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A new Roman camp north of the Lower German Limes at Ermelo (the Netherlands)

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SUPPLYING THE ROMAN EMPIRE

HARRY **VAN ENCKEVORT**, MARK **DRIESSEN**, ERIK **GRAAFSTAL**,
TOM **HAZENBERG**, TATIANA **IVLEVA** AND CAROL **VAN DRIEL-MURRAY** (EDS)

LIMES XXV VOLUME 4



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A new Roman camp north of the Lower German Limes at Ermelo (the Netherlands)

Mark Driessen and Wouter
Verschoof-van der Vaart

The Roman limes in the Netherlands consists of a modest 150 km of riverine frontier, excluding the – frequently neglected – coastal military defences. The Dutch waterscape border zone is quite densely packed with military installations and houses more than 20 *castra* and *castella*. For decades Roman military studies focused on these installations, their inhabitants and environs, overlooking other military structures such as, for instance, temporary camps. That this is not unique to the Dutch situation is underlined by Rebecca Jones (2017, 521) labelling them as the ‘Cinderella of Roman military studies’ in a 2009 Limes Congress session. Consequently, until recently only one Roman camp was known in the Netherlands outside the limes zone: Ermelo-Leuvenum (fig. 1B). However, recent archaeological research has resulted in the discovery of a new Roman camp (fig. 1A) in the vicinity of Ermelo and the known camp, about 40 km north of the limes.

The discovery

As part of the second author’s PhD research, LiDAR data (Crutchly & Crow 2018) from the northern Veluwe was analysed (Lambers *et al.* 2019, 8; Verschoof-van der Vaart 2022). While scanning the LiDAR data he stumbled upon a distinctive parallelogram-shaped structure hidden under the canopy of an early 20th century Douglas fir (*Pseudotsuga menziessii*) production forest. This discovery immediately aroused the attention of his Roman colleagues: could this be a new Roman camp, situated only a few kilometres from the one at Ermelo-Leuvenum? A small archaeological field survey demonstrated that the outer perimeters consisted of an earth rampart enclosed by a V-shaped ditch. During consecutive fieldwork campaigns 15 trenches were dug through the defensive works and interior of the parallelogram shaped structure (fig. 2), together with some sparse finds making clear that we are dealing with such a military installation.

The camp of Ermelo-Leuvenum

The structure found at Ermelo-Indianenbos appears to be a mirrored design of the camp of Ermelo-Leuvenum, situated 4 km to the east (fig. 1B). Holwerda was the first to investigate

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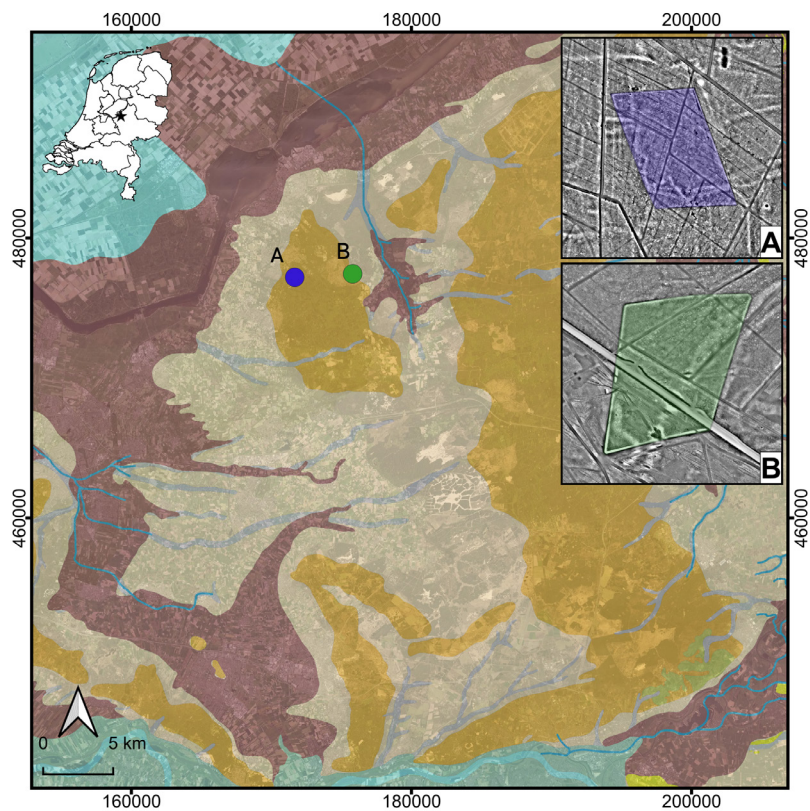


Figure 1. The two Roman camps of Ermelo plotted on the palaeogeographical map of 100 AD. A. Ermelo-Indianenbos; B. Ermelo-Leuvenum, and showing the pushed moraine (orange), Pleistocene sand area (pale yellow), peat (brown), outer water, mainly brackish and marine areas (light turquoise), occasionally, or former flooded fluvial plains (dark turquoise), inner water, mainly freshwater rivers and creeks (blue). Insert: location (star) in the Netherlands (source map <https://www.pdok.nl>).

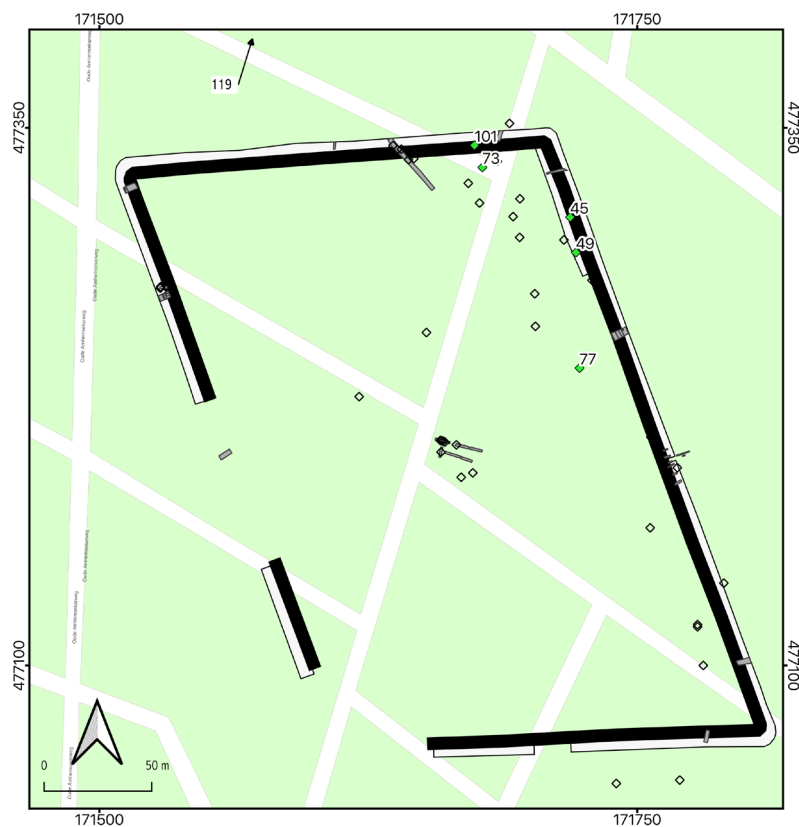


Figure 2. The Roman camp of Ermelo-Indianenbos, showing the earth rampart (black), ditches (white), excavation trenches (grey), and the find locations (diamonds, in dark green the ones mentioned in text).



Figure 3. Cross-section through the ditch of the Roman camp of Ermelo-Indianenbos (trench 4).

Ermelo-Leuvenum in 1922 (Holwerda 1923), but only in 1987 were additional small-scale excavations conducted by the State Service for Cultural Heritage (then called Rijksdienst voor het Oudheidkundig Bodemonderzoek, ROB), which were published twenty years thereafter (Hulst 2007).

Ermelo-Leuvenum is a parallelogram-shaped structure, albeit slightly larger than Ermelo-Indianenbos, with uneven sides of 250-300 by 340-360 m (c. 22 acres or 9 ha). Its rampart had a preserved height of 0.45 m and was surrounded by 0.8-1.7 deep and 1.6-2.4 m wide V and U-shaped ditches. These V-shaped in cross-section ditches were of the *fossa fastigata* type with bottom rectangular slots (Holwerda 1923, fig. 23; Hulst 2007, 16-24). At the eastern, southern, and western sides entrances, defended with *tituli* can be distinguished (Holwerda 1923, 41, fig. 23; Hulst 2007, fig. 4).¹ The post-Medieval extensive use of the 'Leuvenumsche Veld' as heathland has led to reasonable preservation of the structure's ditch and rampart. However, the northern part was affected by wood exploitation for mine tunnelling and land reclamations taking place in the 1920's and 1930's (Hulst 2007, 7-8).

Ermelo-Leuvenum has been dated during the reigns of Antoninus Pius or Marcus Aurelius by Hulst (2007, 35-38), based on a Dragendorff 18/31 *terra sigillata* sherd, 2nd century Oelmann 89 coarseware fragments, and the results of three ¹⁴C dates. However, a Hadrianic origin cannot be ruled out, considering the current view of the range shown in the ¹⁴C dates and the presence of other ceramic fragments, which include a South Gallic *terra*

sigillata sherd. Such a dating can be underlined by a recently discovered RIC 247 Hadrian *denarius* – from the same consulship as the one found at Ermelo-Indianenbos (see below) – found in the vicinity of the camp (Mattingly & Sydenham 1926).

The camp of Ermelo-Indianenbos

The parallelogram-shaped camp of Ermelo-Indianenbos (fig. 1A) covers an area of c. 200 by 300 m, enclosing more than 14 acres (5.7 ha). The archaeological fieldwork indicated that the structure was defended by earth walls surviving to a height of c. 0.80 m and a width of at least 4 m. Referring to the rampart's measurements given by Vegetius (*Epitoma Rei Militaris* 1.24) and Pseudo-Hyginus (*De Munitionibus Castrorum* 50). Jones (2017, 525) concludes that seen the existing survived height of three Roman feet or even more for a dozen camps in Britain, Pseudo-Hyginus' larger dimensions were attested at many camps. Likewise similar original measurements can be expected for the camp at Ermelo-Indianenbos. The walled camp was surrounded by U and V-shaped ditches with a preserved width of 1.3-1.5 m and depth of 0.9-1.0 m. The *fossa fastigata* ditches were several times outfitted with a bottom rectangular slot (fig. 3). These bottom channels – regularly encountered with Roman military installations – are interpreted as ankle breakers to hinder attackers, or for drainage/cleaning purposes (Johnson 1983, 47).

Observing the backfill stratigraphy in the ditch it is assumed that after an initial process of limited infill (fig. 3, fill 1) – resulting from natural slippage from the rampart wall or other taphonomic processes rather than deliberate dismemberment after abandoning the camp – the ditches remained open and visible for a considerable time. This is dictated by the second infill, which appears to be aeolian drift-sand (fig. 3, fill 2). Drift-sand in this region is normally dated to the Late Middle Ages (from c. 950 AD

1 The northern part of the camp is privately owned property (the Estate Leuvenum) and was therefore previously inaccessible. LiDAR images and aerial pictures – made by both authors for possible future work – show that the defensive structures at the northern side are still recognizable.

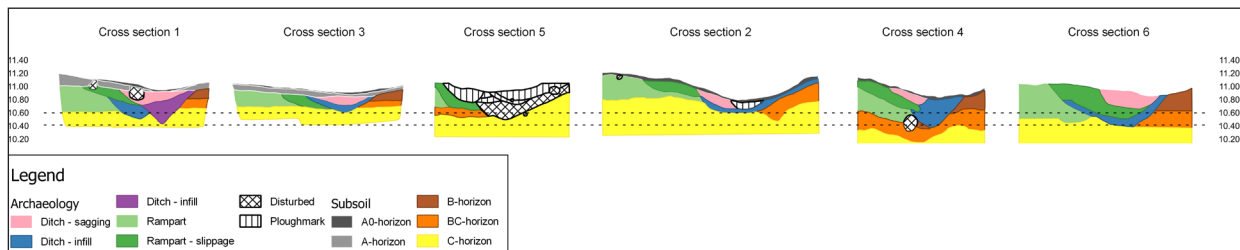


Figure 4. Cross-sections near the eastern entrance gate of the Roman camp of Ermelo-Indianenbos.

onwards with an emphasis in the 13th to 17th century) and is generally related to overexploitation of the landscape (Koster 2009; Sparrius & Riksen 2018). Interestingly, a similar infill pattern of an initial, limited infill soon after abandonment and a second, more substantial infill in the Middle Ages is also speculated for the camp at Ermelo-Leuvenum (Hulst 2007, 20). At the camp's northeastern side, a second parallel ditch with a preserved width of c. 1.6 m and depth of c. 0.7 m was found, which potentially belongs to another phase of the camp.

Although the camp's perimeters appear to be reasonably preserved – as was observed with many other camps around the Empire and speaks against destruction by the troops themselves – a substantial land reclamation and reforestation were conducted in the area in the 1930's. As part of this manual and mechanical (deep) ploughing was carried out, resulting in the demolition of substantial parts of the camp's defensive works, especially in the south(west)ern part, including the possible locations of the western and southern gates, of the structure. Unfortunately, the exact impact of the ploughing could not be ascertained through fieldwork, as the south(west)ern part of the area is covered by a dense natural regeneration of Douglas fir and hence largely inaccessible.

However, the eastern gate could be traced down by comparing cross sections of the wall and ditch at short intervals (fig. 4). These show the ditch becoming shallower towards its entrance. The setting of this gate was most probably still level and inviting for the 1930's plough team, as they went exactly through the middle of it (fig. 4). A nearby, possible *titulus*-like wall and ditch could be indicative too for the position of this camp's entrance.

However, other possible entrances at the northern, western, or southern sides of the structure could not be ascertained due to inaccessibility caused by heavy vegetation or the destruction caused by the above-mentioned ploughing. Surprisingly, the LiDAR images also give no clue on their whereabouts, so we remain unsure about their existence and location. As gates can be considered possible weaknesses in the defensive system, it is not strange to expect these to be kept to a workable minimum. Deviating from the typical four-gate formation seems to be regular practice as is testified by many British

camps where the number varies from only one to more than ten gates (Jones 2012, 86).

For a long time, Roman temporary camps were considered to be devoid of internal structures (Welfare & Swan 1995, 21-22). However, several ovens and pits discovered at the interior of Ermelo-Leuvenum (Hulst 2007, 29-35) as well at other camps *inter alia* in Scotland (Jones 2012, 94-98; Cook 2017) show that this is not invariably so. Consequently, it was decided to search for possible internal structures at Ermelo-Indianenbos. Three trenches were dug at the centre of the camp and at other accessible locations where limited destruction by the 1930's ploughing was suspected: never the less, apart from parallel plough marks, no other features were recovered. Therefore, we have to conclude for now that the camp interior is archaeologically an apparently 'empty' enclosure, lacking an intensively filled up layout with deeply dug-in structures and features.

As part of the fieldwork, an intensive metal detector survey was conducted in both the interior and in the immediate surroundings of the structure (fig. 2). Several relevant finds were discovered, besides metal objects from the 19th and 20th century, such as buttons and fighter plane ammunition. Interestingly, no finds from the Medieval or Early Modern periods (c. 1000-1800 AD) were found.

At the north-eastern interior – not far from the defensive works – ; a brooch type Almgren 22/Heeren-van der Feijst 18b, in the first half of the 1st century AD popular with soldiers (fig. 2.77); a possible horse harness strap (fig. 2.73) and a small undeterminable bronze coin were found (fig. 2.101). While just north of the camp an Augustan as (fig. 2.119) with the Lyon Altar (RIC 230/233, 7 BC-14 AD, Sutherland 1984) was found.² The northeastern defensive works contained a leather sandal fragment with four shoe nails in place (fig. 2.49), plus several sherds of Roman period handmade pottery (fig. 2.45). Such pottery consists in a large proportion of the ceramic assemblages for early Roman military installations in our regions (Stoffels 2006; 2009; Diederik 2013).

2 The coins were analyzed by Mike den Hartog. The pottery assemblage was analyzed by Ivo Hermesen.

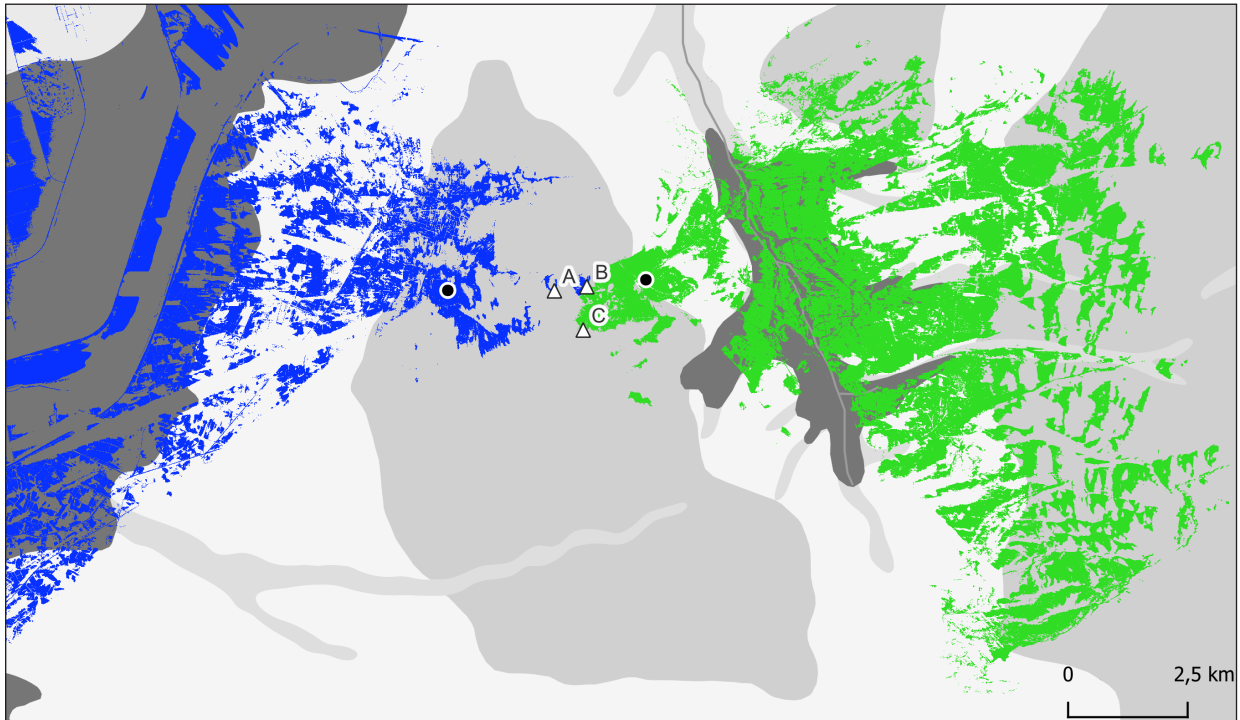


Figure 5. Viewshed analysis of the two Roman camps of Ermelo, showing the highest points in the region (A. Kriemelberg; B. Paalberg; C. Toverberg) and the visibility from Ermelo-Indianenbos (blue) and Ermelo-Leuvenum (green) on the palaeogeographical map of 100 AD (source map <https://www.pdok.nl>).

Moreover, c. 100 handmade pottery sherds, dating from the Late Bronze Age till the Roman period, were found mostly in the topsoil and in plough marks in several of the excavation trenches. In one trench a bank, dissected by the camp's ditch, also produced multiple pottery fragments. These finds possibly indicate a prior use of the area as agricultural field, such as a Celtic field system.

The sparse finds point towards a use of the camp in the first half of the 1st century, although a few 2nd century coins – including an almost unworn Hadrian denarius (RIC 240, 134-138 AD, Mattingly & Sydenham 1926) – were discovered outside the perimeters of the camp. These potentially indicate a Roman military re-use of the camp, which is not an uncommon practice in British camps (Jones 2012, 70-74).

The location and function of the camp(s)

Due to the similarity in shape, orientation, location, and possible comparative dating in the 2nd century, we cannot escape the impression that the two camps at Ermelo are somehow connected. And therefore, might have a shared function or purpose. For a possible function, we first have to consider the location of both camps in the landscape (fig. 1). The Ermelo-Leuvenum (local height of 23-27 m +NAP/AMSL) and Ermelo-Indianenbos (local height of 20-22 m +NAP/AMSL) camps are situated on respectively the eastern

and western slopes of an ice-pushed moraine formed in the Saale glacial period (c. 350,000 to 130,000 years ago, Berendsen 2000, 42). The highest parts of this ridge – named the Kriemelberg (36 m +NAP/ASML), Paalberg (44 m +NAP/ASML) and the Toverberg (56 m +NAP/ASML) – are situated between both camps and block the intervisibility between both (fig. 5A-C). Ermelo-Leuvenum lies on the western edge of the stream valley of the Leuvenumsche Beek, a creek that had in the Roman period access to the inland sea, the *Mare Flevum* mentioned by Plinius the Elder (*Historia Naturalis* 4.101). The viewshed analysis (fig. 5) makes clear that Ermelo-Indianenbos had a tactical overview over the lower lying peats and *Mare Flevum* towards the northwest. Corresponding Roman military installations with strategic positioning, sometimes with split regiments, are also known from other parts of the Empire (Breeze *et al.* 2022, 201-202 for examples and literature).

The subsoil at both locations consists of push moraine deposits, coarse sands and gravel, which were subsequently partly covered with cover-sand deposits during the Weichselian glacial period (c. 115,000 to 10,000 years ago; Berendsen 2000, 44). A podzol soil (*haarpodzol*; Berendsen 2000, 52-53) has developed in these well-drained, sandy soils. Due to very low groundwater tables, preservation conditions for (ferrous) metal and organic artefacts are low.

Roman temporary camps were for a long time labelled as solely marching camps. It has become clear that this is only one of the uses of these military installations. Generally, a differentiation has been made between the following functions (Lepper & Frere 1988, 260-263; Jones 2017; Welfare 2017):

1. Marching camps (troops in transit).
2. Construction camps (troops engaged in the construction of a nearby fort, road, or frontier; including defending quarrying, harvesting and/or procuring activities).
3. Practice or training camps.
4. Siege camps.
5. Camps for exploration, intelligence gathering, or diplomacy.

With the camps near Ermelo situated 35-40 km north of the Rhine limes, several of these purposes can most probably be ruled out. Their distance from any Roman forts, roads, or even the frontier zone excludes an interpretation as construction camps. The same could be argued for the interpretation of these camps being practice and/or training camps, as these are predominantly found in the vicinity of auxiliary forts and legionary bases. Training camps are also known from armies in transit, but in either situation they normally are quite modest in proportion and constructed with an emphasis on entrance protection structures such as *claviculae* or *tituli* (Jones 2017, 523; Welfare 2017, 568; Bödecker 2013; 2015).

Siege camps are either well-attested through classical sources, via archaeo-historically known (besieged) settlements or through militaria and/or related material culture retrieved in the wider environs of a camp. The camps at Ermelo do not match with these conditions. No settlements or strongholds to be sieged are historically or archaeologically known in this region during the Roman period. Also, both the sites and the surrounding area lack find assemblages possibly associated with sieges or battle fields. Lastly, the lack of visibility towards the area between both camps (fig. 5) also seems counterintuitive for siege camps.

An army on the move is a possibility, especially if the early dating of Ermelo-Indianenbos is taken in consideration. This is a period whereby exploration of the landscape and knowledge gathering of environmental, hydrological, and societal conditions are essential, as well as establishing diplomatic relations with local elites. There is clear archaeological evidence that the area of present-day Ermelo was inhabited in the Roman period (Van Sprang 1963; 1964; Pronk 2013). The ceramic assemblages of these small and scattered excavations did not only produce handmade pottery, but also a wide variety of wheel-thrown wares dating to predominantly the 2nd

and 3rd centuries AD, although also 4th-7th century AD fragments were found (Miedema 1974, 36-37; Pronk 2013, 59; Koelewijn 2022, 29). At seven different locations in Ermelo remains of iron production were found, including ovens and furnaces, a charcoal hearth, and an abundance of iron slag and smelting slag fragments (Pronk 2013, 67-71; Koelewijn 2022, 35-37). The wider region around Ermelo – the Veluwe – is archaeologically well-attested as an important iron production region for especially the Late Roman period and Early Middle Ages, although in some cases this could already be attributed to the Late Iron Age (Heidinga 1987, 194; Joosten 2004, 10-11). Iron production was, especially during the Early Middle Ages, the motor behind interregional networks, as settlements occupied with iron production have intriguing ceramic assemblages containing more than 80 % imported wares (Heidinga 1987, 20). This could also explain the variety, wealth, and international provenance of grave goods of a very large and rich grave field from the Late Roman and Merovingian periods found at the Groevenbeekse Heide, c. 1.5 km west of the Ermelo-Indianenbos camp (Blommesteijn 1980; Jager & Goossens 2010).

However, based on the find assemblage of (imported) ceramics, the iron production sites at Ermelo can be dated to the 2nd and 3rd century AD. A Roman date for these sites would be quite early for the metal industry on the Veluwe. Potentially, this early date for iron production could be associated with the temporary presence of Roman troops here. Rome's hunger for metals is well-attested and the Roman armies played a pivotal role in the exploration and exploitation of metal resources not only on the Iberian Peninsula, the Balkans, and Britain, but also in transfrontier regions of the Germanic provinces (Scholz this volume; Auth *et al.* this volume). Roman camps found at Limburg-Eschhofen and Lahnau-Dorlar seem to be associated with iron extraction as well (Rasbach this volume). The valley of the river Lahn where these camps were found is historically and archaeologically well known for iron production, from the Late Iron Age till the Medieval period.

Currently, the role of the Roman armies (and their temporary camps) in the contemporary iron production in the Ermelo region remains unclear. Were the present military troops involved in the control of local iron production communities and the transport of their products, or did they participate themselves in exploration and even exploitation activities? An interesting observation in this is the good visibility from both camps on the north-south routes in this part of the Veluwe region as reconstructed by Hulst (2007 42, fig. 39). Further (field)research on both sites can potentially produce evidence to support the hypothesis of the connection between these camps, local iron production, and Rome's hunger for metal.

Abbreviations

AMSL: Height above mean sea level

NAP: Normaal Amsterdams Peil / Amsterdam Ordnance

Datum: a vertical datum in use in large parts of Western Europe, it was used as the reference level for the United European leveling Network (UELN).

Bibliography

- Berendsen, H.J.A., 2000: *Landschappelijk Nederland*, Assen (2nd edition).
- Blommesteijn, C.M., 1980: *Het rijengrafveld van Ermelo*, Amsterdam (Internal Report Instituut voor Prae-en Protohistorische Archeologie Albert Egges van Giffen, Universiteit van Amsterdam).
- Bödecker, S., 2013: Ein Übungslagerareal im Hochwald bei Uedem, *Der Limes. Nachrichtenblatt der Deutschen Limeskommission* 7/2, 10-13.
- Breeze, D.J., E.P. Graafstal, T. Willmott & Ch. Flügel, 2022: The Ilam Pan. An alternative explanation for the omission of Aballava (Burgh-by-Sands), *Transactions of the Cumberland & Westmorland Antiquarian & Archaeological Society* 22 (Series 3), 196-205.
- Cook, M., 2017: The marching camp at Deer's Den, Aberdeenshire. A precis of the excavations, in: N. Hodgson, P. Bidwell & J. Schachtmann (eds), *Roman Frontier Studies 2009. Proceedings of the XXI International Congress of Roman Frontier Studies (Limes Congress) held at Newcastle upon Tyne in August 2009*, Oxford (Archaeopress Roman Archaeology 25), 531-536.
- Crutchley, S. & P. Crow, 2018: *Using airborne LiDAR in archaeological survey. The light fantastic*, Swindon (2nd edition).
- Diederik, F., 2013: *Local pottery found in the Roman military fortress Velsen I. An approach at understanding local pottery from the Late Iron Age found at the location of Velsen I*, Haarlem (Provinciale Archeologische Rapporten 1).
- Dragendorff, H., 1895: Terra sigillata, *Bonner Jahrbücher* 96/97, 18-155.
- Heeren, S. & L. van der Feijst, 2017: *Prehistorische, Romeinse en Middeleeuwse fibulae uit de Lage Landen. Beschrijving, analyse en interpretatie van een archeologische vondstcategorie*, Amersfoort.
- Heidinga, H.A., 1987: *Medieval settlement and economy north of the lower Rhine. Archeology and history of Kootwijk and the Veluwe (the Netherlands)*, Assen/Maastricht.
- Holwerda, J.H., 1923: Romeinse legerplaats bij Ermelo, *Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden te Leiden* 4, 40-44.
- Hulst, R.S., 2007: *Het onderzoek van het Romeinse marskamp bij Ermelo-Leuvenum, Nederland*, Amersfoort (Rapportage Archeologische Monumentenzorg 146).
- Jager, S.W. & E. Goossens, 2010: *Gemeente Ermelo – Bureauonderzoek. Een inventarisatie van archeologische objecten afkomstig uit de gemeente Ermelo, met verhaallijnen en adviezen ten behoeve van een museale presentatie in het Pakhuis*, Weesp (RAAP Rapport 2048).
- Johnson, A., 1983: *Roman forts of the 1st and 2nd centuries in Britain and the German provinces*, London.
- Jones, R.H., 2012: *Roman camps in Britain*, Amberley.
- Jones, R.H., 2017: What is a Roman camp?, in N. Hodgson, P. Bidwell & J. Schachtmann (eds), *Roman Frontier Studies 2009. Proceedings of the XXI International Congress of Roman Frontier Studies (Limes Congress) held at Newcastle upon Tyne in August 2009*, Oxford (Archaeopress Roman Archaeology 25), 521-530.
- Joosten, I., 2004: *Technology of early historical iron production in the Netherlands*, Amsterdam.
- Koelewijn, M.F.J., 2022: *Roman presence in Ermelo. A look into the Roman period, 12 BC until 450 AD based on the material assemblage present in museum Het Pakhuis*, Leiden (Bachelor thesis Leiden University).
- Koster, E.A., 2009: The 'European Aeolian Sand Belt'. *Geoconservation of Drift Sand Landscapes, Geoheritage* 1/2-4, 93-110.
- Lambers, K., W.B. Verschoof-van der Vaart & Q.P.J. Bourgeois, 2019: Integrating remote sensing, machine learning, and citizen science in Dutch archaeological prospection, *Remote Sensing* 11/7, 794.
- Lepper, F. & S. Frere, 1988: *Trajan's Column*, Gloucester.
- Mattingly, H. & E.A. Sydenham, 1926: *The Roman imperial coinage II. Vespasian to Hadrian, AD 69-138*, London.
- Miedema, M., 1974: A native Roman settlement at Ermelo, *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* 24, 25-41.
- Oelmann, F., 1914 (1968): *Die Keramik des Kastells Niederbieber*, Bonn (Materialien zur Römisch-Germanischen Keramik 1).
- Pronk, E.C., 2013: *Plangebied Margrietschool, gemeente Ermelo. Een opgraving van een Germaanse nederzetting uit de Romeinse tijd en sporen uit de vroege ijzertijd*, Weesp (RAAP Rapport 2623).
- Sparrius, L. & M. Riksen, 2018: *Evaluatie van elf jaar stuifzandbeheer op de Veluwe 2007-2018, s.l.* (Bryologische en Lichenologische Werkgroep Rapport 23), 1-127.
- Stoffels, E., 2006: *Handgevormd aardewerk uit de Augusteïsche castra op de Hunerberg in Nijmegen*, Amsterdam (Master thesis University of Amsterdam).
- Stoffels, E., 2009: Native service. 'Batavian' pottery in 'Roman' military context, in: M. Driessen, S. Heeren, J. Hendriks, F. Kemmers & R. Visser (eds), *TRAC 2008. Proceedings of the Eighteenth Annual Theoretical*

- Roman Archaeology Conference, Amsterdam 2008*, Oxford, 143-155.
- Sutherland, C.H.V., 1984: *The Roman imperial coinage I. From 31 BC to AD 69*, London (revised edition).
- Van Sprang, A., 1963: 2^e-eeuwse nederzettingssporen bij de kanovijver en de Hamburgerweg te Ermelo, *Westerheem* 12/5, 109-126.
- Van Sprang, A., 1964: Depot van bewoningsresten te Ermelo, Gelderland, *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* 12/13, 25-38.
- Welfare, H., 2017: The function of temporary military camps along Hadrian's Wall, in: N. Hodgson, P. Bidwell & J. Schachtmann (eds), *Roman Frontier Studies 2009. Proceedings of the XXI International Congress of Roman Frontier Studies (Limes Congress) held at Newcastle upon Tyne in August 2009*, Oxford (Archaeopress Roman Archaeology 25), 565-570.
- Welfare, H. & V.G. Swan, 1995: *Roman camps in England. The field archaeology*, London.
- Verschoof-van der Vaart, W.B., 2022: *Leaning to Look at LiDAR. Combining CNN-based object detection and GIS for archaeological prospection in remotely-sensed data*, Leiden (PhD thesis Leiden University).