Reconstructing the Battle of Pydna

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On June 22nd, 168 B.C., a Roman army commanded by Lucius Aemilius Paullus defeated the Macedonian king Perseus near Pydna, in one of the most consequential battles of the ancient world. Perseus fled, but was captured shortly afterwards. The Romans abolished the Macedonian monarchy and established their own unquestioned hegemony in the eastern Mediterranean.[1] The battle's decisive nature makes a detailed reconstruction a desideratum, including the poorly documented maneuvers between the opening skirmish and the final clash of legion and phalanx. We lack, however, a securely identified battlefield. This paper proposes a new reconstruction of the battle, placing it to the northeast of Kitros, with the battle-lines parallel to the Agios Georgios river. Secondly, we propose that the dynamics of the battle were shaped by the hasty disgorgement of troops from both camps, which explains in particular the chaotic deployment of the Macedonian line. We propose a detailed reconstruction of the battle, not situated against a white background, but rather imagining units maneuvering on real terrain.[2] It is our hope

[1] For overviews of the Third Macedonian War see N. G. L. Hammond and F. W. Walbank, *A History of Macedonia* III (Oxford 2001) 505–547, and P. Burton, *Rome and the Third Macedonian War* (Cambridge 2020). All subsequent dates are B.C. unless otherwise noted.

[2] In terms of methodology, combining close readings of the sources, topographical considerations, and appreciation of military equipment and tactics, our project follows many of the fundamental considerations elucidated by N. Whatley, "On the Possibility of Reconstructing Marathon and Other Ancient battles," *JHS* 84 (1964) 119–139.

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that advocating this particular battlefield based on topographic considerations encourages archaeological survey to conclusively establish the site.[3]

1. *Sources*

Our sources for the tactical maneuvers at Pydna are unusually poor. We have a detailed description from Livy, who wrote a retrospective of Republican history during the Augustan age, relying on earlier sources. The most important of these was Polybius, an Achaean politician and soldier who wrote a history of Rome while a captive there after 167. Polybius had accompanied the Roman army during the Third Macedonian War, and it is not impossible he had been an eyewitness at Pydna. Furthermore, Polybius' friend and patron, Scipio Aemilianus, who ensured that the historian enjoyed a comfortable and well-connected captivity (Polyb. 31.23.1–31.25.1), was the biological son of Aemilius Paullus, the Roman commander; Aemilianus served as a teenaged cavalryman at Pydna and distinguished himself at the battle (Plut. *Aem.* 22.7). A fragment of Polybius (29.17.1) records Aemilius Paullus speaking about the terror inspired by the Macedonian phalanx, which places Paullus himself among his oral sources.[4] Unfortunately, Polybius' description of the battle is lost entirely, even as it formed the basis for later sources.[5]

It is generally accepted that Livy used Polybius heavily for the military and diplomatic affairs of the Greek East; Livy himself boasts (33.10.10) of preferring Polybius over Latin an-

[3] For the recently discovered Second Punic War battlefield at Baecula see J. P. Bellón, C. Rueda, M. A. Lechuga, and M. I. Moreno, "An Archaeological Analysis of a Battlefield of the Second Punic War: The Camps of the Battle of Baecula," *JRA* 29 (2016) 73–104.

[4] For the literary portrayal of Aemilius Paullus in the ancient sources see P. Reiter, *Aemilius Paullus: Conqueror of Greece* (London 1988).

[5] For Polybian information embedded in surviving sources see F. W. Walbank, *A Historical Commentary on Polybius* III (Oxford 1967) 378–391.

nalistic sources. But Livy used at least two other sources. One was an eyewitness account by Scipio Nasica, one of Paullus' military tribunes. The other, identified by Paul Erdkamp, was an annalistic source responsible for several characteristic tropes that appear in Livy's account: emphasis on the role of Italian allies (*socii*), numbered legions, and the heavy casualties inflicted by the Romans.[6] But this does not necessarily mean we should be skeptical of these aspects in the battle narrative. Livy, himself often skeptical of the excesses of the tradition, could fact-check based on Polybius and Scipio Nasica. Furthermore, Livy's dependence on a late annalist source should not be overstated. Scipio Nasica's own account, as quoted by Plutarch, also included details on the allied contingents that so interested the late annalists, and heavy casualties are reported elsewhere by Polybius (e.g 15.14.9). Unfortunately, Livy's detailed description of the battle is marred by a massive lacuna between 44.40.4 and 44.41.1, breaking off just as both armies are deploying for battle, and picking up only as the heavy infantry lines engage.[7]

A far more concise version of the battle survives in Plutarch's biography of Aemilius Paullus. In addition to Scipio Nasica, Plutarch cites Polybius and an account written by an otherwise unknown Poseidonius (not the first-century polymath), who supposedly took part in the Third Macedonian War (*Aem.* 19.7). Plutarch likely consulted Livy as well.[8] Overall, Plutarch's biographic project entailed that his battle description is more of a précis, but it is valuable in that it survives completely.

[6] P. Erdkamp, "Late Annalistic Battle Scenes in Livy (Books 21–44)," *Mnemosyne* 59 (2006) 525–563.

[7] J. Briscoe, *A Commentary on Livy Books 41–45* (Oxford 2012) 596.

[8] Plut. *Caes.* 47.3–4, using Livy as a source; see Carl Theander, *Plutarch und die Geschichte* (Lund 1951), for a positive view of Plutarch as a historical researcher.

2. *The battlefield*

The sources provide the following topographic references that are critical for situating the battlefield:

The battle takes place on a plain before the city of Pydna (Strab. 7 fr.22).

The battle must be fought along a shallow river, no more than knee deep (Liv. 44.40.8).

The plain must meet with low, rolling hills (*lophoi*), which Perseus used to anchor his right flank (Plut. *Aem.* 16.8).

The ground in front of the Roman camp must in some way be unsuitable for the phalanx (hilly, rugged, obstacles, vegetation, etc.: Liv. 44.37.11).

Troops must be arrayed on opposite banks on at least part of the river, which both sides used for water (Liv. 44.40.4).

That same section of the river must be closer to the Macedonian camp than the Roman one, and on the right side of the Roman lines (Liv. 44.41.3).

There must be sufficient space for a Roman consular camp of roughly 650 m^2, and a Macedonian camp of comparable size.[9]

The Roman camp must be situated so that the Macedonian position is visible from the *praetorium* (Plut. *Aem.* 17.13).

The battlefield must be sufficiently large to accommodate both armies in a combat array, roughly 2.5 kilometers wide.[10]

The Roman battle line has to be situated so that the sun after

[9] For the single consular camp for two manipular legions and wings see M. Dobson, *The Army of the Roman Republic: The Second Century BC, Polybius and the Camps at Numantia, Spain* (Oxford 2007) 101–110, 134, where Lager III at Numantia, likely a two-legion consular camp, had dimensions of roughly 700 m^2.

[10] Perseus' 23,000 phalangites (two pike phalanxes and the peltasts) would need roughly 1300 meters to deploy if arrayed in 'standard' formation: sixteen men deep, three feet per man. Perseus' 10,000 or so non-pike troops would need around a kilometer arrayed eight deep with similar spacing. Given that one legion was able to face off against one 10,000-man pike block in the main battle, Paullus' Roman and Italians troops seem to have put up a frontage of over two kilometers. See M. J. Taylor, "Roman Infantry Tactics in the Mid-Republic," *Historia* 63 (2014) 301–322, at 317–318, for a highly schematic 'white field' reconstruction of Pydna.

around 3:00 p.m. would not be in the Roman's eyes (Plut. *Aem.* 17.13).

The major clash between the *Agema* and the Paeligni and Marrucini, following the initial skirmish, took place roughly 360–400 meters (two stades) from the ramparts of the Roman camp (Plut. *Aem.* 18.9).

The battle must be sufficiently near a height that could be identified as the otherwise unattested Mt. Olokros that the Paeligni and Marrucini retreated towards (Plut. *Aem.* 20.5).[11]

The battle must be sufficiently close to the sea that some of the routed Macedonians could flee to the coast, and sufficiently close to Pydna that it could receive 6000 survivors (Liv. 44.42.4–7).

In the absence of direct archaeological evidence, various topographic postulates have been made. Kromayer and Veith argued that the battle took place near the town of Katerini.[12] Pritchett proposed a nearby site.[13] The primary argument against any location near Katerini is that it places the battle far south of Pydna itself; it is unclear why the battle would not have been known as the Battle of Dion instead. Furthermore, the Pelikas and Mavronari rivers near Katerini would have represented formidable obstacles for the armies engaged, and while the battle accounts mention two rivers, they are described as small watercourses, no more than knee deep in summer, and the northern one did not prove a significant obstacle to the attack of the Macedonian phalanx. Finally, two different traditions had Perseus either dashing to Pydna to offer sacrifices as the battle began (thus Polybius) or returning from Pydna when word arrived of the battle (thus Poseidonius; Plut.

[11] Ken Dowden, "Poseidonios, On Perseus of Macedon (169)," *Brill's New Jacoby* (2014), suggests that the toponym may be corrupted, perhaps from *Phalakros* "Bald Mountain."

[12] J. Kromayer and G. Veith, *Antike Schlachtfelder in Griechenland* II (Berlin 1907) 310–316 and Karte 9.

[13] W. K. Pritchett, *Studies in Ancient Greek Topography* II (Berkeley 1969) 145–176.

Aem. 19.4–8 for both traditions). Neither version is particularly compelling, but would have lacked any element of verisimilitude if the battle occurred twenty kilometers from the city. Similarly, Plutarch reported that the Roman pursuit after the battle extended for 120 stades (ca. 20 km), which would mean only the most aggressive pursuers came within sight of the walls of Pydna if we accept the Katerini site. Few have bothered to muster a defense for these southern locations after it was strenuously challenged by N. G. L. Hammond.[14]

Hammond proposed a site near the village of Kitros that meets many of the topographic requirements: two rivers (the Agios Georgios and Agios Demetrios), defensible narrows for Perseus' blocking position, hills to the west, and rougher ground for Paullus' camp (see *fig.* 1). Hammond identified Perseus' blocking position on June 21st with the ridge north of the Agios Georgios, which peters out toward the coast and salt pans, leaving a fairly level plain about 500 meters wide. The ridges rising off the plain were well suited for light infantry maneuvers. The Romans, in his view, crossed the Agios Demetrios, halted south of the Agios Georgios, and built their camp east of Kitros before withdrawing into it.

Here our main disagreement with Hammond begins. His reconstruction then completely reoriented the battle lines for the main combat fought the next day. Because Plutarch recorded that Paullus avoided a morning engagement so his men would not have the sun in their eyes (*Aem.* 17.13), Hammond's reconstruction saw the Romans deployed facing east by southeast rather than north. In his reconstruction, the Romans had access to any of the streams they wished at their rear, and no reason at all to go downstream towards the Macedonian camp for water, eliminating the basis for the skirmish that started the battle. Furthermore, Hammond's

[14] N. G. L. Hammond, "The Battle of Pydna," *JHS* 104 (1984) 31–47.

reconstruction requires that the Macedonians completely forfeited their control over the ridge north of Agios Georgios, abandoned their camp between the Agios Georgios and Alkavitsa streams, and established a new camp south of the Roman camp, in the plain beside the Agios Demetrios. In his view the Macedonians committed to the plain, with their backs to the salt pans. In doing so they would also have ceded to their Roman foes control over the road to Pydna, their line of communications, supply, and retreat. The sources are clear that the Macedonian camp never moved, and for all his failures on the day of battle, Perseus had not shown the sort of gross incompetence that might have led him to rashly cede his line of communications to the Romans. Furthermore, on Hammond's reconstruction, a dash to Pydna to sacrifice prior to the battle would have forced Perseus to skirt by the Roman left wing, risking capture during an act that Polybius (as reported by Plut. *Aem.* 19.4–5) condemned as cowardice. Finally, Hammond's proposed axis for the battle-lines creates broad and deep lanes for phalanx advances westwards along the river valleys, enviable conditions that hardly fit the ancient accounts of the battle, in which the phalanx was quickly and handily defeated.

Davide Morelli has recently sought to modify Hammond's proposal.[15] Morelli located the blocking position of 21 June on the lower Kitros ridge, with the wide plain north of the Agios Demetrios providing ample room for Perseus' phalanx. This necessarily backed Paullus' camp onto the ridge south of the Agios Demetrios. To confront the Macedonians, Morelli has Paullus' army advancing in column across the ridges to take up positions from near the mouth of the Alkavitsa (near modern Aliki, four kilometers from his proposed camp) down to the Agios Demetrios. This positioning again has the Roman line facing east, leaving the Macedonians yet again in a singularly

[15] D. Morelli, "La battaglia di Pidna. Aspetti topografici e strategici," *Klio* 103 (2021) 97–132.

poor position. Nothing in the accounts of the battle supports situating the Roman camp off the battlefield entirely, separated from it by a river. The opening skirmish on the Agios Demetrios would have been, contrary to the written accounts, far from the Macedonian camp. Morelli's siting does not explain why the Romans would draw water in advance of their lines when the water in his reconstruction ran from their rear and through their own lines in three places. It again supposes that Perseus would permit the Romans to march across the ridges and steal their line of communications, and that Paullus, who had just outmaneuvered Perseus at the Elpeus and was clearly still eager to avoid battle, would fail to take advantage of such a blunder.

This paper shifts the location of the battle just to the north of Hammond's proposed battlefield, and reorients the battle-lines roughly east-west along the watercourses and ridges near Pydna, rather than across them. The ridge between the Alkavitsa and Agios Georgios is prominent, spacious enough for the Macedonian camp to have lain near Aliki and less than two kilometers from Pydna; the heights flatten into the plain before reaching the marshes and sea, providing the *lophoi* described by Plutarch to anchor the flank of the Macedonian blocking position. The Agios Demetrios, likely Plutarch's Aeson River, is nearly two and a half kilometers south. The Kitros ridge sits between the two rivers (*fig.* 1).

Key topographic markers are as follows: (1) The small river, the Leukos, that separated the Romans from the Macedonians would be the Agios Georgios. This watercourse would not seriously impede troop movements, even for the phalanx, while providing a common source for water, particularly for troops stationed on the eastern side of the battlefield. (2) The battle was fought just three kilometers from the town of Pydna itself, and the pursuit would have carried past the city's walls. (3) The site of the Roman camp is in the vicinity of what is now the lower village of Kitros, which provides suitable space for the

Roman camp, as well as sufficient ground (ca. 2 km) to deploy the legions and *alae*. (4) The ridge provides a suitable location for Paullus' tent, with direct visibility of the Macedonian position across the stream. Today one can see several country houses built along this ridge, taking advantage of the vista. (5) Kitros itself makes a plausible location for Mt. Olokros, allowing the Paeligni and Marrucini to retreat in the direction of the nearby height as they were pushed back toward the ramparts of the Roman camp.

3. *Disposition and strength*

Aemilius Paullus had two legions, each brought up to an exceptional infantry strength of 6000 apiece (Liv. 44.21.8). Each legion had a complimentary wing consisting of Italian *socii*. A fragment of Scipio Nasica's account has Scipio enveloping Perseus' blocking position on the Elpeus with a force of 3000 picked Italians, quite likely the *extraordinarii* (ἐκτὸς τάξεως, seemingly a fairly literal translation of *extraordinarii*), and 5000 from "the left wing," presumably the entire *Sinistra Ala* with a strength of 5000 men (Plut. *Aem.* 15.6). If each *ala* was about 5000 strong, with 3000 in the *extraordinarii*, the combined strength of the Romans and Italians was around 25,000 infantry and perhaps 1500 cavalry (300 Roman cavalry per legion, perhaps 1.5 times as many Italians).

In addition, Paullus had a force of Ligurian auxiliaries, whose initial strength when recruited in 171 stood at 2000. Only 700 are mentioned at Pydna, and many may have been lost through combat or attrition.[16] The Ligurians had served as skirmishers at the Elpeus River, and functioned again as forward troops at Pydna.[17] 1000 Numidian cavalry, an equal

[16] Liv. 42.35.6. The Ligurians were also prominent in the high attrition skirmishes at the Elpeus a few days before the battle at Pydna (44.35.19–21).

[17] Livy (44.39.19) comments favorably upon the defensive properties of the *velites*' *parma* and the *scutum Ligusticum*, seemingly a lighter *thureos*-like shield employed by Ligurian light infantry.

number of Numidian light infantry, and 22 African elephants had joined the army after the Battle of Kallinikon (Liv. 42.62.2); only the elephants are explicitly featured at Pydna. 600 Gallic cavalry had also been ordered to be recruited and dispatched to Macedonia (42.21.6), although they are never mentioned as involved in the campaign, and may not have arrived.

4000 Attalid infantry and 1000 cavalry, along with 1500 Achaeans, joined the Roman army at the start of the war, along with numerous smaller contingents, like Thessalian and Aetolian cavalry. With casualties and wastage, these units were likely understrength by 168.[18] 200 picked Thracian and Cretan light infantry participated in the march through Pythium, selected from larger mercenary or allied contingents.[19] Attalus of Pergamon and the *duces externi*, the commanders of the Greek allied contingents, participated in Paullus' war council on the eve of the battle (Liv. 44.36.8). The combat role of these auxiliaries is unclear. Some are likely to have formed up with the cavalry, supported the elephant charge, helped secure the flanks, and guarded the camp. Overall, Paullus likely had somewhat less than 10,000 auxiliary troops in his force, so that 35,000 is a reasonable estimate for the total size of his army.[20]

[18] Liv. 42.55.8–10. The largest of these lesser contingents were 300 Thessalian cavalry (or 400: 42.58.13), 400 men from Apollonia, and a cavalry *ala* of Aetolians (perhaps 400 mounted men). Perseus' fleet had successfully intercepted Attalid reinforcements before the campaign of 168 (44.28.7–15).

[19] Plut. *Aem.* 15.7. Liv. 43.7.1–2 contains a report of a Cretan embassy to the Roman senate, from which we learn that the Cretans had sent as many archers as the consul in Macedonia demanded (cf. 42.35.6, where Livy explicitly states that in his records the number of Cretans was not specified), but that these were outnumbered by the nearly 3000 serving with Perseus.

[20] Kromayer, *Schlachtfelder* 343–344, estimated 33,400 infantry, 4200 cavalry, and 22 elephants, 37,600 altogether; E. Meyer, "Die Schlacht von Pydna," *SBBerl* 1 (1909) 780–803, at 786, offers a lower-end estimate of 30,000–35,000; Pritchett, *Battlefields* 158, puts Roman strength at 38,000,

Perseus began the war with 43,000 men in arms (Liv. 42.51). The largest contingent in the Macedonian army was the phalanx, comprising two divisions called the bronze shields, *Chalkaspides*, and the white shields, *Leukaspides*.[21] A total of 20,000 or so pikemen can only be reconstructed by subtracting other explicitly enumerated contingents from the total provided by Livy (if each had 10 chiliarchies of 1024, then together they would have a paper strength of 20,480). The elite Macedonian infantry were the 5000 peltasts, including 2000 who made up the *Agema*, the veterans of the elite, and collectively "picked men out of all the Macedonians, in the prime of life and exemplary in valor."[22] There were also 3000 Macedonian cavalry, in addition to 1000 Odrysian horse commanded by his ally king Cotys.[23] The rest of the army was comprised of auxiliaries, allies, and mercenaries: 3000 Paeonians, 2000 Gauls, 3000 "Free" Thracians, nearly 3000 Cretans, 500 Aetolians

Hammond, *JHS* 94 (1984) 46, "short of 40,000," Morelli, *Klio* 103 (2021) 98, "poco più di 35,000 uomini."

[21] The suggestion of N. Sekunda, *The Antigonid Army* (Gdansk 2013) 108–110, that the *Leukaspides* were *thureophoroi* instead of pikemen is almost certainly incorrect. The Pydna narrative itself, one of the two appearances of the *Leukaspides*, strongly implies that they were pikemen like the *Chalkaspides*. Diodorus (31.8.10) described their white *aspides* (not *thureoi*) in Paullus' triumph.

[22] Plut. *Aem.* 18.7, ἄγημα τρίτον οἱ λογάδες, αὐτῶν Μακεδόνων ἀρετῇ καὶ ἡλικίᾳ τὸ καθαρώτατον. Livy consistently calls the same contingent *caetrati*, but also believed the *Agema* were a subset of the peltasts and could be called peltasts without contradiction (42.51.4–5); see P. Juhel and N. V. Sekunda, "The *Agema* and 'the Other Peltasts' in the Late Antigonid Army and in the Drama/Cassandreia Conscription Diagramma," *ZPE* 170 (2009) 104–108, for further discussion.

[23] Livy (44.42.2) places Cotys at the battle, although earlier in the war he and his contingent had been furloughed to deal with problems at home. For the arms and armor of the Odrysians see C. Webber, "Odrysian Cavalry Arms, Equipment, and Tactics," in L. Nikolova (ed.), *Early Symbolic Systems for Communication in Southeast Europe* (Oxford 2003) 529–554.

and Boeotians, and roughly 500 Greek mercenaries; Livy (42.51.9) reports that altogether these light troops totaled 12,000.

The Macedonian infantry were armed as pikemen, wielding 20-foot *sarissai* in dense pike blocks. Perseus' auxiliaries and mercenaries were highly variegated in terms of equipment: Thracians wielding scythe-like rhomphaias, Paeonian peltasts, Celtic swordsmen, and a variety of Greek troops, likely a medley of hoplites, *thureophoroi* (armed with oval Celtic shields, not dissimilar to the Roman *scutum*), peltasts, archers, and other specialists.[24]

Plutarch (*Aem.* 13.3) recorded the Macedonian army at a full strength of 4000 cavalry and nearly 40,000 infantry in June of 168 when Paullus assumed command. Both Livy (44.38.5) and Plutarch (*Aem.* 16.6) state that Perseus enjoyed numerical superiority at the battle itself. However, earlier in the spring of 168 the legates from the army in Macedonia reported to the Roman senate that Perseus' army had only 30,000 men (Liv. 44.20.4). It is possible, therefore, that the sources were in error, applying 171 numbers to 168 without accounting for casualties and attrition, although Perseus did have the capacity to recruit replacements from his Macedonian population and hire new mercenaries.

Defensive requirements also prompted Perseus to detach significant forces prior to the battle to deal both with Paullus' flanking maneuver and with the threat of Roman amphibious attacks. Livy (44.32.5–6) describes how 8000 men were detached as Paullus approached: Perseus posted 2000 peltasts at Thessalonica, dispatched 1000 cavalry to the coast, and set

[24] For the Macedonian army in general see M. B. Hatzopoulos, *L'Organisation de l'armée sous les Antigonids* (Athens 2001); also the useful overview by N. Sekunda, "The Macedonian Army," in J. Roisman et al. (eds.), *A Companion to Ancient Macedonia* (Malden 2010) 446–471.

5000 men to guard the Pythium pass around Olympus.[25] The battle narratives identify only 3000 men from the peltasts and *Agema* at Pydna, which had a paper strength of 5000 altogether, which suggests that the 2000 in garrison at Thessalonica were drawn from the peltasts. As for the 5000 at the Pythium pass, those that escaped the Roman assault should have been able to rejoin Perseus before the battle; the 2000 peltasts and 1000 cavalry seem to have remained detached. A rough accounting for previous casualties and detachments would give Perseus at least 30,000 infantry and 3000 cavalry. We should entertain the possibility that Perseus' army was in fact slightly outnumbered on the field at Pydna. Regardless, the two armies possessed a basic parity and this explains in part the hesitation of both commanders to engage in an even and therefore uncertain fight.[26]

4. *Dispositions prior to the battle*

Paullus, elected consul for the second time in 168, had taken command of his army only fifteen days before the battle. After dressing down his men for lax discipline, he instituted a remarkably effective maneuver against Perseus, who was blocking his route into Macedonia with a position along the Elpeus River. Paullus, rather than forcing a passage, sent a flanking force around the far side of Mt. Olympus, forcing Perseus to withdraw across the plain of Dion towards Pydna. Paullus linked up with the detachment, commanded by Scipio Nasica, and on June 21st the full Roman army encountered Perseus in another blocking position near Pydna just north of the Agios Georgios, where the plain narrows, allowing Perseus to anchor his flank on marshy terrain to the east and to throw his light

[25] Plutarch (16.2) puts the Macedonian detachment deployed to the pass at 12,000 men, although this might be the result of Nasica's exaggerations.

[26] For the tension between Paullus and his officers and soldiers see J. Lendon, *Soldiers and Ghosts: A History of Battle in Classical Antiquity* (New Haven 2004) 193–211.

infantry into the hills (*lophoi*) to the west. He deployed his phalanxes in a double depth of 32 ranks in the narrow plain.[27] Upon encountering the enemy force, Paullus deployed his men into a battle array, but declined battle. Rather, he peeled his army away one maniple at a time and effected a retrograde movement to establish a camp.

Perseus did not attack Paullus as he withdrew, perhaps because the width of the plain near Agios Demetrios would have made the doubled phalanx, even including the peltasts, present a narrow frontage of only ca. 700 meters, susceptible to envelopment.[28] The reported dissatisfaction of Roman officers suggests that Perseus could claim a transient moral victory after the Romans declined battle that day. But if Perseus felt smug, the Roman camp in the hills to the southwest significantly weakened his position, requiring him to extend his lines substantially beyond the compact blocking position in the plain. Given that Perseus had sufficient manpower to do so, and the broad, gentle slope of much of the Agios Georgios valley was still suitable for the deployment of his phalanx, he nonetheless maintained his camp, despite the fear of some of Paullus' legates that the king would retreat in the night (Liv. 44.36.10). Instead, the night brought the supernatural crisis of a lunar eclipse, which seems to have spooked troops on both sides (Plut. *Aem* 17.7–10, Liv. 44.37.6–9).

Ancient armies often encamped within sight of one another

[27] Plut. *Aem.* 16.7–9. Livy's coverage is again lost in a lacuna, but later he describes the Macedonian array as having been "in an open plain," *in campo patenti* (44.36.11). Double-depth phalanx: Frontin. *Str.* 2.3.20.

[28] Admittedly, Frontinus' brief account of that day's operations (2.3.20) asserts that Perseus advanced, but at a measured pace. But he also claims that Roman cavalry knocked *sarissa* heads off pikes by riding down the Macedonian line, so we must set caution to any of the details that are not confirmed elsewhere. More likely, the Roman cavalry provided a screen against the tentative Macedonian advance as the last infantry line withdrew.

in advance of a pitched battle. Each army generally sent out skirmishers and pickets, and sometimes more robust covering forces, dispatched parties for forage, wood, and water, and kept the main body in some state of readiness.[29] In some cases the whole army might be arrayed, either as an offer of battle, or in late afternoon to keep the formations exercised and demonstrate preparedness to the enemy.[30] It would not have been normal (and was not the case at Pydna on June 22) for both armies to keep their main lines in full array through much of the day.

At the start of the battle Scipio Nasica rode from the camp to the skirmishers (ἀκροβολιζομένους) for a closer view of the Macedonian advance (Plut. *Aem.* 18.4). These skirmishers likely included Roman and Italian *velites*, and perhaps some Greek light infantry, and probably represented the pickets and light infantry screen that had been posted in front of camp as a routine precaution.

Encamped armies, larger than many ancient cities, had enormous water and forage requirements, and the watering details sparked the conflagration at Pydna.[31] Along the Roman lines, those on the center and left, nearer Kitros, could descend

[29] For example, at Raphia the two sides set out skirmish lines of infantry and cavalry, while their foraging and watering details also occasionally clashed (Polyb. 5.80.7). Neither side led their phalanxes into line until the day of battle (5.82.2). Infantry and cavalry skirmish lines also figured around Pherae, prior to Cynoscephalae (Polyb. 18.19.9–11), at the Po and Trebia (3.65.3, 3.69.8–10), at the Ebro (11.32.2), and are particularly clear at Baecula (10.38.8–10.39.1).

[30] The armies were drawn up repeatedly at Ilipa, but only toward evening (Polyb. 11.21.7–11.22.3); otherwise at Ilipa, too, skirmish lines were the norm. At the Great Plains the Romans drew up their lines on the second day, but sent out skirmish lines only on the third and fourth days, prior to battle on the fifth (14.8.2–4).

[31] For Roman armies foraging for water (*aquatio*) see J. Roth, *The Logistics of the Roman Army at War* (Leiden 1999) 119–123.

safely to the rear to the Agios Demetrios, or draw water from a spring at Kitros on their left wing.[32] On the Roman right, however, the Agios Demetrios was nearly two kilometers off to their rear, and the spring even further. The Agios Georgios, on the other hand, while closer to the Macedonian camp and forward screen, would have been just a few hundred yards off. This would have pushed the forward elements on the Roman right wing toward the common stream and made it a flashpoint for the battle. The 700 Ligurians whose fight triggered the whole battle were providing cover for this watering detail (Liv. 44.35.14).

In addition to the skirmishers, the Romans also set out a *praesidium*, an advanced guard of heavy infantry and cavalry. This is not dissimilar to the advance guard prior to the Battle of Corinth in 146, where an Italian detachment (possibly the *extraordinarii*) was stationed roughly two kilometers (twelve stades) ahead of the main Roman position.[33] At Pydna, Livy (44.40.2) reports that the advance guard, of five infantry cohorts and four *turmae* of cavalry, occupied two positions: one across from the Macedonian camp, and a larger one in front of the Roman camp. It is likely these contingents were the *extraordinarii*, the picked troops of Italian *socii* (Polyb. 6.26.6–8). If a strength of 600 per infantry cohort is correct, these numbered 3000, the same size as the *extraordinarii* Scipio Nasica previously commanded when he turned the pass (Plut. *Aem.* 15.6). Three infantry cohorts, two from Latin colonies and one of the Vestini, a people from the Abruzzi highlands, along with two *turmae* of Latin cavalry, comprised the larger *praesidium* in front of the camp. The second *praesidium,* opposite the Macedonian camp and providing overwatch to the watering parties on the right

[32] Johstono identified at least one spring at Kitros during an autopsy of the site, funded by Air University OSP. The spring would have been within a kilometer of our hypothesized location for the Roman camp.

[33] Paus. 7.16.2; cf. Polyb. 3.110.6, 10.38.8.

wing, consisted of two cohorts, one of Paeligni and one of Marrucini (both Abruzzi peoples), and two *turmae* of Samnite cavalry.

On the Macedonian side, the sources speak only of 800 Thracians who were likewise posted near the streambed (Liv. 44.40.9, Plut. *Aem.* 18.1). It is possible that some of the contingents seen by Scipio Nasica at the start of the battle—Thracians, Greek mercenaries mixed with Paeonians, and the Macedonian *Agema*—had initially been positioned in front of the Macedonian camp as a forward screen, allowing them to engage quickly. The Macedonian camp itself was likely positioned at the center of the original blocking position. After the lines lengthened into the hills, the camp stood closer to the center-left of the Macedonian line. In a battle that neither side had anticipated fighting that day, the position of the Macedonian camp on the left wing made the actions in this sector decisive.

5. *The Battle of Pydna*

The battle began at midafternoon, in a stream no deeper than a man's knees, as several Thracians and Ligurians fought over a loose mule or horse.[34] Plutarch (*Aem.* 17.6) suggests that Paullus had already marshalled his army at midday, planning to give battle. But he writes this while following a tradition that claimed Paullus deliberately triggered the battle by releasing a horse. This is pure nonsense, and is contradicted by other parts of Plutarch's narrative, which has Paullus in a reactive mode as the battle suddenly erupts. Livy's account, with quiet camps, neither commander expecting to fight, and picked guards posted before the camps and near the river, is preferable.

[34] Plutarch (*Aem.* 18.1) reports that the escaped animal was a horse, but acknowledges another version where the Thracians rustle Roman "beasts of burden" (ὑποζύγια). Livy (44.40.7) describes the animal as a *iumentum* ("beast of burden"), which could describe a draught-horse, mule, or donkey; the Pydna victory monument at Delphi (see n.45 below) clearly depicts a horse.

Various traditions recounted by Plutarch suggest that neither Paullus (*Aem.* 19.3) nor Perseus (19.7–10) had time to put on a helmet or cuirass once the battle started, proof of the sudden and unexpected nature of the combat. This point is important for a reconstruction of the battle: if both sides were mostly encamped, then the scheme of the battle should reflect the confused efforts to push units out of the camp, march them to positions, and hastily deploy into combat formations. While both sides were within visual contact, the sudden nature of the battle, with troops on both sides hastily disgorging from their camps, gave Pydna many of the aspects of an 'encounter battle' or 'meeting engagement' where the combatants, suddenly and unexpectedly falling upon each other, hastily engage without any grand plan, often without their entire armies in position.

The skirmish began with a few men over one pack animal, but hundreds of Ligurians and Thracians soon joined it, although the fight remained an otherwise inconsequential tussle between auxiliaries. But other contingents from both sides' forward screen were soon drawn in. Because neither Paullus nor Perseus anticipated fighting, they also failed to control the metastasizing combat. Rather, both king and consul decided to deploy their armies and escalate to a set-piece battle once they became aware of the fracas, rather than seeking to break contact. Plutarch (*Aem.* 17.13) reports that Paullus was able to see some of the developments down the ridgeline and across toward the Macedonian camp from his own tent, but also records that he was alerted to the expanding skirmish only from the commotion in his own camp (18.3); Plutarch here seems to blend alternative versions that present Paullus as either a proactive or reactive commander. Perseus' army advanced quickly and violently, but Perseus' own role as commander is unclear. Much transpires in Livy's lacuna; but at the end of the battle the king and his cavalry were in the field, having never engaged (Liv. 44.43.1, Plut. *Aem.* 23.1).

The battle proper can be roughly divided into two main phases, first the skirmishing and hasty deployments, and second the brief, sharp clash of legion and phalanx. Below we combine the details in the sources with our own deductions based on the standardized tactics of both sides and our topographic assumptions.

PHASE 1: skirmish and deployments (see *fig.* 2)

As Paullus oversaw the marshalling of the legions into line from the camps, Nasica rode out to those "skirmishing" (ἀκροβολιζομένους, Plut. *Aem.* 18.4). Some were drawn into the fight spreading from the river (and Nasica probably rode in this general direction) while the *velites* in particular provided a screen for the heavy infantry who would form up behind them.

Nasica observed the disgorgement of the main Macedonian battle line from the camp (ἐκ τοῦ χάρακος, 18.5–8): first the Thracians, then Greek mercenaries interspersed with Paeonians, third the peltasts and *Agema* (henceforth we will refer to these simply as the *Agema*), and fourth the *Chalkaspides*. The first two were advancing already, the *Agema* were dressing their files, and the *Chalkaspides* were still "issuing from the camp" behind the *Agema* to take their places in the line (18.8). The *Chalkaspides*, as they left the camp, had to march up the valley, some of them approximately a kilometer, just to reach their positions in the extended line west of the camp.

Plutarch mentions no further Macedonian units, including the division of *Leukaspides*, to which Livy (44.41.2) assigns a prominent place in the battle, next in line after the *Chalkaspides*. This may be simple omission, but may hint at how they were deployed: if they disgorged out a side entrance of the camp, perhaps shielded by the ridge, they might have been invisible to Nasica during their initial egress, and quickly moved out of his field of vision as he fixated on the peltasts' assault.

I Legio egressed the camp, probably out the *porta praetoria*, forming up in front of the camp under Paullus' personal command (Liv. 44.41.1). The legion was roughly opposite the

Chalkaspides. To their right, and probably somewhat down the slope, were the cohorts of Paeligni and Marrucini from the advance guard nearer the Macedonian camp; these opposed the Macedonian *Agema*, and may already have engaged.

II Legio and the *Sinistra Ala* egressed, probably both out the *porta principalis sinistra,* although *II Legio* might have also disgorged by trailing *I Legio* out the *porta praetoria*.

The elephants and the *Dextera Ala* marshalled, likely through the *porta principalis dextra,* and probably linked up with the three-cohort *praesidium pro castris.* The manuscript of Livy (44.41.3) gives the deployment on the right of the *alas sociorum.* Here *alas* already reflects an emendation of the manuscript's *alias sociorum,* but Wissenborn raised the possibility of further correction to *alam sociorum*, in order to account for a single infantry wing.[35] Pritchett proposed that both Italian infantry wings fought side by side, both on the Roman right.[36] This would be not only an unorthodox deployment, but also difficult to achieve given that the units were housed on opposite sides of the Roman camp. One possibility is that Livy's sources are imperfectly aware that the *praesidium*, as *extraordinarii,* were distinct from the *Dextera Ala*, even if they counterattacked together, and thus used the plural.[37]

PHASE 2: Main combat (*fig.* 3)

The 3000-strong *Agema* was the first heavy infantry unit to plunge into the fight, directly engaging the Paeligni and Marrucini, some 1200 strong. After the initial clash the latter fell

[35] The Vienna manuscript reads *alias sociorum*, emended to *alas,* but perhaps still incorrect. See Briscoe, *Commentary* 597.

[36] Pritchett, *Battlefields* 162; followed by Morelli, *Klio* 103 (2021) 97–132.

[37] It must be remembered that there had been no *socii* in Roman armies since 88, creating the real possibility that a first century annalist or even Livy himself might be at times confused by the deployment of the Italian allies and the associated terminology.

back towards what Plutarch (*Aem*. 20.5) calls Mt. Olokros, probably the Kitros ridge itself. The impetuous advance of the *Agema* doomed the main phalanx from the beginning. Had the *Agema* held back, it might have protected the vulnerable flank of the *Chalkaspides* and effected a coordinated attack against the legions. Instead, the elite corps committed itself to an ultimately ancillary fight.

The forward advance of *I Legio* against the *Chalkaspides* bypassed the peltasts (thus Liv. 44.41.2: *a tergo caetrati erant*), whose assault isolated them from the main Macedonian line. Paullus seems to have judged that the Paeligni were still in a position to hold against the peltasts to prevent them from assaulting his own flank and rear as he advanced the legion down the slope. The heroics of the Paelignian *hegemon* Salvius, who hurled his unit's standard behind the ranks of the peltasts and demanded his men recover it, had some real tactical value (Plut. *Aem* 20.1–2). *II Legio*, commanded by the legate L. Postumius Albinus, simultaneously moved against the *Leukaspides* (Liv. 44.41.2).

The *Dextera Ala* attacked the Macedonian left, fronted by the elephants (Liv. 44.41.3–4). The elephant attack was met by Perseus' *elephantomachoi*, whose defense was ineffective.[38] The mercenaries and auxiliaries on the Macedonian left collapsed under the assault of the Latin and allied infantry.

The *Chalkaspides* advanced across the watercourse to engage *I Legio*. Crossing the Agios Georgios may have caused some disruptions, but the *Chalkaspides* were in intimidatingly good order when they attacked Paullus' legion, so that Paullus later freely admitted his private terror (Polyb. 29.17.1). Yet the cohesion of the pike phalanx failed rapidly. Because of the forward advance

[38] The passage of Livy that described the *elephantomachoi* is missing, but Zonaras (*Epit.* II 314 Dindorf) contains a description of a contingent (a "phalanx of hoplites" actually, φάλαγγα ὁπλιτῶν) armored with spikes on shields and helmets, a curiosity—human caltrops!—that may derive from the annalist tradition rather than Polybius.

of the *Agema*, the left flank of the *Chalkaspides* was vulnerable from the start, but Plutarch emphasized the "varied efforts of the combatants" that saw some parts of the line push well ahead of others, opening up "breaks and gaps."[39] As Livy says, there were "many scattered combats" that "first broke apart the phalanx in its uneven advance, then destroyed it."[40]

The *Leukaspides* were not fully formed when the Romans attacked, and were quickly infiltrated and destroyed by *II Legio* as a result (Liv. 44.41.6: *inmissa dissipauit phalangem*). It is entirely possible that the *Leukaspides* did not even advance across the Agios Georgios. Given that it likely took 20–30 minutes for both armies to maneuver into position, the complete collapse of both Macedonian phalanx divisions happened within 30–40 minutes of actual combat; Plutarch (*Aem.* 22.1) reports that the entire battle took less than an hour.

There is no evidence that the Macedonians sought to use their fortified camp as a refuge, in contrast to the Seleucids at Magnesia, who offered significant resistance from their ramparts after their phalanx broke (Liv. 37.43.10–11). It is possible that the successful attack of the *Dextera Ala* captured the camp before the phalanx units fled, depriving them of a potential redoubt. Only nightfall and, most likely, the Haliacmon river, roughly twenty kilometers from the battlefield, stayed the Roman pursuit (Plut. *Aem.* 22.1–2).

6. *Casualties*

Casualty reports of 20,000 (Liv. 44.42.7) or even 25,000 (Plut. *Aem.* 21.7) Macedonians killed are likely exaggerated, either due to the inflationary influence of a late annalistic

[39] Plut. *Aem.* 20.7: κλάσεις τε πολλὰς καὶ διασπάσματα … ποικίλαις ὁρμαῖς τῶν μαχομένων, τοῖς μὲν ἐκθλιβομένην μέρεσι, τοῖς δὲ προπίπτουσαν.

[40] Livy 44.41.6: *quam quod multa passim proelia erant, quae fluctuantem turbarunt primo, deinde disiecerunt phalangem*; Plut. *Aem.* 20.8: καὶ συμπλεκομένους μὴ μίαν πρὸς ἅπαντας, ἀλλὰ πολλὰς καὶ μεμιγμένας κατὰ μέρος τὰς μάχας τίθεσθαι.

source (so Erdkamp) or possibly even rooted in Paullus' own grandiose claims.[41] Indeed, the enemy casualties in the sources may derive from the public report made in Rome by Paullus' legates, which described thousands of Macedonians killed and captured (Liv. 45.2.4: *quot milia ex iis caesa, quot capta forent*).[42] Livy (44.27.8) reports 11,000 Macedonian prisoners; this figure may be more reliable if captives were tabulated, entered into treasury records, and paraded in the triumph. Still, adding the figures together, 31,000–36,000 killed and captured, would encompass virtually the totality of Perseus' force, and suggests an overestimate of the dead. Regardless, Macedonian losses were extraordinarily heavy. The killed and captured were concentrated among the heavily engaged ethnic Macedonians in the phalanxes and *Agema*, a demographic disaster for the kingdom, and a major reason why support for the Antigonid monarchy collapsed after the battle.

Roman losses were light: Plutarch (*Aem.* 21.7) provides two alternate but similar figures: 100 following Poseidonius, 80 following Nasica. Livy reports less than 100 killed, mostly among the Paeligni.[43] The lopsided casualty ratios were typical for Roman battle, where most of the casualties were suffered by the defeated side massacred in the pursuit, while few men were killed on either side during the pitched battle so long as they were able to maintain formations that maximized the protec-

[41] Erdkamp, *Mnemosyne* 59 (2006) 545; P. Brunt, *Italian Manpower* (Oxford 1971) 643, was generally skeptical of casualty reports in Roman sources.

[42] For triumphal petitions and official reports as a source of both friendly and enemy casualty counts see M. Pittenger, *Contested Triumphs: Politics, Pageantry, and Performance in Livy's Republican Rome* (Berkeley 2008) 104–114.

[43] E. Pearson, *Exploring the Mid-Republican Origins of Roman Military Administration* (Routledge 2021) 75–85, considers the administrative processes that underlay reports of Roman dead in Roman or pro-Roman sources, suggesting that the need to determine ration and pay requirements for the army meant that the official tally of Roman and Italian dead was carefully kept and relatively accurate, albeit often rounded in the sources.

tion of their shields and armor.[44]

7. *Cavalry at Pydna: presence and absence*

Above, we reconstruct Pydna as an infantry fight. Our sources give no indication the Macedonian cavalry sought to engage on either wing, or made any attempt to slow the Roman counterattack against the Macedonian left wing on ground suited for cavalry action. The invisibility of the Macedonian cavalry at Pydna therefore stands as a mystery akin to the odd lack of the Persian horse at Marathon. Curiously, the Macedonian cavalry was quite close to the king himself, and fled with him after the battle (Plut. *Aem.* 23.1). This would seem to preclude the explanation of simple command and control failure. Perseus may have deliberately held the cavalry back hoping that he could unleash it should his phalanxes rout the legions. Indeed, Paullus' cavalry may have operated under similar orders, although Paullus was sufficiently distracted by his personal command of *I Legio* that it is far more plausible that the belated engagement of the Roman cavalry was indeed a command and control failure. We cannot rule out that unattested environmental factors (heavy patches of vegetation, marshy soil near the coast, etc.) also hindered the cavalry from getting into position before the brief infantry clash concluded.

It is nonetheless possible to imagine a scenario in which both cavalry wings hastily moved to the lower plain, only to fix each other, rather than directly engage. Alternatively, we might read the problematic *alas sociorum* (discussed above) who accompanied the attack of the elephants against the Macedonian left wing, as the advance of some cavalry units, not only Romano-Italian, but perhaps also Greek and Numidian riders. This would require the assumption that a late annalistic source, or even Livy himself, elided the Middle Republic *ala* for Italian infantry formation with the emerging early imperial use of *ala*

[44] Sabin, *JRS* 90 (2000) 5–6.

as cavalry squadron, often employed for this purpose by Livy (e.g. 26.14.6).

The account of Cato's son (Plut. *Cat.Mai.* 20.7–8), who lost his sword in a cavalry assault, and with a band of comrades recovered it after brutal hand-to-hand fighting, locates the cavalry in the thick of the battle. A plausible scenario for combat between Roman cavalry and Macedonian pikemen would be if the Roman horse rode against the flank and rear of the *Agema*, which had been bypassed and isolated by the main infantry assault, finally relieving the beleaguered Paeligni. The Pydna monument prominently portrays Roman cavalry locked in combat with both Macedonian cavalry and infantry, although this may simply be artistic license, or alternatively evokes the pursuit and slaughter of the Macedonians in the final phase of the battle.[45]

When the phalanx buckled, the Macedonian and Thracian cavalry retreated with the person of the king (Liv. 44.42.2, Plut. *Aem.* 23.1–5). Hellenistic kings were often forced to extract themselves quickly in the event of a defeat, given the catastrophic consequences of their person falling into the hands of the enemy. Antiochus III fled quickly with his cavalry after the defeat at Raphia (Polyb. 5.84.13), raced away again with his cavalry as the jaws slammed shut at Thermopylae (Liv. 36.19.9), and also made a sudden retreat at Magnesia (37.44.4). Philip V had likewise fled with the bulk of his cavalry after Cynoscephalae (Polyb. 18.26.8). The king had to survive for his dynasty to survive, and so the flight of kings in lost battles was less an act of cowardice than standard operating procedure.

8. *Conclusion: an encounter in plain sight*

The key to understanding the battle of Pydna is to treat it as a 'meeting engagement', in which two sides blunder into each

[45] M. J. Taylor, "The Battle Scene on Aemilius Paullus's Pydna Monument," *Hesperia* 85 (2016) 559–576.

other, neither expecting nor prepared to fight, but commit to a battle because both have the strategic goal of defeating and destroying the opposing army. Meeting engagements are characterized by hasty deployments and confused circumstances, generally shrouded in an unusually thick fog of war. At Pydna, both sides knew the precise location of the other and could even see each other from their respective camps. But neither planned to fight that afternoon. The unanticipated skirmish prompted both sides to disgorge their armies from their camps and hurtle towards each other in hastily-formed battle arrays.

In such encounter battles, focused leadership can be decisive, especially the general who has a good hunch about where the decisive point of the battle will be and commits combat power accordingly. Here Paullus had the advantage. While Perseus held back with his cavalry, perhaps hoping for a decisive pursuit, Paullus identified the main infantry fight as critical point, personally took command of the legion confronting the advancing phalanx, wisely bypassed the distraction of the *Agema* and the Paeligni, and broke the *Chalkaspides*. While Paullus had twice hesitated to offer battle, and might have continued attempts to out-maneuver Perseus but for the escaped horse, once the battle began he successfully combined calm assessment and swift but focused action.

The encounter battle also rewards military units that can quickly deploy for combat, and here the Romans enjoyed an advantage. In our topographic reconstruction, a key aspect of that advantage was the extent that the location of Paullus' camp shifted the center of gravity of the engagement. Thus, while the legions were able to transition into combat formations almost immediately upon disgorging to the front of their camp, the two phalanxes, as they marched west up the Agios Georgios valley against the forming Roman center, spent more of the early phase of the battle in a marching formation. In such hasty and imperfect deployment, the tactical flexibility of the Roman legion, famously described by Polybius (18.28–31),

was critical. We conclude with only a few additional considerations on 'the face of battle' as the manipular legion confronted an imperfectly deployed phalanx.[46]

A potential weakness of a pike phalanx is the length of the pike itself.[47] Livy (44.41.7) himself alludes to this fact, and he may reflect the analysis of Polybius: "but if by attacking them in detachments you can compel them to wheel about their spears, which are cumbersome in both weight and length, they are rendered an entangled, confused mass."[48] When confronted on an exposed flank, the Macedonian *syntagma*, the basic building block of the phalanx, sixteen men wide and sixteen men deep, had limited recourse. Livy asserts that, because the phalanx battalion oriented toward a single direction, "any tumult at the flank or rear throws them all into ruinous confusion."[49] Hellenistic tactical manuals described two ways for phalanxes to cover their flanks and rear, the oblong *plaision* and squared *plinthion*.[50] However, in the manuals and in

[46] While most of this essay has focused on topographical and tactical aspects of the battle, the methodology associated with J. Keegan, *Face of Battle* (London 1976), remains a landmark study for appreciating the psychological and physical variables of frontline combat, and how they impact the overall outcome of battles; for the dynamics of Roman battle see P. Sabin, "The Roman Face of Battle," *JRS* 90 (2000) 1–17, although note that the hour-long combat at Pydna represent a brisk battle by Roman standards.

[47] The most convincing reconstruction of the Macedonian *sarissa* remains P. Connolly, "Experiments with the Sarissa—the Macedonian Pike and Cavalry Lance—a Functional View," *Journal of Roman Military Equipment Studies* 11 (2000) 103–112, proving that a roughly six-meter pike, as described by Polybius and fitted with a spearhead and buttspike from Vergina, was a functional weapon.

[48] Liv. 44.41.7: *si carptim adgrediendo circumagere immobilem longitudine et gravitate hastam cogas confusa strue implicantur.*

[49] Liv. 44.41.7–8: *si vero aut ab latere aut ab tergo aliquid tumultus increpuit, ruinae modo turbantur.*

[50] Classical-era examples for hoplite phalanxes include Thuc. 7.78.2 and

historical examples both formations were used exclusively for larger divisions.[51] Johstono, while conducting phalanx drill with military cadets, adapted battalion-level drill from tactical manuals to the sub-battalion level to explore possible responses to flank attacks. Attempts to form a square in close formation produced frequent contacts (which would have produced injuries had the weapons had butt-spikes).[52] The only practical square involved half-file leaders instructing their rear ranks to face their flank and lower pikes, which nonetheless left the flanks of forward ranks exposed. In meeting an attack on an exposed flank of a *syntagma*, lowered pikes must be raised to full vertical to shift face, and handfuls of men from different files coordinated to dress their ranks and lower pikes in a new direction. This would have to be managed without the participation of the file-leading officers, who were all posted in the first rank.[53] Any phalangite attempting to defend himself from

Xen. *An.* 3.4.19. Asclepiod. *Tact.* 11.6 specifies that the sides of the *plaision* each comprised one or more sub-units arrayed so that the file leaders faced out on each side.

[51] Arr. *Tact.* 29.8 specifies that the *plinthion* is a later term for a squared *plaision.* The classic case for a Macedonian phalanx is the retreat of the *argyraspides* in Diod. 19.43.5. It seems the 3000 *argyraspides* formed a single square prior to cavalry attack, then withdrew under attack. The 16,000 Seleucid phalangites at Magnesia also formed in a square, with elephants and light troops inside (App. *Syr.* 35). See also Plut. *Crass*. 23.3, Jos. *AJ* 13.4.4, for a *plinthion* as an entire army in a hollow square.

[52] These experiments were conducted over several classes with Citadel cadets, using rigid 8-pound, 12-foot poles and 60 cm shields.

[53] The theoretical principles in the manuals suggest that their solution for defending an attack on, say, the right flank, would have been for the half-file leaders (*hemilochagoi* or *dimoiritai*) to compact their formation on the rear left, then a quarter turn on the right to make the half-file leaders the new front rank on the right, then extend back to normal combat spacing. This sort of parade maneuver is practically absurd in combat, but did work with cadets on the parade field. The fact that Macedonian officers were the only ones required to present cuirasses or half-cuirasses (*SEG* XL 524.B.2, 6) strongly

a flank attack with his pike was likely to wound those around him, or become entangled with other pikes, so he may have been inclined to drop his pike and draw his sword instead.

In the scrum of close combat, the Romans also had an advantage in equipment, a fact mentioned in general terms by Polybius (18.31.10), and more specifically by Plutarch (*Aem.* 20.10), who contrasts Roman *scuta* and *gladii* against Macedonian "flimsy shields" (ἐλαφροῖς δὲ πελταρίοις) and "small daggers" (μικροῖς μὲν ἐγχειριδίοις). Plutarch's rhetoric exaggerates, but the legionaries indeed enjoyed a material advantage once they got inside their opponents' pikes. Macedonian soldiers likely carried either a leaf-bladed *xiphos* or a machete-like *machaira*. The *gladius hispaniensis* seems to have been modestly longer than both Macedonian types: the two specimens of *gladii* contemporary with Pydna, from Šmihel, Slovenia (ca. 175 B.C.), have blade lengths of 62 and 66 cm; the total lengths including the hilt would have been approximately 75 and 80 cm.[54] One of the few well-preserved Hellenistic *xiphê*, from Beroia, has a blade length of 46 cm, for a total length of 55 cm.[55] Two unprovenanced *machairai* in the Metropolitan Museum in New York have similar dimensions.[56]

suggests that they were the front-rank fighters. A tombstone from Koptos, Egypt, likewise honors a Macedonian commander who fell fighting in the front rank (E. Bernand, *I.métr.Egypte* 4).

[54] J. Horvat, "Roman Republican Weapons from Šmihel in Slovenia," *Journal of Roman Military Equipment Studies* 8 (1997) 105–120; for other Republican-era *hispaniensis* lengths see F. Quesada Sanz, "*Gladius Hispaniensis*: An Archaeological View from Iberia," *Journal of Roman Military Equipment Studies* 8 (1997) 251–270, at 256, with blade lengths falling between 60–67 cm. Both Šmihel blades have badly damaged tangs; the estimate for total length is based on the Delos *gladius*, which has a 13 cm hilt.

[55] G. Touratsoglou, in *Ancient Macedonia* IV (Thessaloniki 1986) 616–620.

[56] Inv. no. 2001.346/543, with total lengths of 56.5 and 54.6 cm respectively.

The Roman *scutum* presented roughly 7000 cm^2 of protective surface, compared to ca. 3800 cm^2 for a large Macedonian shield with a 70 cm diameter. Smaller shields, ca. 60 cm, would only offer ca. 2800 cm^2 of protection.[57] In close combat the Roman legionary benefited from a somewhat longer sword and substantially larger shield.[58]

The effective range of the Roman *pilum*, up to 25 meters, also allowed legionaries to riddle the phalanx while staying clear of the bristling *sarissai*.[59] *Pila* also protected the spaces between the Roman maniples from counter infiltration. If a Macedonian *syntagma* tried to move into the space between two maniples of *hastati*, it would find itself in a lethal situation, facing the maniple of *principes* to its front, and now itself flanked by the *hastati*, and caught between a devastating cross fire of heavy javelins, including raking fire against their unshielded right flank. Thus, a fundamental asymmetry in the battle: when the Romans discovered a gap in the phalanx, they could exploit it to devastating effect; the Macedonians entered any space in the Roman line at their own peril.

Plugging a single hole in the phalanx could require great efforts: a break at the Battle of Issus in 333 was closed only after 120 Macedonians fell fighting, including the taxiarch (Arr.

[57] Dimensions of the *scutum*: Polyb. 6.23.1 (120 x 75 cm), with discussion by A. Treloar, "The Roman Shield: Polybius VI.23.2," *CR* 21 (1971) 3–5. For considerations of the size of the Macedonian shield see J. K. Anderson, "Shields of Eight Palms' Width," *CSCA* 9 (1976) 349–363, and N. G. L. Hammond, "A Macedonian Shield and Macedonian Measures," *BSA* 91 (1996) 365–367.

[58] For the overall material advantage Roman soldiers enjoyed in arms and armor see B. Devereaux, *The Material and Social Costs of Roman Warfare in the Third and Second Centuries B.C.E.* (diss. Univ. of North Carolina 2018), whose conclusions have heavily influenced the discussion presented here.

[59] Range of the *pilum*: P. Connolly, "The Reconstruction and Use of Roman Weaponry in the Second Century BC," *Journal of Roman Military Equipment Studies* 11 (2000) 43–46.

Anab. 2.10.4–7). Such heroics were no doubt also present on the Macedonian side across the battlefield at Pydna, but proved futile as the Romans infiltrated the hastily and imperfectly formed phalanx and carved it apart from the inside out.

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Figure 1: Perseus' blocking position and Paullus' line of march, 21 June 168

All satellite imagery courtesy of Google Earth under fair use policy

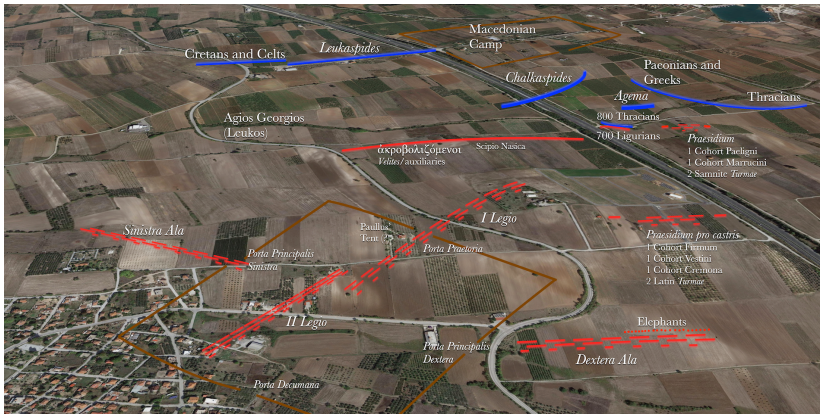

Figure 2: Phase 1 of the battle, as the skirmish at the river escalates and both sides hastily disgorge their forces from the camp

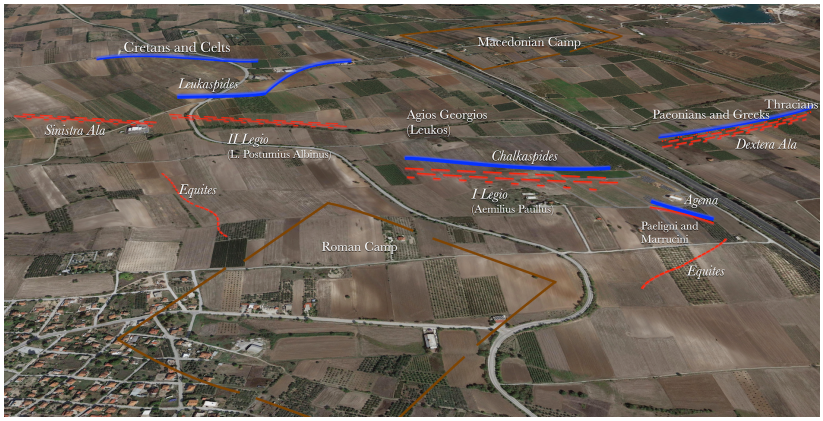

Figure 3: Phase 2 of the battle, as formations on both sides move into position and launch mutual attacks