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BURIED UNDER? RE-EXAMINING THE TOPOGRAPHY AND GEOLOGY OF THE ALLIA BATTLEFIELD

JANNE IKÄHEIMO, JARI-MATTI KUUSELA & EERO JARVA

Introduction

The territory of the Roman Empire abounds with battlefields – about twenty of them are documented in literary sources from the fifth and fourth centuries BC alone. However, they have not received much attention from archaeologists, partly because of problems pertaining to their exact identification and the lack of actual material evidence.¹ The two notable exceptions to this rule are the archaeological studies of the battle site of Lake Trasimene and the extensive battle site of Teutoburg.² The battlefield of Allia near Rome (Fig. 1), on the other hand, falls into line with the majority of Roman battlefields, as it has not attracted much attention from archaeologists. A clash between Romans and Gauls (or Celts) at this site ended in victory for the latter, resulting in the capture and sack of Rome around 390 BC or later in the 380s, depending on how the literary sources are interpreted. Although the battle is frequently mentioned in

¹ J. Coulston, "The archaeology of Roman conflict", in P. Freeman and A. Pollard (eds.), *Fields of Conflict: Progress and Prospect in Battlefield Archaeology*, Oxford 2001, 26.

² G. Susini, *Ricerche sulla Battaglia del Trasimeno*, Cortona 1960. Concerning the battle of Teutoburg, see Strabo 7,1,3 and concerning studies conducted at the site, see A. Rost, "Characteristics of ancient battlefields: Battle of Varus (9 AD)", in D. Scott, L. Babits and C. Haecker (eds.), *Fields of Conflict. Battlefield Archaeology from the Roman Empire to the Korean War*, Washington (D.C.) 2009, 50–57; S. Wilbers-Rost, "Total Roman defeat at the Battle of Varus (9 AD)", in D. Scott, L. Babits and C. Haecker (eds.), *Fields of Conflict. Battlefield Archaeology from the Roman Empire to the Korean War*, Washington (D.C.) 2009, 121–132.

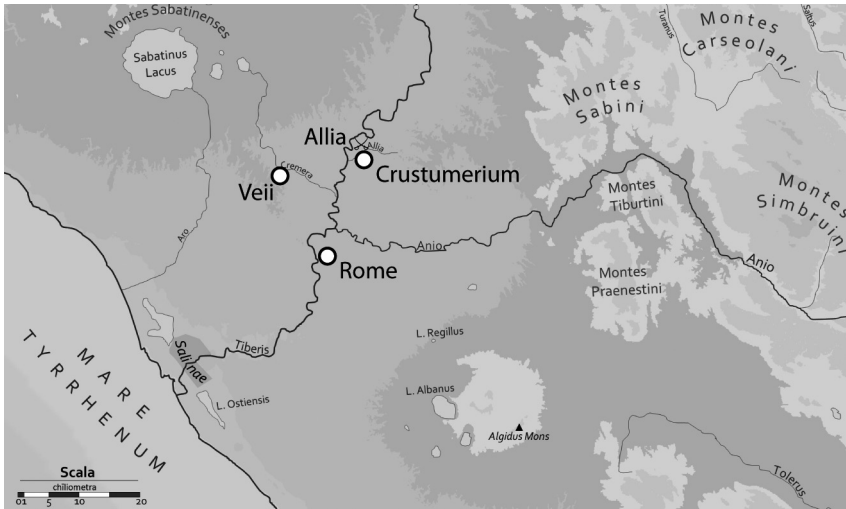


Fig. 1. Map of Central Italy with the sites mentioned in the text. Base map source: Wikimedia Commons, license CC-BY-SA-3.0 (Author: Cassius Ahenobarbus).

studies regarding Republican Rome,³ it is often discussed only by referring to the accounts of the three main authors describing the incident, namely Livy,⁴ Diodorus Siculus,⁵ and Plutarch.⁶ While these accounts are detailed, they were written several centuries after the battle and are therefore likely to incorporate legends and myths in addition to genuine tradition. Notable historical research concerning the battle was conducted in the late 19th and early 20th centuries,⁷

³ E.g. E. Meyer, *Geschichte des Altertums*, Stuttgart – Berlin 1902; L. Hartmann, "Die äußere Geschichte Roms bis zur Einigung Italiens", in L. Hartmann and J. Kromayer (eds.), *Römische Geschichte*, Gotha 1921, 41–55; L. Pareti, *Storia di Roma*, Torino 1952; H. Scullard, *A History of the Roman World 753 to 146 BC*, London 1969.

⁴ Liv. 5,37,1–5,38,10.

⁵ Diod. Sic. 14,114,1–14,115,2.

⁶ Plut. *Cam.* 18,4–7.

⁷ T. Mommsen, *Hermes* 13 (1878) 515–555; C. Hülsen and P. Lindner, *Die Alliaschlacht. Eine topographische Studie*, Rom 1890; O. Richter, *Beiträge zur römischen Topographie*, Berlin 1903; G. De Sanctis, *Storia dei Romani* 2, Milano 1907; E. Kornemann, *Klio* 11 (1911) 335–342; J. Kromayer, *Abhandlungen der Sächsischen Gesellschaft* 34 (1916) 28–59; J. Kromayer and O. Veith, *Schlachten-Atlas zur antiken Kriegsgeschichte*, Leipzig 1922; F. Schachermeyr, *Klio* 23 (1930)

but recently the battle has received little attention from scholars. One exception is the monograph by Lorenzo Quilici and Stefania Quilici Gigli, which focuses on the survey results of the ancient settlement of *Crustumerium*.⁸ A significant section of this monograph is devoted to the identification of the Allia battlefield via topographical means. Beyond this, the discussion of the battle itself largely follows the accounts of the ancient authors. However, as Quilici and Quilici Gigli ponder the exact location of the Allia battlefield, they make interesting passing references to the possibility that the course of the Tiber River could have changed with the centuries.⁹ Unfortunately, they do not develop this argument much further.

For this reason, the main aim of this paper is to provide an answer to this very question: might the course of the Tiber have changed during the past 2400 years, and if so, how much? Depending on the answer, the accountability of the ancient authors writing about the Battle of Allia might also be re-evaluated. To reach this point, various sources of information regarding the topography, geology, and hydrogeology of the presumed location of the Allia battlefield must be scrutinized. This material includes historical and geological maps and aerial photographs, as well as the extensive literature pertaining to the geology and geography of the region. It will be shown that the course of the Tiber has always been and continues to be in constant change and that these changes very likely explain the mutually contradictory statements made by the ancient authors. In addition, it will be claimed that especially the horizontal topography in the area has been transformed to such an extent that the exact location of the battlefield cannot be reliably pinpointed without new archaeological data. To reach such a conclusion, it is essential to first provide a short outline of this clash between the Romans and the Gauls and its location as reported in literary sources. In addition, it is also essential to review how the question of the location of the battlefield has been dealt with in previous research. Only then can we focus on details regarding the topography and geology of the area.

The present paper can be said to represent battlefield archaeology, a recognized subfield and an integral part of conflict archaeology, which has gained

277–305.

⁸ L. Quilici and S. Quilici Gigli, *Crustumerium*, Roma 1980, 39–44, 162–168, 291–294, 298, see also pl. 105.

⁹ L. Quilici and S. Quilici Gigli (above n. 8), 161, 168, 292.

prominence only in the last two decades or so.¹⁰ As the name itself suggests, this subfield focuses on the identification and study of battlefields and battles via archaeological means. The correct identification of a battlefield is an integral part of this process, which relies heavily on historical documentation, thus placing the subfield within the scope of historical archaeology. As battlefield archaeology is concerned with the actual site of the battle, its reliance on historical evidence is understandable. While the existence of prehistoric battles and warfare is hardly doubted and direct evidence of such events is available in the form of skeletal and other material evidence, it would be very hard to identify a battlefield without historical evidence pointing in the right direction.

When a prospective site for a battlefield has been identified, archaeological fieldwork methods may be applied to determine whether the identification is correct. For example, electromagnetic conductivity surveys can be used to detect subsurface anomalies, metal detection surveys to detect metal artefacts pertaining to the battle, and GIS methods to study topography and/or visualize and study the results of fieldwork surveys.¹¹ In some cases, often when the site has been identified reliably, it may also be prudent to conduct archaeological excavations.¹² However, archaeological fieldwork is relevant only when the rough identification based on historical sources has already produced a viable candidate, or at most a few candidates, for the site of the battle. As this paper in part demonstrates, this is often not an easy task.

Arguably, the task of identifying a battle site correctly becomes more and more challenging as time passes since the event itself. Furthermore, during the centuries – perhaps even millennia, like in the present case – several post-depositional factors may have destroyed, removed, and/or altered the evidence on site, making the archaeological verification of a battlefield difficult, if not impossible.¹³ These problems are compounded if the battle was fought in an en-

¹⁰ See e.g. T. Pollard and I. Banks (eds.), *Past Tense. Studies in the Archaeology of Conflict*, Leiden 2006; D. Scott, L. Babits and C. Haecker (eds.), *Fields of Conflict. Battlefield Archaeology from the Roman Empire to the Korean War*, Washington (D.C.) 2009.

¹¹ G. M. Pratt, "How do you know it's a battlefield?", in D. Scott, L. Babits and C. Haecker (eds.), *Fields of Conflict. Battlefield Archaeology from the Roman Empire to the Korean War*, Washington (D.C.) 2009, 6–9.

¹² A. Rost (above n. 2); S. Wilbers-Rost (above n. 2).

¹³ See J. Coulston (above n. 1).

vironment that is topographically unstable in some way, as landmarks that may once have marked the site of the battle might not exist today or their positions might have shifted. As demonstrated below, the Battle of Allia is an exemplary case of such an event.

The Battle and Battlefield of Allia

At the time of the Battle of Allia, the Romans fought in a Greek-style hoplite phalanx consisting of heavily armed infantrymen.¹⁴ The phalanx required level ground for the battle, as it was impossible to maintain the tight formation on uneven ground.¹⁵ The topography of the presumed Allia battlefield therefore seems to match the features common to sites of hoplite engagements rather well.¹⁶ The battlefield is a level plain naturally enclosed by topographical features and observable from a nearby settlement (Crustumium), and a road (Via Salaria)¹⁷ – a common feature for a site of hoplite engagement¹⁸ – led directly to the site.

It is also worth noting that this is the area where the Tiber river valley narrows down from 3 km to 1.5 km within a stretch of only five kilometres downstream. This feature probably influenced the selection of the battle site, as the Roman army – composed of 24,000–40,000 men, according to the an-

¹⁴ E.g. G. Webster, *The Roman Imperial Army of the First and Second Centuries A.D.*, London 1969, 19; T. J. Cornell, *The Beginnings of Rome. Italy and Rome from the Bronze Age to the Punic Wars (c. 1000–264 BC)*, Guildford and King's Lynn 1995, 184; E. Jarva, *Archaologia on Archaic Greek Body Armour*, Rovaniemi 1995, 125; J. Lendon, *Soldiers & Ghosts. A History of Battle in Classical Antiquity*, New York 2005, 182.

¹⁵ V. Hanson, *The Western Way of War. Infantry Battle in Classical Greece*, Suffolk 1989, 138; J. Lazenby, "The killing zone", in V. Hanson (ed.), *Hoplites. The Classical Greek Battle Experience*, Chatham 1991, 99; J. Ober, "Hoplites and obstacles", in V. Hanson (ed.), *Hoplites. The Classical Greek Battle Experience*, Chatham 1991, 173.

¹⁶ J. Carman and P. Carman, *Bloody Meadows. Investigating Landscapes of Battle*, Sparkford 2006, 41–42.

¹⁷ On Via Salaria, see S. Quilici Gigli, *La via Salaria da Roma a Passo Corese*, Roma 1977; T. J. Cornell (above n.14), 48, F. di Gennaro, "Alla ricerca dell'identità di Crustumium", in P. A. J. Attema, F. di Gennaro and E. Jarva, *Crustumium. Ricerche internazionali in un centro latino. Archaeology and Identity of a Latin Settlement near Rome*, Groningen 2013, 14 and figs. 20–23.

¹⁸ J. Ober (above n. 15), 174–175.

cient authors¹⁹ – had to fit into the local topography in an optimal manner to act efficiently as a unit. If the phalanx formation broke, a hoplite was severely hampered in hand-to-hand combat by the cumbersome load of his armour,²⁰ whereas a Gaulish warrior was an individual fighter and therefore had the edge in a man-to-man fight. The armour is also the reason why a road was required for travelling to the battlefield, as hoplites were reluctant to arm themselves until the very last moment due to the discomfort of the hoplite panoply.²¹

By combining the information offered by Livy, Diodorus Siculus, and Plutarch, the progress of the battle can be outlined as follows (see also Fig. 2). After having learned of the rapid approach of the Gauls, the Romans levied their army *en masse*²² and marched north along the Tiber, where they either made camp near the Allia stream, a tributary of the Tiber,²³ or stumbled upon the Gauls and hastily arranged their battle lines.²⁴ According to Livy, the Romans deployed their troops so that the battle line extended from the Tiber to the hills where the right wing, consisting of reserves, was placed.²⁵ As the battle began, the Romans were quickly routed and, according to Livy and Plutarch, the left wing on the plain fled first,²⁶ whereas Diodorus maintains that the troops stationed on the hills collapsed first.²⁷ Livy then tells how the reserves, stationed on the right wing, made their way to Rome, whereas those on the plain fled to Veii, crossing the Tiber.²⁸ Plutarch, on the other hand, maintains that the whole Roman battle line was stationed on the plain, and when the Gauls attacked the right wing, the Romans withdrew to the hills, from where they made their way to Rome.²⁹

¹⁹ Diod. Sic. 14,114,1–14,114,3; Plut. *Cam.* 18,4.

²⁰ Plut. *Flam.* 8,3–4; V. Hanson (above n. 15), 78, 136–137.

²¹ V. Hanson (above n. 15), 60–83.

²² Liv. 5,37,7.

²³ Plut. *Cam.* 18,6.

²⁴ Liv. 5,38,1–3.

²⁵ Liv. 5,38,2–3.

²⁶ Liv. 5,38,5–7; Plut. *Cam.* 18,6–7.

²⁷ Diod. Sic. 14,114,4.

²⁸ Liv. 5,38,8–10; on flying to Veii across the Tiber, see also Plut. *Cam.* 18,7.

²⁹ Plut. *Cam.* 18,7.

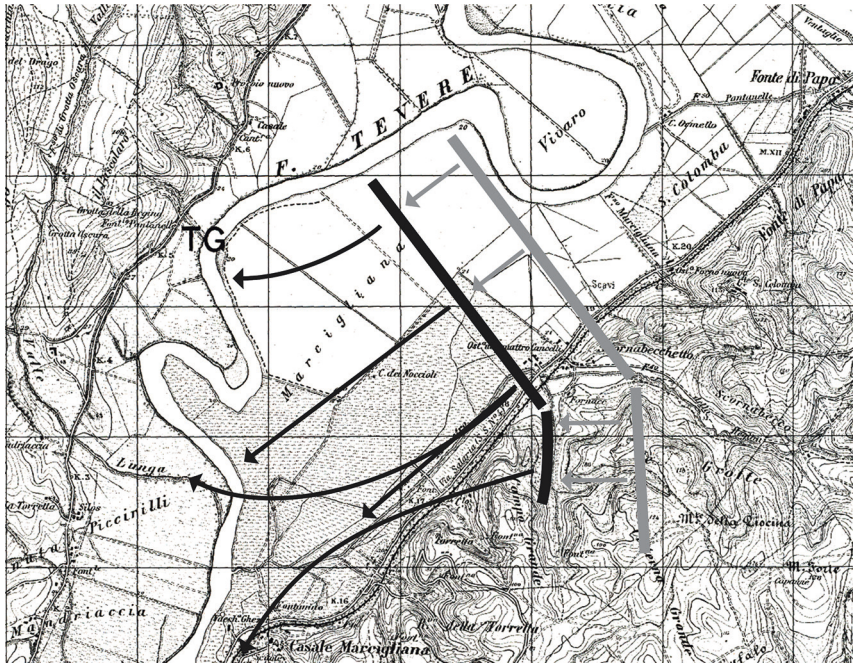


Fig. 2. The topography of the Tiber Valley in the Marcigliana area with the hypothesized location and manoeuvres of Roman (black) and Gaulish (grey) troops. Base map of Istituto Geografico Militare modified after Quilici & Quilici Gigli 1980: tav. CXV by J. Ikäheimo.

Regarding the specific location of the battle, Livy places it on the eastern bank of the Tiber on the eleventh milestone from Rome (between 14.8 and 16.3 km) near the river Allia and by the ancient town of Crustumerium.³⁰ Plutarch, who does not mention the Allia at all, places the site ninety stades from the city (à 177.6 m, i.e. nearly 16 km),³¹ whereas Diodorus³² says that the Romans crossed the Tiber proceeding eighty stades (about 14.2 km) along the river, obviously on the western bank. These conflicting accounts have puzzled scholars

³⁰ Liv. 5,37,7–8.

³¹ Plut. *Cam.* 18,6; see also Eutr. 1,20.

³² Diod. Sic. 14,114,2.

in the past, resulting in an argument with one school supporting Diodorus³³ and the other Livy³⁴. In more recent research, Diodorus' account is not considered as credible as Livy's.³⁵ Further disagreement over the location of the battle ensued between Gaetano De Sanctis³⁶ and Johan Kromayer³⁷. De Sanctis placed the battle on the eastern bank, but somewhat more to the south than Kromayer. He argued that the southern position would have been more advantageous for the Romans due to their smaller numbers compared to the Gauls. Kromayer disagreed and maintained that the battle was fought more to the north on a wide plain on the eastern bank of the Tiber.

Quilici and Quilici Gigli support Kromayer's view, since the remains of the ancient town of Crustumerium have been located on the site where De Sanctis placed the Gaulish positions.³⁸ According to Livy, the town was conquered by the Romans during the consulships of Titus Aebutius and Gaius Vetustius, both in 499 BC.³⁹ This appears to be confirmed by studies of surface finds from the site of Crustumerium,⁴⁰ the number of which shows a drastic decrease in the fourth century BC, a factor interpreted as an indication of the establishment of new farming estates (villas) on the site.⁴¹ Recent excavations in the settlement area of Crustumerium have revealed that a monumental road trench passing through the site, part of a road tract between southern Etruria, Latium, and Campania,⁴² was kept in a good state of repair until the middle Republican

³³ T. Mommsen (above n. 7); C. Hülsen and P. Lindner (above n. 7); E Meyer (above n. 3); K. Be-
loch, *Römische Geschichte*, Berlin 1926, 311.

³⁴ O. Richter (above n. 7); G. De Sanctis (above n. 7); E. Kornemann (above n. 7); J. Kromayer
(above n. 7); R. Laqueur, *Philologische Wochenschrift* 41 (1921) 861–864; J. Kromayer and O. Veith
(above n. 7); F. Schachermeyr (above n. 8); L. Pareti (above n. 3).

³⁵ L. Quilici and S. Quilici Gigli (above n. 8), 166.

³⁶ G. De Sanctis (above n. 7).

³⁷ J. Kromayer (above n. 7); J. Kromayer and O. Veith (above n. 7).

³⁸ L. Quilici and S. Quilici Gigli (above n. 8), 166–168, 293–294.

³⁹ Liv. 2,19.

⁴⁰ A. Amoroso, *ArchClass* 53 (2002) 316–317.

⁴¹ A. Amoroso (above, n. 40), 322; see also L. Quilici and S. Quilici Gigli (above n. 8), 285, pls.
113, 115, 116.

⁴² F. di Gennaro, "Primi risultati degli scavi nella necropoli di Crustumerium. Tre complessi funerari
della fase IV A", in *Archeologia Laziale* IX, Roma 1988, 113–123; F. di Gennaro "Crustumerium e

period.⁴³ Accordingly, the site may still have been settled extensively enough to render De Sanctis' interpretation obsolete.

The main tradition refers to the east side of the Tiber around the eleventh mile from the city as the place where the troops met. This leads to the conclusion that the site should be identified as being somewhere on the plain below the hills where the remains of Crustumium are known to be located. This interpretation is supported by the discovery in 1977 of a Roman milestone near Via Salaria, 17.7 km from Rome, possibly the tenth milestone.⁴⁴ Another fixed topographical point rising from the tradition, which obviously goes back to the 4th century BC, as these events were known already to Aristotle,⁴⁵ is the Allia river itself. Accordingly, in this paper, we follow Kromayer's view and focus our study on the floodplain of the Tiber between 16 km and 18 km along the Via Salaria north of Rome⁴⁶ (Figs. 1–2). This area is henceforth referred to with the closest place name, Marcigliana.

The Tiber – The Ever-Changing River

Introduction

Currently, the Tiber to the west and north and the steep hills to the east form the natural boundaries of the field that is assumed to be the site of the Battle of Allia (Figs. 2–3). A modern highway and railway lines cross the plain from south-west to north-east. The field itself is a level floodplain between the Tiber and the hills flanking it, which have substantially steep slopes that could have

la sua necropolis", in M. A. Tomei, ed. *Roma. Memorie dal sottosuolo. Ritrovamenti archeologici 1980/2006*, Verona 2006, 22–23.

⁴³ E. Jarva, A. Kuusisto, S. Lipponen and J. Tuppi, "Excavation in the road trench area of Crustumium and research prospects in the future", in P. A. J. Attema, F. di Gennaro and E. Jarva (eds.), *Crustumium. Ricerche internazionali in un centro latino. Archaeology and Identity of a Latin Settlement near Rome*, Groningen 2013, 35–44.

⁴⁴ L. Quilici and S. Quilici Gigli (above, n. 8), 179; F. M. Cifarelli and F. di Gennaro "La via Salaria dall'Aniene all'Allia", in E. Catani and E. Paci (eds.), *La Salaria in età antica. Atti del convegno di studi, Ascoli Piceno – Offida – Rieti, 2.–4 ottobre 1997*, Roma 2000, 121–144.

⁴⁵ Plut. *Cam.* 22,3.

⁴⁶ See L. Quilici and S. Quilici Gigli (above n. 8), 39–44, 162–168.

been heavily wooded in antiquity. However, current topography is not likely to correspond fully with the conditions that prevailed at the time of the battle.

As hinted in the introduction, the factor overlooked by both ancient authors and most modern scholars⁴⁷ is the nature of the Tiber floodplain as a dynamic geological environment. Thus, the aim of this chapter is to outline the geological history and especially the palaeohydrology of the Marcigliana area both before and after ca. 390 BC, the presumed date of the battle. This will be done in order to provide a more accurate picture of the topographical environment in which the Battle of Allia is thought to have taken place.

In the bigger picture, the Tiber river valley – particularly its floodplain – is the product of the last glacial age. The regressive stages caused by glacial maximums resulted in a drop of roughly 120 metres⁴⁸ in the sea level compared to the present situation. To balance its flow during these stages, the Tiber carved its channel deep down into the underlying volcanic bedrock and Quaternary sediments. The maximum depth of the resulting valley, as evidenced by numerous drill cores in the vicinity of Rome, is approximately 60 metres.⁴⁹ During a transgressive stage, on the other hand, the Tiber responded to the continuously reduced vertical distance between the headwaters and outlet by spreading the sediment load suspended in its waters onto the surrounding alluvial plain.⁵⁰ This development, which also took place after the last glacial maximum, has changed both the horizontal and vertical position of the Tiber river channel. These changes will be discussed next, one dimension at a time, after which their implications regarding the location and nature of the Allia battlefield will be scrutinized. Ultimately, it will be shown that any attempt to position the Roman and Gaulish troops on the basis of modern topography (e.g. Fig. 2) is flawed at the outset.

⁴⁷ See, however, L. Quilici and S. Quilici Gigli (above n. 8), 161, 168, 292.

⁴⁸ E.g. M. P. Campolunghi, G. Capelli, R. Funicello and M. Lanzini, *Engineering Geology* 89(1–2) (2007) 23.

⁴⁹ F. Bozzano, A. Andreucci, M. Gaeta and R. Salucci, *Bulletin of Engineering Geology and the Environment* 59(1) (2000) 10 Fig. 9.

⁵⁰ R. Facenna, R. Funicello and F. Marra, "Inquadramento geologico strutturale dell'area romana", in R. Funicello (ed.), *La geologia di Roma - Il Centro Storico*, Roma 1995, 47; R. Funicello and M. Parotto, "General geological features of the Campagna Romana", in G. Cavarretta, P. Gioia, M. Mussi and M. R. Palombo (eds.), *La terra degli Elefanti – The World of Elephants: Atti del 1° congresso internazionale – Proceedings of the 1st International Congress*, Rome 2001, 48–49.

Lateral displacement

Today, the Tiber is a meandering river characterized by constant and occasionally dramatic changes in the location of the river channel within the floodplain. The two main factors contributing to this behaviour are the river's proneness to flooding and the structure of the floodplain's upper strata, which are dominated by layers of substantially fine sediment, mainly mud and clayey or sandy loam/silt.⁵¹ The stratigraphy of the floodplain also includes coarser layers composed of sand and gravel, which can be interpreted as the fossilized remains of a wandering channel bottom. It is therefore quite safe to presume that the horizontal position of the Tiber river channel in the Marcigliana area is not the same today as it was 2400 years ago when the Battle of Allia was fought.⁵²

The horizontal change in the course of the Tiber during the Holocene is well documented, not only in Rome, but also along the Tiber's upper course and its delta.⁵³ One of the best examples in this respect is the valley of Treia, a tributary of the Tiber located in Etruria roughly 30 km north of Rome. The geological evidence regarding Treia undisputedly shows that the position of the river channel can wander from one side of the floodplain to the other in the course of two millennia – although the floodplain in question is only 100 metres wide.⁵⁴ The rapidity at which these changes can take place can be observed on a map depicting the course of the Tiber near Deruta, some 120 km north of Rome,⁵⁵ where the maximum lateral displacement of the river channel in the 2.5-km-wide floodplain has reached nearly 2 km over the past 600 years. In the city of Rome, a geological section based on 57 boreholes suggests a margin of at least 1.5 km for the lateral displacement,⁵⁶ judging from the occurrence of a gravelly river bottom layer in the stratigraphy. A similar gravel layer indicating the bot-

⁵¹ F. Bozzano, A. Andreucci, M. Gaeta and R. Salucci (above, n. 49), 8, 16; M. P. Campolunghi, G. Capelli, R. Funicello and M. Lanzini (above n. 48), 29.

⁵² Cf. L. Quilici and S. Quilici Gigli (above n. 8), 161.

⁵³ E.g. C. Pesaresi "Ambiente, Società, Territorio", *Geografia nelle Scuole* 2/2004 (2004) 28–29.

⁵⁴ T. Potter, *The Changing Landscape of South Etruria*, London 1979, 24–28 with citations.

⁵⁵ A. G. Segre, "Considerazioni sul Tevere e sull'Aniene nel Quaternario", in S. Quilici Gigli (ed.), *Il Tevere e le altre vie d'acqua del Lazio antico*, Roma 1986, 10 Fig. 2.

⁵⁶ See F. Bozzano, A. Andreucci, M. Gaeta and R. Salucci (above, n. 49), 10 Fig. 9 lithotype B1.

tom of the river channel has also been observed in the Marcigliana area,⁵⁷ where it tops a layer of impermeable marine clay – a combination prone to increase flooding during periods of excessive rainfall. Otherwise, gaining information on the palaeohydrology of the Tiber floodplain in the Marcigliana area through its present pattern of meanders is a rather tough quest.

It is important to note that the Tiber river channel still actively meanders in the area. This is obvious in recent aerial photographs, where a former, sediment-filled meander loop can be detected near the southern end of the presumed battlefield on the basis of a combination of soil- and crop-marks (Fig. 3, A). On the other hand, just two kilometres north-west of the presumed battle site, both the photograph and a digital terrain model based on LiDAR data show a feature



Fig. 3. The Tiber valley today in the Marcigliana area, the presumed location of the Allia battlefield, with a reconstructed old meander loop (A) and a man-made oxbow lake (B). Photo: Microsoft Bing Maps Platform.

⁵⁷ R. Funicciello, F. Cifelli and C. Rosa, "I caratteri geologici nell'area romana", in C. Cupitò (ed.), *Il territorio tra la via Salaria, l'Aniene, il Tevere e la via Salaria vetus*, Roma 2007, 35.



Fig. 4. A digital terrain model (DTM) of the Marcigliana area based on LiDAR data (resolution 1 x 1 m). Note the modern gravel/sand extraction pits. Map data: Ministero dell'Ambiente e della Tutela del Territorio e del Mare.

that looks like an oxbow lake set within a larger meander (Fig. 3, B; Fig. 4). Its absence from an aerial photograph taken in 1956⁵⁸ identified it as a recent feature, and a visit to the site revealed the feature to be a by-product of gravel and/or sand extraction from a fairly recent palaeochannel of the Tiber. This feature is yet another indication of the meandering nature of the Tiber river channel.

The primary concern here is, of course, what can be deduced about the location of the Tiber river channel in ca. 400 BC. The answer is: not much, until an extensive coring programme that produces a substantial number of dated samples from former riverbeds is carried out on the floodplain. Another poten-

⁵⁸ L. Quilici and S. Quilici Gigli (above n. 8), Tav. LX.

tial method would be backtracking the process of meandering with a computer simulation. For such a simulation to be at least moderately reliable, it should take into account, with sufficient accuracy, parameters such as soil, climate, and discharge with reliably modelled seasonal fluctuations. Even if these prerequisites were met, the outcome would still be highly speculative. It is therefore more useful to focus on outlining the general remarks regarding the Tiber floodplain in the Marcigliana area.

Historical Maps: An Alternative View

To get a better sense of the inherent river channel oscillation, which, even in the case of a large river, normally does not stretch over the whole floodplain – some areas can remain untouched for centuries or even for millennia⁵⁹ – we must now turn to historical maps depicting the area.

The earliest preserved maps showing the course of the Tiber north of Rome date to the Renaissance. In these maps, the course of rivers is usually depicted in a very sketchy manner. However, the map of Eufrosino della Volpaia from 1547 (Fig. 5) is of particular interest here. While the map is not detailed enough to provide comparative data on the location of the river channel, it confirms the meandering nature of the Tiber in two ways. The first is, of course, the way the river has been depicted *de facto*. Strangely, this provides less information on the topography of the Marcigliana area than another, far more interesting observation. The place name Pantano Ritondo (i.e. Rounded Swamp) is assigned to a rounded feature depicted as a piece of wilderness amidst an otherwise featureless Tiber floodplain. Two similar but somewhat smaller features without place names can be spotted downstream at fairly regular intervals. All three features are located on the eastern bank of the river quite close to the eastern edge of the floodplain. The most likely explanation is that the features seen on the map depict fossilized oxbow lakes. They were first separated from the river channel as the Tiber straightened its course, either rapidly through avulsion during a particularly strong flood or gradually through subsequent cut-offs. Thereafter, they slowly filled up with the sediments of subsequent floods, which gradually turned the former lakes into swamps.

⁵⁹ A. G. Brown, *Alluvial Geoarchaeology*, Cambridge 1997, 23–26.



Fig. 5. A detail of the map by Eufrosino della Volpaia (1547) showing the Tiber valley in the Marcigliana area. Map source: Heidelberg historische Bestände – digital (http://digi.ub.uni-heidelberg.de/diglit/piante_roma_app2/0137).

Another helpful source is the cadastre commissioned by Pope Alexander VII (1599–1667). Some of the map sheets that date to 1660 (e.g. 431/17, Fig. 6) fortunately show the area of the presumed battlefield in considerable detail. Although the way the land survey was carried out certainly influenced the outcome, these maps show that, 350 years ago, the course of the Tiber was fairly similar to the present. The differences are in the small details. For example, the tip of a meandering river channel that is barely visible in modern aerial photographs (see Fig. 3, A) was waterlogged enough to be marked as a quagmire in 1660.

An interesting feature in the cadastre map is the absence of the fossilized oxbow lakes, which, according to our interpretation, are prominent features in della Volpaia's map. It is unthinkable that all three of them could have disappeared during a period only slightly longer than a century. The most likely

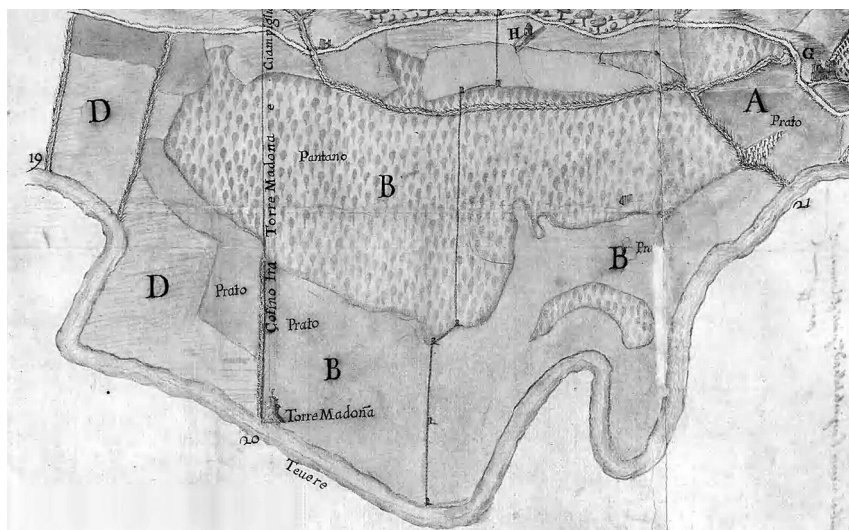


Fig. 6. A detail of map 431/17 (1660) belonging to the cadastre of Pope Alexander VII (*Catasto Alessandrino*) and depicting the Marcigliana area. Map source: *Archivio di Stato di Roma*.

reason for the discrepancy is the purpose of cadastres: they were meant to definitively map land-owning conditions rather than to present the actual topography of the area. Therefore, it is more likely that the mismatch is related to the style of documentation than to a sudden change in environmental conditions.

The lesson to be learned from these observations is that just 500 years ago, the area that has long been viewed as the most potential site for the Battle of Allia was not just a flat and featureless floodplain.⁶⁰ Rather, it was characterized by the presence of previous palaeochannels, which had filled up according to the age of their formation. Without human intervention,⁶¹ this would also be the fate

⁶⁰ See also L. Quilici and S. Quilici Gigli (above n. 8), 55–56.

⁶¹ An interesting question regarding the horizontal displacement of the Tiber river channel in general is whether humans had attempted to control the river's flow before the modern embankments were built between 1876 and 1910 to protect the city of Rome (see, e.g., G. S. Aldrete, *Floods of the Tiber in Ancient Rome*, Baltimore 2007, 247–252). It has been proposed that during the first two centuries of the Roman Empire, the course of the Tiber immediately north of Rome was regulated with earthworks that possibly extended all the way to the Marcigliana area (L. Quilici and S. Quilici

of the "man-made oxbow lake" located north-east of the site.⁶² The fully developed round meander enveloping it (Fig. 3B) will begin its own sequence as soon as the Tiber cuts off the remaining 300 metres of the meander neck. The rounded meander of the current Tiber channel is strikingly similar to the estimated shape and size of Pantano Ritondo.⁶³

Yet another aspect related to the position of the river channel and its effect on the battle that has not gained sufficient attention is that these hostilities took place in July, when the water level of the Tiber is usually at its lowest. July is normally the second-driest month of the year in the Tiber basin, with the water level dropping down to one and a half metres below average. This implies that, notwithstanding the fine sediments that retain water, the floodplain was in all likelihood dry enough to serve as a battle locale. In addition, the low water level might have encouraged fleeing Roman troops to attempt to cross the river with the well-known consequences described by the ancient authors.

Erosion and Sedimentation: Vertical Component

In attempting to locate the Allia battlefield through the geological history of the Tiber, the vertical component of the floodplain evolution must also be taken into consideration. It is evident at the outset that, due to later erosion and sedimentation, the hills flanking the floodplain were slightly steeper and higher and the level of the floodplain was several metres lower than at present.

Sedimentation cannot take place without erosion that produces mineral material for streams and rivers to transport. Furthermore, the volcanic hills flanking the Tiber floodplain in the Marcigliana area have been subjected to erosion. The maximum rate of erosion can be estimated as 30 cm per millen-

Gigli [above n. 8], 161; L. Quilici, "Il Tevere e l'Aniene come vie d'acqua a monte di Roma in età imperiale", in S. Quilici Gigli [ed.], *Il Tevere e le altre vie d'acqua del Lazio antico*, Roma 1986, 204–205 especially note 28). Even if such embankments existed and actually enabled more secure and efficient farming by reducing the risk of flooding, they were only a short-lived solution and hardly had a long-term effect on the topography of the area examined here.

⁶² Cf. C. Pesaresi (above n. 53), 28.

⁶³ A. Carandini, P. Carafa and M. Capanna, "Il progetto 'Archeologia del suburbio per la ricostruzione dei paesaggi agrari antichi' impostazione e la metodologia della ricerca", in C. Cupitò (ed.), *Il territorio tra la via Salaria, l'Aniene, il Tevere e la via Salaria vetus*, Roma 2007, 17 Fig. 3 no 41.

nium⁶⁴ based on observations at nearby sites, where the impact of agriculture is significant. In areas untouched by humans, the rate is reduced to 2–3 cm per millennium. Hence, over the course of nearly two and a half millennia, no more than 0.7 m of pyroclastic rock has been eroded from the hilltops and slopes nearby. The accuracy of the approximation is insignificant, as the relevant piece of information is that from the viewpoint of the flanking hills, the floodplain might have had a slightly more canyon-like topography than it does today. This fact is quite impossible to grasp by viewing the modern landscape, as the effect has been further reduced by the risen level of the floodplain.

The effect of sedimentation is easiest to observe in Rome, where early Imperial structures located on the floodplain, especially at *Campus Martius*, are buried on average under 4–5 m of alluvium.⁶⁵ In the Tiber river valley immediately north of Rome, contemporary Imperial structures are usually covered by 3.5–4 m of alluvium.⁶⁶ Probably the best and certainly the most illustrative piece of evidence showing the magnitude to which historical alluvium has accumulated is the quite recent discovery of a tomb dating to the late second century AD and attributed to general Marcus Nonius Macrinus,⁶⁷ better known as general Maximus thanks to the box-office hit movie "Gladiator". His tomb was found in 2008 near Via Flaminia buried under no less than seven metres of later alluvial deposits. By extrapolating the rate of sedimentation that can be derived from this monument to a battle fought ca. 500 years earlier, one could end up with the seemingly convincing estimate of 9.2 m. This would be the approximate level of the battlefield below the present floodplain. Unfortunately, the alluvial sedimentation history of the Tiber has not been that straightforward, as the accumulation has been interrupted by periods of erosion.⁶⁸

⁶⁴ S. Judson, *Science* 160(3835) (1968) 1445 Table 2.

⁶⁵ F. Bozzano, A. Andreucci, M. Gaeta and R. Salucci (above n. 49), 9, 13, 18. The raising of ground with deliberate fills had also been practiced in various areas of Rome, including *Campus Martius*, from the Early Republican period onwards. G. S. Aldrete (above n. 61) 177–181.

⁶⁶ A. Arnoldus-Huyzendveld, *Bullettino della Commissione Archeologica Comunale di Roma* 96 (1994–1995) 281–283; F. M. Cifarelli and F. di Gennaro (above n. 44), 139 note 78; M. Carrara, *Bullettino della Commissione Archeologica Comunale di Roma* 110 (2009) 348–350.

⁶⁷ P. Popham, *The Independent*, 16.10.2008 (2008), retrieved from <<http://www.independent.co.uk/news/world/europe/found-tomb-of-the-general-who-inspired-gladiator-963797.html>> [Accessed 22 January 2009].

⁶⁸ S. Judson, *Science* 140 (3569) 899.

Nonetheless, studies carried out in tributary valleys corroborate the observations made on the Tiber floodplain – the net accumulation of alluvial sediments after the Roman period.⁶⁹ The fairly constant accumulation of behind-levée alluvial sediments is the outcome of two main factors. The variation between minimum and maximum annual discharge caused by seasonal differences in rainfall is considerable (60–1500 m³/s), while the Tiber transports 90% of its sediment load in suspension.⁷⁰ The result is seasonal flooding of the river that produces sandy or clayey loams and silts. Another factor to be considered here is the slow but steady rise of the sea level in the area of Rome after the last Ice Age.⁷¹ It has been estimated, for example, that two thousand years ago the level of the sea was 1.35±0.07 metres lower than it is today,⁷² which means that in the past two millennia, the Tiber has been forced to balance its flow by accumulating more sediment into its river valley.

It is impossible to determine precisely how much sediment has been deposited in the Marcigliana area of the Tiber floodplain since ca. 390 BC, but 5–10 metres is a reasonable and sufficient estimate.⁷³ The implication of this estimate is that the topography of the Tiber river valley was steeper then than it is today, especially when the subsequent erosion of the flanking volcanic hills is taken into account. However, as no reliable information on the location of the Tiber river channel during the hostilities is available, the maximum reduction in the width of the floodplain can be approximated as 20–50 m based on the inclination of the current slopes. Therefore, when the location of the battle site is reconstructed through palaeotopography, the impact of the vertical component can be excluded from the equation.

⁶⁹ T. Potter (above n. 54), 24–28 with citations.

⁷⁰ C. Ladanza and F. Napolitano, *Physics and Chemistry of the Earth* 31(18) (2006) 1214.

⁷¹ K. Lambeck, F. Antonioli, A. Purcell and S. Silenzi, *Quaternary Science Reviews* 23 (2004) 1567–1598.

⁷² K. Lambeck, M. Anzidei, F. Antonioli, A. Benini and A. Esposito, *Earth and Planetary Science Letters* 224 (3–4) (2004) 563–575.

⁷³ Cf. L. Quilici and S. Quilici Gigli (above n. 8), 161, 297.

Conclusion and Further Implications

After the examination of both horizontal and vertical topography regarding the area where the Battle of Allia most likely took place, the following points must be underlined. In our opinion, it is extremely unlikely that the channel of the Tiber would have followed the same course in 390 BC as it does today. Substantially solid contrasting evidence can be built up using the results of various geological investigations, historical maps, modern aerial photography (Fig. 3), and airborne LiDAR data (Fig. 4). For this reason, any further attempt to pinpoint the precise location of the conflict⁷⁴ must be carried out by taking into account multiple sources of evidence – preferably new archaeological finds pertaining to the conflict – rather than just projecting the information about the Battle of Allia found in literary sources on the contemporary location of the Tiber river channel.

The wider implications of the observation regarding the ever-changing nature of the Tiber are related to the topography of the ancient city of Rome. While the dynamic nature of the Tiber is well-evidenced by frequent references to disastrous floods in historical sources,⁷⁵ it would be foolish to assume that the river channel did not undergo a similar process of meandering in Rome itself as in the Marcigliana area some 17 kilometres north of the city. The immediate implication of this observation is that oxbow lakes and other types of either vague or prominent palaeochannels must have played some part in the urban topography of Rome at least for some time. It is equally possible that intentional efforts were made to integrate them into the townscape of the capital. While this question certainly merits a separate and detailed study, it is worth pointing out here that *naumachie* – artificial pools constructed for the performance of mock sea battles⁷⁶ – are very likely candidates for such attempts at monumentalization.

⁷⁴ L. Quilici and S. Quilici Gigli (above n. 8), Tav. CXV.

⁷⁵ G. S. Aldrete (above n. 61), *passim*.

⁷⁶ Only a limited amount of information concerning these structures has been preserved in historical sources, and even their quantity in the city of Rome is often disputed. A location in the alluvial plain of the Tiber, however, is one of their common features, and most references to them date before the 2nd century AD. In our opinion, this seems to coincide fairly well with the general urban development, which probably turned these topographical nuisances located in the alluvial plain into temporary stages of excitement and emotion. See L. Richardson Jr., *A New Topographical Dictionary of Rome*, Baltimore 1992, 265–266; E. M. Steinby, *Lexicon Topographicum Urbis Romae* vol.

Finally, returning to the presumed site of the Allia battlefield, the evidence regarding its precise location is well concealed by the alluvium of the Tiber, although various ways of modern land use may suddenly lead to unexpected finds offering new and more precise information on this topic. Until then and after that, the river will continue to flow and slowly carve itself a new course through the natural and cultural remains of the recent and more distant past.

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