

FABIAN WELC^{1A}

ORCID 0000-0001-6122-1884

ANA KONESTRA^{2B}

ORCID 0000-0002-7726-6515

KAMIL RABIEGA^{3A}

ORCID 0000-0002-0428-4237

MORANA ČAUŠEVIĆ-BULLY^{4C}

ORCID 0000-0002-7019-6235

SÉBASTIEN BULLY^{5D}

ORCID 0000-0003-3208-4117

PAULA ANDROIĆ GRAČANIN^{6A}

ORCID 0000-0001-6301-3704

BARTOSZ NOWACKI^{7A}

ORCID 0000-0002-9900-6407

AGNESE KUKELA^{8E}

ORCID 0000-0002-3630-9320

MAŁGORZATA ZAREMBA^{9A}

ORCID 0000-0001-5739-1530

AGATA HAN^{10A}

¹ Fabian Welc, University Professor, Director of the Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw. Geoarchaeologist specializing in geophysical research and archaeology of the Adriatic region, with particular emphasis on the period of late antiquity. E-mail: f.welc@uksw.edu.pl.

² Ana Konestra, PhD, research associate at the Institute of Archaeology in Zagreb, Croatia. Her main research interests are Roman and late antique archaeology of the eastern Adriatic and pottery studies. E-mail: ana.konestra@gmail.com.

³ Kamil Rabięga, PhD, assistant professor at the Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw. His research interests include settlement and trade in late antiquity and early Middle Ages, historical architecture and modern methods of documentation and presentation of archaeological sites. E-mail: k.rabięga@uksw.edu.pl.

⁴ Morana Čaušević-Bully, Sc.D., archaeologist at the Université de Franche Comté and Chrono-Environnement laboratory. Her main research interests are Roman and late antique archaeology of the eastern Adriatic. E-mail: morana.causevic-bully@univ-fcomte.fr.

⁵ Sébastien Bully is a CNRS research fellow at UMR ARTEHIS – University of Bourgogne, specializing in monastic archaeology of the first millennium in Western Europe. E-mail: sebastien.bully@cnrs.fr.

⁶ Paula Androić Gračanin, MA, PhD student at the Cardinal Stefan Wyszyński University in Warsaw. Her field of interest is landscape archaeology, with a special focus on the diachronic analysis of settlement patterns in the Northeastern Adriatic, particularly on the island of Rab. E-mail: paula.androic@gmail.com.

⁷ Bartosz Nowacki, MA, specialist at the Faculty of „Artes Liberales”, University of Warsaw. Archaeologist, PhD student at the Cardinal Stefan Wyszyński University in Warsaw. His research interests include contacts and trade in the Adriatic basin in late antiquity and late Roman coarse ware pottery. E-mail: bm.nowacki@uw.edu.pl.

⁸ Agnese Kukela, PhD geol., assistant professor at the University of Latvia. Research interests: geoarchaeology, historical stone monuments, archaeology of the Near East and Mediterranean region. E-mail: agnese.kukela@gmail.com.

⁹ Małgorzata Zaremba, assistant professor at the Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw. She specialises in laboratory research in the field of geology, archaeometry, and material analysis. Her research interests include materials science, provenance of raw materials and ancient technologies. E-mail: m.zaremba@uksw.edu.pl.

¹⁰ Agata Han, Archaeologist, PhD student at the Cardinal Stefan Wyszyński University in Warsaw.

^A Cardinal Stefan Wyszyński University in Warsaw

^B Institute of Archaeology in Zagreb

^C Université de Franche Comté / UMR Chrono-Environnement

^D CNRS-UMR ARTEHIS, Université de Bourgogne

^E University of Latvia

BETWEEN SACRUM AND PROFANUM: PRELIMINARY REMARKS ON THE LATE ANTIQUE FORTIFIED SETTLEMENT ON LUKOVAC ISLET (RAB ISLAND, NE ADRIATIC, CROATIA)

Pomiędzy sacrum a profanum – wstępne rozważania na temat późnoantycznej osady obronnej na wyspie Lukovac (wyspa Rab, północno-wschodni Adriatyk, Chorwacja)

Abstract

In one of the shallow bays of Lopar, in the northern part of the Island of Rab, dominates a rocky islet known as Lukovac. Despite its small size, the islet reveals unique late antique architectural remains. Based on the fieldwork conducted, it can be concluded that almost the entire area of the islet was covered by masonry buildings. The islet was additionally surrounded by a wall reinforced with buttresses. The church was the centrepiece of this late antique settlement. It was a simple building, consisting of only one nave and a semi-circular apse articulated by four *lesene*. Considering the data collected so far, it is likely that in the late antiquity Lukovac Islet fulfilled the function of a fortified settlement, possibly a refugium for local population, while its role as a logistical centre for the Byzantine military presence in the region cannot be fully ruled out. The presence of a large church may suggest that the islet once functioned not only as a local central religious site, but also as a local “centre of power”.

Keywords: Rab Island, late antiquity, masonry architecture, late antique church

Abstrakt

W jednej z płytkich zatok miejscowości Lopar, w północnej części wyspy Rab, dominuje skalista wysepka zwana Lukovac, która mimo niewielkich rozmiarów kryje pod powierzchnią unikalne pozostałości architektury późnoantycznej. Przeprowadzone badania archeologiczne wskazują, że niemal całkowitą jej powierzchnię zajmowała zabudowa murowana, a całą wysepkę dodatkowo otaczał mur wzmocniony przyporami. Centralnym punktem późnoantycznej osady był prosty kościół, składający się jedynie z jednej nawy i półkolistej absydy charakteryzującej się czterema lizenami. Na podstawie wyników dotychczasowych badań można przypuszczać, że w późnym antyku wysepka Lukovac pełniła funkcję osady obronnej – być może w formie refugium dla miejscowej ludności. Nie można jednak wykluczyć jej roli jako centrum logistycznego dla obecnych w regionie wojsk bizantyjskich. Istnienie dużego kościoła może sugerować, że wysepka pełniła niegdyś funkcję nie tylko centralnego miejsca kultu religijnego, ale także lokalnego „ośrodka władzy”.

Słowa kluczowe: wyspa Rab, późny antyk, architektura murowana, późnoantyczny kościół

Introduction

In the northern part of the island of Rab (NE Adriatic, Croatia), off the coast of the Lopar peninsula, in the shallow Crnika bay, there is a small rocky islet known in local toponymy as Lukovac (Fig. 1). From the point of view of the local geology and geomorphology, this islet is in fact a small erosional rocky outcrop. According to the geological map of Croatia, the islet is mainly built up by Eocene marls and sandstones (Lopar sandstones). Detailed field observations indicate that in the south-western part Lukovac is formed by sedimentary rocks:

marly limestones, marls, organodetrritic limestones with a high proportion of nummulites, and in the north-eastern part – by sandstones with calcareous cementation.¹¹

The individual packages of rock layers have sunk in a north-easterly direction at an angle of approximately 60 degrees, which is in accordance with the collapse of the rock layers of the wing of the local syncline.

On the flat-topped part of the islet of Lukovac, with an area of only 260 m², relics of ancient architecture are preserved, of which remains of a church and enceinte wall are best visible (Fig. 2). In 2013, the first archaeological survey led by S. Bully (CNRS-UMR ARTEHIS / University of Bourgogne) and M. Čaušević-Bully (Université de Franche-Comté / UMR Chrono-environment) took place on the islet.¹² These field works were focused on clearing the remains of the church and conducting survey measurements. The aim of the next campaign of 2014 was to inventory the architectural remains and create a model of the islet using photogrammetry (UMV) and a digital terrain model (DTM). A small archaeological trench was dug in the eastern part of the islet, where relics of a cistern were identified, which was an important complement to the documentation activities. The results provisionally obtained confirmed that there are traces of settlement on the islet, and that it can be dated to the late antique period.¹³ Also, the first layout of the church and its possible annexes was proposed. Even though the notion of a monastery remained a potential consideration, the progress made through two initial campaigns of excavating test trenches and conducting topographical surveys increasingly pointed towards the site being a fort. Its location within the broader context and its topographical layout suggested a connection to the Byzantine maritime *limes* established after the Gothic wars ended. In the broader coastal landscape, the islet of Lukovac seems to have served as the island equivalent to the fortress of Klisa in the bay of Lukovo. It likely acted as a barrier, potentially obstructing the primary passage – through the bay of Crnika – to the northern section of the island of Rab.¹⁴

In 2022, field research was resumed on Lukovac Islet as a part of the project of Archaeological Topography of the island of Rab led by F. Welc (Institute of Archaeology, Cardinal Stefan Wyszyński University in Warsaw) and A. Konestra (Institute of Archaeology in Zagreb).¹⁵

¹¹ P. Mamužić, A. Milan, *Osnovna geološka karta SFRJ 1:100,000, Tumač za list Rab L33-144*, Institut za geološka istraživanja Zagreb, Savezni geološki zavod, Belgrade 1973, pp. 5-39; T. Marjanač, L. Marjanač, *Sequence stratigraphy of Eocene incised valley clastics and associated sediments, island of Rab, northern Adriatic Sea, Croatia*, "Facies", 2007, vol. 53(4), pp. 493-508; F. Welc, A. Konestra, A. Dugonjić, P. Androić Gračanin, K. Rabięga, B. Nowacki, *Multidisciplinary insight into late Roman rural settlement on the northeastern Adriatic coast of Croatia: island of Rab case study*, "Polish Archaeology in the Mediterranean", 2019, vol. 28(2), pp. 435-454.

¹² M. Čaušević-Bully, S. Bully, *Kvarner (Croatie). Prospection-inventaire des sites ecclésiastiques et monastiques: campagne 2013*, "Chronique des activités archéologiques de l'École française de Rome. Balkans", 2014, <https://journals.openedition.org/cefr/1059#tocto1n3>.

¹³ M. Čaušević-Bully, S. Bully, *Archipel du Kvarner (Croatie). Prospection-inventaire des sites ecclésiastiques et monastiques: campagne 2014*, "Chronique des activités archéologiques de l'École française de Rome. Balkans", 2015, <https://journals.openedition.org/cefr/1405#tocto1n3>.

¹⁴ *Ibidem*, p. 24.

¹⁵ See among other: A. Konestra, F. Welc, A. Dugonjić, P. Androić Gračanin, N. Šegvić, K. Rabięga, *Field reconnaissance, geophysical survey and trial excavations within the project "Archaeological topography of the island of Rab" in 2017*, "Annales Instituti Archaeologic", 2018, vol. 14, pp. 121-126; A. Konestra, F. Welc, A. Dugonjić, P. Androić Gračanin, K. Rabięga, S. Solecki, B. Nowacki, *Research within the "archaeological topography of the Island of Rab" project at Lopar in 2018: New data on Prehistoric and late Antique sites*, "Annales Instituti Archaeologici", 2019, 15(1), pp. 187-194; A. Konestra, F. Welc, P. Androić Gračanin, K. Rabięga, B. Nowacki, A. Kukela, *Rab island settlement typology and organisation through a diachronic approach – first data from a mul-*

The main aim of this research was to carry out a comprehensive geoarchaeological survey to identify the extent of the late antique architectural structures preserved on the islet. As part of this work, additional geodetic surveying and complementary drone documentation were carried out to create an orthophotographic map of the islet and a high-resolution Digital Elevation Model (DEM). An important supplement to the research conducted in 2023, involved excavating an archaeological trench situated at the juncture of the apse of the late antique church and the cistern. This aimed to unveil the site's stratigraphy and acquire dating materials. The concluding step was the implementation of ground-penetrating radar (GPR) and geomagnetic profiling.¹⁶

Results of the non-invasive survey

Along the outer edge of the islet's plateau, the remains of a masonry wall built in the *opus incertum* technique were documented. The wall was constructed using both limestone and sandstone blocks of various sizes bonded with lime mortar. The width of the exposed wall fragments does not exceed 1 m. Their outer face has been reinforced by irregularly placed buttresses, which are preserved only at the foundation level. They vary in height and width between 0.5 m and 1 m. Like the wall itself, the buttresses were erected from various types of stone, bonded with mortar (Fig. 3).

The primary rock material utilized in constructing the enceinte wall and other surface structures on the islet, such as the church and cistern, consists mainly of sedimentary rocks. Initial macroscopic examinations have distinguished three principal types. The first category comprises predominantly pelitic limestones/mudstones. Grey sparitic limestones are encompassed within the second category. The third type is organogenic limestones.¹⁷ The last type is sparitic limestones, which contain no fossils. In addition to the limestones, several fragments of marble blocks were also identified.

Macroscopic observations have allowed the identification of three types of mortar used to bond the stone blocks together. The predominant pelitic limestone blocks are bonded using a mortar with a significant addition of detrital grains, constituting approximately 90% of the mortar by weight. In addition, grains of crushed ceramic material and white calcite were

tidisciplinary research, "Annales Instituti Archaeologici", 2020, vol. 16(1), pp. 229-244; A. Konestra, F. Welc, P. Androić Gračanin, *The site at the cape Zidine in Lopar in the context of coastal residential and commercial complexes of Rab Island*, "Annales Instituti Archaeologici", 2021, vol. 17(1), pp. 152-170; A. Konestra, P. Androić Gračanin, F. Welc, *Burialscapes of Rab Island (North East Adriatic): The Role of Sepulchral Evidence in the Reconstruction of Roman and Late Antique Rural Settlement Pattern*, "Annales: Anali za Istrske in Mediteranske Studije. Series Historia et Sociologia", 2021, vol. 31(3), pp. 391-412; B. Nowacki, A. Konestra, F. Welc, *Preliminary typology and contextual analysis of Roman and late antique cooking wares from the Roman rural settlement at Podšilo bay on the island of Rab (north-eastern Adriatic, Croatia)*, "Annales Instituti Archaeologici", 2022, vol. 18(1), pp. 88-119.

¹⁶ During the survey, a Topcon RTK/GPS receiver was used for geodetic surveying to work with reference networks. Photogrammetric documentation was produced through aerial imaging using a DJI Phantom drone. This documentation then served as the basis for a high-resolution spatial model of the islet (DEM). During the geophysical prospecting of the islet, a Mala/ABEM GX Groundexplorer GPR with a nominal 450 MHz antenna was used. This was complemented by geomagnetic profiling using a Bartington GRAD 601 gradiometer. The results obtained during the geophysical profiling are currently being processed and will be published shortly.

¹⁷ Among them, numulitic limestone and both pelitic and sparitic limestones containing fragments of marine organisms such as shells and lily pads have been identified. The pelitic limestones are brownish-grey in colour, while the sparitic limestones are creamy-grey.

observed in small amounts. Of utmost importance for further considerations is the fact that the detrital material is poorly bonded, resulting in the mortar being prone to easy crumbling and rapid erosion. On other blocks, a lime mortar with a substantial addition of grains ranging from sand to gravel fractions has been preserved. Furthermore, shell fragments were observed within the structure of the aforementioned mortar. The blocks of milky crystalline limestone are coated with mortar exhibiting a distinctive white colour, which also contains a significant amount of detrital material. The main component of the detrital grains are fragments of crushed ceramics, e.g. pottery, tiles, or bricks, up to 2-3 cm in diameter.

Additional information about the development of the architecture on the islet is provided by the results of the DEM analysis, that was obtained using a drone. The flat top of the islet shows clear SW–NW and SE–NW lineaments, which correspond to the elevations of the surface (dark red colour) (Fig. 4). On site, these features are evident as grass-covered embankments, with the upper portion primarily composed of loose blocks and mortar fragments, clearly indicating the presence of remnants of masonry walls beneath (this was also confirmed by the archaeological trench, see below). Interpretation of the DEM model makes it possible to detail at least two assemblages of long (up to 49 m) and rectangular in plane buildings identified here as the western and eastern complexes respectively (Fig. 4: A and B). In the north-eastern part of the islet, two long buildings appear to have been divided into smaller rooms by transverse walls. It's noteworthy that the wall enclosing the plateau of the islet is not visible in the model. Its path was reconstructed solely based on observations and field measurements (Fig. 5). The reason for this is that the wall was only preserved at the foundation level, suggesting either complete deterioration or intentional demolition.

In the southern part of the islet, an oval-shaped structure was outlined, comprising a low hillock with an average height of about 2 meters, featuring an inwardly curved central section. On site, the edge of the hill is marked by a rampart consisting of grass-covered stone blocks and stone rubble. Field observations suggest that this most likely is the upper edge of a large depression now completely buried (Fig. 4: C).

Results of trench excavations in 2023

Excavations carried out in 2023 extended from the cistern towards the northeast, reaching the area between the cistern and the apse of the church. In the central part of Lukovac, remnants of a church have been retained.¹⁸ It is a hall church with a rectangular nave measuring approx. 13 × 6.50 m in internal outline. Its walls were built in the *opus incertum* technique. They are 0.64 m wide in the nave and 0.72 m in the apse. It is likely that the main access to the nave was from the west (Fig. 6).¹⁹

To the east, the nave is closed by a semicircular apse with a diameter of 4.4 m, and an internal depth of 2.85 m (Fig. 6: C).²⁰ As excavations have shown, on the outside the apse was articulated with four *lesene* distant 2.2 m from each other, 0.75 m wide, and 0.25 m thick (Fig. 6: C – 2). The exposed section of the apse wall was preserved up to a height of 1.2 m, including the foundation, which was placed directly on the local sandstone rock. Inside

¹⁸ M. Čaušević-Bully, S. Bully, *Archipel du Kvarner (Croatie)...*, op. cit., p. 20-25.

¹⁹ *Ibidem*, p. 22.

²⁰ *Ibidem*, p. 24.

the apse, a clergy bench (*synthronon*), or a first apse, 42 cm wide and 25 cm high, is still visible, with a surviving layer of plaster on the outer lower face (Fig. 6: C – 1). The central, exposed section of the bench was damaged by a small robbery trench. In addition, the level of the original floor was found inside the apse, which is now approximately 0.5 m below the surviving crown masonry of the apse. The floor was constructed using lime mortar poured onto the rock surface, which was subsequently smoothed.

In the southeastern part of the islet, the remnants of a cistern are situated, which, as revealed by the excavation, does not have direct contact with the apse of the church (Fig. 6: C – 3). Its dimensions are 11.50 × 5.20 m (internal dimensions), i.e. almost 60 m².

The east and north walls measure 0.80 meters in width, whereas the wall along the cliff is considerably broader, reaching a width of 1.40 meters. Trenches dug in the northern and south-eastern corners revealed that the cistern's interior had been covered with at least two layers of hydraulic mortar of a distinctive pink colour with an admixture of finely crushed pottery. Both trenches, though reaching 1.50 m in depth, did not reveal the floor of the cistern.²¹

As previously noted, the accessible plateau area of the islet was predominantly occupied by buildings, assumed to have served utilitarian purposes such as residential and storage. It is noteworthy that the orientation of the two sets of buildings, as indicated by the DEM model, is identical. This could imply contemporaneous construction or, at the very least, planned development. Within the archaeological trench excavated in 2023, a segment of the south-western wall of one of these long buildings was revealed, leaning on the northern wall of the cistern. It was constructed quite carelessly, using stone blocks of various sizes, which were bonded without the use of lime mortar (Fig. 6: C – 4), but possibly rather applying an earthen mortar or in the dry-stone technique. It is very significant that this wall, unlike the church, was made entirely of roughly worked blocks of local sandstone and marl, suggesting a different (later?) chronological and settlement phase.²² This thesis also seems to be confirmed by the different orientation of the long room complexes in relation to the church.

The archaeological excavations yielded a significant quantity of movable artifacts, primarily consisting of pottery sherds, but also including glass and metal objects. The most abundant artifacts belong to the category of late antique coarse ware (Fig. 7). Among them, fragments of pots (16 rim sherds, 6 bottom sherds), lids (6 sherds), and one sherd of a baking lid with side lobes are present. When it was possible to reconstruct the shape of the pots, they invariably appeared as vessels with a short neck, everted rim, and a flat or slightly rounded lip. On the basis of the preserved sherds, it can be assumed that they mostly had a rounded belly. All preserved bottoms are flat. The lids have shallow conical or slightly domed profiles.²³ Typologically and based on macroscopic fabric analyses, the coarse ware from the islet of Lukovac exhibits the closest resemblance to that found at sites such as Guran and Koper in Istria, as well as various sites in north-eastern Italy, including Classe, Sant'Andrea di Loppio, Monselice, and others. It is important to note that the coarse ware assemblage from Lukovac is very similar to that recovered at the nearby Roman rural

²¹ Ibidem, pp. 22-23.

²² The absence of imported blocks also suggests that at the time of the construction of the long building the perimeter wall and church were in a good state of preservation, and possibly still in use.

²³ P. Ruffieux, *Céramique commune de l'antiquité tardive découverte sur le site de l'église Sainte-Cécile à Guran*, en Istrie, "Hortus Artium Medievalium", 2010, vol. 16, pp. 247-266.

settlement located at Podšilo bay on the island of Rab.²⁴ Among the pottery, there are several examples that can tentatively be classified as Classe type vessels or similar productions. This group may include fragment N-36/1, which has a decoration consisting of horizontal parallel grooves and horizontal wavy multiple lines (wavy band) of medium amplitude on the belly, carved with a multi-point tool.²⁵ Classe type vessels were produced in the Ravenna area, and according to Cirelli, should be dated from the mid-6th to the mid-8th century.²⁶ The remaining fragments of pots belong to types predominant in the northern Italy and the Alpine area, that were produced over a long period of time.²⁷ Based on analogies and the Lukovac context, they can be dated between the 5th and 7th, or even 8th centuries. Sherds of lids can be dated to the 5th-7th century on the bases of analogies.²⁸ During late antiquity, there is a gradual simplification observed in the repertoire of cooking ware when compared to the assemblages from Roman times.²⁹ Starting from the 5th century onwards, particularly in Italy, pans begin to vanish, and by the 6th to 7th century, casseroles also become exceedingly rare or cease to be used at all.³⁰ Thus, the most common late antique shapes are mainly flat-bottomed pots and lids, as well as large baking lids (*clibani*). Given that only fragments of pots, lids, and baking lids have been discovered at Lukovac so far, and these vessels exhibit the closest typological resemblance to types typically dated between the 6th and 8th centuries, it is tentatively suggested that the coarse ware pottery from Lukovac could be placed within this timeframe. However, considering the entirety of the finds, a date not later than the 7th century appears to be more probable.

Within the mentioned building located in the NE part of the trench, numerous amphorae sherds have been recovered, mostly belonging to two vessels (Fig. 8). These vessels can be assigned to two types of late antique amphorae thus far rarely ascertained on the eastern

²⁴ B. Nowacki, A. Konestra, F. Welc, op. cit.

²⁵ E. Cirelli, *Dall'Alba al tramonto. Il vasellame di uso comune a Ravenna e nel suo territorio tra la tarda antichità e l'alto medioevo (III-VIII sec.)*, in: *Le forme della crisi. Produzioni ceramiche e commerci nell'Italia centrale tra Romani e Longobardi (III-VIII sec. d.C.)*, Atti del convegno, Spoleto-Campello sul Clitunno, 5-7 Ottobre 2012, eds. E. Cirelli, F. Diosono, H. Patterson, Bologna 2015, pp. 13-20.

²⁶ Ibidem. Above all, these are pots with a medium long or long everted rim with a sharp passage into the body, thus possessing no neck. They have parallels with the very abundant type 2 pot from Korinjski hrib in Slovenia, which is also very common at other settlements in the south-eastern Alps (e.g., Tonovcov grad and Rifnik in Slovenia, Frauenberg, Duel and Hoischhugl in Austria). Vessels of this type have been dated between the 4th and 7th centuries: S. Ciglencečki, Z. Modrijan, T. Milavec, *Korinjski hrib in poznoantične vojaške utrdbe v Iliriku. Korinjski hrib and late antique military forts in Illyricum*, Ljubljana 2020, "Opera Instituti Archaeologici Sloveniae", vol. 39, p. 109.

²⁷ P. Ruffieux, op. cit., pp. 247-26. On Pots type I.F. see: Koper: R. Cunja, *Poznorimski in zgodnesrednjeveški Koper. Arheološko izkopavanje na bivšem Kapucinskem vrtu v letih 1986-1987 v luči drobnih najdb 5. do 9. stoletja. Capodistria tardoromana e altomedievale. Lo scavo archeologico nell'ex orto dei Cappucini negli anni 1986-1987 alla luce dei reperti dal V al IX secolo d.c.*, Koper 1996, Cat. No. 371; Korinjski hrib: S. Ciglencečki, Z. Modrijan, T. Milavec, op. cit., p. 109; Monselice: G. Ganzarolli, *Le ceramiche comuni grezze*, in: *Monselice. Archeologia e architetture tra Longobardi e Carraresi*, eds. G.P. Brogiolo, A. Chavarria Arnau, Quingentole 2017, pp. 137-172, pots type 5; ibidem. p. 150, pl. 3.9.

²⁸ E.g. Guran: G. Ganzarolli, op. cit., pp. 137-172., lids type II.C.; ibidem. p. 265, pl. 7.4; Sant'Andrea di Loppio: B. Maurina et al., *Ricerche Archeologiche a Sant'Andrea di Loppio (Trento, Italia): Il Castrum Tardoantico-Alto-medievale*, Oxford 2016, p. 355, figs. 579.5, 579.17.

²⁹ A. Donnelly, *Cooking, Cooking Pots, and Cultural Transformation in Imperial and Late Antique Italy*, PhD thesis. Loyola University, Chicago 2016, p. 220.

³⁰ A. Donnelly, op. cit., p. 220; A. Riccato, *Vasellame da cucina ad Aquileia e in area altoadriatica tra V e VI secolo d.C.: continuità e trasformazioni*, in: *Italia settentrionale e regioni dell'arco alpino tra V e VI secolo*, Atti del convegno (15-17 aprile 2021), eds. M. Buora, S. Magnani, L. Villa, Trieste 2022, pp. 379-383.

Adriatic: LR 7³¹ of Egyptian production (late 4th-7th century) and the so-called Samos cistern type³² (6th-7th century). Along with these, in both, the 2014 and 2023 trench, rims of Phocaean Red Slipped Ware/LR C were found, pertaining to variants of Hayes Form 3, roughly datable in the 5th-7th centuries.³³ Among the glass finds an elongated hollow bottom of a so-called funnel shaped glass lamp (Uboldi type IV.2) was discovered, which usually dates in the period from the 5th to the 7th century, evolving later into Medieval shapes.³⁴ Among the metal finds, a silver lunular pendent and a bronze lock plate belonging either to a door or a chest were found.³⁵

Discussion

Despite its small size, the islet of Lukovac revealed surprisingly numerous and at the same time diverse architectural remains. Based on the fieldwork and survey conducted, it can be concluded that nearly the entire available area of the islet's flat plateau was occupied by structures (Figs. 3-5). The islet's plateau was additionally surrounded by an enceinte wall reinforced with buttresses. Unfortunately, we are unable to ascertain its height as it is preserved only at the foundation level. If we assume that its sole purpose was defensive, what stands out is the relatively narrow width of the foundation (not surpassing 1 meter) and its haphazard execution, which greatly restricted the maximum height attainable by the entire structure. Moreover, the material utilized for the wall construction was inadequately chosen, both in terms of the size of the individual rock blocks and their petrographic composition. It is in fact a mixture of several rock types, mainly pelitic, sparitic and organogenic limestones. They were bonded with a low-quality lime mortar with a high proportion of detritus material (mainly gravel fraction), which not only weakened the bond of the masonry but also exposed the joints of the individual blocks to rapid disintegration. All these factors may suggest a hurried construction of the wall or a shortage of skilled builders and technical expertise (e.g. stonemasons). If, in fact, the wall was intended to fulfil a defensive function, its poor workmanship significantly reduced its functionality in this respect.³⁶ There is also the possibility that the wall did not originally serve (solely) a defensive purpose, but rather a utilitarian one, such as enclosing a sacred area in the centre of which the church was located. This would contribute to creating a monumental setting aimed at projecting an image of power. Lastly, it is noteworthy that all the aforementioned rock types used in the construction of the wall are not naturally found on Lukovac Islet, indicating that they must have been transported to the islet from other areas. One possibility is that

³¹ D. Pieri, *Le commerce du vin oriental à l'époque byzantine, Ve-VIII siècles: le témoignage des amphores en Gaule*, Institut français du Proche-Orient, Beyrouth 2005, pp. 129-132.

³² E.g. P. Arthur, *Eastern Mediterranean amphorae between 500 and 700: a view from Italy*, in: *Ceramica in Italia: VI-VII secolo*, ed. L. Sagui, Firenze 1998, 167-168.

³³ J.W. Hayes, *Later Roman Pottery*, London 1972, pp. 329-338.

³⁴ M. Uboldi, *Diffusione delle lampade vitree in età tardoantica e altomedievale e spunti per una tipologia*. "Archeologia Medievale", 1995, vol. 22, pp. 93-145; M. Uboldi, *Aggiornamento sulle lampade vitree di età tardoantica e altomedievale in Italia Settentrionale*, "Hortus Artium Medievalium", 2020, vol. 26, pp. 126-132.

³⁵ E.g. J.C. Waldbaum, *Metalwork from Sardis: The finds through 1974*, Cambridge 1983, "Archaeological Exploration of Sardis", vol. 8.

³⁶ Cf. S. Ciglenečki, *Between Ravenna and Constantinople: Rethinking Late Antique Settlement Patterns*, Ljubljana 2023, "Opera Instituti Archaeologici Sloveniae", vol. 46, pp. 331-332.

portions of the construction stones were salvaged from Roman rural sites in the vicinity, such as the Podšilo Bay area (northeastern part of the Lopar area), where they are known to be the primary building material of the Roman structures uncovered there.³⁷ In other words, salvaged material from demolished architectural complexes (*spolia*) was most likely the primary source used to construct the enceinte wall. This suggests that the endeavour was likely undertaken hastily or with a limited skilled workforce. Nonetheless, it signifies a logistically demanding and planned effort.

As previously mentioned, there is an oval-shaped structure visible in the southern part of the islet (Fig. 4), which is essentially a small hillock with a widened central part. This feature suggests that it may be the remnants of a relatively sizable depression or hollow. It is conceivable that it signifies a robbery trench excavated at the site at some point in more recent history, potentially linked to an account documented in the *Chronicle of Kampor*. This 1930-40s local chronicle mentions the discovery of a sarcophagus on the islet, along with the finding of bones and a coin inside. This information is exceptionally intriguing and significant, as it hints at the existence of a sepulchral area, potentially associated with the church or an annex.

The church is the centrepiece of the late antique structures preserved on the islet. In terms of the form, it was a relatively simple building, consisting only of a single nave and a semi-circular apse adjoining it on the eastern side. The main entrance was probably located in the western facade. We can surmise that the nave was topped by open wooden roofing set up above the rectangular nave. The roof was covered with ceramic tiles, numerous fragments of which have been found in the immediate vicinity of the church. The floor of the church was constructed by pouring lime mortar directly onto the surface of the local rock and then levelling it (see Fig. 6). So far, no evidence of a potentially more intricate floor finishing has been recovered. The apse was covered by a simple hemisphere vault. External wall surfaces of the nave were not articulated. By contrast, the face of the apse was articulated by four shallow *lesene* resting on the abutting foundations. Within the excavated trench numerous fragments of travertine/tuff rocks were found (Fig. 9). The exterior as well as interior walls of the church were originally covered with grey plaster, numerous fragments of which were found in the explored debris layers filling the apse, as well as in its immediate surroundings. Considering the surviving relics, the church can be dated to the 6th century, possibly even to its second half.³⁸

The significant size of the church in relation to the available space on the islet suggests that it was intended to serve a much larger population than could be accommodated there. It is crucial to note that in the southern part of the island of Rab, specifically in the area of Barbat, a late antique church has been preserved that bears striking resemblance in almost every aspect to the church on the island of Lukovac.³⁹ It stands in the central part of an imposing

³⁷ J. Trzciński, E. Wójcik, K. Kielbasiński, P. Łukaszewski, M. Zaremba, L. Kaczmarek, R. Dziedziczak, J. Kotowski, A. Konestra, F. Welc, T. Wejrzanowski, J. Jaroszewicz, *Petrophysical Analyses of Rock Construction Materials from a Roman Rural Settlement in Podšilo Bay on Rab Island (North-East Adriatic, Croatia)*, "Materials", 2024, vol. 17(2), 359, <https://doi.org/10.3390/ma17020359>, p. 359.

³⁸ M. Čaušević-Bully, S. Bully, *Archipel du Kvarner (Croatie)*..., op. cit., p. 24.

³⁹ W. Schleyer, *Arbe, Stadt und Insel*, Wiesbaden 1914; M. Domijan, *Ostaci utvrde sv. Damjana u Barbatu na otoku Rabu*, "Diadora", 1992, vol. 14, p. 325-344; M. Jurković, T. Turković, *Utvrdi Sv. Kuzme i Damjana u Barbatu na otoku Rabu – revizijska istraživanja*, "Rapski Zbornik", 2014, vol. 2, pp. 15-36.

late antique fortress erected on a hill towering over the surrounding area, known as St. Cosmas and Damian (Figs. 10-13).⁴⁰

The Barbat church is a one-nave church, 15.8 m long and 7.85 m wide.⁴¹ The opening of the apse is 4.95 m wide (Figs. 11: A-C) and 3 m deep.⁴² In the central position in the apse, a bifora opening is still visible.⁴³ Its walls were erected using local stone of different dimensions. Lime plaster preserved in the interior of the building is quite rough and grey in colour (Fig. 11: D). On the outer, north-eastern wall of the church, fragments of plaster have also survived – but in this case it is water-resistant hydraulic plaster of a distinctive pink colour (Fig. 11: E). Inside the apse, a clergy bench has been completely preserved with thickness of 0.40-45 m.⁴⁴ Unfortunately, the floor level of the church is not currently visible under the piles of collapsed stones. The outer apsidal wall face is plastically articulated by four shallow *lesene* (1.5 m wide, 0.15 m thick) connected with arches built of dark brown travertine (Fig. 11: B).⁴⁵

It is assumed that the Barbat fortress church was rebuilt in the second half of the 12th or the beginning of the 13th century. This phase is marked by the rebuilding of the nave, while the apse, north and south walls of the original building were still preserved in elevation. Two walls, oriented northeast-southwest were added next to the apse, partially obscuring the shoulders of the apse and forming the perimeter of the new body of the church.⁴⁶ The northeast corner remained untouched, facilitating a clear understanding of the floor plan of the newly erected single-nave church, 7.89 m long and 4.8 m wide (Fig. 13).

In addition to this, we might also draw another analogy from the nearby island of Krk, the Church of St. Nicholas in the bay of Ogrul (Fig. 14).⁴⁷ The church is located on an elevation above the bay, while on the nearby promontory of Glavina, a massive fortification wall encloses its somital part, known as Veli Grad. Z. Brusić and later authors supposed a connection within the church and the fortified area of Glavina, as well as the fertile Vinca area more to the south of Ogrul bay,⁴⁸ while the latest opinion is that the fortification is much older (3rd-4th centuries).⁴⁹ In any case, the church, 17.5 m long and 6.5 m wide, presents the same

⁴⁰ For historic sources mentioning the fort in the middle ages see: D. Mlacović, *Supetarska draga na Rabu v srednjem veku*, in: *Raukarov zbornik. Zbornik u čast Tomislava Raukara*, ed. N. Budak, Zagreb 2005, p. 529. See also: B. Maletić, *Castra ed edifici di culto cristiani: il caso della Dalmazia*, in: *Perchement et Réalités Fortifiées en Méditerranée et en Europe, Vème-Xème Siècles/Fortified Hilltop Settlements in the Mediterranean and in Europe (5th-10th centuries)*, eds. P. Pergola, G. Castiglia, E. Essa, K. Hanna, I. Martinetto, J-A. Segura, Oxford 2023, pp. 370-381.

⁴¹ P. Chevalier, *Salona II. Recherches archéologiques franco-croates à Salone. Ecclesiae Dalmatiae. L'architecture paléochrétienne de la province romaine de Dalmatie (IVe-VIIe S.)*, Rome 1995, vol. 1, p. 53.

⁴² *Ibidem*.

⁴³ *Ibidem*, p. 54.

⁴⁴ *Ibidem*.

⁴⁵ Z. Brusić, *Kasnoantička utvrđenja na otocima Rabu i Krku*, in: *Znanstveni skup Arheološka istraživanja na otocima Krku, Rabu i Pagu i u Hrvatskom primorju*, ed. Ž. Rapanić, Zagreb 1988, p. 111-119; P. Chevalier, *op. cit.*, vol. 1, p. 54. The same way of performing the bow in tuff is found on the outside of the window of the Church of St. Ivan in Rab: M. Jurković, T. Turković, *op. cit.*, p. 33ff.

⁴⁶ P. Chevalier, *op. cit.*, vol. 1, p. 54; M. Jurković, T. Turković, *op. cit.*, p. 33ff.

⁴⁷ Z. Brusić, *op. cit.*, p. 113; P. Chevalier, *op. cit.*, vol. 2, pp. 32, 74-75; P. Chevalier, *op. cit.*, vol. 1, pp. 38-39; M. Jurković, T. Turković, *op. cit.*, p. 33ff.

⁴⁸ Z. Brusić, *op. cit.*, p. 113; P. Chevalier, *op. cit.*, vol. 2, p. 32.

⁴⁹ S. Ciglencečki, *op. cit.*, p. 242.

lesene with arches as the St. Cosmas and Demian apse, that is, with the supposed arched articulation of the apse of Lukovac church.⁵⁰ In the case of St. Nicholas, the *lesene* are 0.5 m long and 0.10 m thick, and at least some of the arches hosted window openings.⁵¹ The apse is 3.95 m long and 2.6 m wide, and the church had a vestibule, though later additions hinder a precise description of its original layout.⁵² As of now, no information regarding the existence of a possible clergy bench is available.⁵³ The dating is tentatively placed within the 6th to 7th centuries.⁵⁴ A new study currently conducted on the Ogrul site is providing additional information on the architecture, landscape, and monumental environment of the church; it will be published soon.⁵⁵

The mentioned analogies, combined with the discovery of travertine/tuff fragments, suggest that the *lesene* of the apse of the church on Lukovac may have been interconnected by arches constructed using brown tuff blocks.

Conclusions

Based on the fieldwork conducted and the data collected thus far, it can be concluded that nearly the entire available area of the islet of Lukovac was covered by buildings dating to the late antique period. Additionally, the plateau of the islet was surrounded by an enceinte wall reinforced with buttresses. The church was the centrepiece of this late antique settlement. It was a simple building, consisting of one nave and a semi-circular apse, which can be dated to the 6th century. In the southern part of the island of Rab, a very similar late antique church has been preserved, located in the extensive fortress of St. Cosmas and Damian.⁵⁶ The far-reaching similarities of the sacred architecture preserved in the Barbat fortress and on the Lukovac Islet might suggest a link between these two sites,⁵⁷ as well as with other monuments within the wider area of the Kvarner.⁵⁸ Recent research on late antique forts in the wider Adriatic and eastern Mediterranean area has distinguished several phases of fortifications and endeavoured to identify their functions.⁵⁹ In this respect, the fortification of the 5th-6th centuries are most difficult to interpret functionally, and thus far no clear demarcation between a military, civilian, or religious use can be identified at most sites.⁶⁰

⁵⁰ For *lesene* as a Mediterranean feature of early Christian architecture on the eastern Adriatic see P. Chevalier, op. cit., vol. 2, p. 54.

⁵¹ P. Chevalier, op. cit., vol. 1, p. 38.

⁵² Ibidem. See also for a more in-depth description of other features of the church.

⁵³ For the latest research at the site see: M. Makarun, D. Tresić Pavičić, *Lokalitet: Otok Krk – uvala Orgul – crkva sv. Nikole*, "Hrvatski arheološki godišnjak", 2018, vol. 15, pp. 560-561. The authors would like to thank M. Makarun for information about this detail.

⁵⁴ P. Chevalier, op. cit., vol. 1, p. 39.

⁵⁵ Master's research at the University of Franche-Comté led by A. Baqué, as part of the ANR MONACORALE programme under the supervision of S. Bully and M. Čaušević-Bully.

⁵⁶ Z. Brusić, op. cit., p. 113; P. Chevalier, op. cit., vol. 2, p. 54; M. Jurković, T. Turković, op. cit., p. 33ff.

⁵⁷ M. Domijan, *Rab. The City of Art*, Zagreb 2007, p. 243.

⁵⁸ Z. Brusić, op. cit., p. 113.

⁵⁹ S. Ciglencečki, op. cit., p. 329.

⁶⁰ Ibidem, pp. 331-332. The problem of function is exemplified by results of recent research at Tureta in the Kornati archipelago, see I. Radić Rossi, T. Fabijanić, *Kurnatski vremeplov. Arheološka istraživanja Turete i Tarca*, Šibenik 2017, pp. 46-47.

Perhaps, an explanation should be sought in the overall militarisation of late antique society,⁶¹ where social roles get blurred and elite identity-representation emulates that of the military echelons.⁶² In the same way, sites' functions could be imagined as multi-fold and more complex than the usually considered military – civilian dichotomy. It is important to bear in mind that very little is known about the continuity and phasing of the sites mentioned here. Therefore, the possibility of a changing role over time should also be considered. Another aspect that should be considered in the future is the relationship of these fortifications with other elements of extra-urban settlement, continuity of which is ascertained at least by the numerous rural churches.⁶³ Certainly, the fort at Barbat had an important Medieval phase to which very little attention has been paid so far.

Therefore, it is conceivable that Lukovac could have served as a settlement for local population (either as a refugium or a more permanent habitation), among which a military presence should not be excluded. The domination of a large church may also suggest that the islet might have served as a local religious centre. Possibly, during the second phase roughly datable to the 7th-8th century AD, the islet was filled with long and narrow buildings erected without use of lime mortar, which may indicate the emergence of a more permanent settlement. This chronological framework seems to be confirmed so far by the archaeological findings, especially pottery. Finally, it is crucial to emphasize that the hypotheses presented above must be further validated archaeologically. This will be the focus of future planned fieldwork by the authors of the article, both on Lukovac Islet and within the St. Cosmas and Damian fortress.

Acknowledgments

Research conducted in 2023 on the island of Lukovac was financed as part of the grant awarded to F. Welc by the National Science Foundation in Poland (NCN): The fall, crisis or transformation? Correlation of the late antique settlement pattern changes with environment and climate fluctuations in the north-eastern Adriatic region based on results of geoarchaeological and palaeoclimatic research, ID: 2020/37/B/HS3/02458.

Bibliography

- Arthur P., *Eastern Mediterranean amphorae between 500 and 700: a view from Italy*, in: *Ceramica in Italia: VI-VII secolo*, ed. L. Sagui, Firenze 1998, pp. 157-183.
- Brusić Z., *Kasnoantička utvrđenja na otocima Rabu i Krku*, in: *Znanstveni skup Arheološka istraživanja na otocima Krku, Rabu i Pagu i u Hrvatskom primorju*, ed. Ž. Rapanić, Zagreb 1988, pp. 111-119.

⁶¹ See e.g. C. Whately, *Militarization, or the Rise of a Distinct Military Culture? The East Roman Ruling Elite in the 6th Century AD*, in: *Warfare and Society in the Ancient Eastern Mediterranean Papers arising from a colloquium held at the University of Liverpool, 13th June 2008*, eds. S. O'Brien, D. Boatright, Oxford 2013, pp. 49-57.

⁶² See e.g. V. Thienen, S. Lycke, *From commodity to singularity: The production of crossbow brooches and the rise of the Late Roman military elite*, "Journal of Archaeological Science", 2017, vol. 82, pp. 50-61.

⁶³ A. Konestra, G. Lipovac Vrkljan, F. Welc, *Rural Landscapes of Roman (northern) Liburnia: Diachronic Development of Organisation and the Economy in Extra-Urban Territories in the Light of Recent Archaeological Research*, "Radovi Zavoda za hrvatsku povijest Filozofskoga fakulteta Sveučilišta u Zagrebu", 2022, vol. 54(3), pp. 195-234; B. Maletić, op. cit., pp. 373-374.

- Chevalier P., *Salona II. Recherches archéologiques franco-croates à Salone. Ecclesiae Dalmatiae. L'architecture paléochrétienne de la province romaine de Dalmatie (IVe-VIIe S.)*, Rome 1995, vol. 1-2.
- Ciglencečki S., *Between Ravenna and Constantinople: Rethinking Late Antique Settlement Patterns*, Ljubljana 2023, "Opera Instituti Archaeologici Sloveniae", vol. 46.
- Ciglencečki S., Modrijan Z., Milavec T., *Korinjski hrib in poznoantične vojaške utrdbe v Iliriku. Korinjski hrib and late antique military forts in Illyricum*, Ljubljana 2020, "Opera Instituti Archaeologici Sloveniae", vol. 39.
- Cirelli E., *Dall'Alba al tramonto. Il vasellame di uso comune a Ravenna e nel suo territorio tra la tarda antichità e l'alto medioevo (III-VIII sec.)*, in: *Le forme della crisi. Produzioni ceramiche e commerci nell'Italia centrale tra Romani e Longobardi (III-VIII sec. d.C.)*, Atti del convegno, Spoleto-Campello sul Clitunno, 5-7 Ottobre 2012, eds. E. Cirelli, F. Diosono, H. Patterson, Bologna 2015, pp. 13-20.
- Cunja R., *Poznorimski in zgodnesrednjeveški Koper. Arheološko izkopavanje na bivšem Kapucinskem vrtu v letih 1986-1987 v luči drobnih najdb 5. do 9. stoletja. Capodistria tardoromana e altomedievale. Lo scavo archeologico nell'ex orto dei Cappucini negli anni 1986-1987 alla luce dei reperti dal V al IX secolo d.c.*, Koper 1996.
- Čaušević-Bully M., Bully S., *Kvarner (Croatie). Prospection-inventaire des sites ecclésiiaux et monastiques: campagne 2013*, "Chronique des activités archéologiques de l'École française de Rome. Balkans", 2014, <https://journals.openedition.org/cefr/1059#tocto1n3>.
- Čaušević-Bully M., Bully S., *Archipel du Kvarner (Croatie). Prospection-inventaire des sites ecclésiiaux et monastiques: campagne 2014*, "Chronique des activités archéologiques de l'École française de Rome. Balkans", 2015, <https://journals.openedition.org/cefr/1405#tocto1n3>.
- Domijan M., *Ostaci utvrde sv. Damjana u Barbatu na otoku Rabu*, "Diadora", 1992, vol. 14, pp. 325-344.
- Domijan M., *Rab. The City of Art*, Zagreb 2007.
- Donnelly A., *Cooking, Cooking Pots, and Cultural Transformation in Imperial and Late Antique Italy*, PhD thesis. Loyola University, Chicago 2016.
- Ganzarolli G., *Le ceramiche comuni grezze*, in: *Monselice. Archeologia e architetture tra Longobardi e Carraresi*, eds. G.P. Brogiolo, A. Chavarría Arnau, Quingentole 2017, pp. 137-172.
- Hayes J.W., *Later Roman Pottery*, London 1972.
- Jurković M., Turković T., *Utrvrda Sv. Kuzme i Damjana u Barbatu na otoku Rabu – revizijska istraživanja*, „Rapski Zbornik”, 2014, vol. 2, pp. 15-36.
- Konestra A., Androić Gračanin P., Welc F., *Burialscapes of Rab Island (North East Adriatic): The Role of Sepulchral Evidence in the Reconstruction of Roman and Late Antique Rural Settlement Pattern*, "Annales: Anali za Istrske in Mediteranske Studije. Series Historia et Sociologia", 2021, vol. 31(3), pp. 391-412.
- Konestra A., Lipovac Vrkljan G., Welc F., *Rural Landscapes of Roman (northern) Liburnia: Diachronic Development of Organisation and the Economy in Extra-Urban Territories in the Light of Recent Archaeological Research*, "Radovi Zavoda za hrvatsku povijest Filozofskoga fakulteta Sveučilišta u Zagrebu", 2022, vol. 54(3), pp. 195-234.
- Konestra A., Welc F., Androić Gračanin P., *The site at the cape Zidine in Lopar in the context of coastal residential and commercial complexes of Rab Island*, "Annales Instituti Archaeologici", 2021, vol. 17(1), pp. 152-170.
- Konestra A., Welc F., Androić Gračanin P., Rabiega K., Nowacki B., Kukela A., *Rab island settlement typology and organisation through a diachronic approach – first data from a multidisciplinary research*, "Annales Instituti Archaeologici", 2020, vol. 16(1), pp. 229-244.
- Konestra A., Welc F., Dugonjić A., Androić Gračanin P., Rabiega K., Solecki R., Nowacki B., *Research within the "archaeological topography of the Island of Rab" project at Lopar in 2018: New data on Prehistoric and late Antique sites*, "Annales Instituti Archaeologici", 2019, vol. 15(1), pp. 187-194.

- Konestra A., Welc F., Dugonjić A., Androić Gračanin P., Šegvić N., Rabiega K., *Field reconnaissance, geophysical survey and trial excavations within the project "Archaeological topography of the island of Rab" in 2017*, "Annales Instituti Archaeologici", 2018, vol. 14, pp. 121-126.
- Makarun M., Tresić Pavičić D., *Lokalitet: Otok Krk – uvala Orgul – crkva sv. Nikole*, "Hrvatski arheološki godišnjak", 2018, vol. 15, pp. 560-561.
- Maletić B. *Castra ed edifici di culto cristiani: il caso della Dalmazia*, in: *Perchement et Réalités Fortifiées en Méditerranée et en Europe, Vème-Xème Siècles/ Fortified Hilltop Settlements in the Mediterranean and in Europe (5th-10th centuries)*, eds. P. Pergola, G. Castiglia, E. Essa, K. Hanna, I. Martinetto, J-A. Segura, Oxford 2023, pp. 370-381.
- Mamužić P., Milan A., *Osnovna geološka karta SFRJ 1:100,000, Tumač za list Rab L33-144*, Institut za geološka istraživanja Zagreb, Savezni geološki zavod, Belgrade 1973, pp. 5-39.
- Marjanać T., Marjanać L., *Sequence stratigraphy of Eocene incised valley clastics and associated sediments, island of Rab, northern Adriatic Sea, Croatia*, "Facies", 2007, vol. 53(4), pp. 493-508.
- Maurina B. et al., *Ricerche Archeologiche a Sant'Andrea di Loppio (Trento, Italia): Il Castrum Tar-doantico-Altomedievale*, Oxford 2016.
- Mlacović D., *Supetarska draga na Rabu v srednjem veku*, in: *Raukarov zbornik. Zbornik u čast Tomislava Raukara*, ed. N. Budak, Zagreb 2005, pp. 513-535.
- Nowacki B., Konestra A., Welc F., *Preliminary typology and contextual analysis of Roman and late antique cooking wares from the Roman rural settlement at Podšilo bay on the island of Rab (north-eastern Adriatic, Croatia)*, "Annales Instituti Archaeologici", 2022, vol. 18(1), pp. 88-119.
- Pieri D., *Le commerce du vin oriental à l'époque byzantine, Ve-VIIIe siècles: le témoignage des amphores en Gaule*, Beyrouth 2005.
- Radić Rossi I., Fabijanić T., *Kurnatski vremeplov. Arheološka istraživanja Turete i Tarca*, Šibenik 2017.
- Riccato A., *Vasellame da cucina ad Aquileia e in area altoadriatica tra V e VI secolo d.C.: continuità e trasformazioni*, in: *Italia settentrionale e regioni dell'arco alpino tra V e VI secolo, Atti del convegno (15-17 aprile 2021)*, eds. M. Buora, S. Magnani, L. Villa, Trieste 2022, pp. 369-391.
- Ruffieux P., *Céramique commune de l'antiquité tardive découverte sur le site de l'église Sainte-Cécile a Guran, en Istrie*, "Hortus Artium Medievalium", 2010, vol. 16, pp. 247-266.
- Schleyer W., *Arbe, Stadt und Insel*, Wiesbaden 1914.
- Thienen V., Lycke S., *From commodity to singularity: The production of crossbow brooches and the rise of the Late Roman military elite*, "Journal of Archaeological Science", 2017, vol. 82, pp. 50-61.
- Trzciński J., Wójcik E., Kiełbasiński K., Łukaszewski P., Zaremba M., Kaczmarek L., Dziedziczak R., Kotowski J., Konestra A., Welc F., Wejrzanowski T., Jaroszewicz J., *Petrophysical Analyses of Rock Construction Materials from a Roman Rural Settlement in Podšilo Bay on Rab Island (North-East Adriatic, Croatia)*, "Materials", 2024, vol. 17(2), 359, <https://doi.org/10.3390/ma17020359>.
- Uboldi M., *Diffusione delle lampade vitree in et.À tardoantica e altomedievale e spunti per una tipologia*, "Archeologia Medievale", 1995, vol. 22, pp. 95-145.
- Uboldi M., *Aggiornamento sulle lampade vitree di età tardoantica e altomedievale in Italia Settentrionale*, "Hortus Artium Medievalium", 2020, vol. 26, pp. 126-132.
- Waldbaum J.C., *Metalwork from Sardis: The finds through 1974*, Cambridge 1983, "Archaeological Exploration of Sardis", vol. 8.
- Welc F., Konestra A., Dugonjić A., Androić Gračanin P., Rabiega K., Nowacki B., *Multidisciplinary insight into late Roman rural settlement on the northeastern Adriatic coast of Croatia: island of Rab case study*, "Polish Archaeology in the Mediterranean", 2019, vol. 28 (2), pp. 435-454.
- Whately C., *Militarization, or the Rise of a Distinct Military Culture? The East Roman Ruling Elite in the 6th Century AD*, in: *Warfare and Society in the Ancient Eastern Mediterranean Papers arising from a colloquium held at the University of Liverpool, 13th June 2008*, eds. S. O'Brien, D. Boatright, Oxford 2013, pp. 49-57.

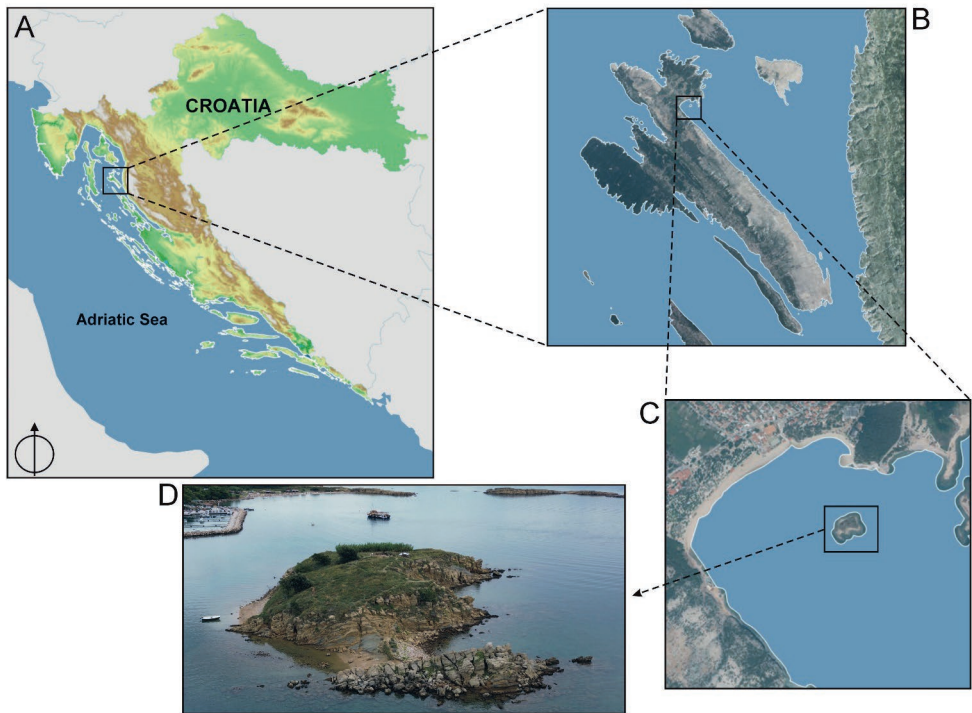


Fig. 1. A: Location of the island of Rab in the north-eastern Adriatic Sea. **B and C:** Location of the island of Lukovac in relation to the island of Rab. **D** View of the island of Lukovac from the west. Drawings and photos: F. Welc



Fig. 2. Top: view of the Lukovac island from the south. **Bottom:** location of the remains of the church in the central part of the island and the archaeological pit. Photos: F. Welc



Fig. 3. Preserved relics of late antique walls on Lukovac Island. A. Remains of a buttress in the south-western part of the island. B. Remains of a long buttress in the north-eastern part of the island. C. The outer wall of a cistern. D. Relics of the perimeter wall with the remains of a buttress preserved in the south-eastern part of Lukovac Island. Photos: F. Welc

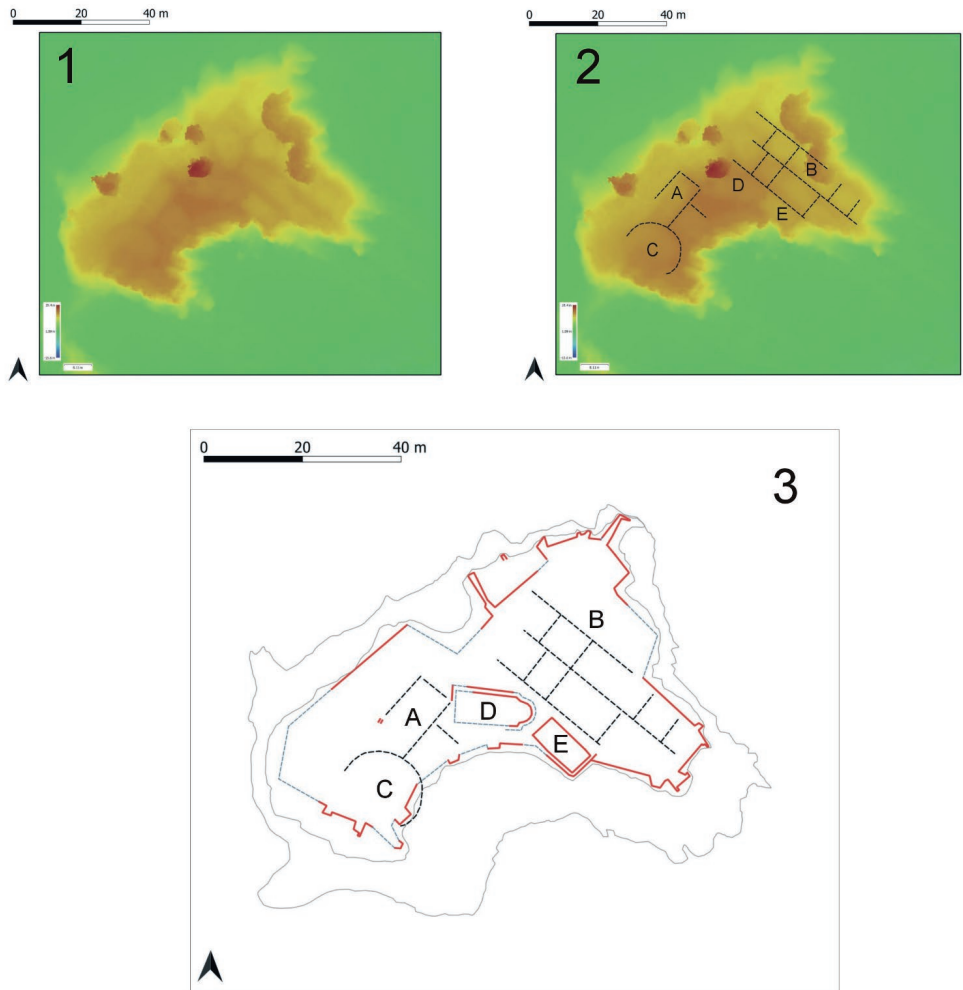


Fig. 4. Analysis of the DEM model of Lukowac Island and its interpretation 1 - The DEM model revealed visible lineaments with a SN - SE - NW course, which most likely correspond to the course of the walls of the residential and farm structures. 2 and 3 - Interpretation: A The so-called western complex of buildings. B - So-called eastern set of buildings. C - Oval structure of unrecognised character. D. Relics of the church. E - Remains of a cistern. Processing and drawings: F. Welc

Fig. 5. Lukovac Island. Orthophoto-map showing the course of the walls documented in the field (red) and the hypothetical (reconstructed) course (blue, dashed line). Markings: 1 - relics of a church with a semicircular apse, 2 - remains of a cistern, 3 - archaeological excavation of 2023. Photo and drawings: F. Welc

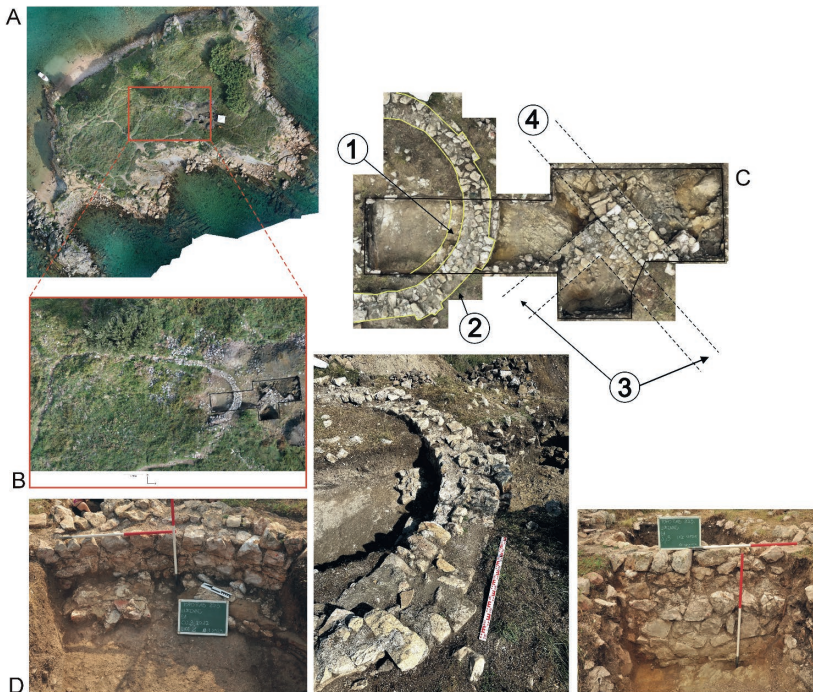


Fig. 6. A. View of the island of Lukovac with the marked area within which the relics of the late antique church are located (Photo and drawings: F. Welc). B. The same area with the visible apse of the church and the location of the archaeological excavation (Photo and drawings: F. Welc). C. Architectural structures discovered within the archaeological excavation, 1 - bench preserved on the inner side of the apse, 2 - one of the four niches decorating the outer face of the apse, 3 - walls forming the corner of the cistern, 4 - exposed fragment of the wall of one of the buildings belonging to the so-called northern complex (Photo and drawings: F. Welc). D. Photographs showing the preserved bench inside the apse (left, photo: K. Rabiega), the decorative niches (centre, photo: F. Welc) and a close-up of the remains of the central nichellesene exposed in the archaeological trench (right, photo: K. Rabiega)

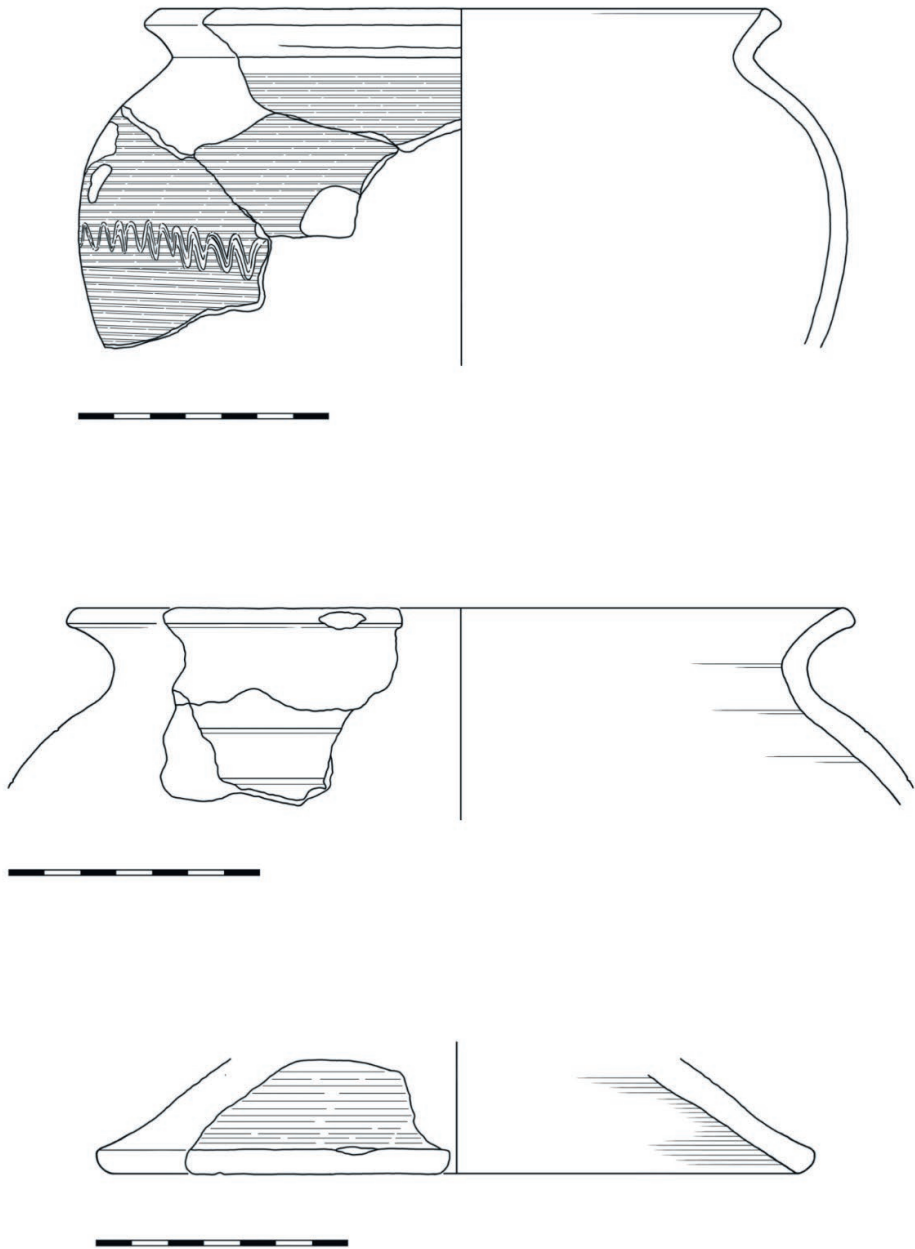
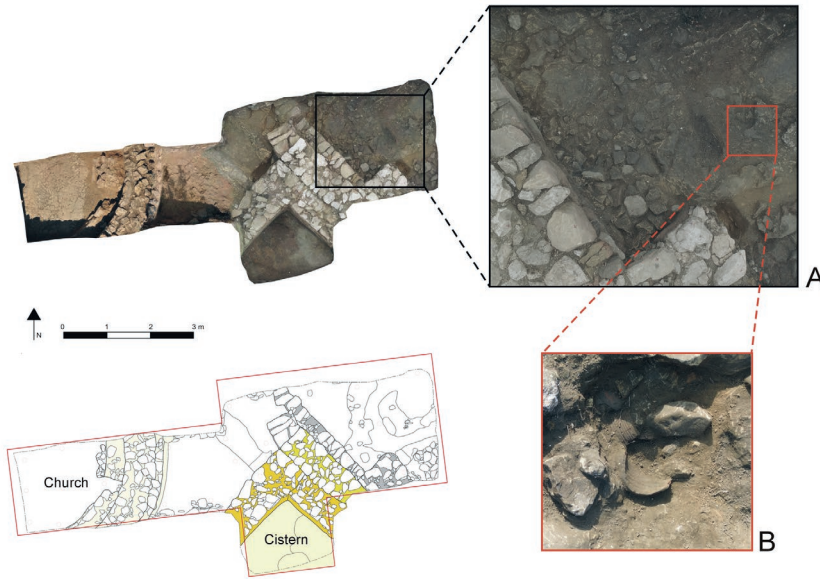


Fig. 7. Selected fragments of coarse late antique wares (so called *Classe* type) found on the Lukovac Island in 2023 (drawings: B. Nowacki)



8. Location of the fragments of the Byzantine amphorae imported from Egypt within the archaeological trench excavated in 2023. A: Close up of the north-eastern part of the archaeological trench with location of Egyptian amphora findings marked by red square (Photo: K. Rabięga, drawing F. Welc). B: Fragment of Egyptian amphora during exploration (photo and drawing: F. Welc)



Fig. 9. A. Fragments of partially worked blocks of travertine and tuff found near the apse of the church during the exploration of the archaeological excavation in 2023. Photo: F. Welc



Fig. 10. Top: aerial view of the Byzantine fortress preserved in the Barbat area (St. Kuzma and Damjan), southern part of the island of Rab. Photo: F. Welc. Bottom: aerial view of the remains of an early Byzantine church. In the foreground, the perfectly preserved ceiling of the apse. Photo: F. Welc



Fig. 11. A: Apse of the early Byzantine church preserved inside the fortress in Barbat (Photo: F. Welc). **B:** The niche of the apse. Its upper arch was made of travertine (Photo: F. Welc). **C:** View of the interior of the church's apse (Photo: A. Konestra). **D:** View of the bench preserved in the interior of the apse (Photo: F. Welc). **E:** Lower external wall of the apse covered with waterproof plaster (Photo: F. Welc)

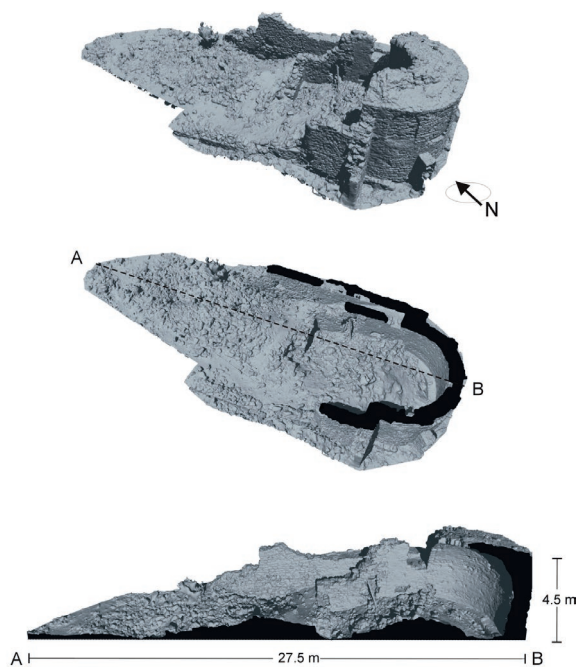


Fig. 12. 3D model of the preserved remains of the Early Byzantine church in the fortress at Barbat, which was created based on aerial photogrammetry. Processing and drawings: F. Welc

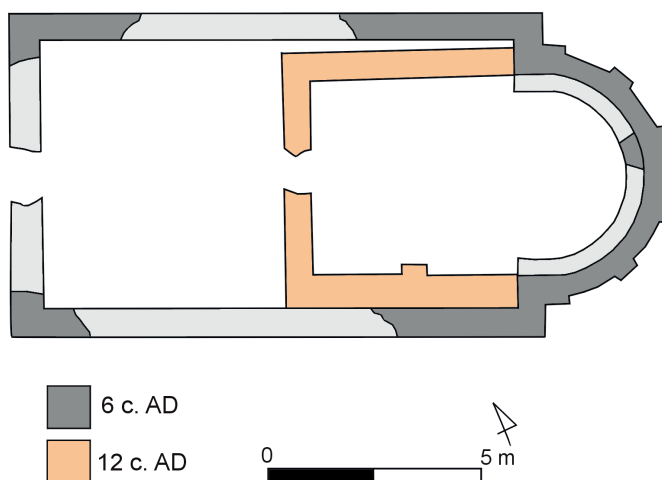


Fig. 13. Plan of the Early Byzantine church located within of the fortress at Barbat (After: M. Jurković, T. Turković, 20214, changed by F. Welc)



Fig. 14 - Church of Saint-Nicolas in Ogrul, view from the East (photo: S. Bully)