UDC: 902.2:903.4(497.581)“638“

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THE BIRTH OF A CITY: MILLENNIAL-SCALE SPATIAL ORGANIZATION IN THE IRON AGE HILLFORT OF NADIN-GRADINA, NORTHERN DALMATIA (CROATIA)

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Abstract. – Systematic archaeological excavations of Iron Age settlements in the region of northern Dalmatia, and indeed in the eastern Adriatic more broadly, are extremely rare given the large investment of time, energy, and financial support required to adequately carry out the work. Consequently, understanding the spatial organization of these settlements, or their relationships to one another on a regional scale, often relies on data generated by smaller programs of archaeological testing or surface observations. From 2015 to 2020, the University of Zadar and the University of Maine carried out a collaborative and systematic program of archaeological research at the site of Nadin-Gradina, one of the largest and most distinctive Liburnian Iron Age and Roman settlements in Dalmatia (Croatia). Over the course of the project, the overall area targeted for excavation constituted less than one percent of the total area of the hillfort, but its rich archaeological stratigraphy extended nearly five meters in depth. Despite the relatively small area of excavation, the results offer unique insight into a portion of the planimetry of the settlement over the course of about 1,500 years, clearly demonstrating the influence of the Iron Age architectural plan on that of the subsequent Roman settlement.

Key words. – Nadin-Gradina, hillfort, northern Dalmatia, eastern Adriatic, Iron Age, settlement structure, settlement organization.

Introduction

In northern Dalmatia, the end of the Late Bronze Age through the Iron Age – a period of about 1,100 years – is characterized by a material culture related to the Liburnian group, named after the ethnic group who, according to Greek and Roman writers, inhabited the area.[1] The Liburnian group was the earliest of all the Iron Age cultural manifestations in the Croatian part of the eastern Adriatic to be characterized and synthesized for the scientific community.[2] Hillforts are the dominant form of settlement during the Bronze and Iron Ages in the Liburnian area, and indeed throughout parts of Europe.[3] Their position high on the landscape was strategic, offering a wide view of their surroundings and the ability to monitor communications with nearby settlements, as well as economic resources of the region. Given their prominent and highly visible locations, hillforts have been recognized as archaeological sites for centuries. Consequently, they are commonly represented on archaeological maps, and they stand out as one of the most numerous categories of prehistoric sites in the region.[4] To date, a number of hillforts have been archaeologically explored, but most involved testing phases only within smaller scopes of work. Given the limited nature of most hillfort investigations, there is still much to learn about their internal organization, planimetry, settlement dynamics, appearance, function, and ultimately their relationship to the wider environment. The relative paucity of information about Iron Age hillforts is the result of a number of factors, from research strategies, to insufficient resources, to logistical obstacles. Additionally, there is a limited number of scholars whose work centers on this period in Dalmatia.[5]

Iron Age settlements, and particularly those with subsequent occupation, are among the most challenging archaeological sites to investigate. Their occupational histories can span centuries, or even millennia in those

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[1] Batović 1987a, 339. For a discussion on identity, ethnicity, and other mentions of Liburnians in ancient Greek and Roman sources, including an extensive bibliography, see Barnett 2016.

[2] Batović 1965.

[3] For the Liburnian area, see: Batović 1977; 1987a, 351–355; Čelhar 2014; for neighboring areas, see: Buršić Matijašić 2007; Hänsel, Mihovilić, Teržan 2015, 27–42, 425–452 (for Istria); Čović 1987, 459–469; Arena et al. 2020 (for central Dalmatia and hinterland); Drechsler-Bižić 1987, 416–424 (for the Iapodian group).

[4] Batović 1977; 1987a, 351–355; Čelhar 2014.

[5] Systematic archaeological research has been ongoing for many years at important settlement sites in Podgrađe near Benkovac (ant. *Asseria*) (Štefanac 2021; with a relevant bibliography) and on Bribirska glavica (ant. *Varvaria*) (Zekan 1996; Ghica, Milošević, Dzino 2015; Ghica, Milošević, Uroda, Dzino 2016; 2018), but these have mostly focused on Roman (or later) settlement horizons. However, recently, at least in the case of Asseria, the focus has also included prehistoric layers within the settlement (Fadić, Eterović Borzić, Štefanac 2018). Since 2017, research has also begun on the Samograd (Zamina) hillfort, (Šućur, Meštrov 2018), and since 2021, on Cape Ljubljana near Ljubač (Vujević, Gusar, Glavaš 2023), but significant exploration of prehistoric layers has not yet been initiated.

cases with antecedent and/or subsequent occupation, leading to complex and deeply buried stratigraphic deposits. Consequently, archaeological investigation of these sites is logistically difficult, requiring considerable time and effort for excavation. Furthermore, research on Iron Age hillforts is financially burdensome, not only for the fieldwork itself, but also for post-field artifact processing, analyses, and conservation. Recent research at Nadin-Gradina (ant. *Nedinum*), one of the most important Iron Age settlements in Liburnia, encountered each of these obstacles. However, despite these challenges, the research strategy employed here generated significant data over the course of six field seasons, providing a look into the evolution of the Iron Age settlement from its origins through Antiquity, when it acquired the legal status of an urban center, or *municipium*.[6] Although our excavations are limited relative to the overall size of the site, our results point to the ways in which the Early Iron Age hillfort influenced the development of the settlement centuries later during the Late Iron Age and even into the subsequent Roman era. In this paper, we address the architectural and spatial organization of Nadin-Gradina as it relates to its ramparts, streets, and settlement organization. In doing so, we also demonstrate the contributions that moderately scaled excavations (relative to the overall size of the site) can make toward our understanding of the Iron Age hillfort.

The Nadin-Gradina Archaeological Site

Geographical location and description

Nadin-Gradina is located centrally in Ravni Kotari (Fig. 1), a karstic region in northern Dalmatia historically important for agriculture and livestock.[7] Ravni Kotari was the setting of numerous hillforts with long occupational sequences, some spanning 1,500 years or more, prompting it to be recognized as the most urbanized region of Dalmatia in Antiquity.[8] Early writings and inscriptions suggest that Nadin-Gradina was one of the largest and most distinctive hillforts during the Iron Age, having also undergone significant transformation into a Roman municipium (*Nedinum*) by the first century AD.[9] The entire site measures approximately 32 ha and is dominated by what has generally been referred to as a megalithic fortification wall, which encloses an area of approximately 7 ha.[10] Today, the ma-

[6] Wilkes 1969, 212–213; Čače 1993, 31.

[7] Čuka, Graovac Matassi, Lončar 2012.

[8] Wilkes 1969, 203.

[9] Wilkes 1969, 212.

[10] Chapman, Shiel, Batović 1996, 117. An area of 7 ha makes Nadin-Gradina one of the largest settlements in Liburnia. For size comparisons among sites in northern Dalmatia and the surrounding area, see Chapman, Shiel, Batović 1996, 155, Fig. 120; Čelhar 2014, 241–242.

jority of this monumental feature appears as an overgrown embankment only, with its stonework exposed in only a few locations. Extramural settlement features on the lower slopes include a necropolis, quarries, enclosures, terraces, and other structures from both prehistoric and historic eras. The ruins of a Late Middle Ages and Early Modern Era fortress lie at the summit of the hill within the megalithic enclosure, along with a nearby Ottoman-era mosque (Fig. 2).[11]

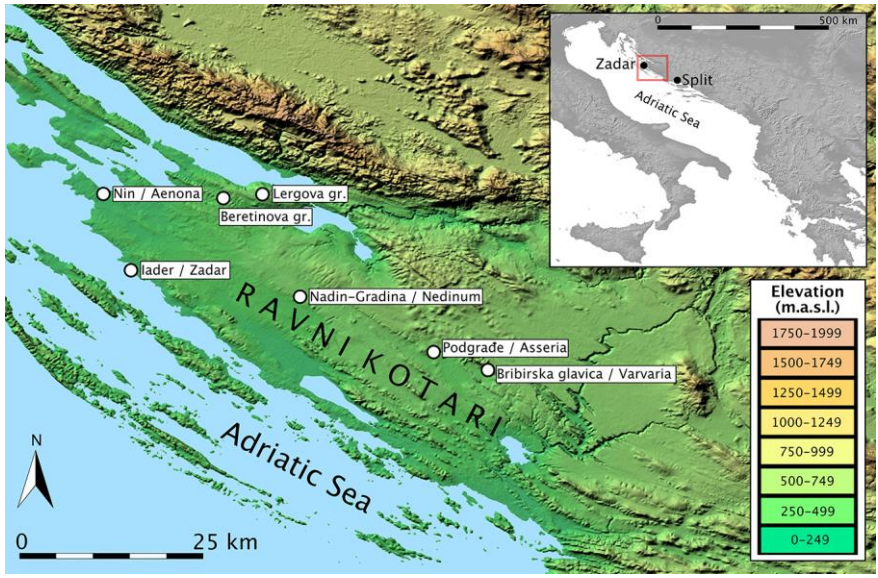

Fig. 1. Regional map showing the locations of Nadin-Gradina/*Nedinum* and other sites mentioned in the text

Previous research

Initial archaeological testing of Nadin-Gradina was carried out in 1986 as part of the internationally collaborative Neothermal Dalmatia Project.[12] A number of test units were excavated in and around the hillfort. Two were located within the area of the settlement defined by the megalithic rampart (see Fig. 2: T1 and T3), while an additional unit was placed across the wall of the so-called *suburbium* enclosure. The remaining units were excavated on the southeastern slopes of the site, with the goal of determining the chronology and function of numerous extramural structures and terraces. The overall area of excavation was quite limited, totaling 44 m.[2] Although there is some discrepancy between data and conclusions pub-

[11] Zaro, Gusar, Čelhar 2020.
[12] Batović, Chapman 1987a; 1987b; Chapman, Shiel, Batović 1996.

lished in Croatian[13] and English[14] language manuscripts,[15] this initial research program provided basic chronological information about the settlement and important insight into the preservation of archaeological deposits and stratigraphy.

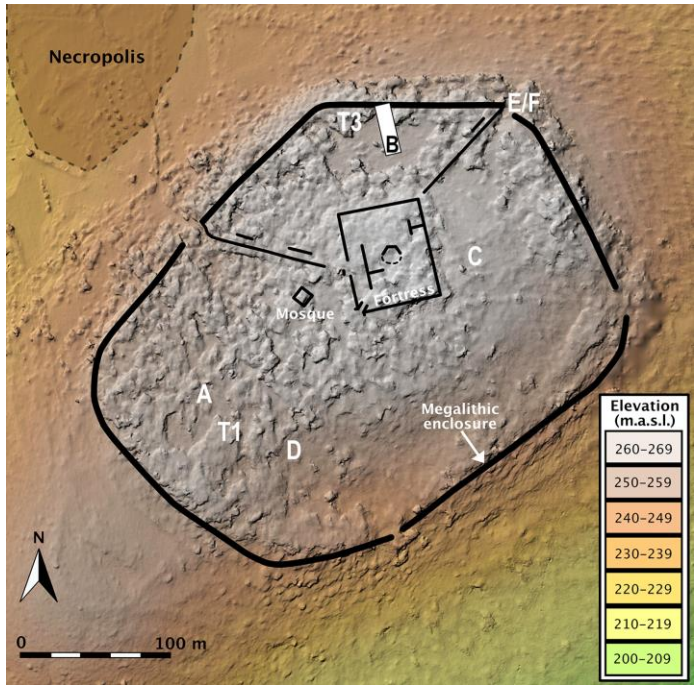

Fig. 2. Plan of Nadin-Gradina depicting the locations of excavation units A–E/F (2015–2020), Trenches 1 and 3 (1986), and the necropolis relative to the megalithic enclosure. The locations of the Early Modern Era fortress and mosque are also noted

Interest in Nadin-Gradina was renewed thanks to an archaeological survey in advance of the A1 motorway construction, the route for which passes in the immediate vicinity of the site. Archaeological reconnaissance recorded a large number of stone mounds, which were investigated in 2002 and 2003.[16] One mound outside the highway route was also investigated (Mound 13).[17] Archaeological work determined that the burials beneath the mounds date to the Late Bronze Age and/or Early Iron Age. Im-

[13] Batović, Chapman 1987a; 1987b; Batović, Batović 2013, 12.

[14] Chapman, Shiel, Batović 1996.

[15] One discrepancy relates to the dating of the oldest horizon in Trench 3 at Nadin-Gradina – whether it dates to the beginning of the Iron Age (Batović, Chapman 1987a, 87; 1987b, 29) or much later from the 3rd to 1st centuries BC (Chapman, Shiel, Batović 1996, 238).

[16] Batović, Čondić 2005.

[17] Kukoč 2005; 2009, 17–50; Kukoč, Batović 2005.

portantly, excavation of Mound 13 at Nadin recorded some burial practices that were previously unknown or insufficiently documented. The mound contained the largest number of graves and of individuals ever recorded within a single mound associated with the Liburnian culture, and both cremations and inhumations were present. Among the inhumations, several differences were also noted, including those in crouched or extended positions. In the Liburnian area, inhumations were commonly laid in a crouched position on their sides. Less frequently observed are those burials in an extended position, like, for example, in the coastal Kvarner area,[18] or among some sites in northern Dalmatia.[19] Cremation, on the other hand, was practiced only rarely during prehistory in Dalmatia, and until recently it was known to have been almost exclusively related to the Early Bronze Age.[20]

At the nearby flat necropolis, Šime Batović's 1968 excavation of two important Late Iron Age tombs demonstrated its potential to provide significant information about Iron Age burial customs.[21] In 2005, soon after a portion of the mound necropolis had been excavated, a more intensive program of research began on the flat necropolis of Nadin-Gradina, which was situated on both sides of the ancient road that led to the settlement from the northwest[22] (see Fig. 2). The necropolis was largely visible on the surface, owing primarily to the walls of Roman burial plots. The necropolis includes both Iron Age and Roman phases, with the latter superimposed over the former.

Over 100 graves were investigated over the course of several seasons, with individual grave preservation varying significantly due to subsequent disturbances from the Roman period onward. Consequently, a good number of the items deposited within the Iron Age graves had been devastated, removed, or scattered between graves. Despite these disturbances, Iron Age grave architecture remained relatively intact, providing insight into the complexity of grave arrangements, their regular spatial organization, and the monumentalization of the necropolis – an observation previously unknown in the Liburnian area.[23]

Excavation of the necropolis at Nadin provided an exceptional window into Iron Age and Roman burial practices, and importantly, the relati-

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[18] Blečić 2002, 81–82; 2004, 56. Although the Kvarner region is traditionally included within the area of the Liburnian cultural group (Batović 1987a), others have argued that during particular periods this coastal area belonged to the Japodians (Olujić 2007, 112–114; see also: Čače 1988; 2007, 69–76; 2021). Additional arguments have suggested that the Kvarner area was occupied by a separate cultural group altogether (Blečić 2002, 121; Blečić Kavur 2010; 2014, 162–165).

[19] Brusić 2000a, 1, 8–9, 12; Blečić Kavur, Podrug 2014, 38, 84.

[20] Kukoč 2010; 2011; Marijanović 2012.

[21] Batović, Batović 2013.

[22] Kukoč 2009, 50–76.

[23] Kukoč, Čelhar 2019.

onship between the two in terms of not only cultural practice, but also with respect to the organization of space. The results helped to inspire a new program of research centered on the corresponding settlement within the hillfort. Beginning with a testing phase in 2015, this new collaborative project served as a starting point to connect the landscape of the dead to the world of the living.

The Nadin-Gradina Archaeological Project, 2015–2020

Research into urbanization and landscape change at the Nadin-Gradina settlement began with a testing phase in 2015, when five test probes (A–E/F) measuring between 16 m^2 and 25 m^2 each were scattered around the area enclosed by the megalithic wall (see Fig. 2).[24] The intent of this inaugural season was to document the chronology and integrity of the archaeological deposits in different locations around the hillfort, with the results providing guidance about where to focus our efforts in subsequent field seasons. Test units A through D were positioned anywhere from 30 m to approximately 65 m from the interior face of the megalithic rampart, whereas unit E and its extension F were intentionally placed at the location of the northeast entrance through the rampart (one of four apparent entrances). Surprisingly, only a small number of Iron Age ceramics were recovered from these initial excavations, which came mostly from the lowest layers of individual probes. There were no Early Iron Age deposits identified in any of these initial units.

In probe D, prehistoric findings were completely absent, but it is important to note that a significant portion of the 5×5 m unit included a Roman era street, formalized with curbs and paving stones, and determined to have been constructed directly onto bedrock.[25] Additional architectural features flanked the sides of the street, further reducing our exploration of deposits in this area. Nevertheless, the absence of prehistoric artifacts may suggest that there was no significant activity in this part of the site (i.e., toward the interior of the hillfort) prior to the construction of the street during the Roman era. This interpretation is also supported to some degree by Trench 1 from 1986, which also failed to yield any Iron Age deposits.[26] However, in that instance, their absence has been attributed either to a lack of prehistoric activity altogether[27] or to Roman period disturbance of prehistoric layers in that part of the site.[28]

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[24] Zaro, Čelhar 2018.

[25] Čelhar, Zaro 2023, 125.

[26] Trench 1 was located within the southwestern portion of the megalithic enclosure, near a Roman cistern (Chapman, Shiel, Batović 1996, 117, Fig. 84, 232). Judging by the plan of the site, it appears to have been placed somewhere between our probes A and D from 2015, and most likely positioned at least 30 m away from the rampart.

[27] Chapman, Shiel, Batović 1996, 232.

[28] Batović, Chapman 1987a, 87; 1987b, 29.

Excavation of the lowest deposits in the other three interior probes (A, B, and C) recovered ceramics with mineral tempers indicative of the Iron Age, along with individual finds of imported Hellenistic pottery (black- and gray-glazed pottery), and fragments of amphorae that are characteristic of the last centuries BC (Greco-Italic and Lamboglia 2 types). Unlike probe D area, this would suggest more intensive uses of space in these locations during the Late Iron Age.

At approximately 30 m away, probe B was the closest of any of these interior units to the megalithic wall, and it contained the only preserved remains of Late Iron Age architecture. Consequently, given our interest in the origins, evolution, and spatial organization of the hillfort through time, probe B quickly emerged as the most promising for expanding our excavation in subsequent years. Over the following three seasons (2016–2018), the project opened an additional thirteen 5×5 m quadrants, designated B1–B13.[29] The entire excavated area measured 10×35 m, extending from the original probe B northward to the megalithic wall (Fig. 3). Over the course of the final two years (2019–2020), each probe was excavated to bedrock. Due to the underlying geomorphology around probe B, the bedrock is significantly lower toward the megalithic wall, with stratigraphy reaching nearly 5 m in depth. Utilizing a range of absolute and relative dating measures (e.g., ^{14}C, ceramic inventories, stratigraphy/superposition), the investigation confirmed an occupational history that spanned more than 1,500 years, from the Late Bronze Age or Early Iron Age until the end of Late Antiquity (Fig. 4). This was followed by a period of abandonment during the Early Middle Ages, with subsequent resettlement during the Late Middle Ages and Early Modern Era. The hilltop site was abandoned for good soon after – most likely sometime during the latter part of the 17th century.[30]

In total, the area of excavation around probe B encompassed approximately 335 m^2 of surface area, which amounts to less than one percent of the total area of the settlement within the megalithic enclosure. However, as we demonstrate below, the methodological approach we took affords us the opportunity to address issues related to the origin and expansion of the settlement, its spatial organization, and its evolution from prehistory into Antiquity.

[29] Given their overlap with the megalithic wall, the excavated portions of units B12 and B13 were slightly smaller than the 5×5 m areas of the other units.

[30] Zaro, Gusar, Čelhar 2020.

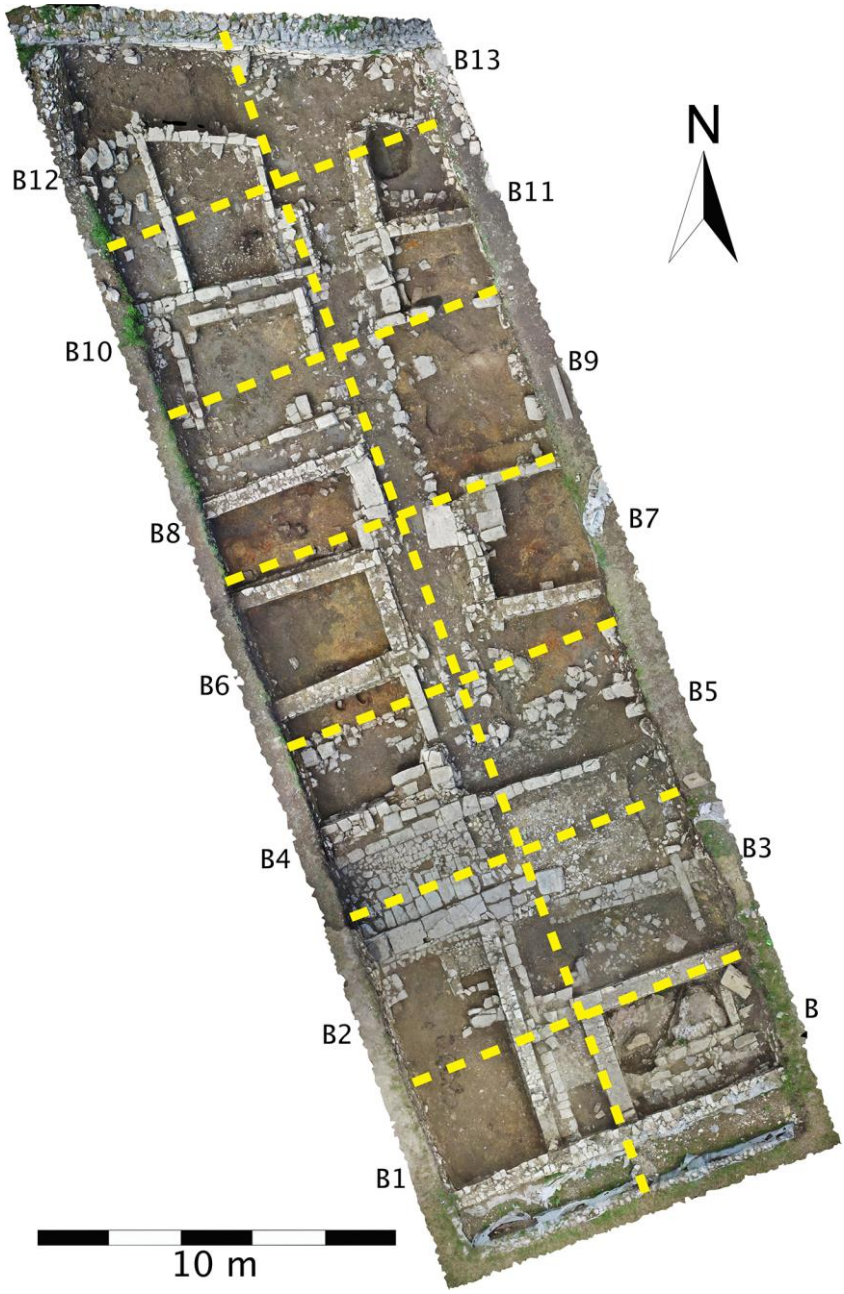

Fig. 3. Plan view of area B excavation from May of 2019 indicating the layout of excavation probes B–B13. Photographs for the orthomosaic were processed using Agisoft Photoscan software. The interior face of the megalithic wall lies at the northern terminus of the excavated area. Visible architecture represents a range of chronological phases, from Iron Age through Late Antiquity

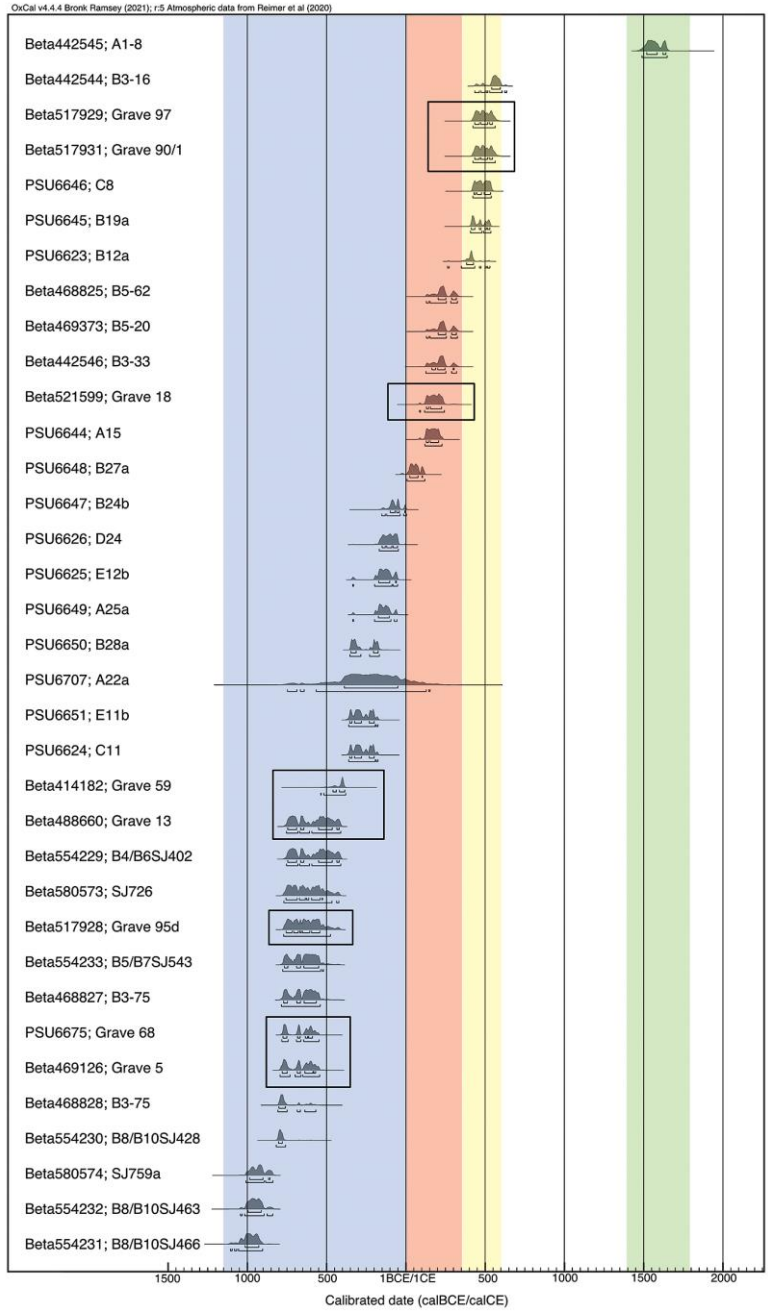

Fig. 4. Calibrated radiocarbon probability distributions from the 35 samples processed from Nadin-Gradina. Boxes indicate samples from graves; all others are from settlement contexts. Blue = Iron Age (with end of Bronze Age); Red = Early Roman; Yellow = Late Antiquity; Green = Late Middle Ages/Early Modern Era

Architectural and Spatial Organization

Ramparts

Ramparts constitute one of the most prominent features of Iron Age settlements in northern Dalmatia and beyond. Their distinctive monumentality not only defined the form of the settlement, but also served a range of functional, social, and symbolic purposes. Stratigraphic deposits with associated artifacts and radiometric dating confirm that the earliest settlement at Nadin-Gradina formed at the very end of the Late Bronze Age or beginning of the Iron Age. Within the excavation area of probe B, deposits associated with this earliest period are restricted spatially to a narrow strip in the immediate vicinity of the megalithic rampart, the construction of which occurred much later. Although we might assume the existence of an older rampart, as is the case with other hillfort settlements in Dalmatia, this has not yet been confirmed at Nadin-Gradina.[31] However, there is some indication to suggest that an older fortification wall had been constructed at Nadin-Gradina more or less along the same path as the later megalithic rampart, similar to other contemporaneous sites in the Ravni Kotari region, like *Asseria*,[32] *Varvaria*,[33] and others.[34]

In area B, quadrants B12 and B13 provide some insight into this question, where an approximately 11 m section of the interior face of the megalithic wall was exposed at the northern terminus of the excavation (Fig. 5).[35] The exposed interior face of the wall is preserved to heights of 2.5–3 m and displays a range of construction and/or renovation episodes through time. A small drystone wall on its summit constitutes the latest phase, presumably for delineating a field boundary or for pasturing sheep and goats in the modern era. Beneath these drystone cobbles are six to eight courses of limestone blocks. Most are regularly shaped (rectangular/quadrangular), with some variability in size. The addition of mortar to a small section of blocks in the upper western portion of the exposed megalithic wall suggests some later modification, likely associated with adjacent

[31] Batović, Batović 2013, 12; Čelhar, Zaro 2023, 118. For additional general information about Iron Age fortifications, see Faber 1976; 2000; Batović 1977, 214–219; Brusić 2000b.

[32] Fadić, Štefanac 2014, 96ff.

[33] Suić 1980, 37ff.

[34] Faber 1976, 230ff.

[35] With respect to the entire circuit, the megalithic wall lies in various states of decay and is seen mostly as an overgrown embankment today, rendering precise dimensions of its original height and width difficult to ascertain. Chapman, Shiel, Batović (1996, 119) recorded widths that range from 4.2–6.6 m, which may reflect the dimensions of the embankment rather than the wall itself. However, Batović, Batović (2013, 12) state that the width of the megalithic wall varies from 2–4.5 m. Variations in width are also documented at nearby *Asseria*, where the fortification is remarkably well-preserved and has been investigated in different locations. Fadić, Štefanac (2014) note a width of 2.5 m along an upper portion of the northern wall (p. 66–67), 3.2 m along a section of the eastern wall (p. 70–72), and 1.4–1.8 m along a section of the southern wall (p. 75).

structures that were documented to have been added later during Late Antiquity, and again during the Late Middle Ages or the Early Modern Era. The dry-laid megalithic stones range from approximately 50×30 cm to upwards of around 100×60 cm. The lowest course of megalithic blocks is set in alignment to create a level plane on their upper surfaces to support the next course of stones, but because individual blocks vary significantly in size, its lower face is highly irregular. Importantly, this lower course was not constructed on bedrock but rather atop a jumbled deposit of large, unworked stones. The lowest course of megalithic stones is also located relatively high in the stratigraphic sequence and approximately at the same horizontal level as structures that date to the 2nd/1st centuries BC. The jumbled deposit of cobbles beneath the megalithic wall also extended to the area immediately south of the interior face. Its excavation recovered a large quantity of ceramics, including different types of imported pottery, among which fragments of Greco-Hellenistic vessels were most represented.

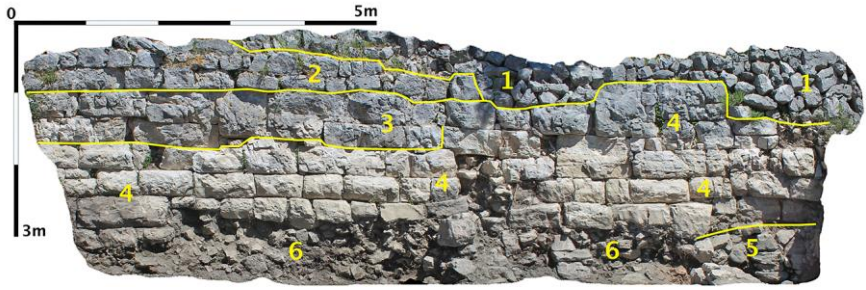

Fig. 5. Exposed interior face of the megalithic wall in quadrants B12 and B13. (1) Modern Era drystone wall, presumably associated with sheep pasturing; (2) Early Modern Era construction with regular application of mortar; (3) megalithic stones in original position but with light mortar, possibly applied during Late Antiquity; (4) 2nd/1st century BC dry-laid megalithic blocks; (5) possible interior facing of earlier Iron Age fortification; (6) cobble debris, possibly associated with earlier Iron Age fortification

Quadrants B10 and B12, positioned just south of the megalithic wall in the northwest corner of area B, offer additional information. Excavation of those quadrants identified a number of architectural features, but the earliest was a 2nd/1st century BC structure without any antecedent construction evident in the deposits below. Indeed, although abundant Iron Age ceramic material was recovered from the stratigraphic layers beneath the structure, not a single antecedent clay floor, hearth, or any other *in situ* structural feature was documented. The structure was built immediately on top of or cut partially into a deposit of large, unworked cobbles that may be connected to those lying beneath and to the south of the me-

galithic rampart. Below the cobbles was a sequence of uniform gray and gray-brown deposits, the bands of which plunged steeply away from the megalithic wall. Unfortunately, given the potential instability of the megalithic wall, excavation of the space between the wall and the north face of the 2nd/1st century BC structure was ultimately abandoned (see Fig. 5). It is possible that the cobble debris constitutes the remains of an earlier fortification wall, which was toppled and/or partially repurposed for the construction of the megalithic rampart. A short segment of potentially faced irregular stones was uncovered beneath the easternmost section of the megalithic wall, but it is too small of an exposure to definitively claim it to be the remnant of an older fortification (see Fig. 5: 5).

Additional clues about an earlier fortification come from the northeast entrance of the megalithic rampart. Excavation of probes E/F determined that the extramural road that led to the entrance measures approximately 1.5–1.6 m wide and was paved with stone slabs, while the portion within the settlement appears to have been constructed of compacted gravel with an underlying matrix of mixed soil, sand, gravel, and small stones. At the threshold between the exterior pavement and the interior gravel road are three stones suggestive of a gate with a locking mechanism. Both outer stones – one on each side of the road – contain a circular groove for the door frames, whereas a smaller third stone placed centrally in the road has a linear groove for locking. Wear marks on the outer stones indicate the doors swung toward the interior of the hillfort (Fig. 6).

Fig. 6. Street and gate stones at northeast entrance through the megalithic fortification. Note the circular depressions and wear marks on the gate stones where the pavement turns to compacted coarse gravel

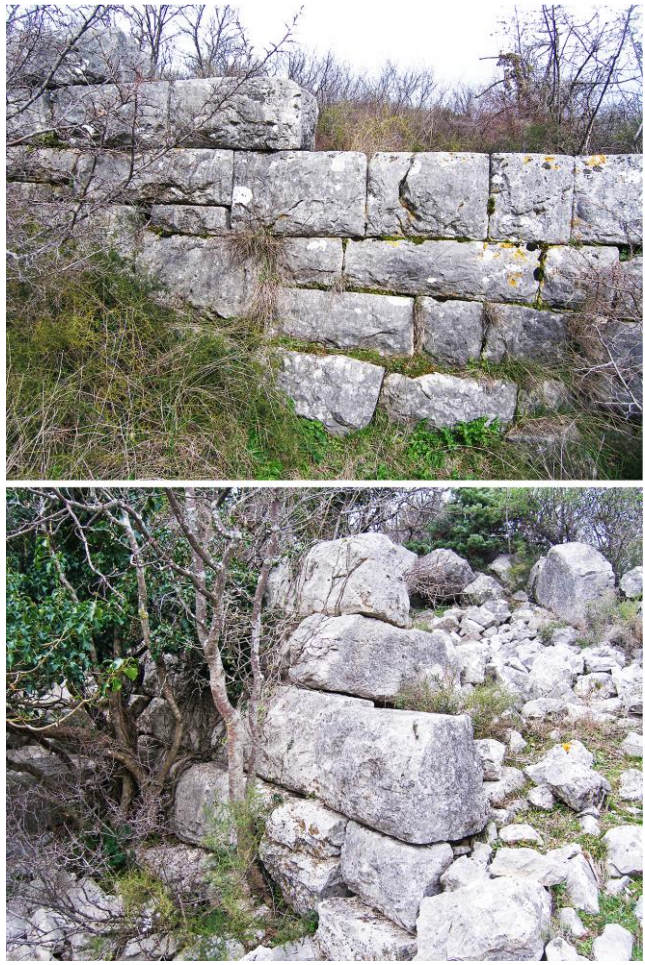

Fig. 7. Examples of exposed stonework of the megalithic enclosure

This entrance to the summit area was modified and reused to some extent during the Late Middle Ages and Early Modern Era. At the point of entry through the megalithic wall, the entrance was widened and the road repositioned slightly to the west from the original road, presumably in coordination with a late medieval Venetian/Ottoman-era auxiliary wall that extended from the northeast corner of the summit area fortress to the entrance.[36] Although masonry in the megalithic rampart at the site is exposed in only a few locations (Fig. 7), the monumental wall is, for the most part, clearly visible as an overgrown embankment. In the case of this entrance and road, a section of the megalithic wall was clearly removed to ac-

[36] See also Zaro, Gusar, Čelhar 2020, 193; Čelhar, Zaro 2023, 116–118, Fig. 7.

commodate the new configuration. The surface was leveled, with several megalithic stones repurposed and mortared into place to form the terminus of the auxiliary wall as it articulated with the megalithic embankment.[37]

The deposits beneath the early paved road and the later renovation where a portion of the megalithic wall was removed show similar stratigraphic sequences and may suggest the remains of an earlier fortification. Excavation of a small section of the road just inside the entrance through the megalithic wall revealed that the lowest megalithic blocks, at least those exposed by excavation along its western margin, were placed at street level. Similar to the section of megalithic wall documented in area B, the megalithic blocks here do not lie on bedrock but rather atop a deep deposit of medium-to-large drystone cobbles. This cobble deposit also extends beneath the adjacent road used during the Late Middle Ages or Early Modern Era – the space where a section of the megalithic wall had been removed. Excavation of this deposit reached a depth of nearly 2 m below surface before the operation was abandoned for safety reasons. The deposit consisted entirely of unworked cobbles, generally 20–40 cm in diameter, with occasional pockets of air and very little sediment. The deposit contained the greatest number of Iron Age ceramics recorded during the 2015 field season, and neither imported Iron Age pottery nor later Roman-period materials were recovered from its excavation (Fig. 8).

Fig. 8. Overview of excavation E/F at the northeast entrance through the megalithic wall. The eastern wall of the entrance remains partially intact whereas the western wall was removed down to its base. Note the cobble deposits (yellow arrows) beneath the removed portion of the fortification and beneath the lowest megalithic blocks that line the road

[37] Zaro, Gusar, Čelhar 2020, Fig. 7.

Based on current evidence, it is difficult to determine with certainty whether the cobblestone deposits documented beneath the megalithic wall in both locations represent the remains of an older rampart or simply a prepared foundation upon which the megalithic wall was to be constructed. Specific information about the foundations of other megalithic ramparts in the Liburnian area is limited, since most are known from their upper visible courses only and very few have been formally investigated. For comparative purposes, the sites of *Asseria* and *Varvaria* are the most relevant given their geographical locations in northern Dalmatia, comparable cultural histories, and published research concerning their megalithic walls.

At *Asseria*, investigations determined that the megalithic walls were constructed directly on top of bedrock with the only exceptions being those places where it crossed the demolished Iron Age fortification.[38] However, this only appears to have occurred in short sections with only shallow remains of the older construction left behind.[39] Conversely, at *Varvaria*, the megalithic rampart that enclosed the site did not extend to bedrock. Rather, it was constructed directly onto soil or atop a foundation consisting of one or two courses of smaller irregular stone blocks.[40] Suić considers this to be unexpected for such a massive construction, emphasizing the audacity of its engineers.[41] Suić also mentions that in some sections, particularly the western "older" part of the rampart,[42] the stones of the older Iron Age fortification were repurposed to build the foundation upon which the new megalithic rampart was built.[43] Unfortunately, the maximum depth of its foundation is unclear, rendering direct comparison to Nadin-Gradina difficult since depths at the latter certainly approach 2 m or more below the lowest course of megalithic stones based on the excavation of probe E/F. At *Asseria*, where investigations have been conducted more recently, the megalithic enclosure appears to run along an almost identical path to the older Iron Age fortification, with the former occasionally overlying or

[38] Fadić, Štefanac 2014, 50, 64; Fadić, Eterović Borzić, Štefanac 2018, 577–579.

[39] Berislav Štefanac, personal communication.

[40] Suić 1968, 224–225, T. III: 2. It appears that all Iron Age residential architecture of each temporal phase at Nadin-Gradina, including that of the 2nd/1st century BC, was built more or less on contemporaneous surfaces. The same observation applies to structures dated to Late Antiquity. However, walls constructed in the 1st and 2nd centuries AD (and even perhaps part of the 3rd century), commonly extend to bedrock, regardless of the depth or nature of pre-existing deposits.

[41] Suić 1968, 224, 228.

[42] Suić (1980, 32–38) dates the building of the megalithic rampart to a period of about 80 years, from the time of Caesar to Tiberius, with the western tract being the oldest. On the other hand, Faber (1976, 244; 2000, 168, Fig. 45) suggests that the *Varvaria* walls display two phases of construction, from the 3rd and 1st centuries BC.

[43] Suić 1980, 37–38; see also Faber 2000, Fig. 34. Based on old excavation photographs from Bribir/*Varvaria*, provided by Nikolina Uroda, curator of the Museum of Croatian Archaeological Monuments, it is evident that some portions of the megalithic wall lie atop a jumbled deposit of unworked stone, similar to the situation at Nadin-Gradina.

completely negating the latter.[44] Taking the cases of *Asseria* and *Varvaria* into consideration, it seems plausible that the cobblestone deposit beneath Nadin-Gradina's megalithic rampart constitutes the remains of an older fortification that extended more or less along the same route as the subsequent wall, at least along the northern boundary of the hillfort where our excavations occurred.

Although a precise date of construction for Nadin-Gradina's megalithic wall will require additional field research, there are several pieces of information that would suggest a likely 2nd/1st century BC construction date. First, within the northeast entrance, the artifact inventory[45] together with radiocarbon dates obtained from the street layers[46] associated with entrance in probe E/F indicate that the construction of the megalithic wall should not have occurred any earlier than the 2nd century BC.[47] Second, with the exception of a small modification made during Late Antiquity or later, the use of mortar as a binding agent for Nadin-Gradina's megalithic stones was apparently not employed.[48] In northern Dalmatia, mortar was primarily associated with the Augustan age onward.[49] Consequently, although the megalithic wall at Nadin-Gradina undoubtedly underwent a number of structural modifications over its lifespan, as did others in Liburnia,[50] it seems reasonable to suggest that its initial construction occurred sometime during the 2nd/1st century BC, based on currently available information.[51]

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[44] Fadić, Štefanac 2014, 96–109.

[45] Diagnostic material includes a fragment of a Greco-Italian amphora and a black-coated skyphos dated to the 4th/3rd century BC, and one Carthaginian coin minted in the period between 200 and 146 BC, representing the *terminus post quem* for its date of construction (Čelhar, Zaro 2023, 119–120).

[46] PSU-6625: 2120±20 BP; (79.8%) 198–88 cal BC, (14.3%) 81–52 cal BC, (1.4%) 336–330 cal BC; PSU-6651: 2200±20 BP; (92.9%) 361–194 cal BC, (2.5%) 188–176 cal BC.

[47] For more details about the chronology of the entrance, see Čelhar, Zaro 2023, 119–121.

[48] This must be taken with some caution since mortar is mostly seen in the fill of the walls (Faber 1976, 240), which was not excavated in the case of Nadin.

[49] Brusić 2000b, 142–143.

[50] Faber 1976; 2000; Brusić 2000b.

[51] In this context, the drywalled megalithic ramparts at Lergova gradina in Slivnica warrant mention (Brusić 2000b, 133–136; Ilkić, Čelhar 2018). The ramparts are particularly important for the chronology of their construction in the north Dalmatian region because, unlike other sites with similar walls, the settlement was abandoned during the mid-Augustan period at the latest. Hence, this would represent the *terminus post quem non* for the construction of the ramparts. On the other hand, the entire development of this settlement is somewhat unique in the wider Dalmatian region. After a brief settlement phase during the Middle Bronze Age, the site seems to have been abandoned until the end of the 3rd or beginning of the 2nd century BC, when the settlement was reconfigured according to a new plan with monumental ramparts and an orthogonal pattern of residential architecture (Ilkić, Čelhar 2024).

Streets

Two streets or alleyways were documented within the probe B excavation area: a more formally prepared street extending in the east-west direction, and a second, more narrow alleyway extending in the north-south direction. The east-west street is notably wider (approximately 2 m, not including curbs) and seemingly more important, as it could accommodate higher traffic between different parts of the settlement. The perpendicular north-south alleyway is much narrower (variably 1 m or less) and essentially represents a passage between two architectural complexes extending from the immediate vicinity of the ramparts toward the interior. Although each street was constructed differently and underwent some degree of renovation, they both exhibit a long continuity of use, from the Early Iron Age into Antiquity.

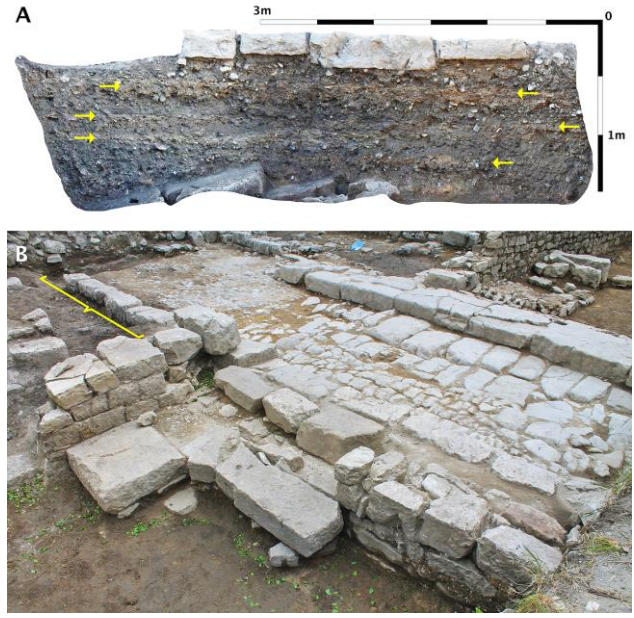

Fig. 9. Street identified in quadrants B2–B5. (A) North profile beneath Roman era curb stones along the eastern portion of the street. Yellow arrows indicated compacted Iron Age street surfaces. (B) Overview of Roman era street and curb stones. Yellow bracket indicates location of profile in A (prior to excavation)

The wider and more formally prepared east-west street was initiated during the Iron Age and consisted of an extremely compacted surface of sediments mixed with thousands of small stones, fragments of Iron Age pottery, and faunal material. Profiles of stratigraphic deposits indicate that there were several stages of street preparation and renovation during the

Iron Age, presumably in coordination with the growth of the surrounding settlement (Fig. 9A). During the Roman period, the street underwent significant renovation, evidenced by the addition of curb stones and pavement. Although more monumental than previous Iron Age iterations, the Roman street was fairly simple, utilizing variably sized and highly irregular stone slabs in its construction. Moreover, the entire street does not appear to have been capped with paving stones. Within the excavation, the pavement only covered the western section of the street. The eastern portion consisted of a compacted matrix of soil and small angular stones, reminiscent of the earlier Iron Age street surfaces below, but with the accompanying curb stones (Fig. 9B). Importantly, the Roman street is superimposed over and mostly aligned with the older Iron Age street surfaces, but shifted slightly to the south. A final renovation occurred during Late Antiquity, when it was resurfaced in a simpler manner with a compacted sandy soil matrix.

The north-south alleyway was prepared differently and seemingly defined by architectural complexes on either side of it. During the Iron Age, the passage was composed mainly of dark brown sediments that are clearly distinguishable from the lighter clay floors of the structures that flank it. The passage continued to be maintained during the early Roman era, defined largely by new structures that were built along its margins utilizing double-faced walls with heavy applications of mortar.

Settlement Organization

11th–9th centuries BC

Given the broad 10×35 m exposure in area B, interpretations regarding settlement organization and its evolution predominantly come from this part of the site. As noted above, our excavation documented the oldest part of the settlement to be near the megalithic rampart in the northern half of area B, reflected in thin deposits in quadrants B6 and B7, with more pronounced evidence coming from quadrants B8 through B11. Some of these early deposits returned calibrated radiocarbon age ranges from the 11th to the beginning of the 9th centuries BC,[52] which are consistent with the ceramic inventory recovered during excavation. It is also important to note that excavations did not recover fragments of imported pottery from these early layers, yet they are quite common in later deposits.

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[52] Two dates were obtained using charcoal recovered from layers in quadrants B8/10: Beta-554231: 2830 +/- 30 BP; (93.8%) 1058 – 906 cal BC, (1.6%) 1083–1065 cal BC; Beta-554232: 2800 +/- 30 BP; (91.3%) 1027–891 cal BC, (4.1%) 879–848 cal BC; and a third using charcoal recovered from a layer associated with a structure in quadrant B9: Beta-580574: 2780 +/- 30 BP; (75.8%) 1007–891 cal BC, (19.6%) 882–835 cal BC.

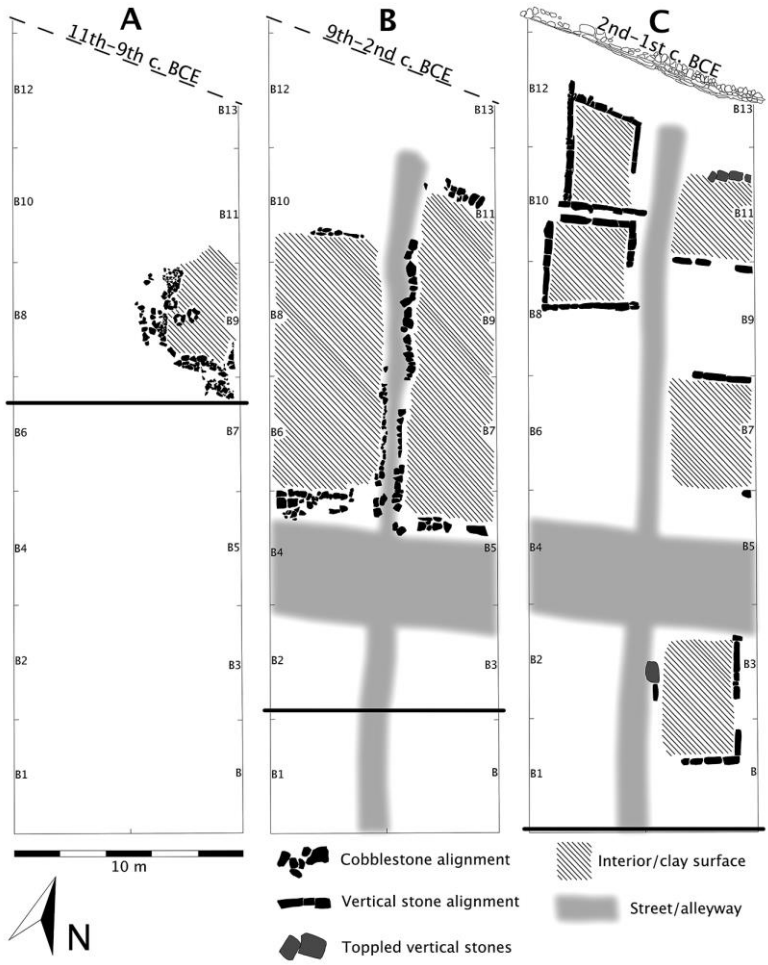

Fig. 10. Positioning of Iron Age structures in area B by time period, demonstrating the growth of the settlement and southward expansion toward the interior of the hillfort through time. The east/west street and north/south alleyway are also depicted. The dark horizontal lines indicate the farthest south archaeological materials were found to be contemporaneous with the structures associated with each occupational phase

Although this oldest settlement horizon was composed of numerous stratigraphic units, only one recognizable structure was documented, mostly in quadrant B9 in the eastern part of the excavation (Fig. 10a).[53] Unfortunately, because the structure extends beyond the eastern profile of the probe, its exact dimensions cannot be determined without further excavation. However, it appears to have been a domestic structure defined

[53] The structure is associated with the uppermost deposit of this oldest settlement horizon (which also lacks imported pottery).

Fig. 11. Earliest structure identified at Nadin-Gradina showing (A) drystone foundation with post holes, and (B and C) detailed images of post holes

by a drystone wall base. The drystone foundation also contained a number of post holes for the construction of its walls, with several others located within the structure, presumably for roof support (Fig. 11). Post holes vary in diameter and depth but are all lined with stones. Elsewhere, Liburnian clay floors with associated features (e.g., hearths, ovens) have been documented as evidence for domestic spaces, along with infrequent finds of drystone walls.[54] However, in the karst landscapes of the eastern Adriatic, including the area of northern Dalmatia, evidence for post holes is rare.[55] Their preservation among early deposits at Nadin-Gradina is, therefore, noteworthy, and can aid in the reconstruction of early dwellings. Apart from the post holes, a pit was also documented to have been cut into the floor of the structure. It was unlined and held a smaller bowl containing two sheep cervical vertebrae (Fig. 12).[56] Considering the size of the

[54] Batović 1987b; 104–115.

[55] For a rare documentation of the use of wooden posts in residential architecture, see the Bronze Age hillfort of Monkodonja (Hänsel, Mihovilić, Teržan 2015, 347ff.).

[56] Magdalena Kolenc of the Faculty of Veterinary Medicine, University of Zagreb, determined the faunal elements to consist of one first cervical vertebra (atlas) and one second cervical vertebra (axis) of a sheep.

pit, and, more importantly, the size of the bowl and its contents, its use for storage seems unlikely. Although the intent behind the feature remains unclear, it may have held some symbolic and/or ritual value, likely serving as a votive offering before and/or during the construction of the dwelling.[57]

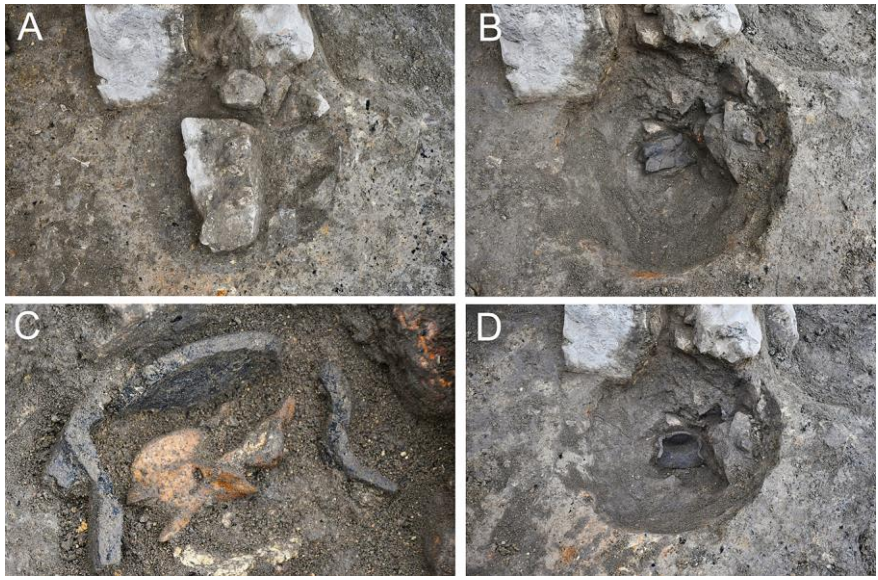

Fig. 12. Detailed views of the pit with a bowl. (A) surface of the pit; (B) initial identification of the bowl; (C) vertebrae inside the bowl; and (D) bowl after removing contents

Inside this oldest structure, excavation also revealed the remains of hearths/ovens. Unfortunately, their eastern portions also partially extend beyond the excavation unit, so a complete characterization of them is not currently possible. Cultural and depositional processes also destroyed part of the structure, evidenced in part by the presence of a large 95 cm diameter circular pit that subsequently cut through its easternmost portion. A charcoal fragment recovered from the hearth returned a calibrated radiocarbon age that most likely places the structure in the 10th or early 9th century BC.[58]

There are no clear architectural remains from corresponding stratigraphic levels on the western side of the excavation in the quadrants directly opposite this early structure (B6, B8, and B10). This could indicate the presence of open spaces between structures, which would, in turn, point

[57] For information about customs and rituals employed during construction, see: Capelle 1987; Paulsson-Holmberg 1997; Trebsche 2005.

[58] Beta-580574: 2780 +/- 30 BP; (75.8%) 1007–891 cal BC, (19.6%) 882–835 cal BC.

to a smaller resident population at the hillfort during the earliest period of settlement. Unfortunately, site formation processes make this early period difficult to interpret, as later structures overlie these early deposits. In extreme cases, Antique walls of stone with heavy applications of mortar cut down through Iron Age deposits, often reaching bedrock. As a consequence, the excavation was necessarily divided into smaller discontiguous units defined by Roman era and later masonry, complicating the picture of the hillfort's early occupational history. This was especially the case along the western half of the area B excavation.

9th/8th–2nd centuries BC

A different picture emerges from the 9th to the beginning of the 8th century BC, when Matt-painted pottery from southern Italy began to appear in large quantities. The sequence of imported pottery began with Middle and Late Geometric Daunian types, followed by the arrival of Subgeometric South Daunian (Ofanto I and II) types, and pottery from Greek production centers (i.e., Corinth, Athens, southern Italy). Despite the complicated reality of site formation, where long-term use, modification, or even (partial) destruction or mixing of older layers is commonplace, the sequence of imported pottery still demonstrates depositional consistency in the chronological order it was produced. Given their stratigraphic position, these imported materials have proven to be extremely valuable when assigning approximate age ranges to individual deposits and associated structures, particularly when considering the "age plateau" that occurs in the radiocarbon calibration curve from the 8th to 5th centuries BC.[59]

From the 9th/8th century BC onward, a basic grid of dwellings and associated streets was established, with structures now appearing in both eastern and western sides of the area B excavation. This architectural expansion consists of two larger parallel structures separated by the narrow north/south passage or alleyway described above. These structures are also flanked on their southern sides by the wider east/west street described earlier (Fig. 10b). Both Iron Age structures appear to be of a similar size but extend beyond the margins of the excavation, so it is not possible to determine their total dimensions. However, they are likely quite sizable structures, with exposed portions of the eastern structure measuring approximately 3.5×15 m and a minimum area of about 52.5 m^2 (see Fig. 10b). The appearance of new and more tightly spaced structures probably reflects a gradual increase in the resident population. However, Early Iron Age artifacts are rare in the southernmost quadrants of the excavation and concentrated in the deepest deposits of the northern portions of quadrants B2 and B3 only. Architecture, on the other hand, is completely absent for

[59] Bronk Ramsey 2021; Reimer et al. 2020.

this period in the southernmost area (quadrants B, B1, B2, B3, and B4). This may indicate that the settlement remained more open toward the interior and was perhaps used for other domestic, social, or economic activities, like community gatherings, keeping livestock, or managing small gardens, for example.

Fig. 13. Examples of drystone foundations from the period 9th–2nd century BC. (A) delineation along the north/south alleyway; (B) delineation along the east/west street

Successive clay floor surfaces testify to the continuous restoration of buildings in the same positions and with identical dimensions until at least the 2nd century BC. Although post holes were common in the oldest structure, such features are notably absent or rarely evidenced among these later surfaces, making it difficult to reconstruct their appearances. Their dimensions, however, can be calculated given the sharp and highly visible boundary between the edges of these clay surfaces and the dark brown deposits of the streets/alleys that divide them. As the Iron Age progresses, these clay surfaces become delineated by drystone alignments as well, further differentiating them from the north/south passage and the street to their south (Fig. 13). The drywall foundations that delineate the structures along the north/south passage consist of single stone alignments and appear to be narrower or less robust than those that delineate the southern (and possibly northern) margins. This technique was utilized in at least two phases of construction or renovation, where stone alignments were found to be superimposed over the other (Fig. 14).

The archaeological inventories associated with both western and eastern structures point to varied activity areas within them and a shared internal organization of space that was maintained over the course of centuries, even through successive periods of renovation (e.g., resurfacing of clay floors and/or establishing new drystone alignments around their perimeters). The southern portions of each dwelling contained the majority of

hearths and ovens (Fig. 15), documented within a number of stratigraphic levels (i.e., older and younger horizons).[60]

Conversely, with only one exception,[61] such features are notably absent from the northern portions of each dwelling. The northern portions commonly contain fixed rectangular clay features with thickened and raised edges, possibly used as bins for storage purposes. To date, they have not been documented among other hillforts in northern Dalmatia or surrounding regions.[62] In the western structure, rectangular clay features were documented in one stratigraphic layer only, while in the opposite eastern structure they are more commonly represented and documented within three different stratigraphic deposits and superimposed in nearly identical positions. The two older clay features are rectangular in shape and a bit larger. The oldest measures 1.5×1.2 m in area, with a 3–4 cm thick rim, whereas the subsequent clay feature measures 2.2×1.36 m in area, with an 8–10 cm thick rim. Both are relatively shallow, measuring just over 10 cm in depth. Two shallow circular clay features with thickened edges were also documented and associated with the same horizon as the earliest rectangular clay feature mentioned above. Adjacent to one was a groundstone slab and a

Fig. 14. Two segments of superimposed drystone foundations along the north/south alleyway. Top arrow points to a later foundation that was removed during excavation but remained visible in the profile

[60] Hearths and ovens were documented in quadrants B6 and B8 on the west side of the north/south passage, and in portions of B5, B7, and in the extreme southwest corner of B9 on the east side.

[61] One hearth was identified in one level in quadrant B8/10.

[62] Although much earlier, Parica (2021, 84) describes a potentially similar feature at the submerged Middle Bronze Age settlement of Ričul in Turanj, consisting of fragments of a large quadrangular clay bin. Elsewhere, a number of rectangular clay bins or silos, also argued to have been for storage purposes, were excavated within 5th/4th century BC structures in L'Île, Martigues, in southern France (Damotte 2003, 173–176, 219ff, Fig. 43–45).

large number of handstones (Fig. 16). These grinding implements probably reflect some kind of work space, perhaps connected to cereal processing. The structure, together with each of these features, was apparently exposed to a fire event, as there is evidence of considerable burning. A charcoal fragment from one of the circular features returned an age range that falls within the Iron Age calibration "plateau", or 8th–5th century BC.[63] However, stratigraphic superposition and associated cultural materials indicate a more precise date of approximately the 8th century BC.[64]

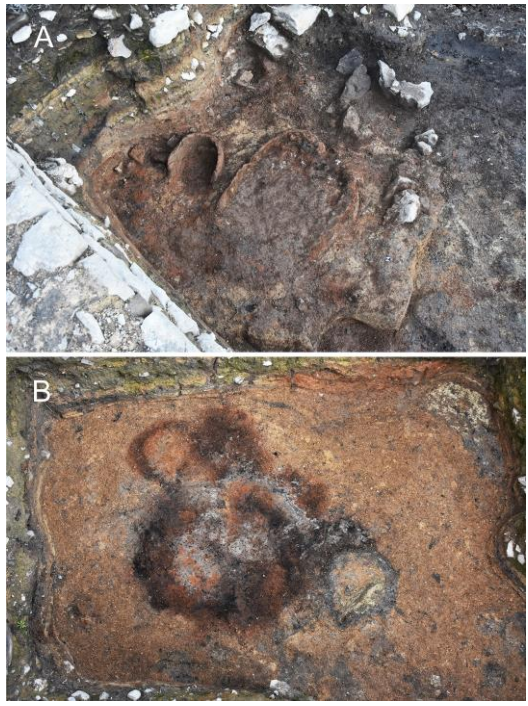

Fig. 15. Examples of ovens (A) and hearths (B) from the period 9th–2nd century BC

The youngest clay features within the eastern structure were crafted somewhat differently and consisted of several smaller clay containers arranged contiguously. An identical configuration was documented in the western structure and on a similar horizontal plane (Fig. 17). For some of the younger features, small stones were coated and packed in clay and used as a base.

[63] Beta-580573: 2470 ± 30 BP; (93.3%) 766–465 cal BC; (2.1%) 436–422 cal BC.

[64] Matt-painted pottery from Daunia of the Late Geometric phase (see Yntema 1990, 226–234) was recovered from deposits above the floor surface. Included are fragments of a spherical jar (olla) with vertical bandhandles topped with a disc. These were recovered from each quadrant in which the structure extends (B5/7, B7 and B9).

Fig. 16. Overview of an Early Iron Age domestic structure with (1) clay partition, (2) clay storage bin, (3) circular clay feature, and (4) groundstone/handstones. The distinction between the brownish sediments of the north/south alleyway and the mottled clay surfaces of the structure is clearly visible along the left margin of the photo

Although clay containers were mostly absent from the northern portion of the western structure, there are other indicators that this space was used for storage purposes. The most compelling evidence stems from the many carbonized remains of plants, especially cereals, scattered about one of the floor surfaces,[65] which is not surprising considering the degree of burning the structure seems to have experienced at one point. The associated ceramic inventory also points to storage functions. Included in the assemblage are many fragments of thick-walled storage vessels,[66] along with larger coarse ware, a smaller number of bowls, and *in situ* finds of two clay rings, one double bowl (or "salt cellar"), and the bottom fragment of a large vessel filled with carbonized grain (Fig. 18). Radiocarbon analysis of the carbonized grain returned a calibrated age range of 827 to 762 BC.[67] The large vessel is a Middle Geometric Daunian jar, which was generally produced from the late 9th through most of the 8th centuries BC,[68] providing further confirmation of the structure's chronology. This ceramic type is also the oldest southern Italian Matt-painted pottery to appear at Nadin-Gradina, and indeed more broadly in the Liburnian

[65] Knežić 2023, 105–107.
[66] Knežić, Šoštarić, Čelhar 2023.
[67] Beta-554230: 2600 ± 30 BP; (95.4%) 827–762 cal BC.
[68] Yntema 1990, 223.

area.[69] It is clearly distinguishable from other wares produced locally or regionally by its painted decoration and use of finer clays. Imported pottery from Daunia is often interpreted to have been a luxury good whose distribution would have been somewhat restricted and probably reserved for tableware. Yet, at Nadin-Gradina, these southern Italian imports are consistently represented in nearly every settlement deposit that corresponded to its phase of production and distribution around the Adriatic basin. Indeed, it is arguably the most numerous category of imported pottery during the Early Iron Age. Still, despite its regular appearance, its apparent use for storage purposes in this particular case, especially considering it was one of the earliest imports to the Nadin community, is somewhat surprising.[70]

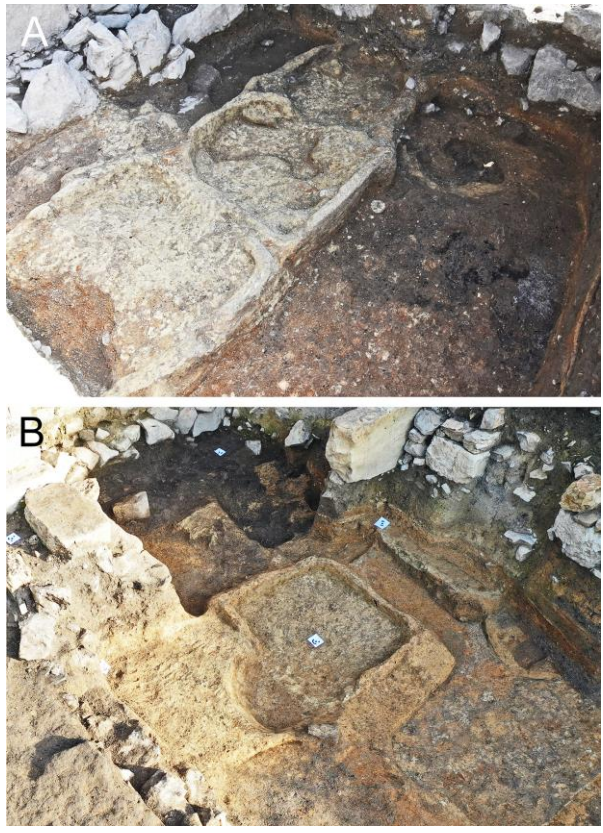

Fig. 17. Clay storage bins. (A) bin identified in the western structure (B8/B10) and (B) bin identified in the eastern structure (B9)

[69] Čelhar, Borzić 2016, 72–76; Čondić, Vuković 2017, 53–55, 74–83; Škoro 2020; 2023.

[70] It is important to note that the vessel is relatively large, measuring over 40 cm in height and in diameter.

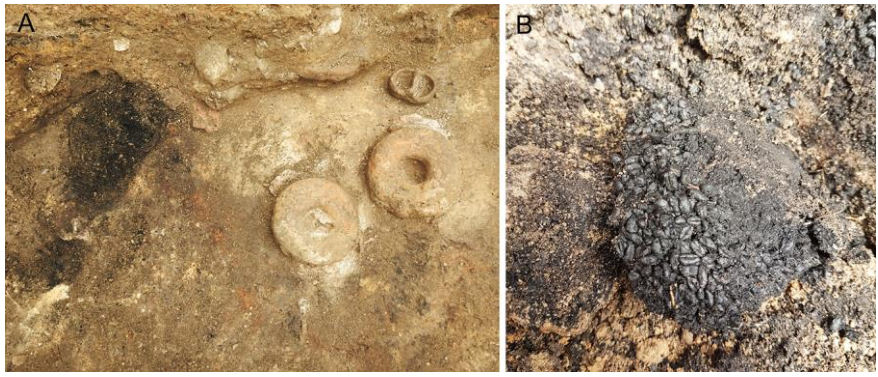

Fig. 18. Floor surface with in situ finds of (A) two clay rings, one double bowl, and vessel base containing carbonized cereals; (B) detail of carbonized cereals from vessel bottom

The spatial division of domestic activities into southern and northern spaces also appears to have been architecturally formalized as well. This is less certain within the western structure, given the more intensive (and destructive) program of construction during the early Roman period. However, the eastern structures were much better preserved, having suffered much less damage from later buildings. This permitted broader areas of excavation, resulting in a clearer stratigraphic picture of successive clay floors and features. As evidenced in the eastern profile of the excavation, changes in the depositional sequences associated with individual features and the internal division into northern and southern uses of space regularly occurred in about the same location (Fig. 19).

Considering each individual archaeological context, it appears that these domestic uses of space were formally defined architecturally by transverse walls or other low partitions within each structure. In one case, an east-west division was first established using a raised clay partition, followed in a later phase by a slightly narrower dry-stone base of small stones with a large post hole (Fig. 20). Multi-room structures have been documented in the neighboring Japodian region[71] or, in the case of a special function structure in the central Dalmatian region – the Gorica sanctuary.[72] In the Liburnian area, however, only one-room structures have been previously recorded.[73]

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[71] Drechsler-Bižić 1986, 111, T. 3.

[72] Човић 1976, 252–255, Fig. 137. Structures with several rooms have also been documented at the Bronze Age hillfort of Monkodonja in Istria (Hänsel, Mihovilić, Teržan 2015, 360–365, Fig. 275–277, 281).

[73] Batović 1987a, 107–108.

Fig. 19. Orthomosaic photo of a section of the eastern profile of area B (quadrants B5 to B11), demonstrating the stratigraphic complexity of clay floors from the 9th–2nd century BC. The architectural partitions within the structures occurred in the same locations, indicated stratigraphically by the yellow box.

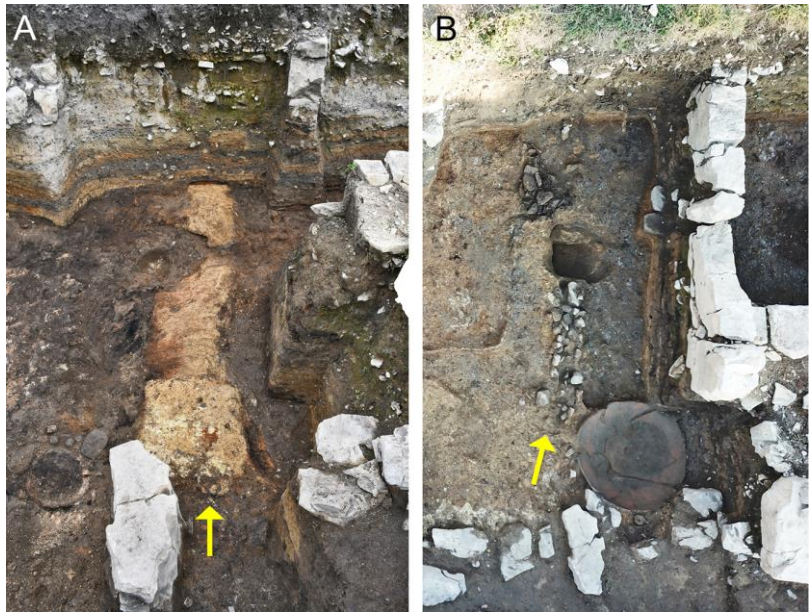

Fig. 20. Examples of internal partition foundations identified in 9th–2nd century BC structures. (A) clay partition; (B) drystone partition with posthole

2nd/1st centuries BC

Late Iron Age (2nd century BC) architecture is clearly distinguishable from both antecedent and subsequent construction techniques, representing a departure from the long-term continuity of construction, design, and use of domestic space seen throughout much of the preceding millennium. Architectural forms are smaller than previous types and consist of quadrangular structures defined by large, vertically placed stone blocks,

most of which are broken and partially hewn (Fig. 21). Their construction technique is quite similar to the large Late Iron Age tombs documented in the flat necropolis where successive burials were carried out over the course of several centuries.[74] To some extent, they also resemble older grave architecture in the flat necropolis as well, with stone burial cists enclosed in a similar manner.[75] Among other hillforts like Jerebinjak[76] and Lergova gradina,[77] a similar, albeit more robust, design of residential architecture has also been documented. Two of these structures were excavated at Lergova gradina, which yielded Late Iron Age archaeological material and corresponding radiocarbon assays.[78]

Fig. 21. Late Iron Age (2nd/1st century BC) structures in quadrants B8/B10/B12. The megalithic fortification wall is visible in the upper right corner of the photo

At Nadin-Gradina, three of these Late Iron Age architectural units were discovered in area B, although there is evidence to suggest the presence of at least two others as well (Fig. 10c). The two most preserved structures were exposed in the northwestern portion of the excavation and found to be completely intact. The southern of these two is quadrangular in shape, with an interior space measuring approximately 11 m^2. However, the northern structure is somewhat irregular, with its northern wall constructed not at a right angle to the others but rather in coordination

[74] Batović, Batović 2013; Kukoč, Čelhar 2019, 23–25; Čelhar, Borzić 2024.

[75] Kukoč, Čelhar 2019, 18–23, Fig. 10–12, 15.

[76] Brusić 2000b, 138–139, Fig. 27–28; Čelhar, Zaro 2023, 113, Fig. 4.

[77] Ilkić, Čelhar 2018.

[78] Ilkić, Čelhar 2018. Three carbon samples from different locations returned calibrated age ranges from the 2nd to the first half of the 1st century BC (Beta-488659: 2110 ± 30 BP, (95.4%) 204–46 cal BC; Beta-488658: 2110 ± 30 BP, (95.4%) 204–46 cal BC; DeA-44532: 2103 ± 15 BP, (95.4%) 170–50 cal BC).

and alignment with the megalithic wall to its north. It is of similar size to the first, measuring a total area of about 10 m^2. The remnants of a third Late Iron Age structure were identified in the southeast portion of the excavation, just south of the east/west street, but it suffered significant damage from Early Roman era construction activity. Fortunately, enough was left intact to be able to reconstruct its general quadrangular appearance and to calculate an approximate area of 15 m^2.

There is some evidence to suggest the presence of additional Late Iron Age structures of this type on the eastern side. There, two parallel alignments of these large vertically-placed stones were noted, but without any identifiable transverse or connecting walls. Furthermore, the alignments extend beyond the eastern margin of the excavation, so little additional information can be gleaned from the record without further excavation.

The two alignments possibly form the opposite walls of a single structure, but it seems more likely that the two alignments are associated with two separate structures, in which case the area between them would have represented exterior space during this period. Several observations would point to this interpretation. First, if they were part of a single structure, then the complete absence of evidence for its western wall is difficult to explain, especially since there was no apparent Roman architecture in that space. Roman construction techniques are easily differentiated in the archaeological record from antecedent Iron Age construction in their use of double-faced walls of smaller, stacked stones and heavy applications of mortar. The heavy Roman-era construction activity built over other Late Iron Age structures at the site, particularly those identified in quadrants B and B3, was destructive but still left clear archaeological signatures of their prior existence. Roman construction practices seemed to either remove small sections of walls to accommodate new constructions, incorporate them into the fabric of a new wall, or, in some cases, repurpose the large stone blocks as building material for new constructions. In any of these cases, Roman programs of construction often left signatures of older walls, and some partly or wholly intact.[79] Consequently, even with subsequent building activity, we would expect to find at least some evidence for the existence of a western perimeter wall, but there is none in this case.

Second, there is some indication of an opposite, paired wall associated with each of these two alignments. In the case of the southern alignment, there is a parallel row of stone blocks to its south. The stones are consistent with those used in other Late Iron Age structures, but they had

[79] In one instance, a stone block that originally stood vertically was later laid horizontally and incorporated into the curb of the ancient street, although it differs visually from the other properly carved blocks used for this purpose. Additionally, during the construction of a Roman-era wall that passed perpendicularly to the Late Iron Age wall, a single stone block was removed to permit the new construction while leaving the remaining stones in their place.

been incorporated into the construction of a Late Antique wall. A slightly different situation was observed to the north of the northern alignment, where a row of large stone blocks are visible. Some had been toppled over and laid horizontally, probably during the construction of a new building.

Third, the southern of the two stone alignments displays evidence of plaster on its southern side, most likely its inner face. This technique is present in one of the two completely preserved 2nd/1st century BC structures in the northwest part of the excavation. In the southern of the two structures, plaster is documented on the inner surfaces of the walls only, which may be used to differentiate interior vs. exterior faces of stone alignments elsewhere, when present. Interestingly, plaster is completely absent in the other well-preserved structure to its north, and there is no evidence to suggest plaster was used in the partially preserved Late Iron Age structure in the southeast portion of the excavation (quadrant B/B3). Elsewhere, contemporaneous architecture at Lergova gradina shows no indication of plaster, either in the construction of its ramparts or in its residential architecture. Based on its apparent, albeit limited, use at Nadin-Gradina, its presence on the southern face of the southern alignment would indicate an interior surface, and, hence, an entirely separate structure from the northern alignment.

The application of plaster or mortar is commonly associated with Roman construction techniques, but the timing of its initial introduction to Nadin-Gradina is difficult to determine. For instance, fragments of mortar or plaster were recovered from the upper surface of Tomb 105 in the necropolis, probably signifying its terminal use. At least 228 individuals were successively buried in the tomb beginning in the 2nd century BC and lasting into the middle or late Augustan period.[80] Hence, the tomb's construction and use falls within the chronological framework of the 2nd/1st century BC structures within the hillfort, with fragments of mortar or plaster tied to its final stages of use. Consequently, in both domestic and grave architecture, the use of plaster is associated with the final period of transition from Late Iron Age to Early Roman life at the hillfort, marking the change of an era. In settlement contexts, the accompanying inventory of archaeological materials provides additional evidence that these Late Iron Age hillfort structures were used not only in the 2nd/1st centuries BC, but also into the first half of the 1st century AD. Therefore, the application of plaster on interior walls of Late Iron Age dwellings likely reflects modifications or renovations implemented sometime during the late 1st century BC or early in the 1st century AD.

The addition of plaster is not the only architectural modification observed for the Late Iron Age settlement. As a perpetually evolving hillfort, there are other indications that existing dwellings continued to be renova-

[80] Čelhar, Ugarković 2021, 312–314; Čelhar, Borzić 2024.

ted, modified, or outfitted with new building techniques. The clearest example comes from the northernmost of the two well-preserved Late Iron Age structures, where a small entrance corridor was added to its eastern wall as part of a renovation. The addition was constructed of small, stacked stones with a heavy application of mortar, clearly differentiating it from the technique used to build the original structure. Excavation also revealed a shallow channel across the threshold of the entrance into the original frame of the structure. It is clear that several vertical stones once stood in this location but were removed at some point later as part of a modification to create an entrance with an adjoining external corridor.[81]

Batović suggests that during the Iron Age, domestic structures in the eastern Adriatic were constructed of stone and sometimes wood.[82] At Nadin-Gradina, drystone wall foundations with perishable superstructures appear to have been common, with perhaps some constructed entirely of perishable materials. Apart from foundation walls composed of large, vertically placed stones, there is little additional information to aid in reconstructing the original appearance of these Late Iron Age dwellings. No associated post holes were documented within the interiors or around the exterior of the structures. The stone foundations probably supported a perishable superstructure, as their relatively narrow dimensions would hardly have supported higher walls of stone without the use of mortar.[83]

Discussion

With approximately 7 ha of urban space enclosed within its megalithic rampart, Nadin-Gradina represents one of the largest and most pronounced settlements not only in Liburnia, but in the wider eastern Adriatic area. From the 2nd/1st century BC onward, the megalithic wall spatially defined the hillfort, and it remains a prominent feature on the landscape today, primarily as an overgrown embankment. Available evidence suggests that an earlier fortification probably ran along at least a portion of the megalithic wall's path, which is consistent with information generated at other contemporary hillforts in northern Dalmatia.[84] However, with

[81] The width of the channel is identical to the widths of the other stone blocks that form the wall.

[82] Batović 1987b, 97.

[83] Given that no post holes were documented, the superstructure was possibly solved by laying horizontal wooden beams, which is supported by the leveling of the upper surface of the stone blocks in a row. As mentioned previously in the text, the absence of a large number of post holes is also reflected in the 9th–2nd century BC horizon of buildings in Nadin, where the architecture is characterized by drystone foundations (rows of stones) of varying widths. The use of wooden beams in combination with similar drywall foundations is well documented with numerous excavated houses at the Iron Age settlement at Most na Soči in Slovenia (Svoljšak, Dular 2016, 44ff.), which provides a possible analogy for the solutions and construction technique used for different kinds of structures with a drystone base.

[84] For *Asseria*, see Fadić, Štefanac 2014, 96ff.; for *Varvaria*, see Suić 1980, 37ff.

only a small section explored at Nadin-Gradina, it is possible that the original area of the settlement may have differed considerably from the more developed form of the Late Iron Age hillfort. On the other hand, if the original area of the settlement was more or less the same as what is defined by the 2nd/1st century BC megalithic wall, as the oldest deposits in the vicinity of the wall would attest, then clearly the use of space within the area defined by the ramparts had evolved over time.

Despite complicated depositional sequences, Iron Age architecture is remarkably well preserved around probe B. Using a range of absolute and relative dating measures, it is clear that the built environment (in this case, probably domestic architecture) was initially established relatively close to the rampart, within a narrow 20–25 m wide area. Over the course of the Iron Age, the urban built environment became more densely configured, and it gradually expanded toward the interior of the hillfort. The settlement continued to expand toward the interior during the Roman era, further supported by the results of our initial testing of interior spaces in 2015 (probes A, C, and D), where only architectural remains of the Early Roman period or later were identified. This interpretation is consistent with the results of the initial testing conducted in 1986 as well.[85]

This pattern aligns with observations made at a number of other important Liburnian hillforts in the region, like Beretinova-Gradina in Radovin,[86] Bribirska glavica (ant. *Varvaria*),[87] and more recently, at Cape Ljubljana in Ljubač near Zadar.[88] A slightly different scenario exists for the two important coastal peninsular settlements of Zadar (ant. *Iader*) and Nin (ant. *Aenona*). However, these latter cases also constitute living cities. Consequently, archaeological work was of a protective nature only and primarily dictated by the distribution of urban development projects. Archaeological probes were more numerous and more widely placed within the cities. In these cases, excavations revealed (Early) Iron Age artifacts and architectural remains broadly throughout the cities, suggesting more densely developed interior settlement areas (i.e., not restricted to their perimeters only).[89] It is important to note that these are the two largest Iron Age settlements in the northern Dalmatian region. Their size and prosperity certainly resulted from their favorable locations along Adriatic trading routes and their protected ports, which is particularly the case for Zadar.[90]

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[85] Chapman, Shiel, Batović 1996, 232

[86] Batović 1968, 56–57.

[87] Batović 1980, 66.

[88] Vujević, Gusar, Glavaš 2022, 33–34.

[89] Čondić 2010, 28–30; Dubolnić Glavan 2015, 21–23, Appendix 1. It is important to note that in some cases sea level rise and the presence of groundwater hindered excavation below Roman levels in these coastal settings (Čondić 2010, 30).

[90] Brusić 2001; Čače 2006, 70.

Initial settlement of Nadin-Gradina appears to have occurred during the end of the Bronze Age or beginning of the Early Iron Age. Although the population was relatively small from its foundation, changes in the distribution and density of domestic architecture suggests a gradual increase in resident population over time. Chapman and colleagues surmise that fewer than 400 people probably lived in the hillfort during the Iron Age, "...with a possible doubling of that figure in the Roman period."[91] Although assessing population numbers with any degree of confidence is always a challenge, our work at Nadin-Gradina generally supports this assessment. If the arrangement of Iron Age domestic architecture exposed in probe B were to be replicated along the extension of the megalithic wall, the length of which measures nearly 1 km,[92] then a count of some 50–70 structures housing a few hundred people would be a reasonable estimate and consistent with other projections.[93] Data generated from the necropolis also aligns with this estimate, particularly with respect to the Late Iron Age. Although burials from the Roman period onward either partially disturbed or fully devastated a majority of Iron Age tombs, Tomb 105 contained burials predominantly from the 2nd and 1st centuries BC and can offer insight into the question of population at the hillfort during this period. Skeletal analyses confirmed that a minimum number of 228 individuals of both sexes and all age groups are represented in the tomb.[94] At least eight other large Late Iron Age tombs with successive burials were also excavated, but occurring within a somewhat broader chronological span (4th/3rd–1st centuries BC). Unfortunately, given the amount of subsequent disturbance, precise data regarding MNI could not be generated.[95] Considering the necropolis has not been explored in its entirety, and thus leaving open the likelihood that additional contemporaneous tombs remain unexcavated, an estimate of several hundred inhabitants of the hillfort during the (Late) Iron Age seems reasonable.

The foundation and subsequent development of the prehistoric hillfort can be divided into three basic phases. First, the earliest settlement is registered by a number of deeply buried artifact-rich deposits, mostly without associated architectural remains, with the exception of a single structure at the uppermost range of these deposits. It was identified in the northeastern part of probe B, and it dates to the end of the Late Bronze Age and beginning of the Early Iron Age (11th/10th to 9th century BC). The absence of any other identifiable structures associated with this period may indicate that dwellings were relatively dispersed and that much of the interior of the hillfort was undeveloped.

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[91] Chapman, Shiel, Batović 1996, 123.
[92] According to Chapman, Shiel, Batović (1996, 119), the length of the rampart is 962 m.
[93] See Chapman, Shiel, Batović 1996, 123.
[94] Čelhar, Ugarković 2021, 298; Čelhar, Borzić 2024.
[95] Batović, Batović 2013; Kukoč, Čelhar 2019.

Second, the hillfort underwent significant changes in its organization of space, beginning around the end of the 9th or sometime during the 8th century BC. Around this time, a basic orthogonal pattern of streets and narrow passageways was established and effectively maintained on more or less the same horizontal plane for more than a millennium. This spatial pattern served as a framework onto which all subsequent structures were arranged. From about the 9th to the 2nd centuries BC, two rows of relatively large structures are apparent, separated from each other by a narrow north/south passage and flanked to their south by a wider east/west street. Despite minor architectural changes, there is a clear continuity in the development of the settlement, where individual structures underwent multiple renovations utilizing their same locations and dimensions. This continued uninterrupted for a period of about six or seven centuries, until somewhere around the 2nd century BC. Throughout much of this time, the interiors of both structures exhibited similar patterns of spatial organization. The northern parts of the structures were regularly reserved for storage purposes, whereas the southern parts of the structures were designed for more active domestic activities, including kitchen areas and other living spaces.

The third distinctive phase of settlement during the prehistoric era arose during the 2nd/1st century BC. During this period, a new domestic architectural form was introduced, and the urban built environment continued to expand toward the interior of the hillfort, with structures now evident to the south of the east/west street. Dwellings became smaller but more numerous and more densely arranged, probably reflecting a growing population. However, despite the architectural changes that occurred, including changes in the shapes and floor plans of structures, the basic grid that was established in the Early Iron Age continued to frame the growth and development of the settlement through the end of the Iron Age and into Antiquity.

The long-term continuity evident in Nadin-Gradina's organization of urban space, particularly as it was framed by its network of roads and passageways throughout much of the Iron Age, is not an isolated case in northern Dalmatia. Excavation beneath the main street near Kraljevac in the town of Nin (ant. *Aenona*) determined there to have been as many as seven successive street levels below, suggesting a high degree of urban continuity from the Iron Age into the modern era.[96] Furthermore, at the Banovac site in the northeastern part of Nin, the orientation of the street was clearly maintained from the prehistoric era into Roman times.[97] Kolega suggests that the orthogonal coordinate system was not applied to Nin during the Roman era while planning the main street leading from the

[96] Kolega 2005; 2019, 27, 36.
[97] Kolega 2019, 27, 46–47.

southern city gate to the forum. Rather, the orientation was determined by the existence of older Iron Age structures along its path and the general morphology of the settlement.[98]

By the first half of the 1st century AD, Nadin-Gradina was undergoing significant changes associated with its transformation into the Roman municipium *Nedinum*. The urban built environment continued to expand toward the interior of the hillfort, with apparently more intense programs of construction. Roman techniques tended to utilize double-faced walls with smaller, faced stones and heavy applications of mortar. Although a detailed description of Roman *Nedinum* is not within the scope of this paper, these new techniques clearly reshaped the fortified town and cemetery according to Roman standards of urbanism.[99] However, much like the adaptation of the Late Iron Age settlement to the urban built environment that preceded it, the Roman township adapted to the 2nd/1st century BC hillfort by following the same basic spatial layout of streets and passageways that had shaped Nadin-Gradina for centuries. In this manner, the basic Iron Age organization of space, in which long-used traffic routes played a prominent role, directly influenced the civic planning and character of the hillfort as it evolved into the Roman city.

Any divergence of Roman designs from the ideal canons of classical civic planning can be attributed, along with natural factors (geomorphology of the terrain), to the influence of indigenous organization of space that preceded it.[100] The classical city is often characterized by orthogonal planning, established initially by the intersection of two primary streets – the *cardo* and *decumanus*.[101] Although these principal streets associated with Roman *Nedinum* have not been documented or located, the continuity of streets evidenced within our excavation, along with the architectural complexes that flank them, clearly testify to the outgrowth of a classical urban matrix from an indigenous foundation.

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[98] Kolega 2019, 36.

[99] Burials during the 2nd and 1st centuries BC still show autochthonous practices in terms of grave architecture and methods of burial. The most pronounced change is seen in the growing presence of Italic material, especially from northern Italy from the end of the 2nd century BC. This became the dominant category of finds in the second half of the 1st century BC, accompanied also by the gradual introduction of cremation (Čelhar, Borzić 2024). Although there are still no recorded burials at the Nadin necropolis that could be dated to the first half of the 1st century AD with certainty, "classical" Roman burials in urns with accompanying grave goods from the middle of the 1st century AD have been recorded. At approximately the same time, Roman burial plots were constructed, bounded by walls with applications of mortar (Kukoč, Čelhar 2019, 13, 16, Fig. 6, 8–9). When taking into account data from both the settlement and the necropolis, the Italic element/influence has been present to some degree since at least the end of the 2nd century BC. However, the manifestation of this influence in the built environment was more gradual, with new architectural forms and construction techniques dominating by the 1st century AD.

[100] Suić 1965; 2003, 203.

[101] Suić 1965, 164–165; 2003, 137ff.

Conclusion

Iron Age hillforts with long occupational histories are often deeply buried, contain complex stratigraphic sequences, and require significant investments of time, labor, and money for their investigation. The strategic program of research employed at Nadin-Gradina was purposefully designed to minimize these obstacles. Imperative to this strategy was an initial season of archaeological testing, when five units were scattered around the hillfort and excavated to bedrock. This generated data regarding the depth, preservation, and spatial distribution of archaeological deposits, and importantly, a chronological framework in which to place them. The results were used to determine where to focus our efforts for subsequent seasons in order to generate the greatest returns on our investment. Despite our limited archaeological exposure relative to the overall size of the site, this strategy proved effective, permitting a more robust look into specific elements of Nadin-Gradina's settlement history.

One of the most significant discoveries to come from this work is the documentation of Iron Age domestic architecture within a diachronic framework. Domestic architecture in Liburnia is very poorly known, particularly with respect to its internal organization of space and changes in its appearance over time. At Nadin-Gradina, the oldest structures appear to have been more widely spaced, and they were constructed using a combination of drystone foundations with an organic superstructure. This is clearly evidenced by a well-preserved series of stone-lined post holes within the earliest structure documented at the site. From the 9th/8th century BC, domestic structures increased in size and became more densely arranged. Additionally, it appears that these structures became internally organized into two functionally differentiated spaces at this time. This architectural configuration remained in use for much of the Iron Age, with the same basic floor plan and functional division of space continuing until the 2nd century BC. Near the end of the Late Iron Age, or sometime around the 2nd/1st century BC, a new quadrangular form of domestic architecture appeared. Structures were smaller than previous types but more numerous, and they were defined by foundation walls of large, vertically placed stone blocks that probably supported perishable superstructures. However, this new domestic form had a counterpart in the architecture of Late Iron Age tombs, and even in the older grave enclosures that were constructed around stone cists within the Early Iron Age necropolis at the site.

Overall, the results of this study are able to shed light on the origins and development of the Iron Age settlement and its continued impact on spatial organization over the course of a millennium as the hillfort evolved into a Roman municipium. If the information gleaned from our excavations indeed constitutes a representative sample of broader site-wide processes, then the data strongly indicate an 11th–9th centuries BC foundation

with a relatively modest resident population and an architectural core concentrated near the interior face of the ramparts. From the 9th/8th century BC onward, the urban built environment gradually expanded toward the interior of the hillfort, representing a more intensive use of space through the Iron Age. Settlement growth, and presumably population, reached its peak during the Roman period, when the entire area enclosed by the megalithic wall became architecturally developed and interconnected via a system of streets and alleyways. The continuity in urban spatial organization, from the Early Iron Age into the Roman era, is expressed primarily in the maintenance of streets and alleyways through time, but also in the basic orientation of the structures that were positioned along their margins. Hence, the indigenous organization of space, as manifested in the built environment, played a significant role in shaping the classical Roman city of the 1st century AD.

Acknowledgements

The Nadin-Gradina Archaeological Project received generous support from the Croatian Science Foundation, the Croatian Ministry of Culture, the Rust Family Foundation, and the National Geographic Society. We also thank the Native Museum of Benkovac for providing logistical support to the project. We are grateful to the University of Zadar and the University of Maine for their contributions to the project, as well as to the many students from both institutions who helped to make the project a success. Photographic documentation of this work, including that used to create digital models and orthomosaic imagery included here, was produced and processed under the auspices of the Nadin-Gradina Archaeological Project, but we wish to especially thank Maja Grgurić Srzentić and Luka Bogdanić. We are also grateful to Berislav Štefanac for providing important information regarding the ramparts at *Asseria*, and to Nikolina Uroda for sharing unpublished photographs and information about the excavation of *Varvaria*'s fortification walls. Finally, we thank the two anonymous reviewers for their helpful comments and insights, and the Editorial Board of this special issue of *Živa Antika* for their efforts in bringing this work to publication.

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