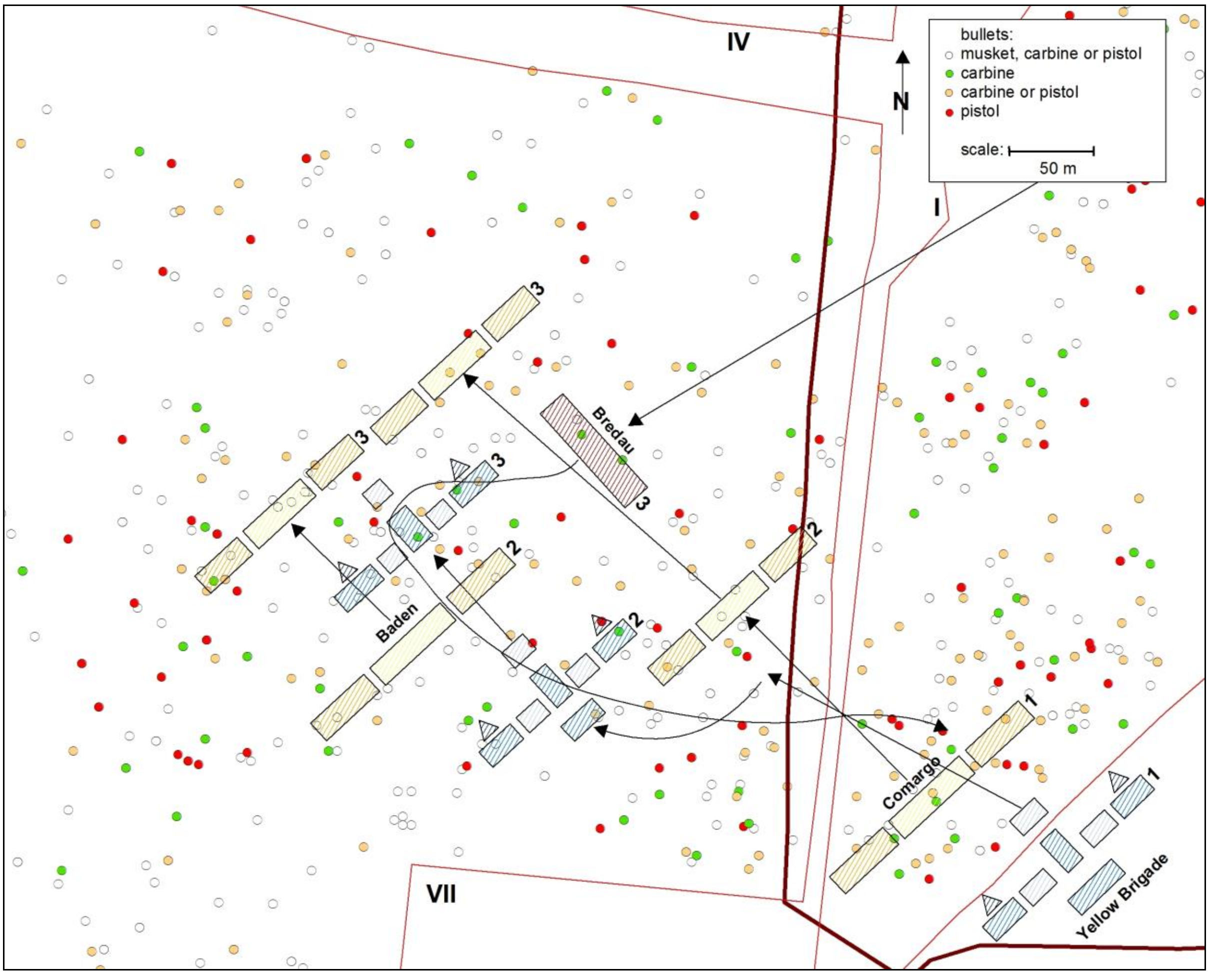


Figure 101: Yellow Brigade's attack vector 11.00am to 1.00pm on pistol and carbine bullet distribution map.

Slightly more blurred due to several combats, but still visible, are pistol/carbine bullet concentrations (Cav14/15) in the same zone, also containing several bullets with severe and moderate impact damage. Three pistol slugs and eight parted bullets confirm that there was substantial infantry-cavalry interaction here as well. In comparison to the action on the Imperial right centre, the boundaries between the musket bullet and pistol/carbine bullet concentrations is less clear and it seems that they derive mostly from one engagement. It resembles more the continuous combat zone of a unit moving forward, fighting at close range, and then withdrawing than two separate events, one at the first and one at the second Imperial line. This might be seen as evidence that the Yellow Brigade did not just stand, fight and die, but tried to retreat out of the killing zone.

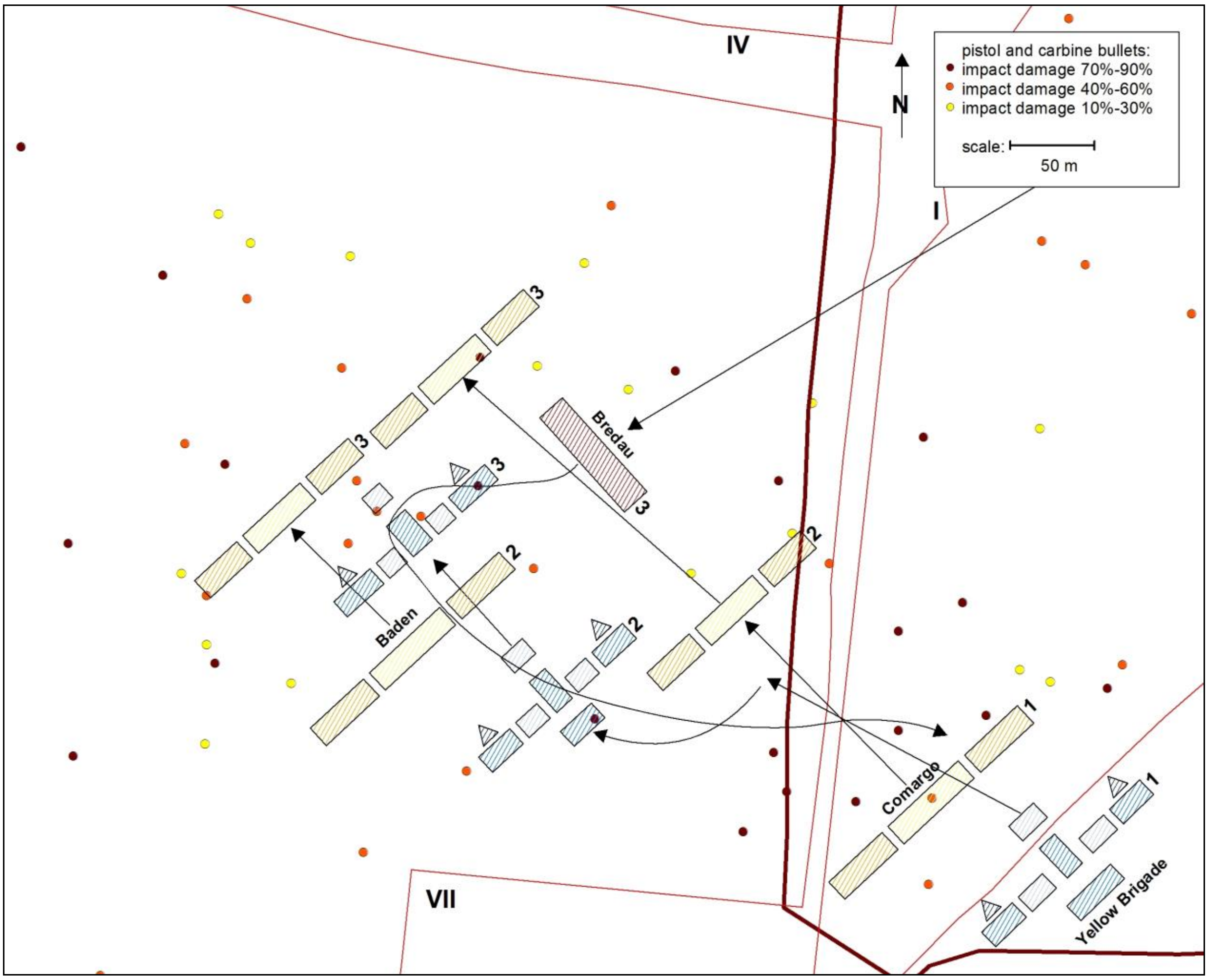


Figure 102: Yellow Brigade's attack vector 11.00am to 1.00pm on pistol and carbine bullet impact damage distribution map.

There is one problem interpreting these bullet concentrations as the retreat of the Yellow Brigade. Once positioned deep behind the first Imperial line, it would have lacked left flank protection. However, it is possible that flank protection was provided by one of the second line brigades, probably by Thurn's, either directly, by following the Yellow Brigade, or indirectly, by occupying the Imperial infantry squadron GFZM Breuner frontally. A corollary to this interpretation would have the Old Blue Brigade following the Swedish left wing into action. This concept is supported by a less dense musket bullet distribution in the middle of the Imperial centre. Here, there is almost an absence of pistol/carbine bullets, confirming that there was only minor combat during the entire battle.

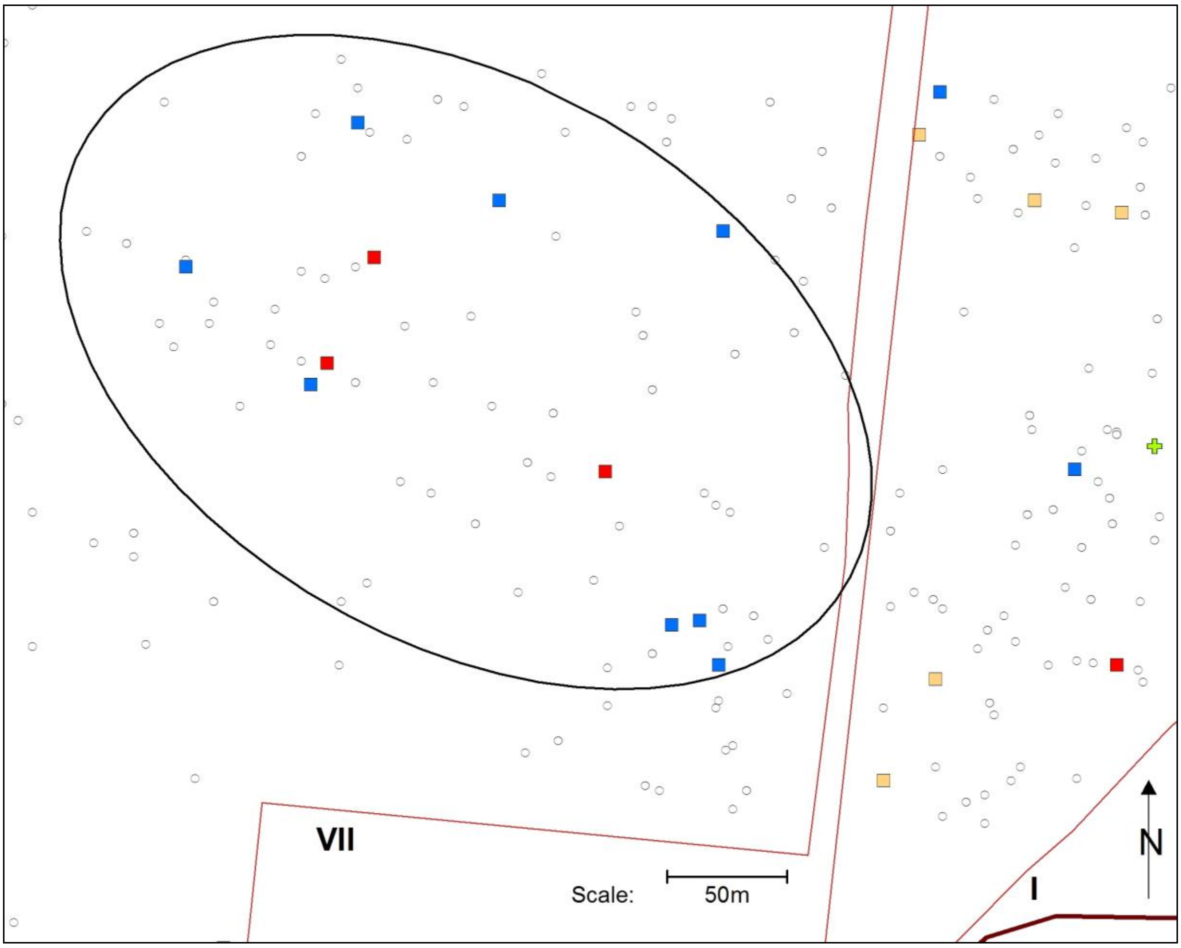


Figure 103: Detailed distribution of parted musket bullets (blue) and slugs (red) along the Yellow Brigade's advance.

The events

After having suffered casualties at the road ditches, the small battery, and the first Imperial line, the Yellow Brigade advanced towards the second line and approached the Regiment Baden; behind it the Regiment Comargo was reforming. Although its left flank was possibly protected by Thurn's Brigade, the Yellow Brigade became more and more isolated after the Swedish Brigade to its right fell back. It seems that Generalmajor Nils Brahe was not fully aware of the situation, because the gun smoke and the burning of Lützen created a dense 'fog'. Less than 1,000 men of Gustav Adolf's guard now faced approximately 1,700 Imperial infantry. The sudden appearance of cuirassiers on their unprotected flank was devastating because their pikemen were engaged in hand-to-hand combat against Baden's and Comargo's infantry. Even the Royal Guard veterans had no chance against this Imperial combined arms counterattack.

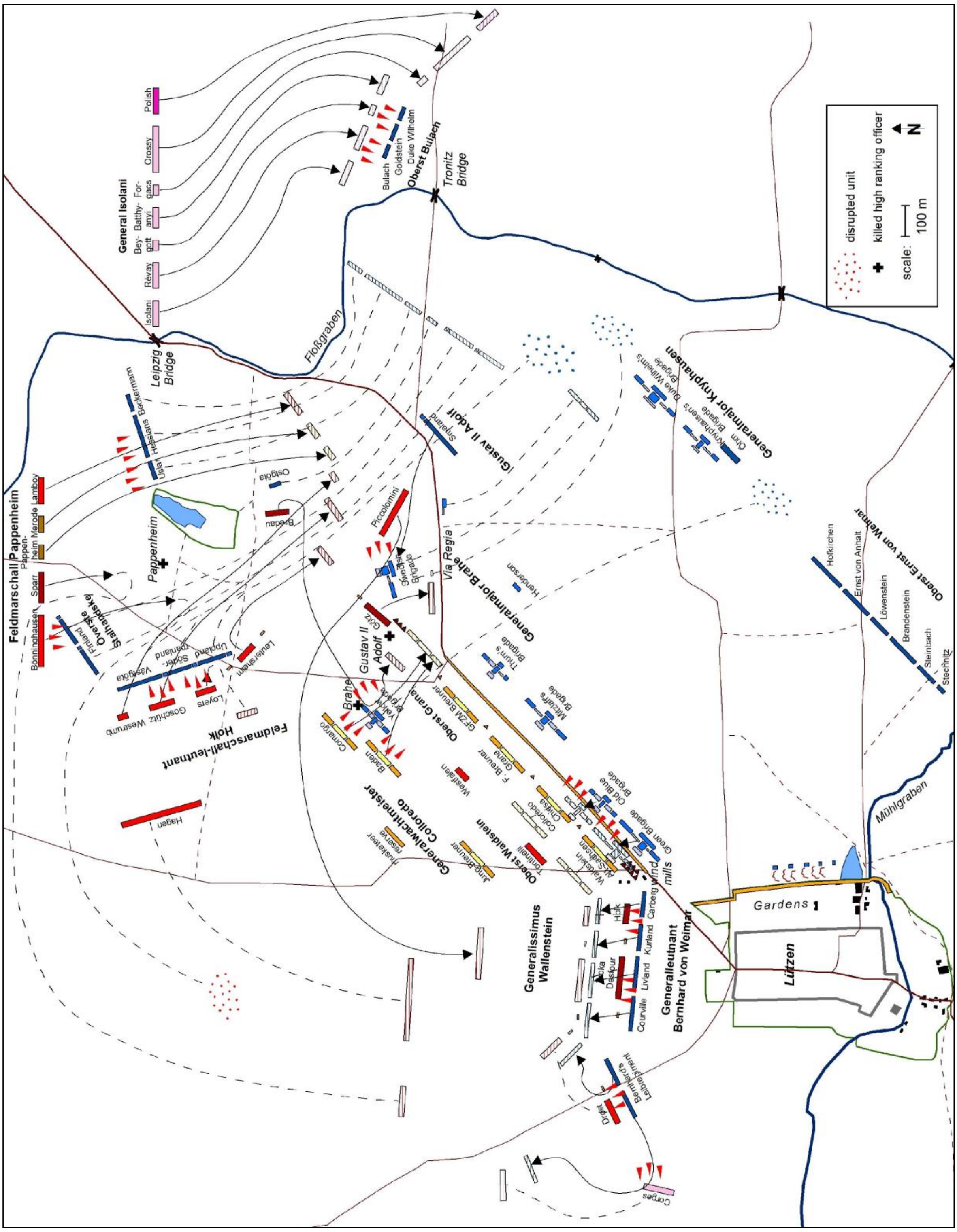


Figure 104: 12.00am to 1.00pm: Gustav Adolf's and Pappenheim's death and destruction of the Yellow Brigade.

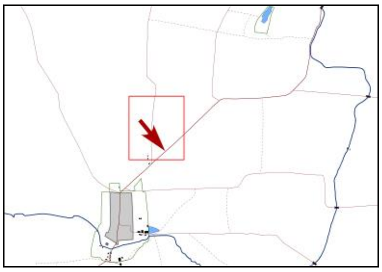
It was a bloody fight. Generalmajor Nils Brahe was shot in the knee and died a few days later;[873] 693 of his 1,017 men were wounded or killed and only 324 men from the Yellow Brigade survived relatively unharmed after fighting their way back to their own lines.[874] Diodati reported:

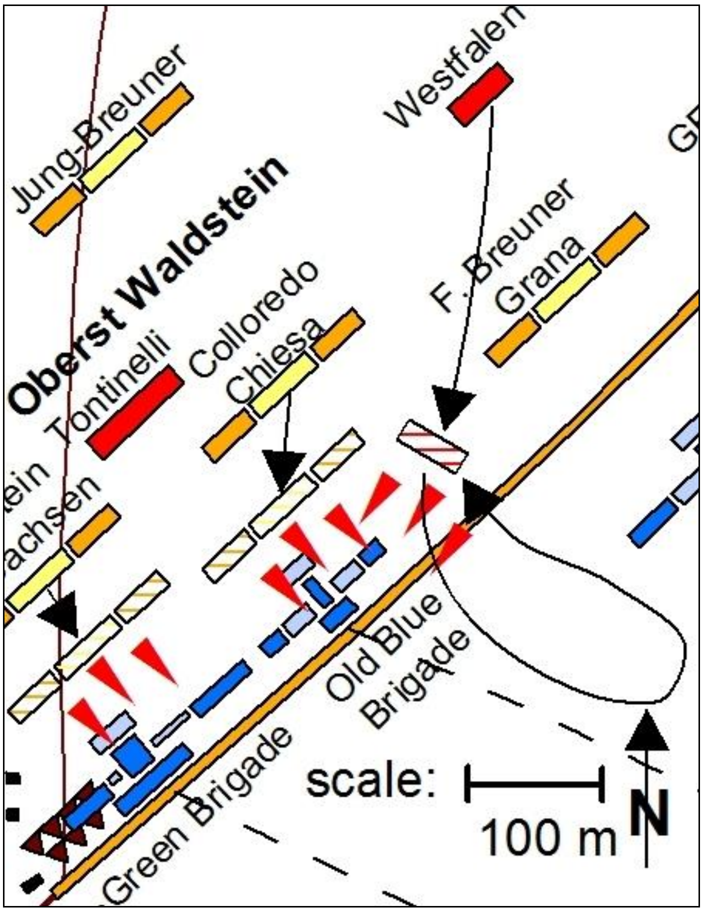
“A great body with yellow casacks came up resolutely in formation with pikes covering their musketeers. When they were attacked by our foot they remained completely on the spot, and it was a wonder to see in a moment the body reduced to a mound of corpses.”[875]

Gustav Adolf’s Lifeguard and Life Regiment were wiped out in minutes. But the Imperial side paid a heavy price. Baden’s Regiment took the highest casualties of any Imperial unit in Lützen; the commanding officer, Oberstleutnant Stolper, the Obristwachtmeister and all company commanders, except Hauptmann Schulder, were killed, and Obristwachtmeister Münchhausen of Comargo’s Infantry had to take command of both regiments.[876] From Piccolomini’s Regiment, the Oberst received one musket shot and two sword blows; Oberstleutnant Conte Avogadri was hit by a musket bullet in the right thigh; Major Pier Martelini, Rittmeister Baco, Rittmeister Marchese Palavicino and Rittmeister Fesente were killed; Rittmeister Crepi was hit in his ear with a pike; Rittmeister Silvio Piccolomini, who “hoped in god and his capable barber”, was shot in the thigh and the knee; Rittmeister Baron Mattei’s horse was killed and a cavalry regiment rode over him; 100 cavalry men were killed and another 100 wounded.[877]

[873] Hülshorst (Wittrock 1932, 303), Pentz (Fiedler 1864, 571), Hallenus (Mankell 1860, 662).
[874] Brzezinski 2001, 87.
[875] Fiedler 1864, 563.
[876] Münchhausen (Wittrock 1932, 305), *Relation from 1632* (Droysen 1880, 11), Wallenstein’s 22 December 1632 letter to Holk (Hallwich 1912a, 657).
[877] Reported by Silvio Piccolomini (Archivio 1871, 241).

8.3.7 Imperial right wing: Wallenstein's counterattack and destruction of the Old Blue Brigade 12.30am-1.30pm





Historical sources

The Old Blue Brigade is mentioned once when it advanced along with the Swedish left wing.[878] It appears only in the Protestant eyewitness account by Fleetwood. All Catholic eyewitnesses and secondary sources have confused the Old Blue Brigade with the Swedish Brigade, because both were wearing, at least in part, blue uniforms. Because the Green Brigade is also mentioned only sporadically, there are no reliable reports about events on the Swedish left centre around midday. By then the Old Blue Brigade had suffered terrible losses. From 918 soldiers, excluding officers, only 331 were mustered shortly after the battle; 63% were killed, wounded, or unaccounted for and the commanding officer, Oberst

[878] Fleetwood 1632, 7.

Hans Georg aus dem Winckel, was wounded.[879] Even the Green Brigade, which frontally assaulted the fortified Imperial windmill battery, had only 39% losses. This suggests that the Old Blue Brigade met a fate similar to the Yellow Brigade.

There is one more question concerning the Imperial right wing: Where was Piccolomini's Regiment? Neither Ottavio nor Silvio Piccolomini mentioned what happened to their regiment after Gustav Adolf's death. Holk reported that

"The Duke [Wallenstein] … fought two hours against infantry with four horse regiments, namely Holk, Trcka, Piccolomini and Desfour, and he was encircled completely until Holk gave back the cavalry to 'second' him."[880]

This comment might be the key to understanding what happened on the Imperial right. Holk put this sentence at the end of his account after he had explained the result of the battle, making it difficult to fit into the timeline. The cavalry Holk "gave back" is certainly that which came from the right as reinforcements, i.e. the Regiment Westrumb. By then the Regiment Piccolomini was already engaged on the right. Both regiments were under Holk's command, at least for a time, and he certainly knew that they left his command. Both regiments could not have been sent to the right wing before Holk was at least partially successful.

It seems that Piccolomini changed to the right wing immediately after he attacked the Swedish Brigade around 12am, while Westrumb must have followed soon after, possibly after the Swedish right was beaten around 1pm. Piccolomini certainly did not fight two hours on the right before Westrumb arrived, which seems only to have been one of Holk's generalizations. However, it does not seem very likely that the Regiment Piccolomini was responsible for the destruction of the Old Blue Brigade, because he was needed on the right wing to prevent a disaster.[881]

[879] According to Eberstein, all colonels of the infantry except possibly Mitzlaff and himself, were wounded or killed (Diemar 1893, 348). See also *Relation II from Erfurt* (Droysen 1880, 21), *Relation from 1633* (Droysen 1880, 34), *Declaration from 1633* (Droysen 1880, 44) and Khevenhiller 1726, 197.
[880] Wittrock 1932, 309.
[881] Watts (1633, 161) made a comment in the *Spanish Relation* reporting that Piccolomini destroyed a Swedish regiment, leaving it stretched out on the ground, which Watts (1633, 161) commented to have been Winckel's Regiment, which might be one of the sources for the confusion of the Old Blue and the Swedish Brigades.

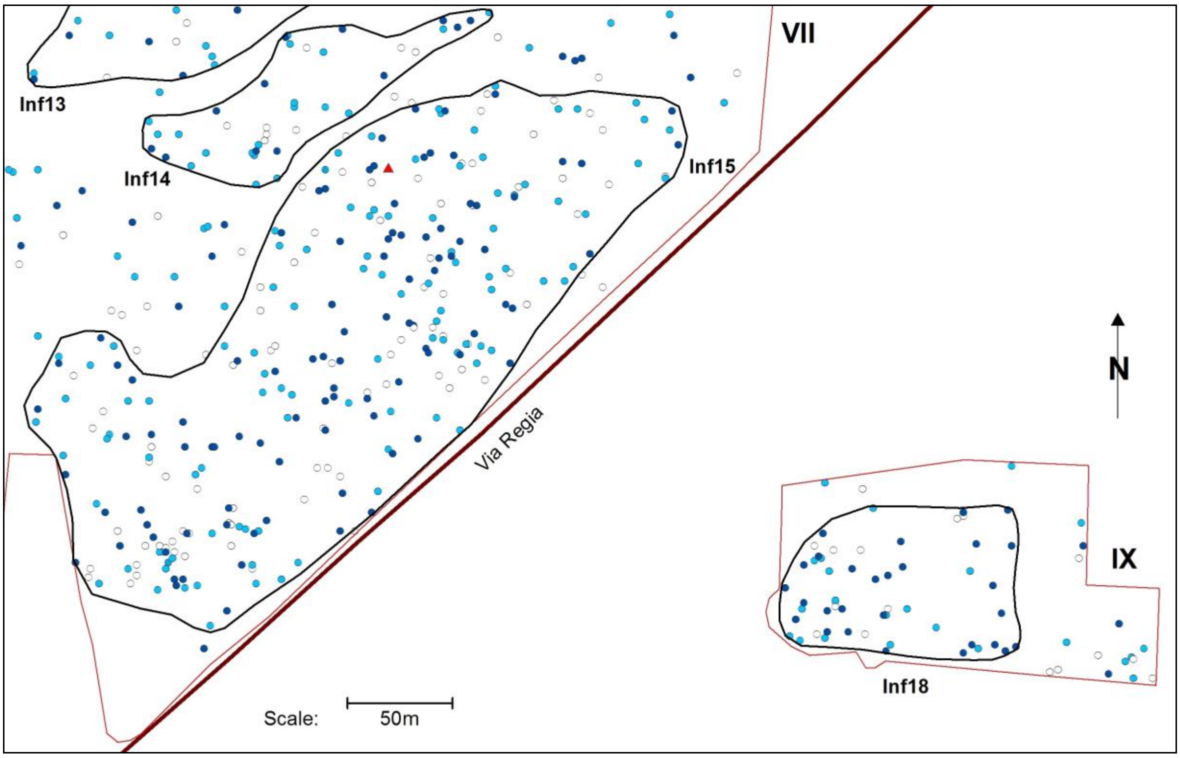


Figure 105: Detailed musket bullet distribution map, Imperial right centre and Swedish approach.

Archaeological sources

As discussed in section 8.3.3, the Old Blue Brigade was likely held in place at the first Imperial line; their combat is probably represented by the musket bullet concentration Inf15. Located in the same area is one of the largest, densest pistol/carbine bullet concentrations Cav21, with the most severely impacted bullets of the battlefield. This same zone also contains the densest concentration of slugs, three from pistols, two from pistols/carbines and three from carbines. This confirms that there was heavy cavalry fighting against infantry and is, therefore, evidence for the destruction of the Old Blue Brigade. Field IX is located along the Old Blue Brigade's attack vector, 120m to 300m south of the Via Regia, where no combat is reported to have occurred. The relatively dense musket bullet concentration Inf18 can partially be explained by the Imperial skirmish line firing from the road ditches (section 6.2.4); however, the number of bullets is too high for skirmishing. In addition, one bullet with severe and three with medium impact damage were found here. This location is too far away from the Via Regia to create such deformation so it is probable that these bullets derive from an infantry engagement.

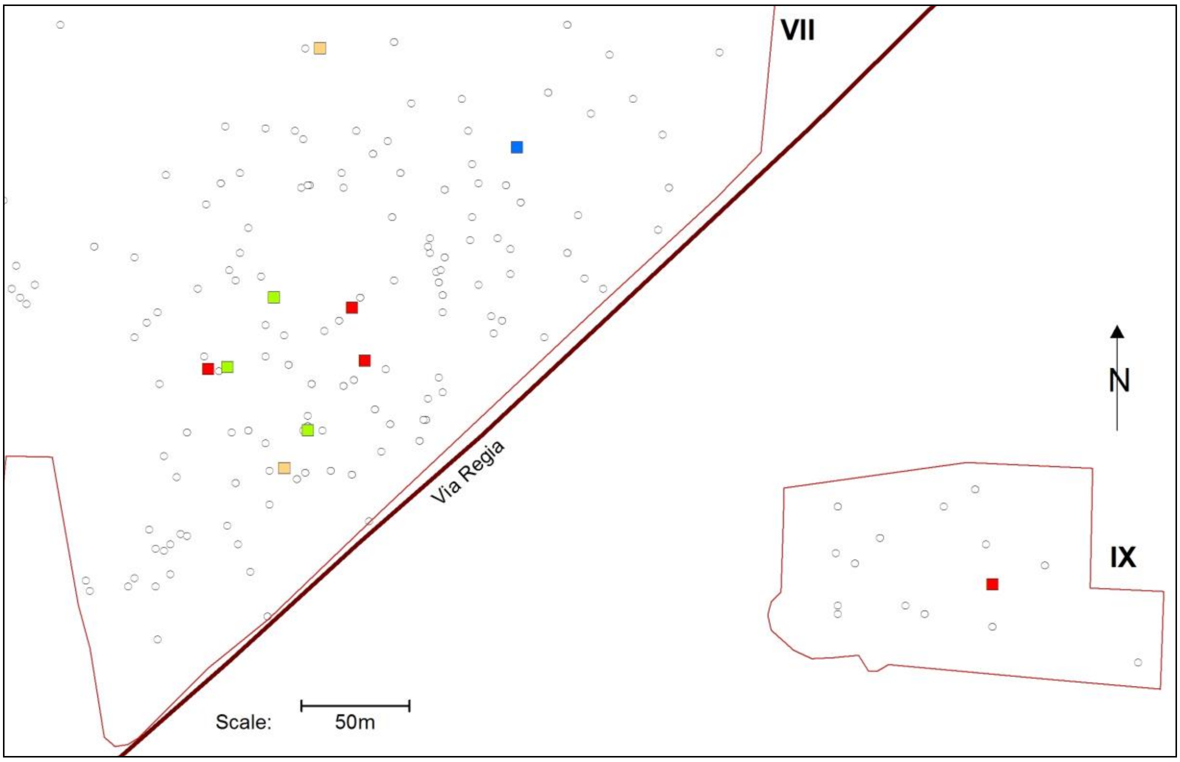


Figure 106: Detailed distribution of parted musket bullets and slugs, Imperial right centre and Swedish approach.

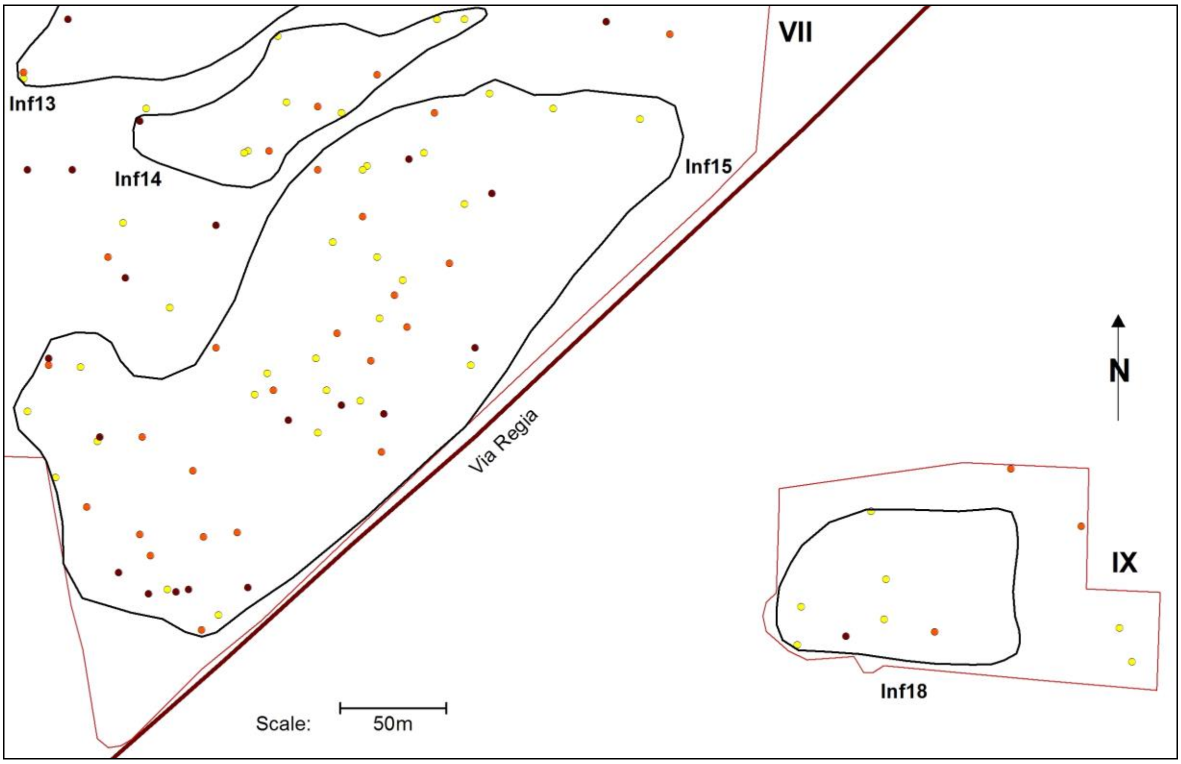


Figure 107: Detailed impacted musket bullet distribution map, Imperial right centre and Swedish approach.

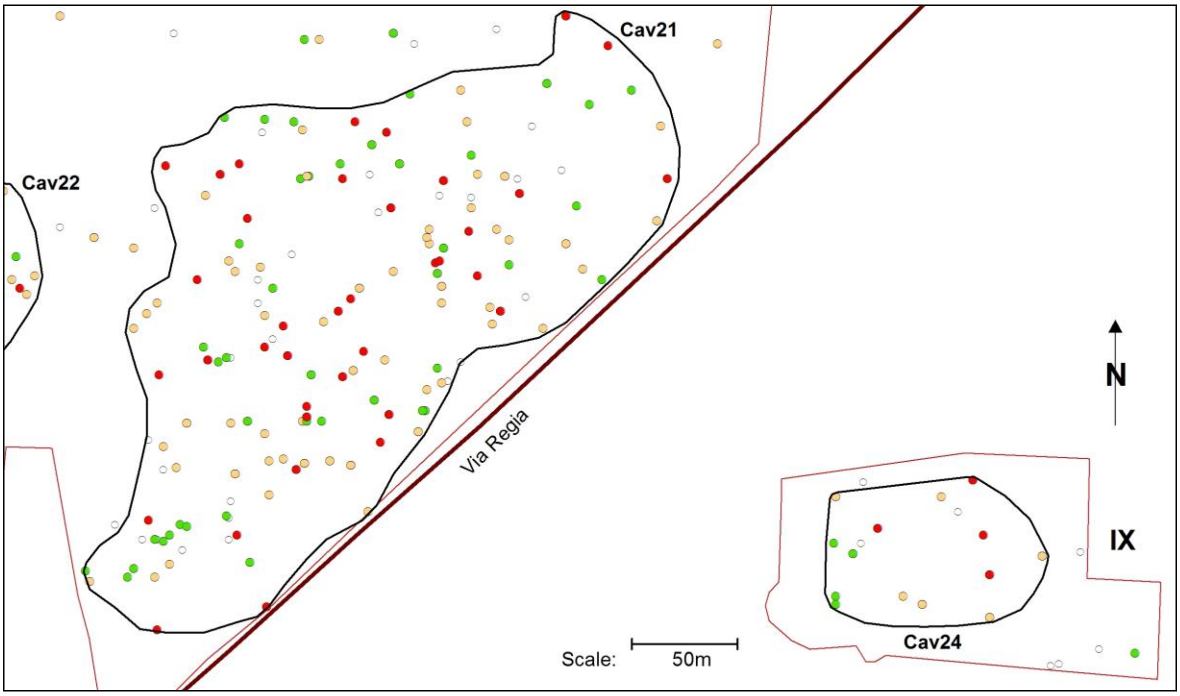


Figure 108: Detailed pistol/carbine bullet distribution map, Imperial right centre and Swedish approach.

A combat south of the Via Regia is also confirmed by bullet distribution Cav24 in field IX. This cluster is out of range for pistol or carbine bullets to have been fired from the road. It is a dense concentration containing four pistol, six pistol/carbine, five carbine and seven carbine/musket bullets, of which two have severe and two light impact damage and a pistol slug, resulted from cavalry closely engaged with infantry.

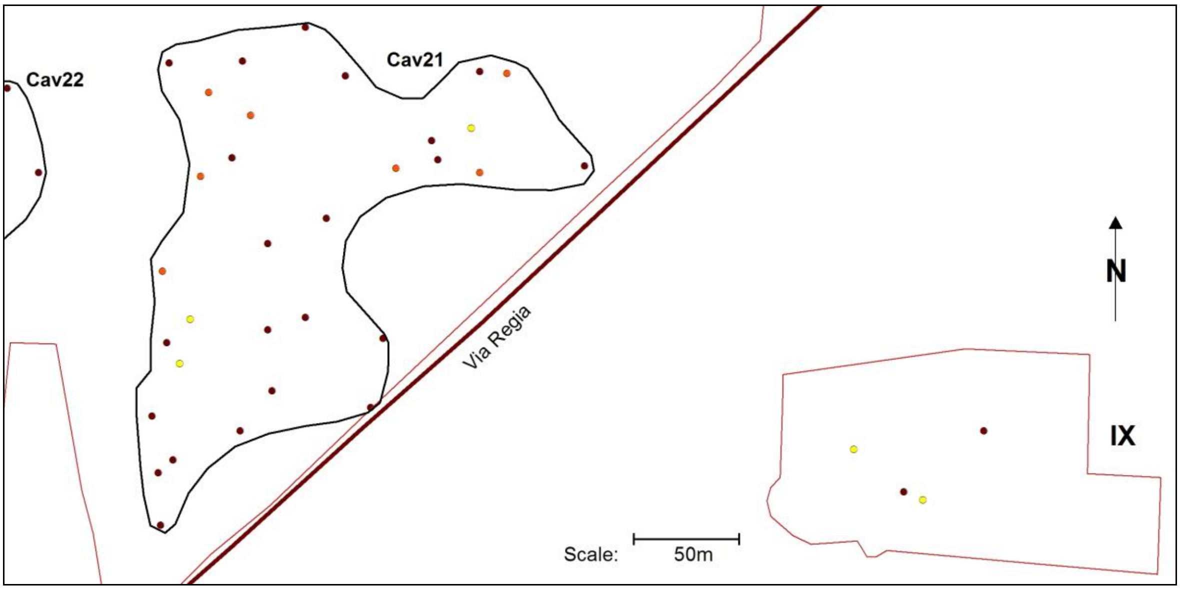


Figure 109: Detailed impacted pistol/carbine bullet distribution map, Imperial right centre and Swedish approach.

The most reasonable conclusion is that an engagement took place here during the Swedish rout around midday, when the Swedish army was most vulnerable, and Imperial units were bold enough to cross the Via Regia. It is, therefore, very likely connected to the retreat and destruction of the Old Blue Brigade, which was pursued by Imperial cavalry. The lack of reports about the Old Blue Brigade makes it likely that such an event was simply forgotten, a factor that might have been caused by poor visibility due to the smoke from the burning town. At any rate, the Protestants were certainly not eager to actively draw attention to the destruction of one of their best regiments.

The events

It seems that the arrival of Pappenheim's cavalry on the Imperial left wing, despite the death of the Feldmarschall and the Imperial 'Fahnenflucht', had an impact on the whole course of the battle. Once the Swedish attack was stopped by Pappenheim's reinforcements, an Imperial counterattack punched through the Swedish line between the centre and right wing. Exploiting this success, adjacent units were attacked and beaten freeing Imperial units for other operations; as Holk reported, he sent back the units he had received from the right wing.[882]

With reinforcements from Holk's successful left wing, the Imperial right centre and right wing was stabilized, making it possible to counterattack the Old Blue Brigade, using Wallenstein's successful combined arms tactics with infantry on their front and cavalry on the flank. Nevertheless, the Swedish infantry still managed to retreat over the Via Regia, closely followed by Imperial units. At some point Oberst Hans Georg aus dem Winckel was wounded, the Old Blue Brigade lost cohesion and finally broke up. Only 331 out of 918 soldiers made it back to their lines relatively unharmed; Winckel's veteran regiment was in no shape to resume fighting.

Meanwhile, the arrival of Piccolomini's Regiment prevented a disaster on Wallenstein's right, where Bernhard von Weimar was still pressing on. When the Old Blue Brigade was beaten back, the Green Brigade's right flank was threatened, and Oberst Georg Wulf von Wildenstein,[883] who was wounded, could not hold his position. With further reinforcements from Holk, consisting at the very least of Westrumb's harquebusiers, Wallenstein counterattacked Bernhard von Weimar's wing and drove him back. Soon almost the entire Swedish army was in retreat.

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[882] Wittrock 1932, 309.

[883] Monro 1637, part II, 165, *Relation II from Erfurt* (Droysen 1880, 21), *Relation from 1633* (Droysen 1880, 34), *Declaration from 1633* (Droysen 1880, 44), Khevenhiller 1726, 197.

8.3.8 Stalemate: Imperial and Swedish armies at the brink of collapse 1.00-2.00pm

It is almost impossible to get a clear picture of the situation in the early afternoon. Most accounts from both sides played down the chaos with descriptions like "our cavalry was almost disordered."[884] However, some eyewitnesses give a completely different picture, in particular Gustav Adolf's Chaplain Jacobus Fabricius:

"After his Majesty King Gustav Adolf …, riding with the Smaland cavalry over a ditch, had engaged the enemy … it was soon after that, that this regiment returned, and no one wanted to answer my question, where the king was, until a passing by field preacher shouted: 'The king is wounded.' I was shocked about that and turned to the place where I had seen his Royal Majesty moving. But instead I met Oberst Ernst von Anhalt-Bernburg, Oberstleutnant Winckler and Oberstleutnant Rehlinger along with other high-ranking officers, who asked if I have seen their folk ... Two members of the Royal Office rode by and shouted: 'It is a rout.' But I responded: 'Make a stand, our flight provoke all others to flee.' In search for my king I met a lot of fleeing musketeers and cavalrymen and a Livonian nobleman named Oberstleutnant Tiesenhausen, whom I ordered to stand. But the more we were shouting the faster they were running, because they thought they were pursued by the enemy, not seeing far because of the thick fog."[885]

It is a very telling point about the Swedish army's condition that officers were searching for their soldiers. Fleetwood's comment that

"…for had not our foote stoode like a wall, there had not a man of us come off alyve, ... ; and our horse did but poorely"[886]

is evidence the Swedish cavalry was even in worse condition than the infantry. Herzog Albrecht von Sachsen-Lauenburg fled from the battlefield with 300 horse.[887] If it seems that the entire army was about to fall apart, why did Wallenstein not take advantage of the situation? It was certainly not because Fabricius and Oberst George Fleetwood began to sing Lutheran songs and so rallied many soldiers.[888] Pursuing Imperial cavalry, which was already moving over the Via Regia to finish off the Swedish army, would have prevented that.

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[884] Diodati (Fiedler 1864, 563), *Relation from 1633* (Droysen 1880, 31).
[885] Wittrock 1932, 306. The correct names and ranks are given rather than those given by Fabricius.
[886] Fleetwood 1632, 9.
[887] Hülshorst (Wittrock 1932, 303).
[888] According to Fabricius (Wittrock 1932, 306).

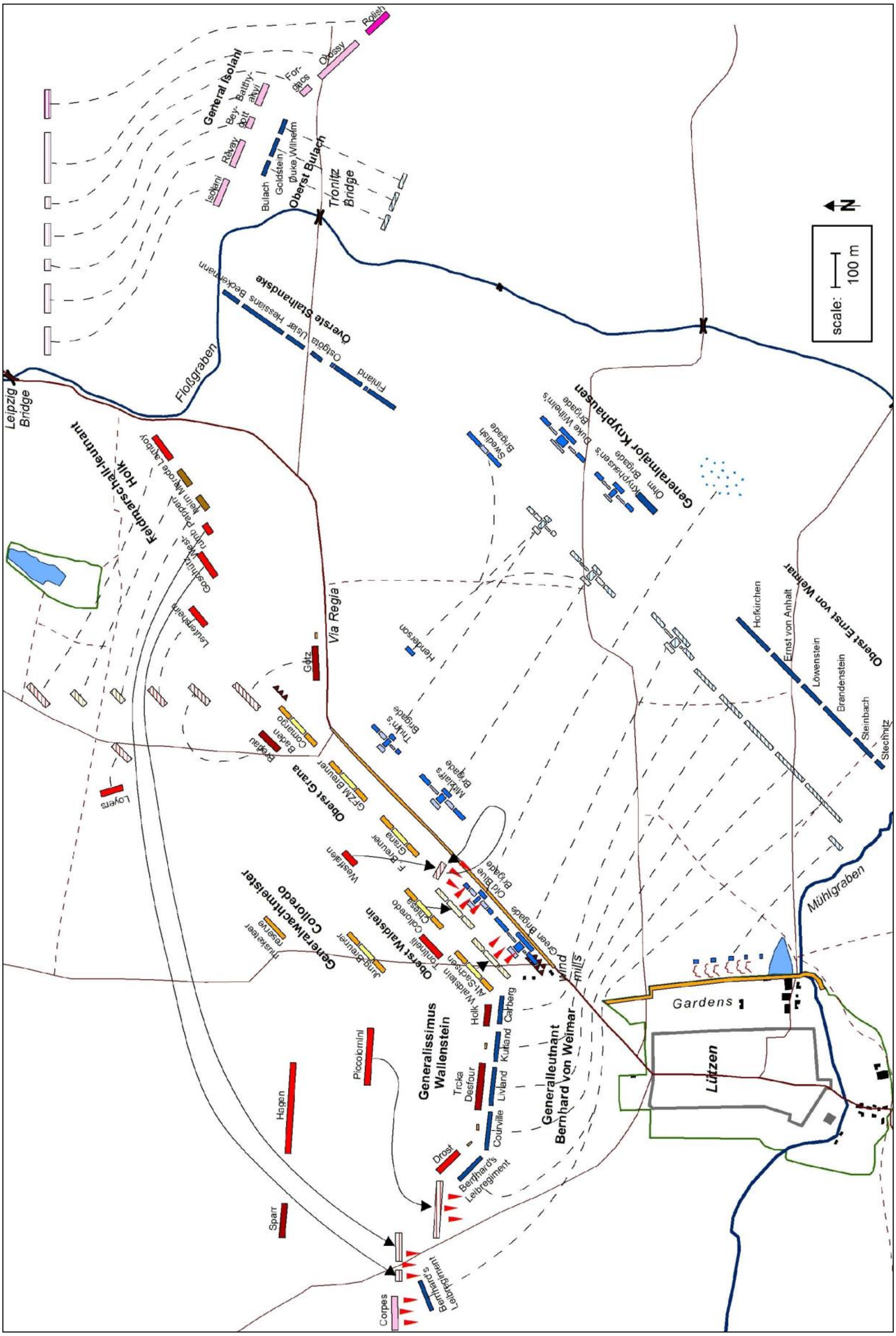


Figure 110: 12.30am to 2.00pm: Destruction of the Old Blue Brigade and retreat of the Swedish army.

The answer has to be that the Imperial army was not in a good shape either. The Harquebusier Regiment Hagen had changed wings twice without combat and was then waiting behind the right wing, disobeying orders to engage the enemy.[889] Hagen was accompanied by the Cuirassier Regiment Sparr, which also retreated from the left to the right wing and also refused to fight, until it finally left the battlefield just before the end of the fighting.[890] The worst of all was Oberst Lothar von Bönninghausen, whose harquebusiers retreated before they engaged at all, then, looted their own baggage train, probably frightening the female camp followers who, in turn, cut the wagon horses loose and rode off together with the cavalry.[891] On their way back to Halle they tried to discourage Pappenheim’s infantry from reinforcing the Imperial army at Lützen.[892] It was not just the mounted men, the infantry, although holding their ground, had suffered terrible losses and many high-ranking officers were either killed or wounded. In essence, there were too few intact regiments able to pursue the Swedes.

On the Swedish side Generalmajor Knyphausen kept his own brigade, the Brigade Duke Wilhelm and the Cavalry Regiment Öhm in reserve.[893] They were holding the line so the routed Swedish regiments could be rallied behind them. In addition, the other two second line Brigades, Mitzlaff and Thurn, whose task had probably been to occupy the Imperial centre, but not to break through, had not taken heavy losses[894] and seem to have made an orderly retreat. At this point the battle paused.

[889] Verdict vs. Hagen (Seidler 1954, 142).
[890] Verdict vs. Hofkirchen (Seidler 1954, 142-143).
[891] Watts 1633, 142.
[892] Verdict vs. officers from Bönninghausen’s Regiment (Seidler 1954, 144-145). Bönninghausen himself was too important to be executed. The Imperial ‘Fahnenflucht’ and plundering the baggage train is also reported by Holk (Wittrock 1932, 309) and Münchhausen (Wittrock 1932, 305).
[893] Dalbier 1632, 252.
[894] Brzezinski 2001, 87 calculated a total of 38% and 15% losses during the battle.

8.4 Bernhard von Weimar and Knyphausen: Second Swedish attack

After the Swedish rout, the battle went on for at least another four hours, but eyewitness accounts are mostly silent; secondary sources are inconsistent about what happened in the latter stages of the battle. Most seem influenced by the unreliable *Inventarium Sueciae*. Consequently, Deuticke[895] and Brzezinski[896] made only a short mention of any afternoon combat. Seidler reconstructed a completely erroneous scenario based on secondary sources, reporting that the Swedish army attacked in a 'storm of vengeance' because of the dead king,[897] while Generalstaben suggested a different erroneous account similar to modern warfare with a slowly but steadily advancing front, which completely ignored the Swedish rout.[898]

Of the small number of reliable accounts about the afternoon's events, only Fleetwood and Dalbier gave valuable information, reflecting on the condition of both armies, which were near collapsing, and on the limited visibility due to gun smoke and the burning Lützen. Although it is almost impossible to get a clear picture of the events of the afternoon at the present time from historical sources alone, additional evidence is provided by the archaeological survey.

With most soldiers near exhaustion, the nature of engagement in the afternoon is described best by Vitzthum/Berlepsch:

"A fatal earnestness was seen and heard on both sides."[899]

His comment is supported by *Extract Underschiedlicher Schreiben*[900] and *Relation from 1632*[901] reporting that no quarter was given and the Imperial musketeers clubbed Protestants to death with their musket butts, showing the brutality of the engagement during its latter stages. The 'storm of vengeance' because of Gustav Adolf's death, which

[895] Deuticke 1917, 79-82.
[896] Brzezinski 2001, 79-80.
[897] Seidler 1954, 79-83.
[898] Generalstaben 1939, 438-451.
[899] Glafey 1749, 14. See also Brzezinski 2001, 79.
[900] Droysen 1880, 4-5.
[901] Droysen 1880, 9.

turned the tide for the Swedes, is reported by very few sources and seems to have been one of the myths associated with the dead king.[902]

8.4.1 Collapse of the Swedish command structure

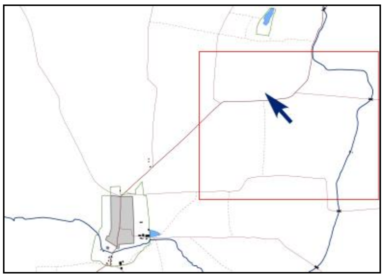
With Gustav Adolf's death and the fatal wounding of Generalmajor Nils Brahe, the army had lost its overall commander and the right wing and right centre then lacked command. The consequences of the disrupted Swedish command structure have never been subject to research. The most accepted view,[903] that Bernhard von Weimar got Knyphausen to agree to continue the battle, is based only on the unreliable accounts of Siri and Richelieu.[904] This view is very likely a myth possibly created to justify Bernhard von Weimar taking command of the army a few days after the battle. Although Generalleutnant Bernhard von Weimar outranked Generalmajor Knyphausen, as the only senior officers left, only secondary sources claimed that Bernhard actually took command of the Swedish army during the battle,[905] which is still the accepted view.[906] However, Gustav Adolf was more than just the army's commander, not necessarily succeeded by the next in rank. In fact, two eyewitnesses[907] and four early letters reported Bernhard von Weimar and Knyphausen shared army command,[908] and Hallenus stated that Bernhard von Weimar took command in Weissenfels after the battle.[909]

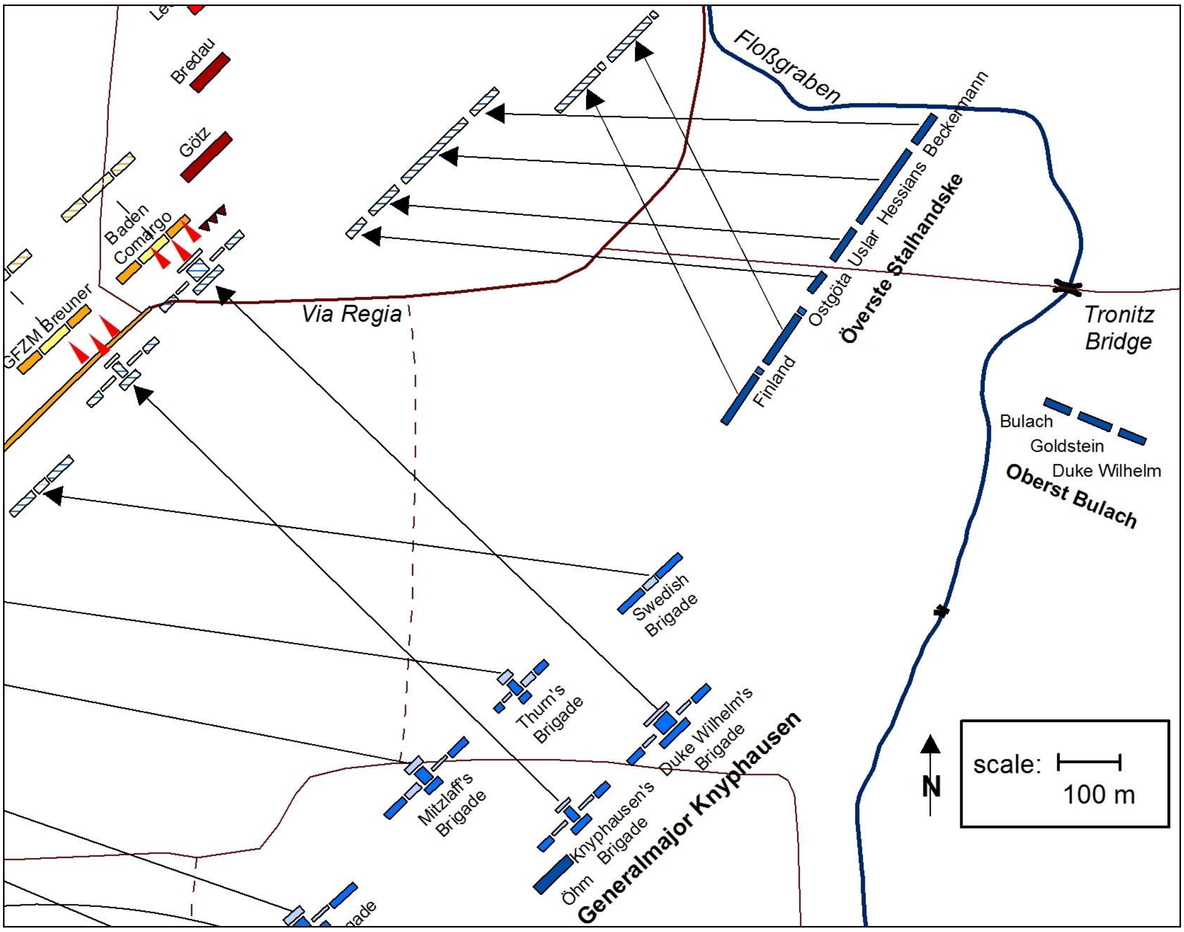
The command of the right wing and right centre, which was unlikely to have been in the hands of Torsten Stalhandske, who lacked authority as Överste, has been completely overlooked by historians. It is likewise not probable that Bernhard von Weimar commanded the entire first line centre and both wings, as Deuticke claimed,[910] because such a command would have been too large to handle, especially with all the casualties among senior officers. Dalbier reported Knyphausen as connected with the afternoon's

[902] Fleetwood 1632, 8, Chemnitz 1646, 466. A 'storm of vengeance' is suggested by Seidler (1954, 79) and rejected by Brzezinski (2001, 9).
[903] Deuticke 1917, 80, Generalstaben 1939, 447, Seidler 1954, 79, Brzezinski 2001, 78.
[904] Richelieu 1823, 261.
[905] Bodo von Bodenhausen (Glafey 1749, 11), 58. *Ordentliche Wochentliche Zeitung* (Söltl 1842, 338-339), *Relation II from Erfurt* (Droysen 1880, 20-21), *Relation from 1633* (Droysen 1880, 31-32), *Declaration from 1633* (Droysen 1880, 42), Chemnitz 1648, 467, Abelinum 1646, 749-750, Khevenhiller 1726, 196, Richelieu 1823, 260 and Gottfried 1633, 26, copied by Monro 1637, part II, 164-165, *Wahrhaftige Beschreibung* 1633 and *Glaubwürdiger Bericht* 1633.
[906] Generalstaben 1939, 447, Brzezinski 2001, 78. Seidler ignored the question of command.
[907] Brandenstein (Glafey 1749, 10), Swedish HQ (Söltl 1842, 348).
[908] *Extrakt Schreiben aus Berlin* (Mankell 1860, 658), *Copia verträulichen Schreibens* (Söltl 1842, 341), letter from 17 December (Söltl 1842, 341), Pentz (Fiedler 1864, 570-571).
[909] Mankell 1860, 665. The problematic of taking over command of the Swedish main army is also reported by the 19 November letter from an unknown author (Mankell 1860, 647).
[910] Deuticke 1917, 79.

events on the right wing and it seems possible and reasonable that he took command of that wing,[911] while Bernhard von Weimar kept command of the left wing, both sharing command of the centre.[912]

8.4.2 Second Swedish right wing attack 3.00-6.00pm





Historical sources

If we would believe Holk's account, the battle ended when his wing put the Swedish right wing to flight around midday.[913] The result of the battle, especially with all the Imperial

[911] Dalbier 1632, 252. Knyphausen as commander of the right wing is also noted by Chemnitz (1648, 466).
[912] Fleetwood 1632, 8, *Relation from 1633* (Droysen 1880, 31-32), Chemnitz 1648, 467, Khevenhiller 1726, 196 and Gottfried 1633, 26, copied by Monro 1637, part II, 164-165, *Wahrhaftige Beschreibung* 1633 and *Glaubwürdiger Bericht* 1633.
[913] Wittrock 1932, 309.

artillery being captured by the Swedes, and that the battle went on until darkness, are proof that Holk omitted the circumstances of how he lost the small Imperial battery.

The second capture of the Imperial battery is reported by Dalbier,[914] in the most detailed part of his account suggesting that he witnessed it. He noted that the Swedes captured the battery and spiked the guns at 2pm, but Dalbier's timeline is not always accurate. When they realised that the enemy was not returning, Knyphausen ordered the nails removed and he sent ammunition of the correct calibre.[915] After the Swedes fired the captured artillery for one hour, there was no Imperial unit left on that wing. The absence of Imperial forces here very likely means they were out of firing range. While it sounds as if there was not much resistance from the Imperial side, the battle still went on for at least another three hours, indicating that most details about the fighting around the Imperial battery after it was taken by the Swedes are not preserved. A third and fourth attack on the Imperial left wing are only mentioned by secondary sources and it seems likely that those printed accounts were just to fill in the gap of knowledge.[916]

Archaeological sources

It is very difficult to find out which small find derived from which attack. Generally, there are more bullets and denser concentrations on the Imperial right centre than on the left centre, suggesting that there were more Swedish attacks and/or more intense combat here. The archaeological finds seem to support Dalbier's account that the Imperial right centre fighting ended soon after the Swedes captured the Imperial guns.

The events

At some point in the afternoon it was probably Generalmajor Knyphausen who ordered the Swedish right wing to attack with an unknown force. It is likely that the White and Duke Wilhelm's Brigades were part of this attack because they were probably the only intact infantry units left in this area. Any other units were possibly ad hoc formations created from rallied soldiers. The attack was at least partially successful as the small Imperial battery was captured and its guns turned against Imperial forces.[917] This episode, in turn, forced Holk's exhausted left wing to retreat beyond firing range. There was certainly a lot

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914 Dalbier 1632, 252-253.
915 Chemnitz (1648, 466) reported this incident similar that Knyphausen's infantry took the guns and turned them.
916 *Relation from 1633* (Droysen 1880, 32), Watts 1633, 148, Abelinum 1646, 750, Chemnitz 1648, 467 and Gottfried 1633, 26, copied by Monro 1637, part II, 164-165.
917 Chemnitz 1648, 466.

of skirmishing until the evening, which was concealed by the smoke, but no serious action, which could have changed the battle’s outcome.

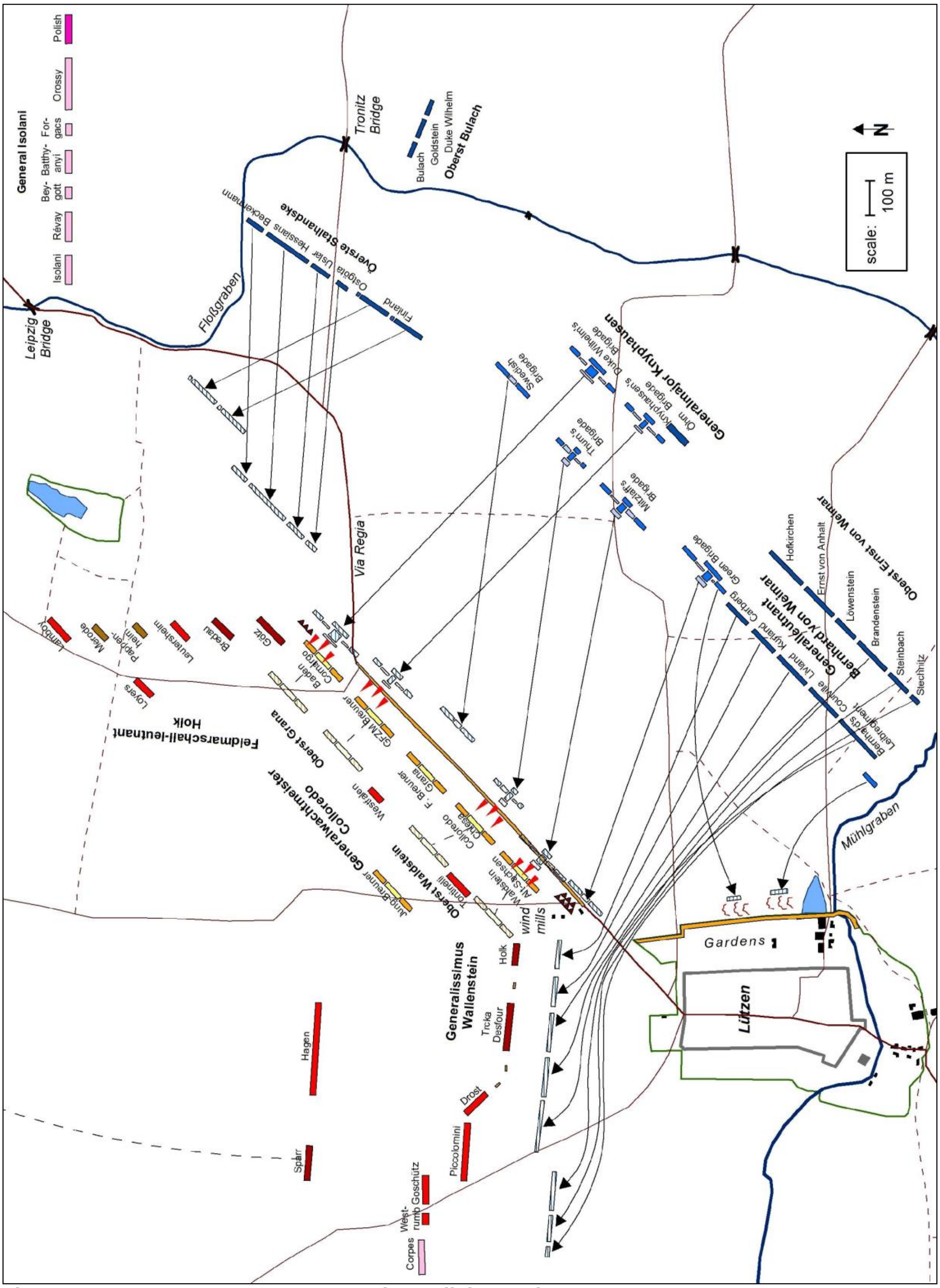
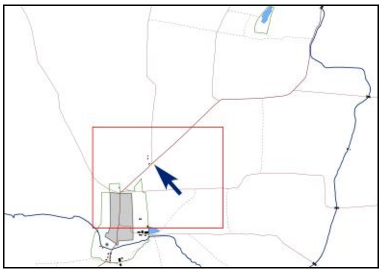
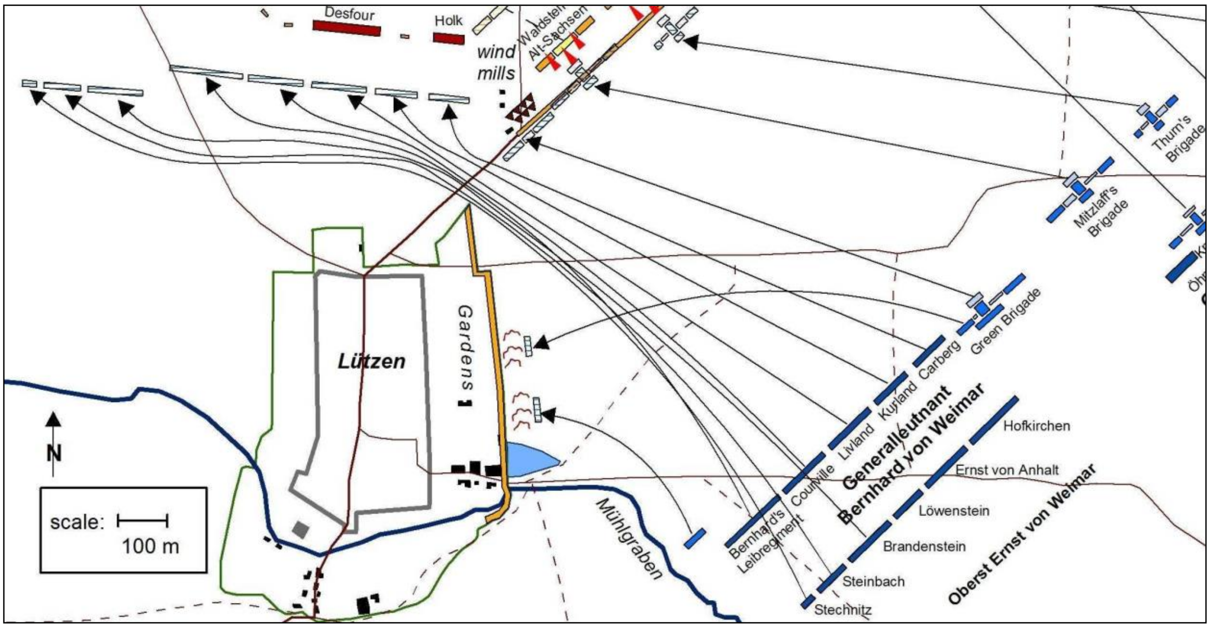


Figure 111: 2.00pm to 3.00pm: Second Swedish attack.

8.4.3 Second Swedish left wing attack 3.00-6.00pm





Historical sources

There is not much known about the afternoon's events at the windmills. There is, however, a strange agreement in those historical sources based on the *Relation II from Erfurt* about the arrival of Pappenheim's infantry in the late afternoon and their subsequent counterattack against the windmill battery.[918] While more reliable sources state that the infantry arrived after nightfall, too late for the battle,[919] the eyewitness Fleetwood[920] believed Bernhard von Weimar was attacked by Pappenheim's infantry in the late afternoon, incorrectly as Watts stated.[921] Those Imperial infantry squadrons were more

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[918] *Relation II from Erfurt* (Droysen 1880, 20), copied or retold by *Relation from 1633* (Droysen 1880, 31), *Declaration from 1633* (Droysen 1880, 42), Gottfried 1633, 26, Monro 1637, part II, 164, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Abelinum 1646, 750, Chemnitz 1648, 467, Khevenhiller 1726, 193.

[919] In particular Holk (Wittrock 1932, 309), Diodati (Fiedler 1864, 566) and Ottavio Piccolomini (Archivio 1871, 240). See also Burgus 1641, 326, *Spanish Relation* (Watts 1633, 163) and *Relation from 1632* (Droysen 1880, 10).

[920] Fleetwood 1632, 8.

[921] Watts 1633, 149.

likely rallied, ad hoc assemblies of fragmented units, possibly reinforced by newly arriving companies from nearby garrisons.[922]

According to Fleetwood, the Imperial counterattack broke down when a high-ranking officer, who he believed, incorrectly, was Merode, was killed.[923] Generalfeldzeugmeister Hans Philipp Breuner and Oberst Berthold von Waldstein, both subcommanders, were also fatally wounded near the windmills, which could have caused a panic among Imperial soldiers in that area.

Archaeological sources

As discussed above, the linear distribution of the new Swedish light musket (M2) shot inside the musket bullet concentration Inf12, including some severe or medium impacted bullets, derives from a second line brigade, probably Mitzlaff's, during an afternoon Swedish attack. This unit reached the Imperial second line and fought against an Imperial infantry unit, the Regiment Jung-Breuner, which is confirmed by a concentration of the South German m4 and M5 musket bullets in the same area. There is another small bullet concentration (Inf10) even further north, but without severe or medium impacted bullets, a clue to a medium range infantry fire fight. These concentrations suggest that at least one sizeable Swedish infantry unit achieved a breakthrough which got to the Imperial musketeer reserve squadron 500m north of the Via Regia.

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[922] Brzezinski 2001, 79.
[923] Fleetwood 1632, 8.

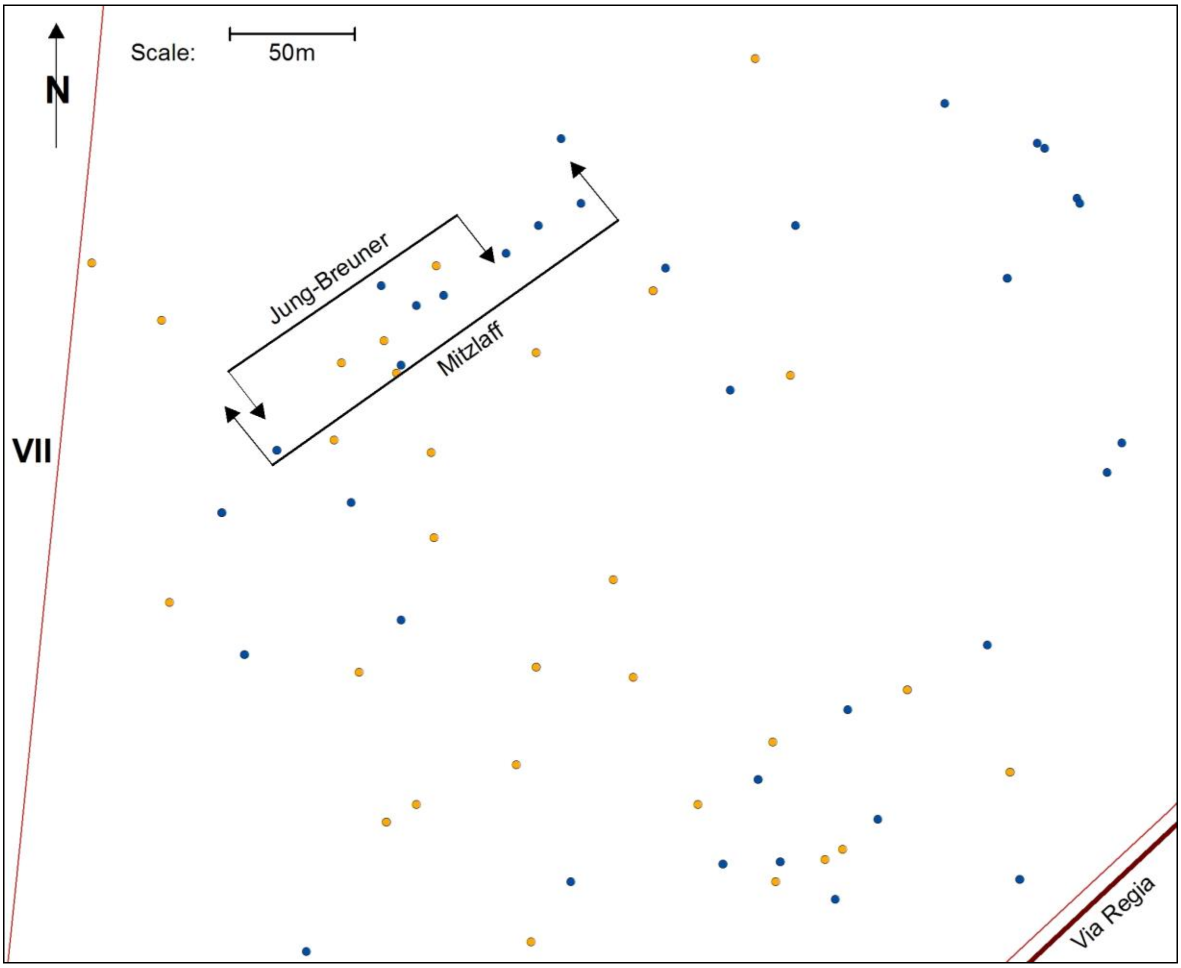

Figure 112: Detailed distribution of musket bullets from the German/Imperial 13 bore (m4) and 14 bore (M5) muskets with calibres of 17.3-17.8mm, and the Dutch 10 bore (M2, m3) muskets with calibres of 17.9-18.8mm or 30.25-32.50g, Imperial right centre second line.

The battlefield's densest concentration of artillery ammunition, consisting of nine shrapnel fragments from 3- to 24-pounders, was found 400m north of the windmill battery near the Imperial second line and along a minor road. It could be argued that these fragments came from the explosion of Imperial ammunition wagons shown on the Merian copperplate, in particular because they were found in close proximity to a road. However, the positioning of an ammunition supply train so close to a battle line seems unlikely. Another explanation could be that these shell fragments derive from artillery fired by the windmill battery, which was captured by the Swedes and turned against Imperial troops further to the rear.

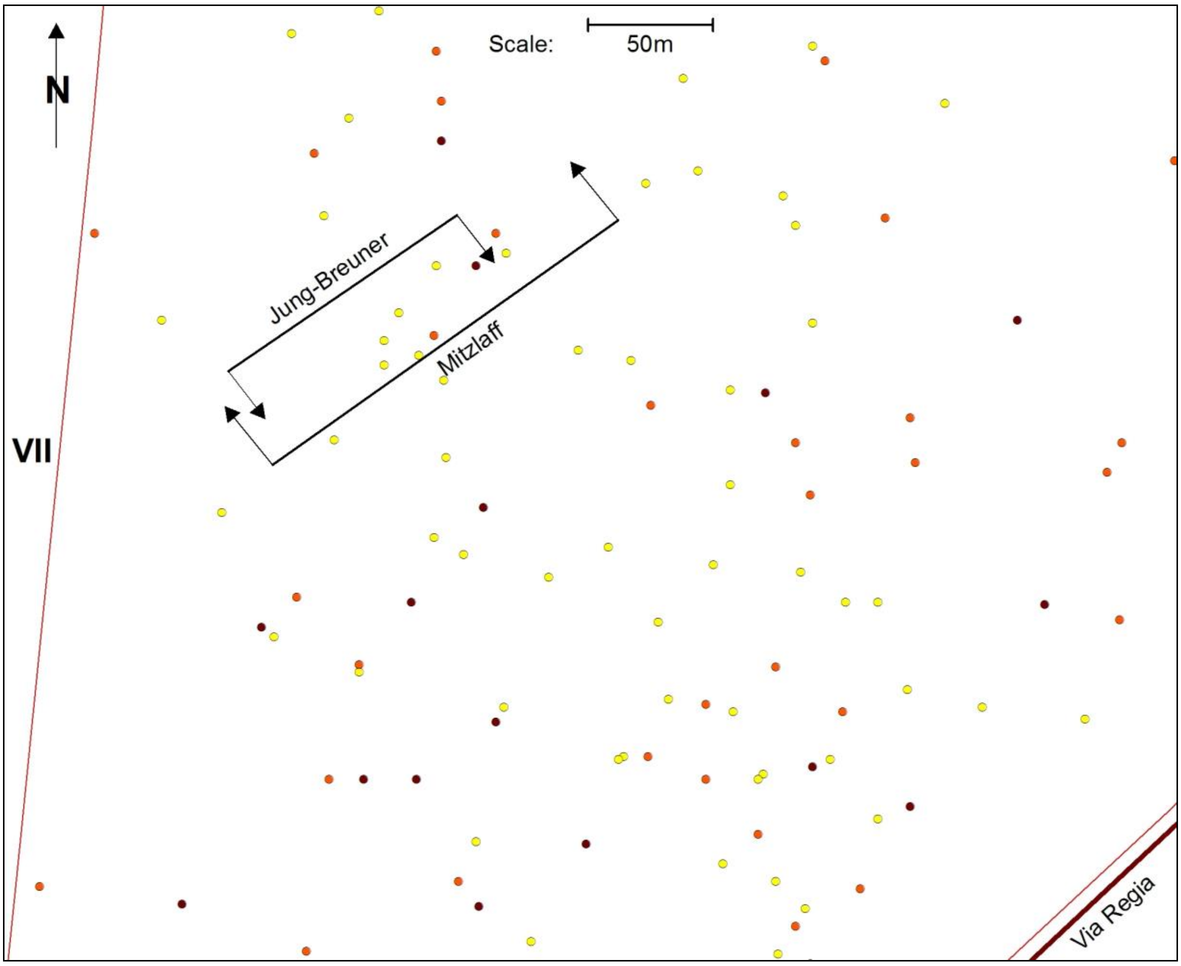

Figure 113: Detailed impacted musket bullet distribution map, Imperial right centre second line.

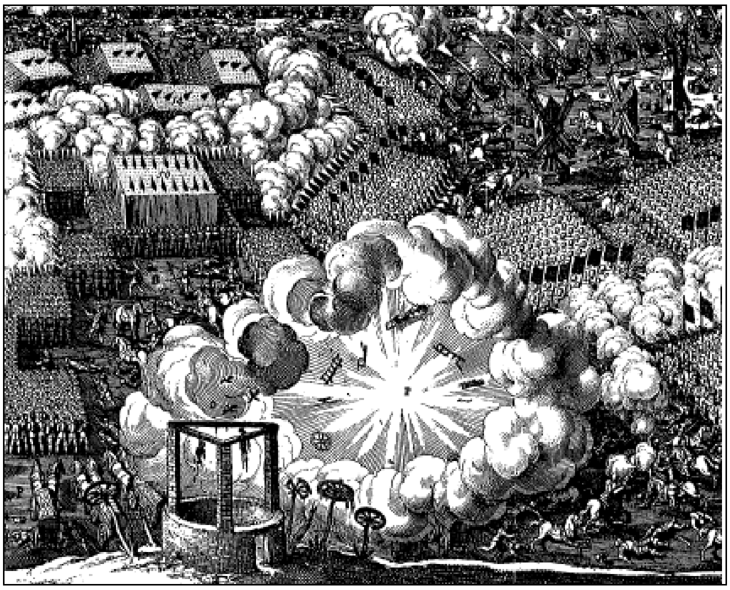

Figure 114: Explosion on the Merian copperplate.

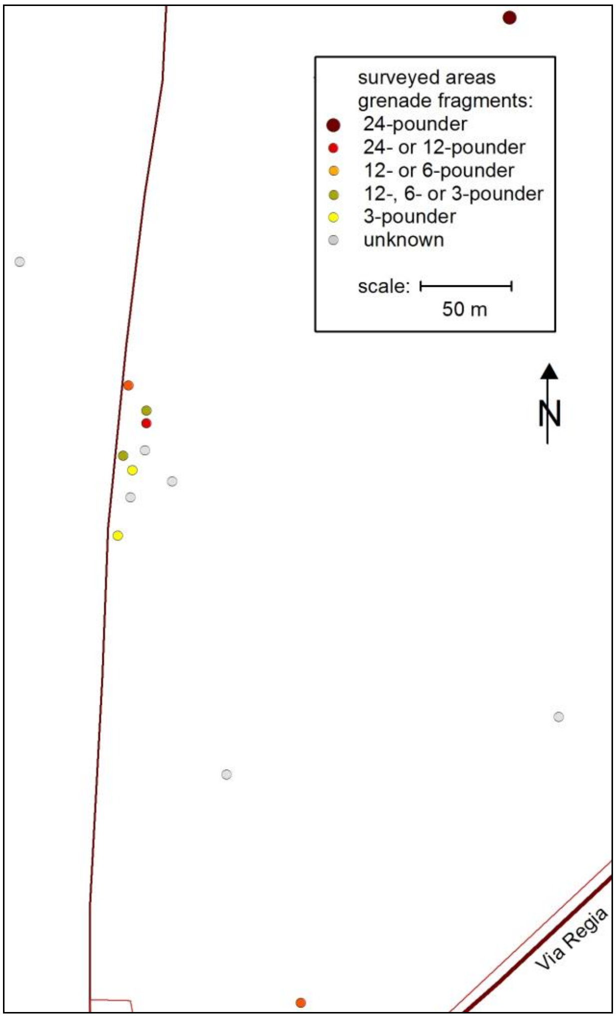

Figure 115: Details of spherical cast iron fragments distribution.

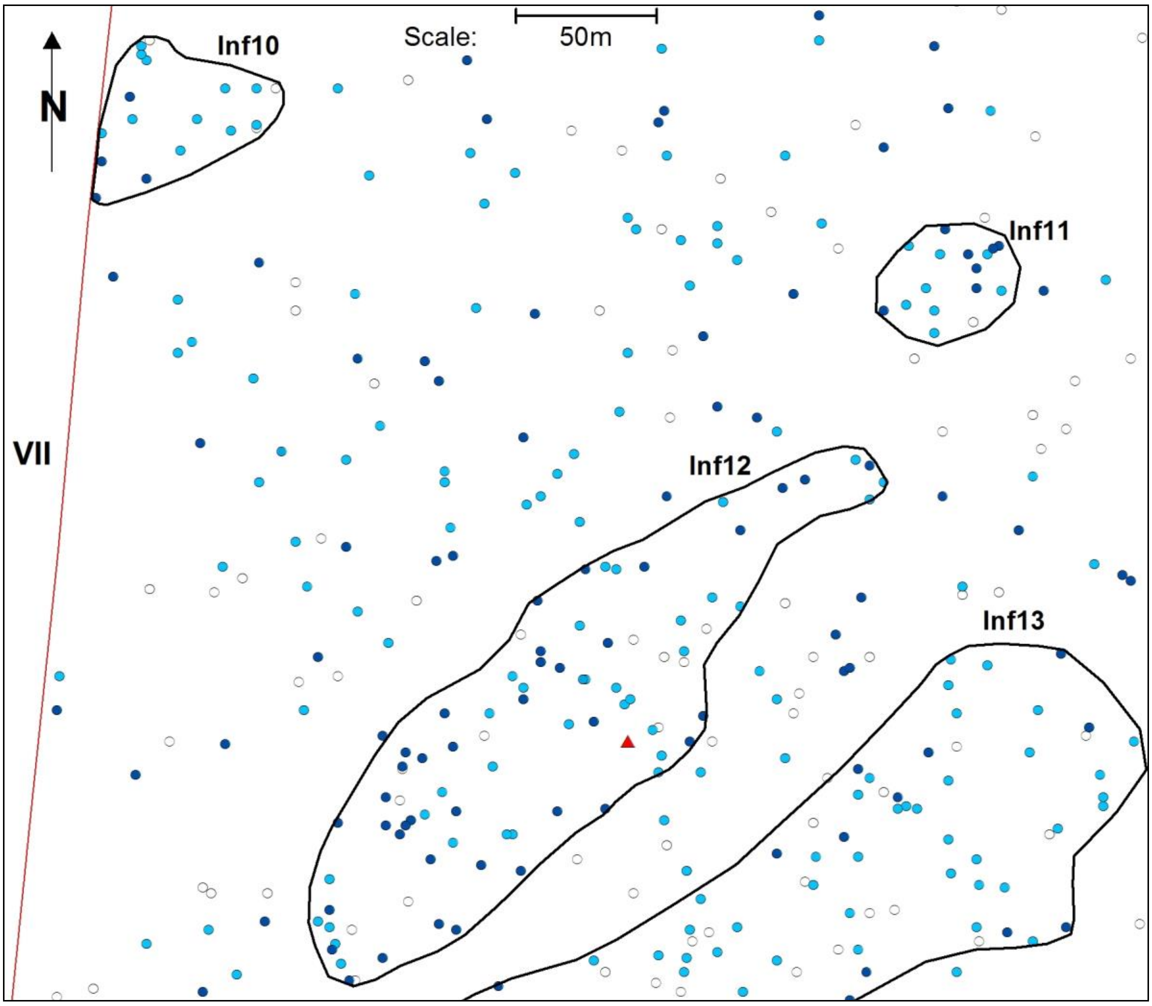

Figure 116: Detailed musket bullet distribution map, Imperial right centre second line.

The events

After rallying his troops about 3pm, Generalleutnant Bernhard von Weimar faced the same difficult situation as in the morning. He ordered Oberst Gersdorf with his detached musketeers to renew the attack against the Lützen gardens,[924] this time probably supported by additional forces, possibly including Leslie's Scots.[925] The rest of Bernhard von Weimar's task force is unknown, but very likely consisted of the second line and parts of the first line cavalry, the Green Brigade, and the leftmost two second line infantry brigades Mitzlaff and Thurn.

[924] Watts (1633, 149) reported that the Swedes finally cleared the gardens in the fourth attack.
[925] Monro (1637, part II, 164) stated incorrectly that Gersdorf's musketeers included Leslie's Scots. However, it might be possible that Monro misunderstood an eyewitness and they supported Gersdorf in the second attack.

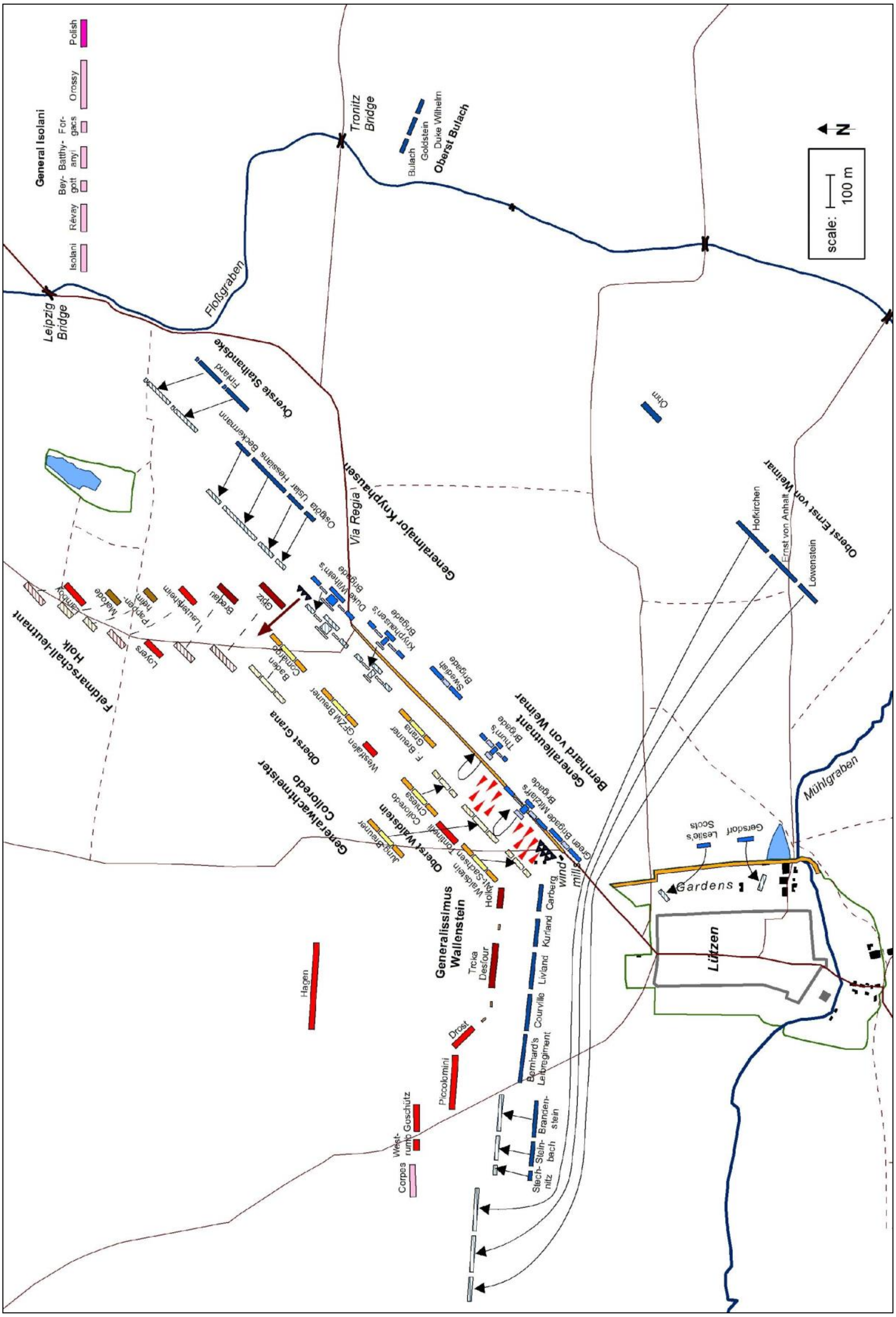

Figure 117: 3.00pm to 4.00pm: Second Imperial counterattack.

Wallenstein seems to have gathered his remaining forces on his right wing at the windmills. These consisted of three infantry squadrons, probably the leftmost squadrons Waldstein/Alt-Sachsen, Colloredo/Chiesa and Jung-Breuner, and some cavalry,[926] among them Piccolomini and probably the cuirassier squadrons Holk and Trcka/Desfour.[927]

At some point the Green Brigade managed to capture the windmill battery, now only 50 men strong according to Fleetwood,[928] and turned the guns on the Imperial troops.[929] Oberstleutnant Albrecht von Hofkirchen finally left the battlefield with Sparr's Regiment.[930] In the end, Wallenstein managed to gather his forces one last time and the rallied infantry units recaptured the windmill battery, during which Generalfeldzeugmeister Breuner or Oberst Berthold von Waldstein were mortally wounded which broke Imperial morale. It was reported that the Swedish Rittmeister Bodo von Bodenhausen managed to get close to the Generalissimus and shot at him, but he missed.[931] One Swedish brigade, probably Mitzlaff's, pursued the retreating Imperial infantry and engaged them in a last fire fight.

8.4.4 The battle's end and the arrival of Pappenheim's infantry 6.00-8.00pm

The battle ended with nightfall at 5pm when darkness made it impossible to fight on.[932] The fact that the battle ended at nightfall suggests that it was not over suddenly. Diodati gave a good, although not entirely honest, description of this process:

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[926] The *Relation II from Erfurt* (Droysen 1880, 20) noted that there were only three Imperial infantry regiments left at the windmills in the afternoon. According to Dalbier (1632, 252) there were two Imperial infantry squadrons and cavalry left at the windmills.

[927] Holk (Wittrock 1932, 309).

[928] Fleetwood 1632, 8. The low strength of the Green Brigade can not be explained with exceptional high losses, but is probably an argument for Leslie's Scots being involved in the afternoon's fight in the Lützen gardens.

[929] Fleetwood 1632, 8, Vitzthum/Berlepsch (Glafey 1749, 14), *Relation from 1632* (Droysen 1880, 8), *Relation from 1633* (Droysen 1880, 31), *Declaration from 1633* (Droysen 1880, 42), Gottfried 1633, 26, Monro 1637, part II, 164, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Abelinum 1646, 750 and Richelieu 1823, 261.

[930] Seidler 1954, 143.

[931] *Wahrhaftiger Bericht* (Diemar 1893, 340).

[932] Eyewitnesses and secondary sources agree on the battle's end. Eyewitnesses: Swedish HQ (Söltl 1842, 347), Vitzthum/Berlepsch (Glafey 1749, 14), Wallenstein (Lorenz 1987, 256), Silvio Piccolomini (Archivio 1871, 240), Poyntz 1908, 73. Secondary sources: Hallenus (Mankell 1860, 663), *Relation from 1632* (Droysen 1880, 9), *Relation II from Erfurt* (Droysen 1880, 20), *Relation from 1633* (Droysen 1880, 32), Gottfried 1633, 26, Monro 1637, part II, 165, *Wahrhaftige Beschreibung* 1633, *Glaubwürdiger Bericht* 1633, Burgus 1641, 326, Abelinum 1646, 751, Chemnitz 1648, 467 and Richelieu 1823, 261. An exact time is given by Fleetwood 1632, 8 and Watts 1633, 150 with 5pm; by Knyphausen (Studien 1844, 49) and Pentz

"Meanwhile the night was near, and the enemy's cavalry left the field in disorder, with the result that the foot had to follow, after that they started again with a heavy artillery fire, concentrated large masses of infantry, and they appeared to attack again, but these were the signs of retreat..."[933]

This illustrates the situation at the evening, when the battle ended with both sides separating under artillery fire after 6 hours of fighting, when "both Armies retreated the space of one half English mile."[934] According to reliable Imperial eyewitnesses, it was after both armies drew apart after or close to nightfall, when Pappenheim's infantry Regiments Gil de Haes, Goltz, Moriamez-Pallant, Pallant, Reinach and Würzburg, approximately 3,000 men commanded by Generalwachtmeister Heinrich Graf von Reinach,[935] arrived on the battlefield,[936] eager to fight.[937]

It was dark when Reinach sent the junior officer Augustin von Fritsch and a corporal to gather intelligence about the general situation. He reported after they had crawled near the windmills and feared to be caught by Swedish guards, at first believing to have seen the burning match cords of muskets:

"I saw, however, that they were only candles which the soldiers were holding as they looted the battlefield or visited the dead. From there I went over to see our big canon, but there was not a single soldier of ours or the enemy's at that place."[938]

Could Wallenstein have continued the battle the next day with Reinach's infantry and the opportunity to recapture the Imperial artillery?

Wallenstein's army had fought for 6 hours with many fewer reserves, which meant that his soldiers were engaged more often in combat than the Swedish soldiers, and were exhausted. Poyntz noted:

(Fiedler 1864, 571) with 6pm; by Dalbier 1632, 252 and Holk (Wittrock 1932, 309) with 7pm; and by Hülshorst (Wittrock 1932, 303) with 8pm, which seems to agree with a battle's end at "nightfall."

933 Fiedler 1864, 566.

934 Poyntz 1908, 73.

935 Officially Oberst Jean Graf Merode-Varoux was Pappenheim's second-in-command, but he was probably somewhere else (Brzezinski 2001, 26 and 81). However, Diodati (Fiedler 1864, 566) reported Merode in command of Pappenheim's infantry.

936 Holk (Wittrock 1932, 309), Diodati (Fiedler 1864, 566) and Silvio Piccolomini (Archivio 1871, 240), confirmed by the catholic secondary sources *Relation from 1632* (Droysen 1880, 10), *Spanish Relation* (Watts 1633, 163) and Burgus (1641, 326), clearly contradicts secondary sources of lesser reliability (section 8.4.3).

937 Holk (Wittrock 1932, 309).

938 Brzezinski 2001, 81.

"wee were scarcely laid downe on the ground to rest and in dead sleep but comes a comaund from the Generall to all Coronells and Sergeant Maiors to give in a Note how strong every Regiment was found to bee, but it seemes finding every Regiment very weake by the Officers Relation, wee had scarcely had one sleep for ourselves & our horses and as little victuals for both."[939]

In addition, Wallenstein could not anticipate whether or not Saxon regiments would arrive the next day to reinforce the Swedish army. Wallenstein's health was not the best and it seems possible that his will to fight was broken.

After counting his losses,[940] among them many fellow officers including his nephew Oberst Berthold von Waldstein and his brother-in-law Graf Harrach, and discussing the situation with his officers,[941] Wallenstein opted for retreat and started to make an orderly withdrawal from the battlefield between 8pm and 9pm.[942] He had to leave his heavy artillery pieces[943] with all their ammunition wagons[944] behind, because most of his draft animals had run away with his camp followers.[945]

Except the second line's reserve, Öhm's cavalry, all Swedish units had been fairly heavily engaged in combat.[946] The Swedish must have been exhausted too as they made no attempt to pursue the Imperial army or to seize the Imperial artillery that evening. According to Fritsch and Diodati,[947] they withdrew to their initial position before the battle, where they camped that night and next day.[948]

[939] Poyntz 1908, 73.
[940] Poyntz 1908, 73.
[941] Holk (Wittrock 1932, 309).
[942] Two hours after nightfall according to Diodati (Fiedler 1864, 566), three hours according to the *Spanish Relation* (Watts 1633, 163), 9pm according to the *Relation II from Erfurt* (Droysen 1880, 20).
[943] There is a conflict in secondary sources about the captured Imperial artillery, made up by the *Relation II from Erfurt* (Droysen 1880, 20), stating that the Imperial army burned their camp and left three pieces behind. This is changed in *Relation from 1633* (Droysen 1880, 32) into "the Imperial army took three pieces with them," which was embellished by the *Declaration from 1633* (Droysen 1880, 42) into "the Imperial army took three 24-pounders with them," which was changed again by Gottfried (1633, 26) into "the Imperials burned their camp and took three pieces with them." The *Wahrhaftige Beschreibung* 1633 and *Glaubwürdiger Bericht* 1633 copied the *Declaration from 1633* and Abelinum (1646, 749) used the *Relation II from Erfurt* but changed the number of pieces to two. Watts (1633, 151) misunderstood the story completely and noted that the Swedes burned seven pieces, while Monro (1637, part II, 165) claimed that the Imperials burned three pieces and took the rest with them. There is no proof from any eyewitness reporting a similar story, which was very likely made up in the first place.
[944] Dalbier 1632, 252, Fleetwood 1632, 9, Vitzthum/Berlepsch (Glafey 1749, 14) – most ammunition, Hülshorst (Wittrock 1932, 303), Pentz (Fiedler 1864, 571), *Relation from 1633* (Droysen 1880, 32).
[945] Diodati (Fiedler 1864, 566), Poyntz 1908, 73. Holk (Wittrock 1932, 309) noted that they had no horses for towing the artillery.
[946] Brzezinski 2001, 83.
[947] Brzezinski 2001, 81, Fiedler 1864, 566.
[948] Dalbier 1632, 252.

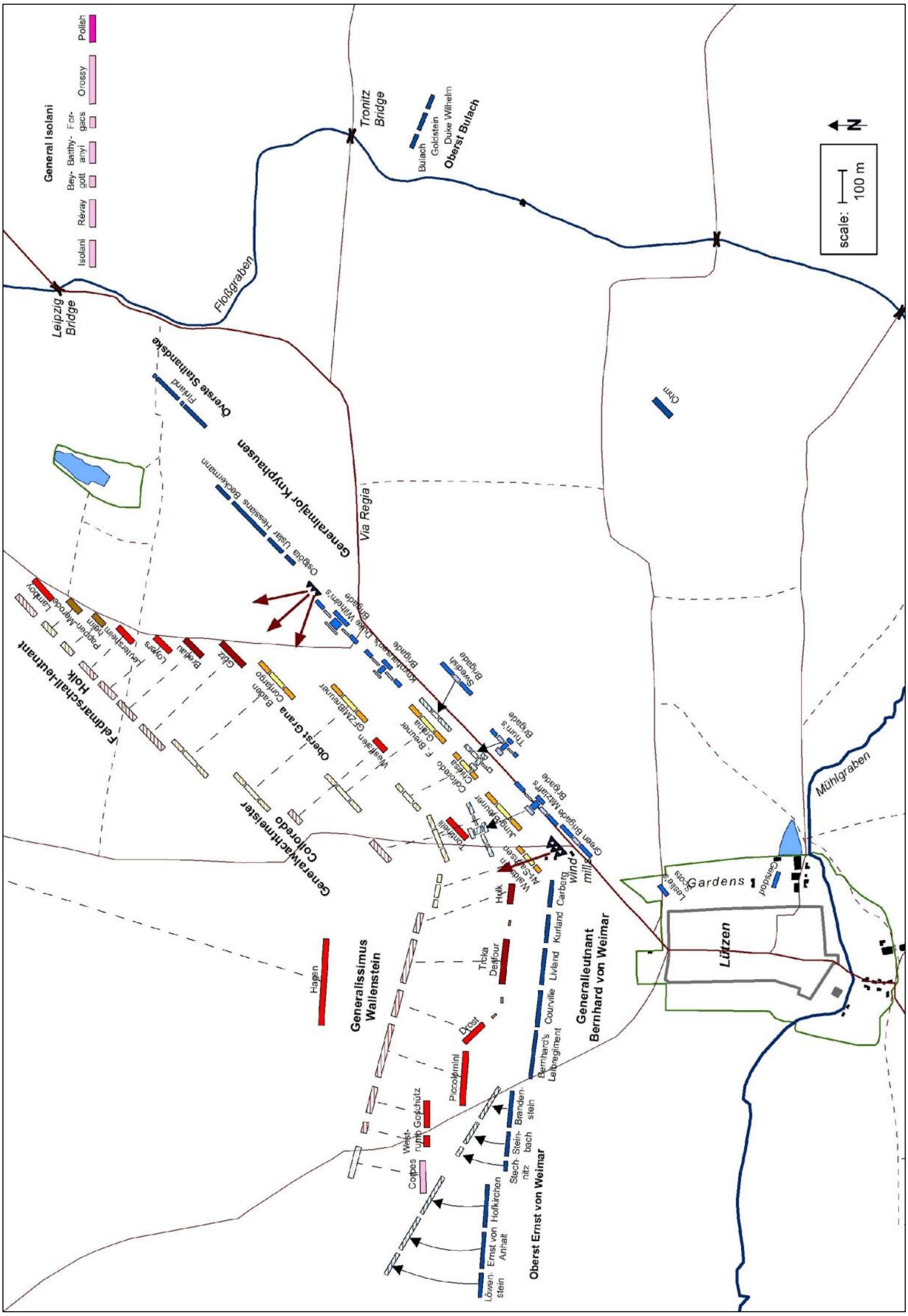

Figure 118: 4.00pm to 5.00pm: Last operations before dusk.

Chapter Nine

Aftermath

9.1 Skirmishes, casualties and mass grave

Soon after the battle both sides began to claim victory based on the casualties, number of captured colours and the claim of holding the battlefield. A second battle for the sovereignty of interpretation started. Attempts from the Imperial side to make people believe the Swedes left the battlefield at first failed.[949] The Swedes had the captured Imperial guns to show and that settled the question of who could claim the battlefield. However, Corpes' Croats remained three or four days as rearguard, harassing the Swedish clearing of the battlefield and they almost recaptured some Imperial artillery on its way to Naumburg.[950]

According to Diodati, the Imperial army captured 60 colours, of which 36 from the Old Blue and Yellow Regiments were left on the field because they were mere poles, although both units together had only 32 companies.[951] Münchhausen reported that his regiment and that of Baden alone took fourteen colours from the New Blue and Yellow Regiments.[952] These numbers correspond with Wallenstein's note that they captured 30 colours, while he lost only five or six cornets (cavalry colours),[953] four according to Diodati.[954]

Later, the 'relations' *Glaubwürdiger Bericht* and *Declaration from 1633* claimed that the Swedes captured 28 cornets and 50 colours.[955] There is no confirmation of these numbers from any eyewitness and they were certainly not taken by the Swedes during battle, but in mopping-up operations after battle, as Brzezinski believed, or they are simply an invention.[956]

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[949] Diodati (Fiedler 1864, 566).
[950] Diodati (Fiedler 1864, 566), Holk (Wittrock 1932, 309), *Relation from 1632* (Droysen 1880, 10).
[951] Diodati (Fiedler 1864, 567), Silvio Piccolomini (Archivio 1871, 240).
[952] Münchhausen 1632. In his earlier letter he claimed to have taken fifteen colours from unknown infantry regiments (Wittrock 1932, 305).
[953] Droysen 1880, 2. Similar numbers are given by three anonymous letters and *Relation from 1632* (Droysen 1880, 2-3, 9).
[954] Fiedler 1864, 567.
[955] Droysen 1880, 43.
[956] Brzezinski 2001, 87.

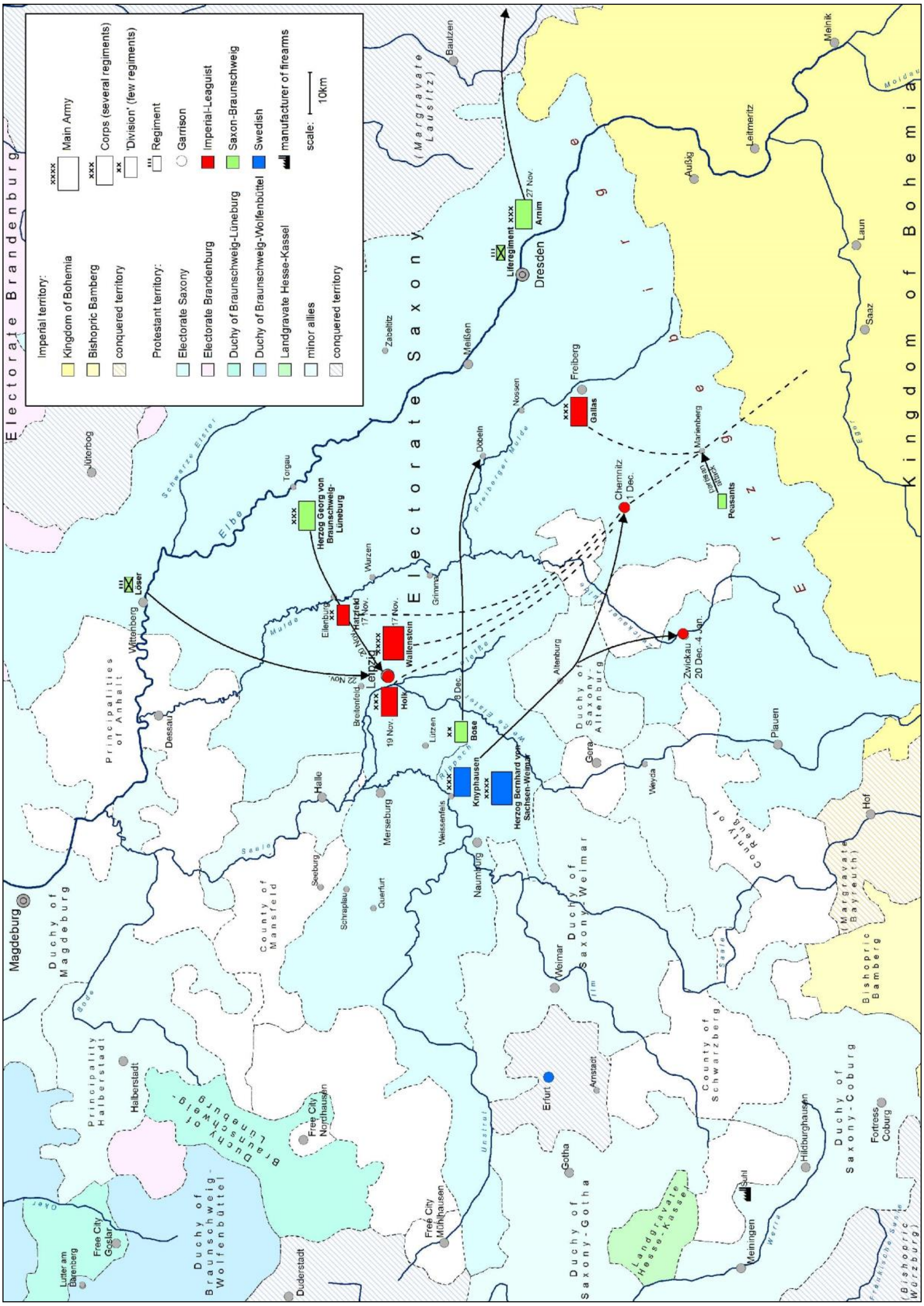

Figure 119: Wallenstein’s retreat to Bohemia 17 November to 4 January.

	Oberst, Oberstleutnant, Major, Quartiermeister	Hauptmann	Leutnant	Fähnrich	NCO	soldier
Swedish Brigade	3	5	5	4	20	374
Yellow Brigade						
Yellow Life Regiment	1	5	3	3	0	258
Lifeguard	0	0	1	8	9	15
Blue Brigade	0	5	5	4	18	381
Green Brigade						
Bernhard's Green Life Regiment	1	3	1	3	5	96
Wildenstein's Black	1	2	3	1	7	80
Leslie's Scotts	0	0	3	2	7	47
Duke Wilhelm's Brigade						
Wilhelm's Life Regiment	0	2	4	0	7	23
Bose/Pforte	0	0	0	0	3	38
White Brigade	0	3	1	3	5	96
Thurn's Brigade						
Thurn	2	1	0	1	3	3
Isenburg	1	0	0	0	4	10
Wilhelm von Hessen-Kassel	0	0	1	0	2	20
Mitzlaff's Brigade						
Gersdorf	1	1	2	0	12	90
Mitzlaff	1	0	1	1	12	122
Rossow	1	0	1	4	4	45
9th Brigade						
Henderson	0	1	1	1	4	47
Löwenstein	0	1	0	0	4	183

Table 24: Swedish casualty listing of wounded infantrymen.

Few historians have discussed the disproportion of numbers of captured colours or even wondered why. Most colours were taken from the Old Blue and Yellow Regiments when they were destroyed. But the other 30 colours, which were taken by the Imperial army, show that the Swedish army in general did not perform well. Many colours might have been taken during the collapse and rout of the Swedish army around midday by pursuing Imperial cavalry, but the exact circumstances remain uncertain.

	musketeers	pikemen	officers	total	musketeers	pikemen	total
Swedish Brigade	*832*	*42*	*212*	*1086*	*22.1%*	*84.3%*	*31.0%*
Erik Hand	330	42	96	468	29.0%	84.3%	43.5%
Karl Hard	350	0	96	446	21.7%		17.9%
Klas Hastfer	152	0	20	172	2.6%		15.7%
Yellow Brigade	*167 (+40)a*	*82 (+25)a*	*96*	*420*	*68.4%*	*70.4%*	*65.6%*
Blue Brigade	*279*	*52*	*96*	*427*	*42.6%*	*88.0%*	*61.5%*
Winckel's Old Blue	279	52	96	427	42.6%	88.0%	61.5%
Green Brigade	*692 (+79)b*	*200 (+41)b*	*192b*	*1204b*	*37.0%*	*28.3%*	*40.9%*
Bernhard's Green Life Regiment	344 (+44)b	137 (+22)b	96b	643b			
Wildenstein's Black	348 (+35)b	63 (+19)b	96b	561b			
Leslie's Scots	b	b	b	b			
Duke Wilhelm's Brigade							
Wilhelm's Life Regiment	108	60	96	264	60.9%	23.1%	46.8%
Bose	504	120	96	720	6.7%	23.1%	9.1%
Pforte	314c	86c	48c	448c			
White Brigade	*534*	*235*	*96*	*865*	*24.6%*	*13.0%*	*22.8%*
Knyphausen's White	534	235	96	865	24.6%	13.0%	22.8%
Thurn's Brigade	*498*	*234*	*168*	*900*	*13.5%*	*31.6%*	*28.1%*
Thurn	210	126	96	432	12.5%	12.5%	10.0%
Isenburg	96	36	24	156	20.0%	33.3%	42.2%
Wilhelm von Hessen-Kassel	192	72	48	312	11.1%	50.0%	37.8%
Mitzlaff's Brigade	*648*	*282*	*240*	*1170*	*37.6%*	*39.0%*	*36.2%*
Gersdorf	240	48	48	336	27.3%	50.0%	35.6%
Mitzlaff	192	90	96	378	43.9%	54.5%	44.6%
Rossow	216	144	96	456	41.0%	14.3%	27.6%
9th Brigade	*600d*	*0*	*144d*	*744d*	*38.7%*		*35.8%*
Henderson	d	0	d	d			
Löwenstein	480d	0	96d	576d			
Brandenstein	120d	0	48d	168d			

a Number of unarmed soldiers in parenthesis; suggested distribution of 2:1 to musketeers/pikemen.

b As a; the numbers suggest that Leslie’s Scots were included into Bernhard’s and Wildenstein’s Regiments.

c The numbers suggest that parts from Pforte’s Regiment were detached somewhere else at Lützen, but were reunited when this list was made.

d The numbers suggest that Henderson’s Regiment was included into Löwenstein’s and Brandenstein’s Regiments.

Table 25: Undated list of Swedish infantrymen with losses in percent (Stockholm 1632).

9.1.1 Casualties

Generally, the casualties in Lützen are difficult to estimate because only wounded were counted on both sides, probably because they had to be cared for by the army and cost money. In fact, there are no entirely reliable numbers for dead soldiers. Not surprisingly, the number of killed was exaggerated, in particular those from the enemy, and constantly increased in accounts and 'relations' in a kind of race for the highest number until it reached a fantastic 18,000 dead according to the *French Relation from 1633*. A good example of how these casualties were estimated is an anonymous and undated letter, which noted that Oberst Illow wrote, that Holk told him there were 12,000 dead; but Holk himself estimated only 8,000 dead.[957] It seems that the numbers were constantly rounded up a bit in most accounts. However, casualties of 25% or more are not only suspicious, but also very difficult to achieve as long as the opponent fights back and usually apply to situations where one side breaks and the other sets out in pursuit of the other with cavalry.[958]

	Oberst, Oberstleutnant, Obristwachtmeister; Quartiermeister	Rittmeister	Kapitänleutnant, Leutnant	Cornet	NCOs	cavalrymen
Desfour	1	0	2	2	4	52
Holk	0	1	1	1	5	66
Trcka	0	0	0	2	8	58
Götz	1	0	1	0	7	58
Bredau	1	1	0	1	4	7
Loyers	1	0	0	0	3	34
Goschütz	0	0	1	0	0	20

Table 26: Imperial "list of damaged" with wounded cavalrymen.

Another problematic issue might be the definition of battle casualties. Watts noted that many wounded were frozen to death during the night on the battlefield,[959] and the *Declaration from 1633* stated that only 4,000, the lowest estimated number in any account, were killed directly during battle, but many wounded died over a period of several days and many scattered and lost Imperial soldiers were killed by angry Saxon peasants seeking revenge.[960] All these soldiers died as a result of the battle, but not during the battle itself. However, these second-hand stories are not confirmed by any eyewitnesses.

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957 Droysen 1880, 4, Wittrock 1932, 309.

958 Casualties of 9,000 or higher: Hülshorst (Wittrock 1932, 309), anonymous letter (Droysen 1880, 2), *Wahrhaftige Beschreibung* 1633, Abelinum 1646, 751, Khevenhiller 1726, 197. The number of 9,000 killed has been suggested by Seidler (1954, 95) and has influenced research, but is only a figurative number and too high: Mann 1971, 861, Neuhold 2011, 101.

959 Watts 1633, 152.

960 Droysen 1880, 43. The number of 4,000 killed was copied by *Glaubwürdiger Bericht* 1633. Peasants killing Imperial soldiers on their retreat are mentioned by the *Declaration from 1633* and a letter from

Killed	Regiment	Sources
Generalfeldzeugmeister Breuner (w)	GFZM Breuner	H, D, B
Oberst Waldstein (w)	Waldstein	H, D, B1, F, Hü
Oberst Comargo (w)	Comargo	H, D1, P, B
Oberst Lohe	Lohe	M, H, D1, B
Oberst Westrumb	Westrumb	M, B
Oberstleutnant Mendj	(u)	M
Oberstleutnant Stolper	Baden	M, B
Oberstleutnant Dauignj/Tauigni (p)	Lamboy	M, D1, B
Oberstleutnant Ehinhaussen (w)	(u)	M
Oberstleutnant Falkenberg	Götz	D1, B
Oberstleutnant (u)	Desfour	D1, B
Oberstleutnant (u)	Comargo	B
Wounded		
Oberst Lamboy	Lamboy	D1, B1
Oberst Colloredo	Colloredo	P, B
Oberst Piccolomini	Piccolomini	B1
Oberst H.G. Breuner	Jung-Breuner	B1
Oberstleutnant (u)	Waldstein	D1, B1
Oberstleutnant Hämmerle	Alt-Sachsen	D1, B1
Oberstleutnant (u)	Jung-Breuner	D1, B1
Oberstleutnant (u)	Friedrich Breuner	B1
Oberstleutnant (u)	Forgatsch	D1, B1
Oberstleutnant Tontinelli	Tontinelli	B1
Oberstleutnant von Rauchhaupt	Trcka	B1
Oberstleutnant Osterhold	(u)	B1

(w) fatally wounded
(p) prisoner
(u) name unknown
M: Münchhausen (Wittrock 1932, 305)
F: Fleetwood (1632, 10)
Hü: Hülshorst (Wittrock 1932, 303)
H: Holk (Wittrock 1932, 309)
D: Diodati (Fiedler 1864, 565), D1 (567)
P: Silvio Piccolomini (Archivio, 241)
B: *Relation from 1632* (Droysen 1880, 11), B1 (12)

Table 27: Imperial officer casualties.

Shortly after the battle, the Swedish army at Naumburg had an effective strength of approximately 8,000 foot, including Vitzthum's 850 men strong garrison, and 4,000 horse.[961] The undated casualty listing states that 2,575 infantrymen[962] were wounded; this would leave approximately 3,300 foot killed or unaccounted for and 2,000 horse killed, wounded or unaccounted for. Some deserters might have turned up later and many soldiers probably recovered from their wounds, but the Swedish army had temporarily lost 7,875 men or 40%.[963] How many actually died is difficult to tell. Only one Protestant eyewitness, George Fleetwood, mentioned a number killed, which he estimated 1,500, which seems far

Wallenstein to Arnim (Sennewald 2013, 180), and was common practice during the Thirty Years War. This 'other war' between soldiers and peasants is discussed by Langer (1982, 106-111).

[961] Pentz (Fiedler 1864, 572). The number of foot is confirmed by other sources - 7,046 soldiers (Brzezinski 2001, 87) with an unknown number of officers and Vitzthum's 850 strong Brigade.

[962] Mankell 1861, 126-128.

[963] Only Deuticke (1917, 53-55) doubted these numbers, because he assumed these men were all dead or badly wounded. See Seidler 1954, 43 and Brzezinski 2001, 21-23.

too low considering that the Swedish army was the attacker in a 6 hours battle.[964] The number of killed is usually not higher than the number of wounded so that the upper limit of killed is less than 3,900 with the most likely number at around 3,000 to 3,500.[965] Among them were Gustav Adolf, Generalmajor Brahe, Oberst Stenbock, Oberst Gersdorf and Oberstleutnant Nilsson.[966]

The undated list of Swedish infantrymen[967] shows the distribution of losses according to regiments. The casualties of pikemen and musketeers in any single regiment are similar, except for two units. The pikemen of the Old Blue Brigade lost 88.0% while the musketeers suffered 42.6% casualties. With 84.3% pikemen and 22.1% musketeers, the ratio is even more evident in the Swedish Brigade. The Swedish pikemen probably have sacrificed themselves to guard the retreat of their comrades.

The Imperial casualties are more difficult to estimate, because Wallenstein left many wounded behind, on the battlefield and in Leipzig, and there are almost no reliable numbers for the Imperial army after the battle. The "list of damaged" provides an exact number of wounded, 343 in total, for seven cavalry regiments, but since we do not have exact numbers of their original strength it is difficult to estimate a casualty rate.[968] Some cuirassier regiments seem to have taken heavy casualties; Holk had 74 wounded out of approximately 250, which is 30%; the total casualty rate might be 50 % for that regiment. The most reliable sources for the Imperial casualties are Diodati, who suggests that the Imperial army might have lost 3,000 dead or wounded, and Holk, who estimated 3,000 dead.[969]

Considering that the Swedes were the attacker and that two Swedish brigades were destroyed, it seems more likely that the Swedish army suffered the worst damage, but there is no proof yet and Imperial casualties might have increased substantially during the retreat due to deserters, lost soldiers killed by peasants and because Wallenstein had to leave most wounded behind.[970] The Imperial army clearly had a much higher rate of higher ranking officer casualties; Feldmarschall Pappenheim, Generalfeldzeugmeister Breuner, four

[964] Fleetwood 1632, 9.
[965] Brzezinski 2001, 87-88. Watts (1633, 153) estimated 2,000 to 3,000 dead Protestants.
[966] According to Eberstein (Diemar 1893, 348), Hülshorst (Wittrock 1932, 303), Pentz (Fiedler 1864, 571), Monro 1637, part II, 165, Watts 1633, 154, *Relation from 1633* (Droysen 1880, 34), *Declaration from 1633* (Droysen 1880, 44).
[967] Stockholm 1632.
[968] Hallwich 1912a, 596-599.
[969] Fiedler 1864, 567, Wittrock 1932, 309.
[970] Brzezinski 2001, 87-88.

colonels and six lieutenant colonels were killed and the Generalissimus Wallenstein, four colonels and eight lieutenant colonels were wounded. This circumstance might be seen as evidence for an extensive use of sharpshooters in the Swedish army, or for the excellent behaviour of those Imperial officers who did not flee the field, or for both.

It was an odd coincident that Gustav Adolf's former Chaplain Paul Stockmann was vicar in Lützen. He had not seen the battle itself - he was probably imprisoned in the castle or church together with the townsfolk during the battle - but he visited the battlefield the following days and described what he saw in one of his sermons:

"…so dead, that some missed an arm, the other a leg, the third his head and so forth; some lay there sky blue coloured, broken and crushed by bullet [i.e. roundshot] … Others lay, ten, twenty, or more on a pile, so shot with pieces into pieces, or broken in two that everyone could see the wounded lung, liver, hart and intestines without 'anatomy' …"[971]

9.1.2 The mass grave

An Imperial garrison in the castle of Lützen was still present for a few days after both armies left the battlefield,[972] food supply was low and the town was partially burned down.[973] So, the townsfolk were not in the condition to clear the battlefield and it took some days before a group of 200 civilians from Weissenfels arrived to bury the dead in mass graves.[974] One of these mass graves was found in 2011.

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[971] Stockmann 1633, Stöwesand 1927, 90.
[972] Stahl 2012, 258.
[973] Lützen was not entirely destroyed (Stahl 2012, 259), as often claimed (Brzezinski 2001, 51, Seidler 1954, 47).
[974] Stahl 2012, 258-259.

Plate 24: Geological drilling with a Cobra by Gerd Virkus.

In order to find a mass grave, aerial photographs were made. In addition, an area of 0.6ha was surveyed with Ground Penetrating Radar (SIR 3000 and a 400MHz antenna), and 7.9ha was surveyed by geomagnetic (Fluxgate-Gradiometer Förster Ferex 4.032) by the company Posselt & Zickgraf Prospektionen GbR. The most promising anomalies from the geomagnetic survey were subject to geological drilling to establish if there were any archaeological features. The entire search operation was a failure. The search for the mass grave was resumed by the methodology of information gathering, deduction and trial and error. The available information was:

1. One mass grave had been found in 1891 near the Via Regia (Chapter Four).
2. A document stated that the dead were carried to 'the road' during the battlefield clearing process.
3. The area where the heaviest fighting took place was established through the bullet distribution patterns.

The author draw a line on a map through the known mass grave, parallel to the Via Regia, and through the area with the densest distribution of heavily impacted bullets. On this line a 340m long and 4m wide trial trench was dug with a 20tons excavator by which a mass grave was found.

Plate 25: Trial trench in 10cm layers, each surveyed with metal detectors.

An interesting fact is that the mass grave was in the area of the geomagnetic survey and even another geomagnetic survey, made directly on the mass grave after the top soil was removed, was inconclusive.

Figure 120: Geomagnetic survey; Ground Penetrating Radar (red); actual position of mass grave (blue).
(image has been removed due to copyright restrictions)

The entire mass grave, weighing 52tons, was lifted in two blocks and moved to the Archaeological Museum in Halle, where it is prepared for an exhibition.

Plate 26: The mass grave is sheathed in wooden planks…
(image has been removed due to copyright restrictions)

Plate 27: …and reinforced by steel girders.
(image has been removed due to copyright restrictions)

Plate 28: The mass grave is undercut and then supported with steel tubes…
(image has been removed due to copyright restrictions)

Plate 29: …cut in half with a diamond-reinforced band saw and the cut is secured by steel plates, before it is lifted and moved to the museum.
(image has been removed due to copyright restrictions)

The mass grave is located near the Via Regia in an area where the Old Blue Brigade presumably fought.[975] It contained 47 individuals. Several bones show multiple fractures from blunt force trauma, stab and cutting wounds inflicted in hand-to-hand combat. Seventeen bullets were found in the grave of which seven were in a bone or found inside a skull and therefore 'belonged' to the deceased. Most bullets were too deformed from impact or too corroded to establish their exact calibre. Only three bullets probably came from muskets; all others seem to originate from carbines or possibly pistols. These observations concur with events surrounding the Old Blue Brigade, which was destroyed by an Imperial infantry-cavalry counterattack. However, in the Alerheim mass grave from 1645 almost all bullets derive from pistols or carbines, too.[976] That might be coincidental, but might be due to a reason unknown to us, such as cavalry using less gunpowder in their pistols and carbines so these bullets therefore tended to remain in the body they struck.

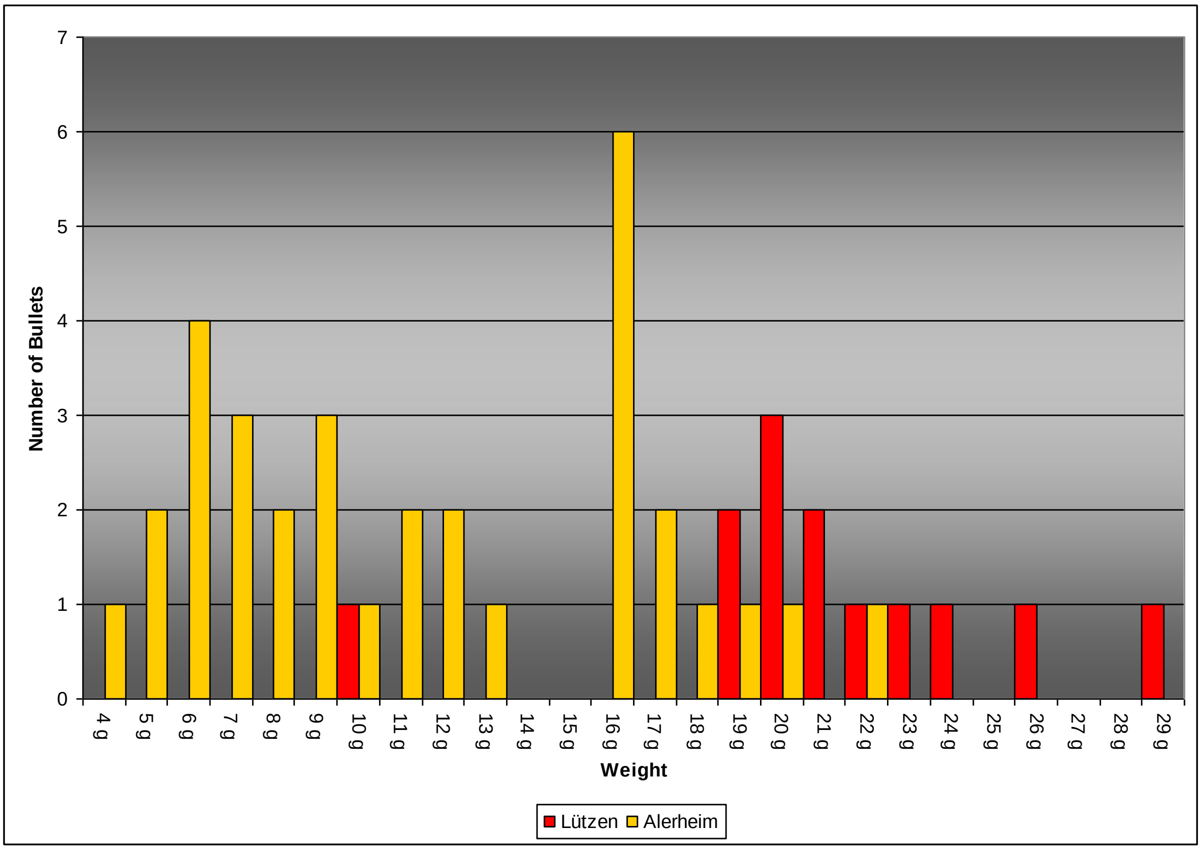

Figure 121: Bullets from the Lützen and Alerheim mass graves by weight.

[975] Alt/Friederich/Meller/Nicklisch/Schürger 2013, 13.
[976] Misterek 2012, 373.

9.1.3 Who won?

Golo Mann once wrote that there is no point in arguing who won the battle because both armies consumed each other.[977] It was certainly not a Swedish victory even if the Swedes held the battlefield while the Imperial army retreated. The Swedes did achieve their objective of forcing Wallenstein out of Saxony, thus aiding their ally, which might be seen as a tactical victory. They gained the spoils of war, all Imperial heavy artillery, parts of the baggage train and many weapons. This victory even had a long term effect because Wallenstein could not pay his army by looting enemy territory, Saxony, but was forced to ask Ferdinand II for money. In addition, Wallenstein was more concerned about punishing the deserters at Prague. All that might have convinced Ferdinand II to get rid of his Generalissimus. Wallenstein was murdered 25 February 1634 in Eger.

Figure 122: Pamphlet after the battle "Der Schwede lebet noch."

However, all these advantages could not out weight the death of Gustav Adolf. Even if he was not the brilliant strategist as often claimed, he was a charismatic figure and a living legend and he held the Protestant alliance together. Even after his death he was used as uniting figure. "Der Schwede [i.e. Gustav Adolf] lebet noch und wird auch ewig

[977] Mann 1971, 860, Brzezinski 2001, 88.

leben (The Swede still lives and he will live forever)" claimed a pamphlet in 1633.[978] Nevertheless, the alliance crumbled and Sweden's most important ally, Saxony, along with many other Protestant cities, defected or declared peace with Ferdinand II in the treaty of Prague 30 May 1635. Englund argued that Lützen was a decisive Swedish defeat in the long run.[979]

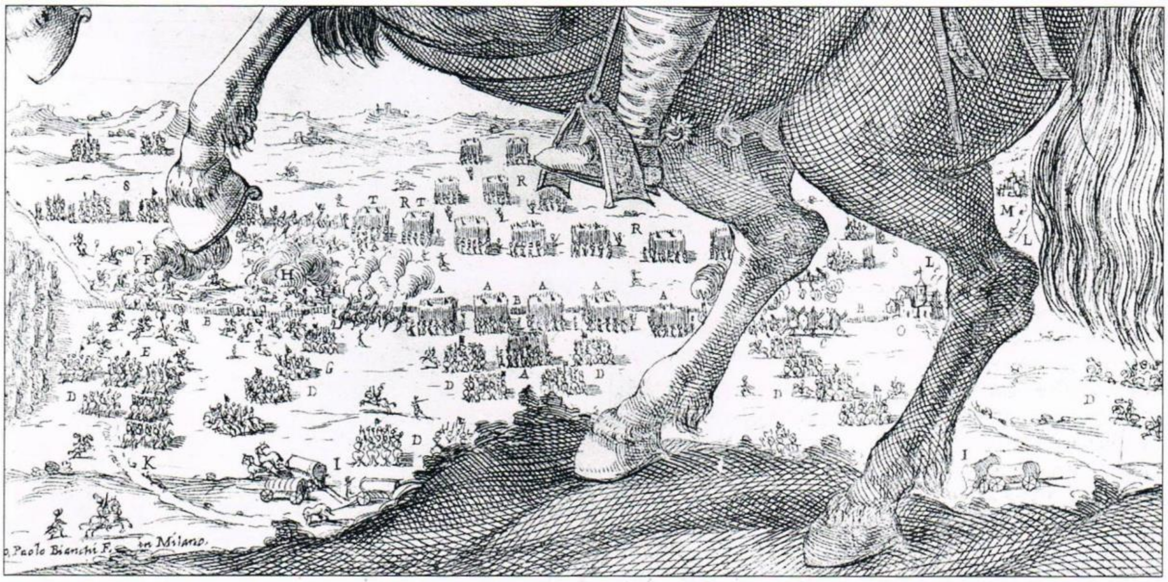

Figure 123: Detail of equestrian portrait of Gustav Adolf by Bianchi.

9.2 A tactical analysis of the battle: Consequences on the development of 17th century warfare

Military historians have often wondered why the same Swedish army, which achieved a decisive victory over Tilly at Breitenfeld, performed so poorly at Lützen. There are several reasons given by historians, such as Wallenstein's fortifications at Lützen, Tilly's clumsy Spanish infantry formation at Breitenfeld, or that Gustav Adolf had to attack an equally strong army at Lützen, which are all incorrect. The Battle of Breitenfeld and Tilly's Spanish-German tactics are not entirely understood, which makes it difficult to figure out the differences between Tilly's and Wallenstein's armies, and why the latter was much more successful against the Swedish. The short time between 17 September 1631 Breitenfeld and 16 November 1632 Lützen, and the fact that both armies consisted of Imperial and Leaguist troops suggest that both armies were not that different.

[978] Mörke 2007, 90-92.
[979] Englund 1998, 137.

Infantry and Artillery

The Swedish army did not change much between Breitenfeld and Lützen. The Swedish musketeers were not equipped with a light musket, providing them with a higher mobility, as often claimed.[980] In fact, musketeers in both armies used similar musket types at Lützen, and if the Swedes used different types at Breitenfeld, these muskets were more than likely the older and heavier Dutch types.

The Swedish-style infantry brigade formation was not too complicated to handle and was not responsible for any setbacks during the Battle of Lützen.[981] Otherwise it would have been abandoned at Nördlingen two years later. It was very likely only a matter of the acceptance of simplicity that the Swedish brigade formation vanished by 1636 Wittstock. Wallenstein reduced the number of ranks of his infantry from Tilly's ten or twelve deep, reformed Spanish 'esquadron' to seven ranks and he began equipping his army with 3- or 4- pounder regimental guns, which increased his firepower moderately. But these reforms can hardly be seen as a key reason for his success at Lützen.

What was new was that Wallenstein deployed his infantry in three lines, a skirmish line in the road ditches, a five squadron first line supported by heavy artillery and regimental guns and a two squadron second line. Such a three line defence can be very effective against an experienced and well trained enemy, as it was exercised in the American War of Independence Battle of Cowpens by Daniel Morgan against the finest British forces.[982] These tactics slowly disrupt morale and formation cohesion, first by skirmish line sharpshooters firing on officers and then by exhausting the enemies soldiers, who had to fight their way through two lines, while the defending units can retreat and reform behind the 2nd line and counterattack.

Cavalry

Gustav Adolf had demonstrated at Werben in July 1631 just what a combined arms task force of dragoons, light cavalry and musketeers was capable of when he surprised four of Tilly's best cavalry regiments;[983] but when he pursued the dispersing Imperial army on 15 November 1632, he had no dragoons and lacked light cavalry, which then consisted only of Stalhandske's Finns, to provide intelligence and clear the way at Rippach in time to allow the Swedish army a smooth crossing of the stream. Instead, Wallenstein's Croats and

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980 Murray 2013, 13.
981 Brzezinski 2001, 89.
982 Babits 1998, 157.
983 Monro 1637, part II, 51-52.

Dragoons, greatly outnumbering the Swedish light cavalry, controlled the entire area of operations, as they did at Nurnberg/Alte Veste as well,[984] preventing Gustav Adolf from surprising the Imperial army or gathering intelligence. Wallenstein's mounted men were a constant annoyance during the Swedish deployment on 16 November, and then threatened the Swedish rear during the battle. Although Wallenstein's skirmishing tactics backfired once, when one Croat regiment disrupted his battle line on the right, he proved a point; light cavalry of any kind became an important branch in European warfare until the early 19th century. Connected with Gustav Adolf's lack of light cavalry and dragoons was his underestimation of terrain, which cost his army valuable time and was probably the result of poor reconnaissance.

Another decisive factor was the Imperial cuirassiers. Much better armoured than the Swedish cavalry, they protected the vulnerable flanks of the infantry centre, and the Swedish cavalry was never able to break them. The poor performance of Sparr's cuirassiers, however, proved that good armour was no guaranty for success when leadership failed. On the other hand, the insufficiently armoured Imperial harquebusiers almost led to the destruction of Wallenstein's army. Wallenstein tried to upgrade the harquebusiers to cuirassiers, but was not successful, mainly because cuirassiers were too expensive. The costs were probably the main reason why most cavalry remained unamoured in Europe.

Leadership

Although Bernhard von Weimar, Knyphausen and Brahe were good officers, the Swedish army at Lützen lacked some of its best commanders. Fältmarskalk Gustav Karlsson Horn Greve til Björneborg, according to Monro one of the best Swedish leaders, commanded a Swedish army in Alsace;[985] General Johan Banér was wounded at Nurnberg/Alte Veste;[986] in the same battle Överste Lennart Thorstenson, who usually commanded Gustav Adolf's artillery, had been taken prisoner, and was succeeded by the inexperienced Major Joen Persson Jernlod;[987] and there were many other capable commanders missing at Lützen. Their absence resulted in low ranking officers, like Överste Thorsten Stalhandske, who was certainly a good officer, but lacked experience as wing commander, finding themselves in unfamiliar positions of great responsibility, when Gustav Adolf and Nils

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[984] Monro (1637, part II, 140, 144, 151) specifically pointed out that Wallenstein's Croats controlled the whole area around Nurnberg, harassing Swedish supply and preventing intelligence gathering.
[985] Monro 1637, part II, 58, Engerisser 2007, 133, Murray 2013, 13-14.
[986] Engerisser 2007, 124.
[987] Brzezinski 2001, 22.

Brahe were killed. The absence of Gustav Adolf's brilliant officers, with whom he had achieved the decisive victory at Breitenfeld, certainly led to minor mistakes, like the delay of his heavy artillery, which in sum let to the stalemate at Lützen. In essence, the Swedish army's success under Gustav Adolf was chiefly based on superior leadership.[988]

On the other side, Hofkirchen's and Bönninghausen's rout have distorted our image of Imperial officers. Wallenstein could rely on Feldmarschall Leutnant Holk, who demonstrated great prudence in commanding the left wing and the battle would have been lost without him. Many other officers, such as Oberst Waldstein, Oberst Piccolomini or Obristwachtmeister Münchhausen, took the initiative when appropriate, or held the line when necessary, disregarding their safety, for which the high Imperial officer casualties are evidence.

Reserve

Another innovation was Wallenstein's cavalry reserve. Here lies the real reason for the success of the Imperial army. While Gustav Adolf had a very strong second line, his army lacked real reserves, which consisted only of Henderson's musketeers and Öhm's cavalry, and even they were assigned to the centre. In contrast to the Swedish army, Wallenstein deployed one musketeer and five cavalry squadrons as reserve. This deployment allowed a much more flexible response to the Swedish attacks. The two wing reserve squadrons strengthened the Imperial left wing at the beginning of the battle and prevented an early Swedish breakthrough until Pappenheim relieved the pressure. Most decisive was the deployment of three cavalry reserve squadrons behind the centre and the cavalry-infantry combined arms operations against the Yellow and Old Blue Brigades. If the Battle of Lützen proved anything, it was the value of highly mobile cavalry reserves, which became an important keystone in European tactics.

Development of the battle

Unlike at Breitenfeld, Gustav Adolf had to take the initiative and start the battle at Lützen, because he could not wait for Pappenheim's corps to arrive and reinforce the Imperial army. Without waiting for his heavy artillery, he rushed into action and attacked on both wings in a delayed double outflanking manoeuvre, instead of attacking only one wing and seeing how the battle developed. When Pappenheim arrived, the Swedish army's entire first line was committed and unable to react, while the lack of excellent commanders,

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988 Junkelmann 1993, 351, Kaiser 1999, 457, Murray 2013, 13-14.

together with a rivalry between Bernhard von Weimar and Knyphausen, prevented swift action and moving second line's cavalry from the left to the right wing. After the Swedish right wing was beaten, the whole army collapsed in a domino effect. The Swedes still had sufficient leadership to avoid total destruction, but at that point they could not beat the Imperial army anymore. Still, the Swedish army's cohesion, experience and leadership allowed Bernhard von Weimar to resume the attack and keep the soldiers going for several hours, where most other armies would have failed.

Chapter Ten

Review and prospects

Military history has chiefly failed to understand even the basic events of the Battle of Lützen by projecting an incorrectly understood Thirty Years War military system on the battle; at the same time the battle was often used to explain the weapons and tactical development of the period. In addition, the problematic of the reliability of eyewitness accounts in comparison to second-hand information has not been recognized, partially because the Battle of Lützen became a myth and Gustav Adolf a religious figure for German Protestants in particular. The objective of this thesis was to demonstrate a methodology of how to evaluate archaeological and historical sources by comparison in order to better understand the Battle of Lützen within the wider context of the development of military equipment, weapons and tactics in the early 17th century.

Plate 30: International meeting on the Lützen battlefield. From the left: Tim Sutherland, Bo Knarrström, André Schürger, and Tony Pollard.

Battlefield archaeology

Fieldwork conducted over five years stood at the beginning of this thesis. Based on the methodology of previously successful battlefield projects, the Lützen project aimed toward a more intense small finds collection by using a systematic, full coverage metal detector sweep for the first time on such a large scale with great success. An approximate small finds recovery rate has been established in test grids, some of them by independent battlefield archaeologists during several international meetings at Lützen. Establishing a recovery rate is an important step toward better understanding small finds distribution patterns on battlefields with a similar agricultural environment, which proves the point; that under normal circumstances, a systematic full coverage metal detector sweep seems to be the best compromise between survey progress and quality of results on musket-era battlefields. However, more data from other battlefields is required to get a clearer picture. The highlight of the fieldwork was the discovery of a mass grave at the end of the project, which was a first time occurrence in an active search, chiefly due to the results from the survey.

The most common artefacts on early modern battlefields are bullets from firearms. Because of their potential they represent the main subject of research in early modern battlefield archaeology and also in this study. The aim was to allocate bullets to firearms, a necessary step toward interpreting distribution patterns, which is, at the moment, the main tool to allow a comparison between archaeological and historical information. This, however, represents a general problem in the musket-era, because windage prevents more modern ballistic analysis, with which bullets can be allocated to individual modern firearms. Instead, research of the last decade has developed a different approach, using bullet weights as a means for allocating them to types of firearms. It was one of the main results of this thesis to demonstrate that this methodology led to wrong conclusions, because it was based on incorrect assumptions. It had not been realized that calibres mentioned by early modern military theorists, our main source for weapon specifications at the moment, refer to the bore of the weapon or the bullet calibre, using different terms for either. It was believed, instead, that military handbooks always referred to the bullet calibre, because the calibre specification is given in bullets per pound. It has been shown that different weight systems were used for calibre specifications, depending on the nationality of the arms manufacture or manufacturer, which complicates an assigning bullets to firearms on any European battlefield because weapons were imported-exported on a large scale during this period. Adding to the problems of interpretation, it has been demonstrated that un-deformed bullets can have very different shapes giving them a varying range of weight. This range of weight for bullets of a specific calibre is not around the intended calibre mentioned in the military handbooks, but below it, due to the inability to produce exact bores and bullets. The result of all these implications was that in previous research in early modern battlefield archaeology the weapon calibre was substantially downsized, with the problematic outcome that known to existing large calibre weapons are not represented in the bullet collections.

By adopting the concept of the calibre graph discussion from battlefield archaeology and in response to the new achievements in the field of early modern weaponry studies, a new approach has been developed. First, firearm models and their theoretical bore and bullet diameter can be identified from military handbooks. Then, the actual bullet diameters from the *Vasa* collection were established and compared to known weapon models. All known weapon models with their established bullet diameter were then superimposed on the Lützen calibre graph. Finally, the results from Lützen were compared to other bullet collections from battlefields, sieges and ship wrecks, resulting in a new, workable methodology for all known early 17th century bullet collections. This methodology is verifiable by weapon specifications from military handbooks. This new archaeological approach has led to a better understanding and clarification of a basic development of firearms during the late 16th and early 17th century, and at the same time it provided new evidence for military tactics, which were partially dependent on specific weapon types or models, such as the change from the Spanish military school to a new German infantry formation in the Imperial army, and that Gustav Adolf's army was not superior due to a new light musket, which, in fact, had not reached the Swedish main army in 1632 in any significant numbers.

In the next step, the basic bullet features were analyzed and a connection between casting sprues, tin bullets, paper cartridges and personal bullet production was established. The main goal, however, was to visualize the results from the calibre analysis and the bullet feature analysis on bullet distribution maps, in order to establish meaningful patterns, which could help explain the battle's events. In particular, the distribution patterns of bullets with various degrees of impact damage brought some details to the foreground, where dense bullet concentrations of several different combats in one area have blurred the results.

This thesis has also raised many questions. The most important question, which should not be underestimated, concerns the different types and models of firearms actually used by the different branches, armies, nationalities etc. Early modern battlefield archaeologists use ammunition as their main information source at the moment, and this question has to be answered on an international level, because armies were equipped internationally. We need more historical data from military handbooks and archaeological data from battlefields, ship wrecks, garrisons etc. A more pressing requirement is analyses of existing collections of military firearms, the missing link between historical and archaeological sources. Very little research has been done on military pistols and carbines, but there is almost nothing known about military matchlock muskets and calivers, and there is certainly much to find out, such as how many musket models actually existed or what range of bore diameter one musket model can have. In addition, metal detector surveys on small scale skirmish sites, which are documented by eyewitness accounts, could be vital to establish the actual weapons used by specific units or branches.

Impact damage on bullets is poorly understood, and it would be an asset to research so we could know what a bullet might have hit. Although some work has been done,[989] it would require much more test firing with the results being compared to assemblages of bullets from battlefields with different ground conditions and terrain. There is also the question of the impact the distribution of non-ammunition finds can have on interpreting a battle, an issue that has barely been touched by early modern battlefield archaeology: yet the results in this research seemed not very promising. However, areas of a rout or hand-to-hand combat might become clearer, in which equipment was thrown away or ripped off uniforms. Nevertheless, this find category had to be withdrawn at a late stage, because it would have overburdened this thesis with a complicated, new and not well understood, yet important study, which deserves an independent thesis.

Military history and small finds distribution patterns

The aim of this thesis was to reconstruct the battle’s events. This was done by generating ammunition distribution patterns, providing a new translation and interpretation of eyewitness statements as well as second-hand information. This procedure included placing units scaled to size and form of their tactical formation within the historical landscape which was reconstructed due to new results from archaeological excavations. All information was then placed within battle episodes that were further aligned by chronological sequencing. This approach led to a new interpretation of the battle; it brought a new insight into the reliability of historical sources and provided a better understanding of the mechanisms of the historical narrative’s development. Finally, compilation of the information allowed a better understanding of ammunition distribution patterns and attribution of concentrations to specific units and events.

[989] Sivilich 2009.

An asset to battlefield archaeology lies within its ability to locate combat on the battlefield and as a result answering the question of 'where.' This is particularly effective in showing the orientation and extent of battle lines, as it has already been demonstrated by Foard at Edgehill and now for Lützen,[990] where it was demonstrated that the Imperial wings were echeloned backwards in a 45° angle. Much more challenging was localizing single units and events on the battlefield. Most episodes were mixed with others, which effectively blurred distribution patterns. Those units, however, which have been located, have changed the interpretation of the battle substantially. This was shown with the analysis of the Swedish Brigade's attack vector against the Imperial cavalry, instead of the Imperial infantry which, in turn, shifted the whole Swedish right wing attack further to the right. Once this shift occurred, the wide gap in the Swedish centre allowed two second line brigades to move forward soon after the battle started. This, in turn, opened new possibilities for re-interpreting historical sources, and, once the events were clarified, often ignored, not- or misunderstood statements in eyewitness accounts made sense.

In the end, clarification and verification of historical sources is probably the major contribution of early modern battlefield archaeology at the moment. Without it, it proves to be nearly impossible to assess the fragmented historical sources for the Battle of Lützen, and therefore newly discovered accounts can easily change our idea of the battle, as Dalbier's account demonstrates. An important lesson for an understanding of the development of historical narrative and the unreliability of second-hand information is the non-existence of Wallenstein's trenches, which are persistently mentioned in all secondary sources and most modern interpretations of the battle until the present day, which became a topos for Wallenstein's battle tactics. After the unreliability of non-eyewitness accounts was established, a new interpretation of all historical sources, without the burden of a flawed modern research, led to many new results. This was, partially, possible due to a re-translation of, or an evaluation of terms in, documents, which resolved some misunderstandings, such as the predestination of Pappenheim's forces or that the Old and New Blue Regiments were confused in the Imperial accounts. This is not to say that archaeology is the handmaiden of history but rather, the documentary sources and the archaeological artefacts must be taken together to resolve questions they mutually generate. Once the two research methodologies are seen as comparable and mutually supporting, then a clearer appreciation of what happened occurs.

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[990] Foard 2008.

Final conclusions

It has been demonstrated throughout this thesis that the key factor for understanding a battle is a symbiosis between battlefield archaeology and military history. By evaluating firearms ammunition evolution, this integrated approach resulted in a better understanding of the development of early 17^{th} century firearms, their distribution over central Europe, and the change in battle tactics. What remains is to test this approach on an international scale.

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