Piotr Zakrzewski

NEW INFORMATION ABOUT CONSTRUCTION AND DEVELOPMENT OF STONE FORTIFICATIONS OF THE LEGIONARY FORTRESS AT NOVAE (LOWER MOESIA)

https://www.doi.org/10.17234/9789533790367.20

Piotr Zakrzewski
Polish Centre of Mediterranean Archaeology
University of Warsaw
Nowy Świat 4
PL – 00-497 Warszawa
zakrzewski.pe@gmail.com

This paper concerns the fortification system of the legionary fortress at Novae. The presented new information related to defence structures, chronology and building sequence were acquired by documentation and observations made during the post-excavation project and by careful re-evaluation of previous archaeological researches. Important aspect of our work was the application of advanced documentation methods.

Key words: *fortifications, stone defences, legionary fortress, advanced documentation methods, geodesy, photogrammetry, digital documentation*

HISTORY OF EARLY RESEARCH

The Roman legionary fortress at Novae is a well-known archaeological site located by the Danube in the northern Bulgaria, nearby modern-day town of Svishtov. It has been a subject of extensive archaeological excavations since the 1960, when the agreement between the University of Warsaw and the Archeological Institute of the Bulgarian Academy of Sciences has been made (Majewski *et al.* 1961). Since that time many significant structures have been unearthed, most notably the legionary headquarters building (*principia*), the army hospital (*valetudinarium*), the early and the late roman baths (*thermae*) and the Episcopal Basilica (see Biernacki 2016; Sarnowski *et al.* 2012a; Dyczek *et al.* 2001). Through the years of insightful analyses of the acquired archaeological data and materials, carried out along with comprehensive studies and interpretations, the general occupational history and chronology of Novae have been gradually established.[1]

Yet one of the most interesting and complex type of architectural remains found in Novae are the components of the legionary fortress stone fortification system constructed in the Flavian period by the *legio I Italica*. Its remnants, represented by sections of curtain wall, gate entrances, interval and corner towers and defence ditches, were frequently local-

[1] For extensive publication list until 2008 see: Dyczek *et al.* 2008.

ized and excavated during the early fieldwork conducted from 1960s until early 1990s. The results of those investigations allowed to define the restricted boundaries of the fortress and establish original course of the two main camp's axes set during the initial planning.[2]

The long-term archaeological works and architectural analysis of the four gates have provided many valuable informations about their chronology, building sequence and enabled to distinguish three separate construction phases for West (*porta principalis sinistra*) and South (*porta decumana*) Gates.[3]

Yet, the real breakthrough came with the fieldworks carried out by T. Sarnowski in the 1979 and 1981 around Tower no. 6, in the section of the defence wall on the eastern front of the legionary camp (Fig. 1: 6). The area was chosen because of the already removed huge amounts of earth during the earlier excavations conducted by the Bulgarian Expedition in 1967–1972 (Dimitrov & Čičikova 1974; Čičikova 1974; 1980). The excavations of the two test trenches provided a full section through the *intervallum*, the curtain wall and the defence ditches located outside the fortress. Furthermore, T. Sarnowski was able to observe and document, for the first time, the remains of the Neronian earth and timber defences (earthen rampart and wooden tower's post holes) belonging to the *legio VIII Augusta*. Those discoveries have confirmed that the earlier fortification system was almost exactly underlining the later stone defences made after the arrival of the *legio I Italica* (Sarnowski 1981; 1983a; 1983b). Later on similar discoveries were made by him, K. Lewartowski and J. Ziomecki in the west part of the fortress (Fig. 1: 9; See Sarnowski 1984; Lewartowski 1983). In the following years new discoveries concerning the legionary fortress defences came to light throughout the excavations around eastern fortifications by P. Donevski, the local museum director. Unfortunately, we have only very scarce information about those excavations due to the fact that the results were never published or simply because the proper documentation was never made.

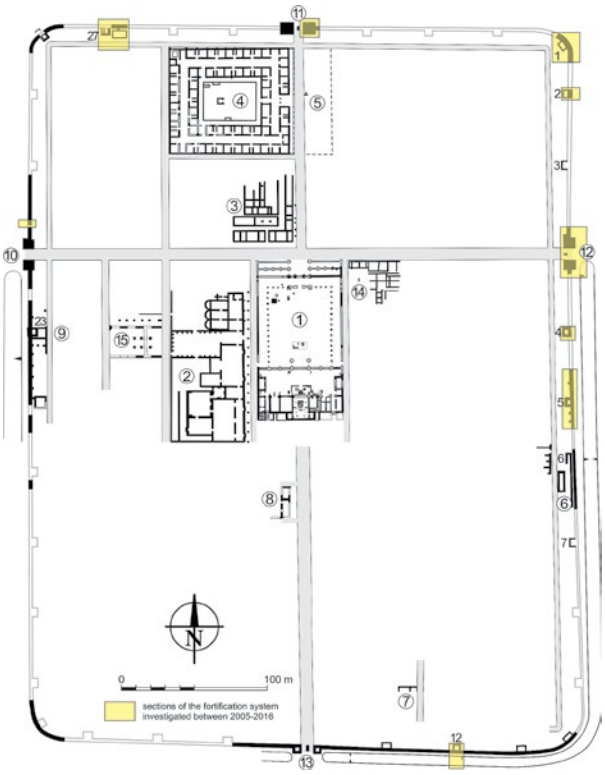

*Figure 1. Novae. Legionary fortress in the 2nd and 3rd cent. AD. An outline plan (by T. Sarnowski, J. Kaniszewski & P. Zakrzewski. Based also on detail drawing by M. Lemke, P. Dyczek & A. B. Biernacki). 1: Headquarters building (**principia**), 2: Bath house (**thermae**), 3: Officer's house, 4: Hospital (**valetudinarium**), 5: Granaries (**horrea**), 6: Water tank, 7: Cavalry barrack, 8: Praetorium (?), 9: Fabrica (?), 10: West gate (**porta principalis sinistra**), 11: North gate (**porta praetoria**), 12: East gate (**porta principalis dextra**), 13: South gate (**porta decumana**), 14: Barracks of First Cohort?, 15: Water tanks (?). Figures along the curtain wall refer to the numbers of interval towers.*

PER LINEAM MUNITIONUM

Because of the above-mentioned lack of published documentation and the undeniable differences between the former and modern methodology, the available information can now be regarded, at least in some cases, as unsatisfactory. That is why for more than a decade, a team working within the Archaeological Expedition of the Institute of Archaeology, University of Warsaw, has been engaged in a post-excavation project called *Per lineam munitionum* focused on the fortification system of the legionary fortress (Sarnowski *et al*. 2005; 2008; 2011–2012; 2012b; 2013; 2014; 2015). The main aim of the project was to verify results of the past excavations by cleaning up and deepening old trenches and recording all archaeological remains. In an attempt to recognize the entire construction sequence of the legionary defences and to better understand the employed construction techniques, the previously investigated areas were substantially extended in the hope of documenting the original architec-

[2] For an overview of early archaeological investigations of Novae fortification system conducted between 1960–1994 see Sarnowski 2016: 175 and n. 1.

[3] For history of early excavations of the four gates see: Zakrzewski 2015: 7–10.

tural substance and the stratigraphy that was undisturbed by the earlier archaeological works.

For that purpose, our research team incorporated into the project's workflow an interdisciplinary approach profiting from modern archaeological methodology including implementation of new technologies and documentation techniques. In this manner, the team has successfully established a comprehensive description of the history of the defence system. The presented results comprised of precise and detailed plans and architectural sections, as well as three-dimensional (3D) computer-generated visualizations that were based on archaeological evidences obtained during fieldwork by means of modern techniques, such as geodesy and photogrammetry.

The fieldwork was carried out in various parts along the defence system of the legionary fortress (Fig. 1) for almost each season since 2005 and continued until 2016. The main excavation works were conducted in the northern and the eastern fronts of the fortifications, in the areas of Towers no. 1 (north-east corner tower), 2, 4, 5 and 27 but also in the North (*porta praetoria*) and the East Gate (*porta principalis dextra*). Furthermore, in the last four campaigns we have also unearthed the remains of Tower no. 12 and re-opened a small trench localized just north from the West Gate (*porta principalis sinistra*). Through our research we were able to re-evaluate old interpretations and establish crucial information concerning the construction and development of the fortification system (Sarnowski 2016; Zakrzewski 2015; 2018a).

ADVANCED DOCUMENTATION METHODS

For the past several years we could observed the continuous and rapid development of advanced technologies and sophisticated instruments used for archaeological purposes. Their application can accelerate significantly the documentation process and increase the quantity, quality and accuracy of the gathered data. Having that in mind, we have made use of some particular technological advancements such as modern tachymetry, photogrammetry and digital computer methods, thus improving greatly our workflow. Additionally, in a pursuit to enhance the data acquisition process we were also able to develop and test some new documentation techniques.[4]

Because of large extent of the research area the core of our advanced documentation works relied on a very precise measurements made with the use of the total station theodolite (TST), which enabled us the proper documentation of the unearthed archaeological evidences.

During the first years of fieldwork we have carried out a full planigraphy of all the already excavated architectural remains and localized most of the old trenches to get a clear picture of the site's layout, but also to aid substantially our interpretation process and to plan any future excavation works. Besides the acquisition of a complex general plan, based on the site's local geodetic benchmark, we have assembled a digital database in the AutoCAD environment. Another aim of the topographic survey was the creation of a digital terrain model (DTM) of the site and its surroundings (Fig. 2). It composes of extensive spatial data about the landform and its

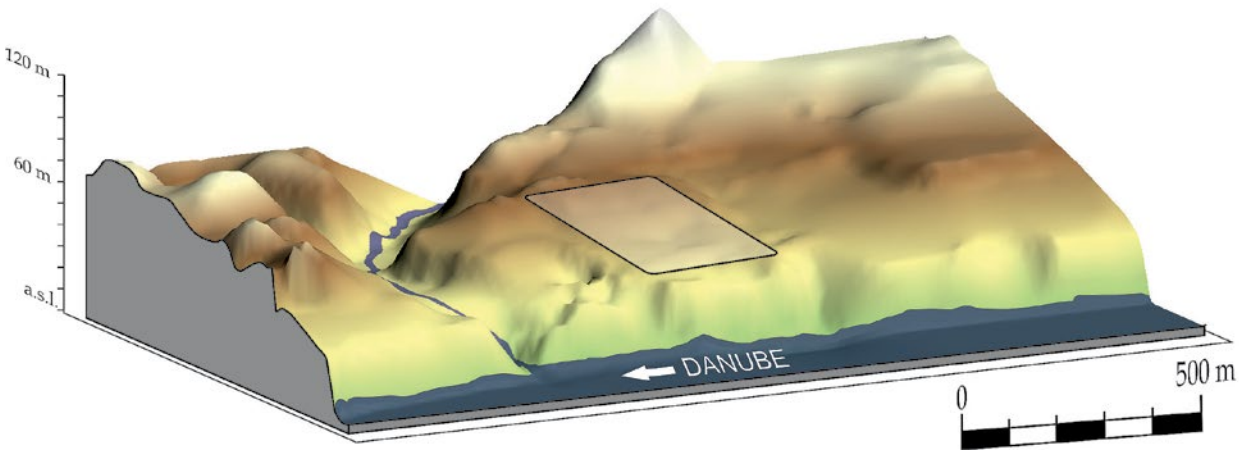

Figure 2. Digital terrain model of Novae and its surroundings (by P. Zakrzewski).

[4] For the description of application of geodesy and photogrammetry in other archaeological projects of the author see Zakrzewski 2018b.

main features. This kind of a digital representation can be valuable in case of researches concerning the military installations localization, but it is especially useful for analysis and simulations concerning volumetrics, hydrology or terrain erosion to evaluate past and present changes in the landscape, its geomorphology and prevent eventual dangers threatening the condition of the archaeological site.

Another applied method was the photogrammetry, which allows to very quickly acquire accurate information about physical objects based on digital images taken by camera from different angles. Although, the process requires also further post-production on computer with special software, the acquired output image can be scaled and drawn in a vector graphic program in significantly faster and more precise manner compared to the use of traditional means of documentation.[5] It can be also used to create 3D representation of the photographed objects to be later studied and analyzed or used for various presentation purposes. Provided with geometrical properties of an object or a structure, it is possible to gather additional information about its dimensions and volume or to produce digital cross-sections. What's very important, with this data we can visualize the unearthed structures and their state of preservation during excavation works and afterwards or it can serve as a base data for the reconstruction process made digitally or during the conservation works.

All of the prepared during our excavations documentation was entirely digitalised and then redrawn in a vector graphic software to acquire elaborate plans, drawings of sections and artefacts. While we have gathered all the available documentation from the earlier archaeological works we have also vectorized old analog plans and drawings to create digital compilations composing of already ascertained information and re-evaluate them in light of new discoveries. In many cases we were also able to verify older data and exclude errors made due to the faulty data acquisition techniques and outdated methodology. All of that made it possible to produce clear and understandable illustrations of the unearthed structures and present their complex features and characteristics.

STONE FORTIFICATION SYSTEM

The history of fortifications of the legionary fortress at Novae can be divided into two major construction phases directly related to the presence of the garrisoned military units. First defence system, composed of the above-mentioned constructions made of earth and timber, was built by *legio VIII Augusta* most probably in the Neronian period.[6] They were later replaced by stone fortifications somewhere between ca. AD 72 (Sarnowski *et al*. 2011–2012: 81–83), after the arrival of *legio I Italica*, and around the reign of Trajan (Sarnowski *et al*. 2015: 178 and n. 4; cf. Gudea 2005: 421). The end of construction works dated for the beginning of the 2nd century, besides other archaeological evidences, is attested by a fragment of the building inscription (IGLNovae: 52) found on a stone block (1.13 x 0.71 x 0.37 m) that was re-used in the later extension wall of the West Gate, though primarily it was probably crowning the gateway entrance (Fig. 3). Additionally, there can be distinguished another extensive building phase of the fortification system, but it was contemporary with the later period when, starting in the late 3rd or early 4th century, the military base has begun to be slowly transformed to a much larger fortified town.

The established building sequence of the stone defences proceeded probably in the similar order on

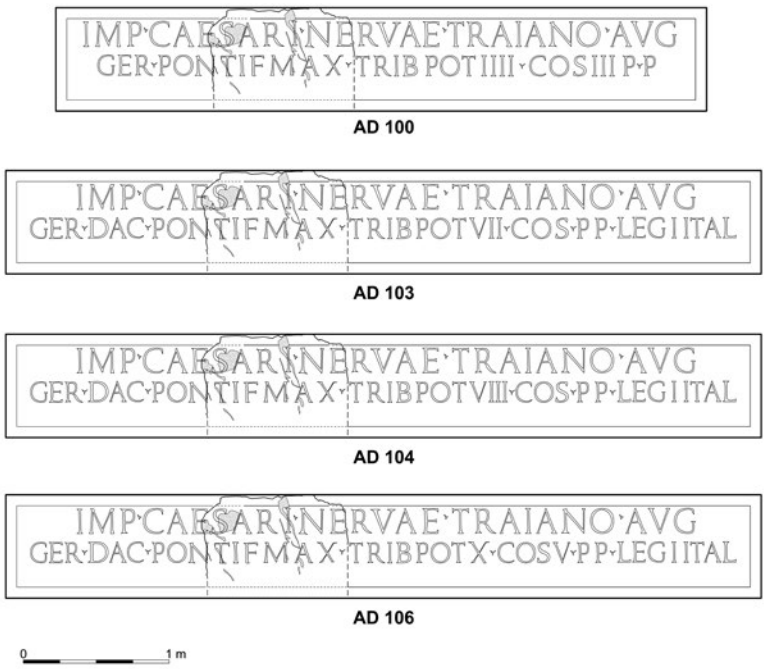

Figure 3. Proposed reconstructions of the building inscription (by P. Zakrzewski, based on transliteration by J. Kolendo).

[5] For extensive description see Verhoeven 2017.

[6] For more see Sarnowski 2016: 178–183.

all of the four fronts of the defence system that surrounded about 18 hectares of the fortress. We have ascertained that the still standing earth and timber fortifications were re-used to a large extent to be somewhat incorporated to the new building concept. First, the Neronian ditches were filled with earth gained from cutting off the outer sloped face of the rampart. Then, new wider and deeper ones were dug partially in the former and measured about 17 m wide and 4 m deep. Furthermore, the early excavations conducted by T. Sarnowski on the eastern front, around Tower no. 6, have revealed traces of additional defence ditches (Sarnowski 1983b; 1981). However, we have also hard evidences, from other parts of the fortification system, suggesting that at least in some sections those kind of defences did not exited. This could be explained by the original terrain configuration, that was sufficient enough to act as a natural obstacle, thus making additional countermeasures unnecessary.

The main line of defence was formed by the masonry curtain wall, which thickness varied from 1.30 up to 2.20 m. It composed of facings made of roughly dressed stones and a core of rubble bonded oftenly with fine white mortar of lime and river gravel. The curtain wall construction was in some cases greatly straighten by having a 1.40 m deep foundations and internal, cross counter forts (Sarnowski *et al*. 2011–2012: 15). Usually, the wall was cut in to the rampart, but in the northern front it was set up just in front of its footing, at the end of a slope, leaving a gap that had to be filled (Sarnowski *et al*. 2008: 166–169). In contrast to that, the earthen rampart on the southern side was pulled down to great extent to probably enlarge the berm-surface between the stone wall and the inner edge of the defence ditch (Sarnowski *et al*. 2015: 183–187). The ascertained height of the catwalk could have varied from ca. 2.20 to 2.80 m (Sarnowski *et al*. 2008: 170; 2014: 184; Zakrzewski 2015: 12, tab. 1). It was accessible by ramps (*acensus*) localized beside the towers and oriented perpendicular to the line of wall (Fig. 4).

There were 28 interval and 4 corner stone towers. Their dimension varied from 4.50 m to 7 m on one side and from 3.80 m to 4.50 on the other. They were raised simultaneously with the curtain walls and placed close to the location of the original wooden ones, thus the length of the intervals between them had not been changed dramatically and ranged approximately from about 27.75 m to about 38 m.

Another type of towers where those flanking the four gateways. The most interesting and characteristic of them were the West and South Gates. Their layout was distinctive from the others because of the towers that were boldly protruding out of the facade of the curtain walls by about 3–4 m (Fig. 5). This solution was not implemented in the Roman military architecture at least before the second half of the 2nd century. In most cases, gate towers of legionary fortresses and auxiliary forts contemporary with the first stone gates at Novae were either receding inwards or equally projecting in and outside the defensive wall of the fortress. In both cases the unearthed remains were rather in a good state of preservation and showed distinct traces of three building phases which correspond with the changes and repair works observed in other sections of the fortification system, all of which were triggered by important events in Novae history.[7]

The defence system of the legionary fortress at Novae remained in this form and underwent only minor changes, mainly some repair works resulting from an unidentified natural disaster, until the late 3rd or early 4th century when the fortified area was greatly

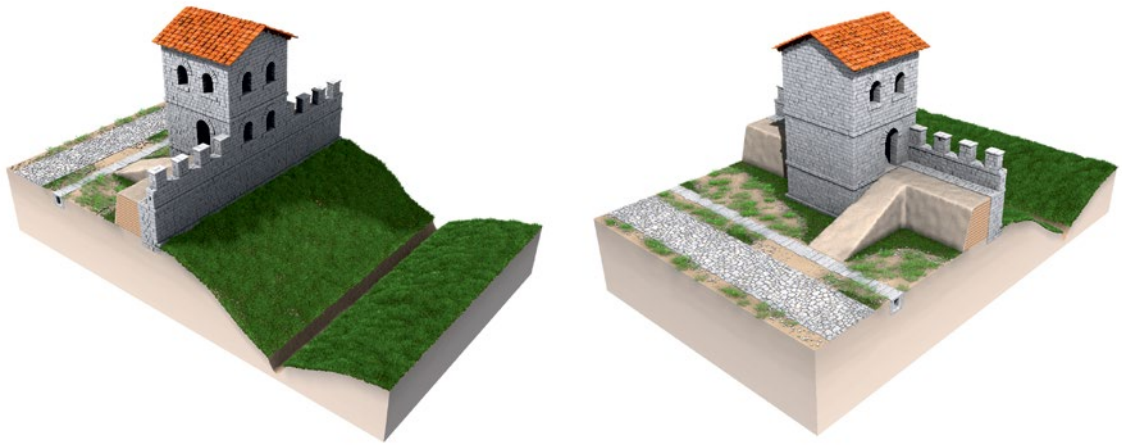

Figure 4. Reconstruction of stone defences on the eastern front of the fortress (J. Kaniszewski & T. Sarnowski).

[7] For extensive description of the gates see Zakrzewski 2015.

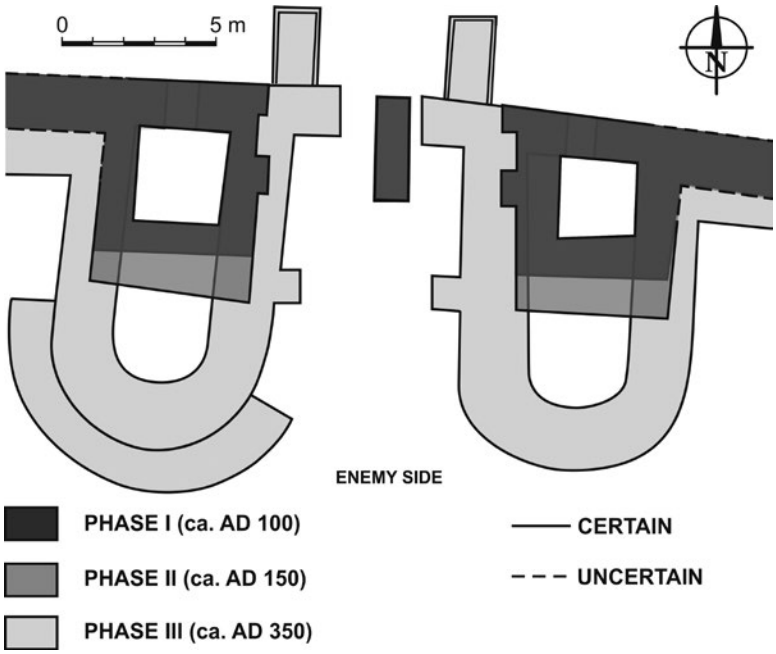

Figure 5. Outline plan of the South Gate (by P. Zakrzewski).

extended by the so-called eastern anex (Lemke 2015; cf. Poulter 2007: 31–39). While the no longer needed original eastern curtain wall was gradually dismantled, the remaining three were reinforced and furnished with new larger U-shaped towers protruding outwards. The last large building project related to the Novae fortification system was the extension of the West Gate towers made under Justinian I at the beginning of the 6th century (Zakrzewski 2015: 16; Sarnowski 2008: 169–170).

BIBLIOGRAPHY

Biernacki 2016 — A. B. Biernacki, "The Large Legionary Thermae in Novae (*Moesia Inferior*) (2nd–4th centuries A.D.)", in: A. B. Biernacki & E. Klenina (eds*.), Novae, Studies and materials. Vol. V*, Poznań, 2016.

Čičikova 1974 — M. Čičikova, "Les fouilles de Novae, *Moesia Inferior*, Secteur Est: campagnes 1960–1968", in: E. Birley, B. Dobson & M. Jarrett (eds.), *Roman Frontier Studies. The International Limes Congress 1969*, Cardiff, 1974, 226–234.

Čičikova 1980 — M. Čičikova, "Forschungen in Novae (*Moesia Inferior*)", *Klio* 62/1, 1980, 55–66.

Dimitrov & Čičikova 1974 — D. Dimitrov & M. Čičikova, "Arheologičeskie raskopki v vostočnom sektore na Nove prez 1967–1969", *Izvestija na Archeologiceskija Institut* 34, 1974, 161–179.

Dyczek *et al*. 2001 — P. Dyczek, J. Kolendo & T. Sarnowski, *Novae – 40 lat wykopalisk*, Warszawa, 2001.

Dyczek *et al*. 2008 — P. Dyczek, T. Derda & J. Kolendo (eds.), *Novae. Legionary Fortress and Late Antique Town, vol. I: A Companion to the Study of Novae*, Warszawa, 2008.

Gudea 2005 — N. Gudea, "Der untermoesische Donaulimes und die Verteidigung der moesischen Nord- und Westküste des Schwarzen Meeres", *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 52, 2005, 319–566.

Lemke 2015 — M. Lemke, "The Dwindling Legion: Architectural and Administrative Changes in Novae (*Moesia Inferior*) on the Threshold of Late Antiquity", in: R. Collins, M. Symonds & M. Weber (eds.), *Roman Military Architecture on the Frontiers: Armies and Their Architecture in Late Antiquity*, Oxford, 2015, 90–97.

Lewartowski 1983 — K. Lewartowski, "Odcinek II", in: L. Press *et al*. (eds.), *Novae – Sektor zachodni, 1981, Sprawozdanie tymczasowe z wykopalisk ekspedycji archeologicznej Uniwersytetu Warszawskiego*, (Archeologia 34), 1983, 160–164.

Majewski *et al*. 1961 — K. Majewski *et al*. (eds), "Sprawozdanie tymczasowe z wykopalisk w Novae w 1960 roku", *Archeologia* 12, 1961, 75–170.

Poulter 2007 — A. G. Poulter, "The Transition to Late Antiquity", in: A. G. Poulter (ed.), *The Transition to Late Antiquity, on the Danube and Beyond* (Proceedings of the British Academy 141), Oxford, 2007, 1–50.

Sarnowski 1981 — T. Sarnowski, "The Legionary Defences of Novae. Report on Latest Sections", *Archeologia* 32, 1981, 29–33.

Sarnowski 1983a — T. Sarnowski, "Wschodni bok twierdzy legionowej (ha XXVI), sondaże", in: L. Press *et al.* (ed.), *Novae – Sektor zachodni, 1981, Sprawozdanie tymczasowe z wykopalisk ekspedycji archeologicznej Uniwersytetu Warszawskiego* (Archeologia 34), 1983, 153–160.

Sarnowski 1983b — T. Sarnowski, "La forteresse de la légion I Italica et le limes du sud-est de la Dacie", *Eos* 71, 1983, 265–276.

Sarnowski 1984 — T. Sarnowski, "Les premiers remparts de Novae et les guerres daciques de Domitien et de Trajan", *Studia Balcanica* 1, 1984, 143–169.

Sarnowski 2016 — T. Sarnowski, "Legionary Fortress at Novae in Lower Moesia. Old and new observations made during the recent work *per lineam munitionum*", in: C. Geta Alexandrescu (ed.), *Proceedings of the International Colloquium, Troesmis 2015*, Tulcea , 2016, 177–190.

Sarnowski *et al.* 2005 — T. Sarnowski, L. Kovalevskaja & J. Kaniszewski, "Novae – Castra legionis, 2003–2005. Preliminary Report on the Excavations of the University of Warsaw Archaeological Expedition", *Archeologia* 56, 2005, 141–153.

Sarnowski *et al.* 2008 — T. Sarnowski, L. Kovalevskaja & A. Tomas, "Novae – Castra legionis, 2006–2009. Preliminary Report on the Excavations of the University of Warsaw Archaeological Expedition", *Archeologia* 59, 2008, 153–172.

Sarnowski *et al.* 2011–2012 — T. Sarnowski, L. Kovalevskaja, A. Tomas, R. Chowaniec & P. Zakrzewski, "Novae – Castra Legionis, 2010–2012: Preliminary Report on the Excavations of the University of Warsaw Archaeological Expedition", *Archeologia* 62–63, 2010, 75–90.

Sarnowski *et al.* 2012a — T. Sarnowski, A. B. Biernacki, P. Vladkova, M. Lemke & A. Tomas (eds.), *Novae. An Archaeological Guide*, Warszawa, 2012.

Sarnowski *et al.* 2012b — T. Sarnowski, L. Kovalevskaja, A. Tomas & P. Zakrzewski, "Novae 2012. *Munitiones castrorum*. Legionary Defences", *Światowit* 51, fasc. A, 2012, 145–150.

Sarnowski *et al.* 2013 — T. Sarnowski, L. Kovalevskaja, A. Tomas, P. Zakrzewski, T. Dziurdzik & E. Jęczmienowski, "Novae 2013. Legionary Defences and Headquarters Building", *Światowit* 52, fasc. A, 2013, 179–186.

Sarnowski *et al.* 2014 — T. Sarnowski, L. Kovalevskaja, A. Tomas, P. Zakrzewski, T. Dziurdzik & E. Jęczmienowski, "Novae 2014. Legionary Defences and the Rear Part of the Fortress", *Światowit* 53, fasc. A, 2014, 185–192.

Sarnowski *et al.* 2015 — T. Sarnowski, L. Kovalevskaja, A. Tomas, P. Zakrzewski, T. Dziurdzik & E. Jęczmienowski, "Novae – *castra*, *canabae*, *vicus*. Preliminary report on the Excavations and Prospection Surveys of the University of Warsaw Archaeological Expedition", *Archeologia* 65, 2015, 177–203.

Verhoeven 2017 — G. J. Verhoeven, "Mesh Is More – Using All Geometric Dimensions for the Archaeological Analysis and Interpretative Mapping of 3D Surfaces", *Journal of Archaeological Method Theory* 24/4, 2017, 999–1033.

Zakrzewski 2015 — P. Zakrzewski, "The gates of the legionary fortress at Novae (Lower Moesia)", *Archeologia* 66, 2015, 7–26.

Zakrzewski 2018a — P. Zakrzewski, "*Portae Castrorum*. Reconstructing the Gates of the Roman Legionary Fortress at Novae (Lower Moesia)", *Proceedings of the 23rd International Limes Congress* (in print).

Zakrzewski 2018b — P. Zakrzewski, "Geodesy and photogrammetry in service of archaeology. Advanced documentation methods used by the Kuwaiti-Polish Archaeological Expedition", in: *Publication in honor of Professor Piotr Bieliński*, Warszawa (in print).