
The Roman Urbanisation of the Northern Adriatic Island of Cres: Re-Evaluation
of Archaeological Sources from Osor, Cres and Beli¹
*Rimska urbanizacija severnojadranskega otoka Cresa: ponovna ocena arheoloških virov
iz Osorja, s Cresa in iz Belega*

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Abstract

The article examines the question of Roman urbanisation on the island of Cres during the early imperial period. It seeks to balance the markedly different levels of research conducted at Osor, Cres, and Beli, evaluating them impartially. This re-evaluation is based on the principle that considering inscriptions, architecture, and landscape context together provides a more comprehensive understanding of Roman urban development than treating these categories separately. Adopting this approach has improved understanding of the available archaeological evidence. At the same time, it has revealed that perceptions of the Roman towns on Cres are influenced more by the state of research than most scholars would admit. The contribution of archaeological prospection methods and the dating of historical mortar are also discussed. Due to the very different post-Roman historical trajectories and natural conditions at each site, a wide range of results has been observed.

The findings confirm that Osor was the Roman centre of Cres and that the inscription CIL III 3148 (10131) most likely originates from there. The location of the potential Roman settlement of Crexi remains unknown. No evidence was found to support the existence of an early imperial town at Beli. Instead, the dating of the city wall mortar indicates a settlement phase in late Antiquity.

Keywords: Kvarner Islands, Osor, Cres, Beli, Roman *municipium*, Mortar analysis

Izvleček

Članek obravnava rimsko urbanizacijo otoka Cres v zgodnjem cesarskem obdobju. Poskuša uravnotežiti zelo različno raziskanost Osorja, Cresa in Belega ter jih nepristransko ovrednotiti. To ponovno vrednotenje temelji na načelu, da celovito razumevanje rimske urbanizacije omogoča sočasno upoštevanje napisov, arhitekture in krajinskega konteksta, saj posamezne kategorije same ne dajejo popolne slike. Takšen pristop je izboljšal razumevanje razpoložljivih arheoloških virov. Hkrati je pokazal, da je naše dojemanje rimskih mest na Cresu odvisnejše od stanja raziskav, kot bi si marsikateri raziskovalec želel priznati. Obravnavana sta tudi vloga arheoloških prospekcijskih metod in datiranje zgodovinske malte. Zaradi povsem različnih zgodovinskih procesov po rimskem obdobju in naravnih pogojev na posameznih lokacijah so rezultati zelo različni.

Rezultati potrjujejo, da je bil Osor rimsko središče otoka Cresa in da napis CIL III 3148 (10131) verjetno izvira od tam. Lokacija morebitnega rimskega naselja Crexi ostaja neznana. Ni dokazov, ki bi potrjevali obstoj zgodnjecesarkega mesta Beli. Datiranje malte mestnega obzidja kaže na fazo naselitve v pozni antiki.

Gljučne besede: kvarnerski otoki, Osor, Cres, Beli, rimski municipij, analiza malte

¹ The editorial team used the AI tools DeepL, Grammarly, and Instatext to proofread the English text.

Introduction

The framework that holds together our knowledge of the Roman history of the Cres-Lošinj archipelago is about 250 years old. It was created at a time when the first interest in antiquity was awakened and reflected in travelogues. For Cres and Lošinj, the travel report of Alberto Fortis (1771) reflects this period. It is not only the oldest publication of its kind, but also the first to include archaeological information. It lists epigraphic monuments, including CIL III 3148 (10131), which refers to the construction of the *curia* under the direction of the *duumviri* in the time of Tiberius (AD 14–37). This is the starting point for this paper. According to Fortis (1771, 137), it originates from the small village of Beli (Ital. Caisole) on the northern tip of the island of Cres (fig. 1). A second epigraphic monument (CIL III 3147), important for the regional history, mentions the *aedile* and *duumviri* and was found on the islet of Susak, SW of the island of Lošinj (fig. 1).

The presumed origin of the CIL III 3148 (10131) inscription at Beli has made the site an important reference point in archaeological research into the urbanisation of the Cres-Lošinj archipelago. However, the research is complicated by the absence of written sources mentioning Beli or the island of Susak; instead, the towns of Crexi and Apsorus are mentioned for the archipelago (Plin. Nat. hist. III, 140). Ancient Crexi is often equated with the modern town of Cres or assumed to be located in its vicinity. Apsorus is today's small village of Osor near the southern tip of the island of Cres (fig. 1). Matijašić (1990, 259) puts it in a nutshell when he says that, paradoxically, the only two inscriptions that provide written evidence of the existence of the institutions and magistrates of Apsorus and Crexi were not found in the respective urban centres. The resulting discussion about the number of urban centres founded on the island of Cres and their role in the administrative system has been going on for more than 100 years (summary in Starac 2000, 78–80). The question was not only wheth-

er three independent Roman towns actually existed (today's Beli, Cres and Osor), but also their exact locations, given that some researchers have equated the Roman town of *Crexi* with modern-day Cres, while others believed it was located in the modern village of Beli (e.g. Margetić 1984, 245–7; Wilkes 1969, 196; Alföldy 1965, 73). However, there is general agreement that Roman towns were founded only on the island of Cres, but not on the neighbouring island of Lošinj.

Table 1: Transcription of the Epigraphic Inscription CIL III 3148 (10131). <https://edh.ub.uni-heidelberg.de/edh/inschrift/HD057945>

Ti(berio) Caesar[e] Aug(usti) f(ilio)
 Augusto pon[t(ifici)] max(imo)
 C(aius) Aemilius Vols(oni) f(ilius)
 Ocla(tinus)
 L(ucius) Fonteius Q(uinti) f(ilius) Rufus
 Ilviri porticum
 curiam d(ecreto) d(ecurionum) faciundum
 curavere id(em)que probav[ere]

Osor has been the focus of the Austrian-Slovenian project 'Osor beyond the myth' since 2023. The project examines Osor's role in maritime prehistoric trade routes, Roman urban architecture within the city walls, but also the city's landscape context and land use under the Roman regime. In this sense, the new project results add to the discussion about traces left by Roman urbanisation on the island of Cres as a whole. This paper therefore addresses the question of whether 'old' archaeological monuments can be re-evaluated in light of the new project results, and whether this process can contribute to the ongoing discussion about the Roman urbanisation of the island of Cres.

The discussion will also draw on the results of a second project that is currently ongoing. Titled 'Mortar analyses of archaeological monuments in the Mediterranean climate regions' (2024–2025), this Croatian-Austrian collaboration focuses on the radiocarbon analysis of historical mortars from the Cres-Lošinj archi-

pelago. As most of the samples are still being analysed, this publication will only include the results relating to the city wall of Beli, as these are directly relevant to the history of Roman urbanisation on the island of Cres.

The paper begins with a brief overview of the case study area. A comprehensive list of all publications dealing with the Cres-Lošinj archipelago is not included. Only publications that are relevant and contain older citations, provide an overview, or deal with a specific topic are mentioned, in order to avoid unnecessary redundancy. This is followed by a presentation of the recent research results from Osor and Beli. The following discussion examines the contradiction between recent research findings and the prevailing view on the Roman cities of the Cres-Lošinj archipelago. This in turn requires a discussion of the reliability of the information surrounding the discovery of the inscription CIL III 3148 (10131). Other inscriptions from the region are not discussed in detail here, as such an analysis would exceed the scope of this work. An overview of the archipelago's inscriptions and their interpretation can be found in Kurilić's work (1999). Most of the inscriptions can also be viewed in the Heidelberg Digital Epigraphic Database (<https://edh.ub.uni-heidelberg.de>). Final-

ly, the location, dating and the regional roles of the presumed Roman settlements at Osor, Cres and Beli are discussed.

Case Study Area

The Kvarner Islands are the northernmost islands along the coast of modern-day Croatia. They include the islands of Krk, Cres, Lošinj and Rab, as well as numerous smaller islands (fig. 1). A total of five Roman settlements on three Kvarner islands have been mentioned in written sources: Fulfinum (Omišalj) and Curicum (Krk) on Krk; Apsorus (Osor) and Crexi (Cres) on Cres; and Arba (Rab) on Rab (ancient toponyms after Margetić 1979, 330–2). According to Starac (2000, 78–83), epigraphic sources indicate the granting of municipal privileges during the 1st century AD.

The extent of research into the suspected larger Roman settlements in the present-day towns of Osor, Cres and Beli varies greatly (e.g. Ćus-Rukonić 1984) (fig. 2). No excavation results are available for the village and region of Beli, although a summary of archaeological zones in the surrounding area indicates significant archaeological potential (Bradanović 1999). Publications dealing with Roman Beli mainly refer to the Tiberian inscription and paint a picture



Figure 1: The Cres-Lošinj Archipelago, Including the Places and Geographical Names Mentioned in the Text (Base: SRTM, elaborated by Nives Doneus, 2025)

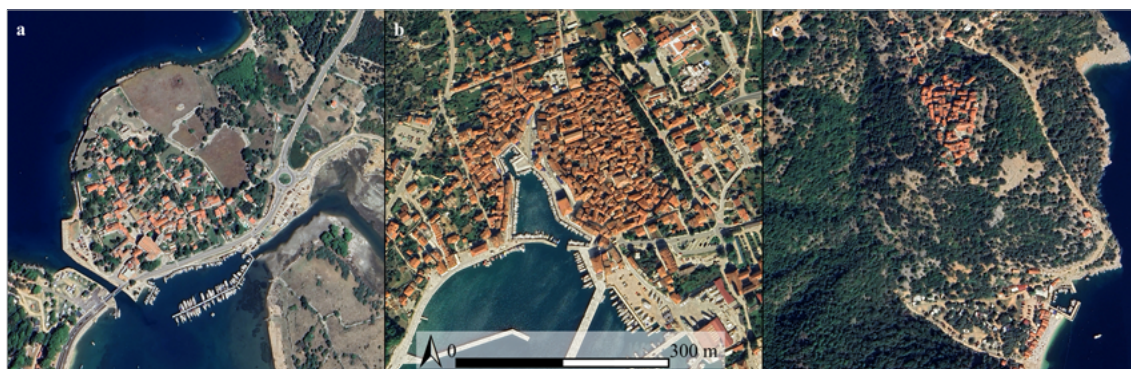


Figure 2: Present-day Settlements of Osor (a), Cres (b) and Beli (c) (Google Earth. Image © 2025 Airbus, elaborated by Nives Doncus, 2025)

of a flourishing city from the early imperial period (Mitis 1913a; Imamović 1975, 219–220). Apart from the inscription from the time of Tiberius mentioned above (CIL III 3148 (10131)), only a few other funerary inscriptions from secondary sites in the vicinity of Beli are known and offer concrete evidence of Roman settlement(s) until the middle of the 2nd century (Šarić 1982; Margetić 1984).

The same applies to inscriptions found in the area around the town of Cres. However, the location of Roman *Crex* has been debated since research on the archipelago began (Mitis 1913b, 100). The Roman town has either been searched for in the area around the present-day town of Cres (Imamović 1975, 221–3; Ćus-Rukonić 1984, 234–5) or it is believed to lie beneath the modern city (Stražičić 1980, 215; Ćus-Rukonić 2014, 22).

This state of research is in strong contrast to the studies that have been conducted in Osor. The present archaeological data indicate that area of later Osor was inhabited already in the Bronze Age (Blečić Kavur 2021; Blečić Kavur and Kavur 2025) and have acquired its future significance with the largest still visible infrastructure project – the erection of the city walls (Mohorovičić 1953; Faber 1982). In the 2nd century BC, the region passed slowly under the Roman influence (Blečić Kavur 2015, 217–33) and later rule with Osor receiving consequently the status of a *municipium*, as indicated by the

available evidence (Starac 2000, 79–81). During the 1950ies, archaeological interest focused on the architectural monuments (Mohorovičić 1953). Excavations along the city wall conducted in the 1970ies revealed its complex stratification and the discovery of submerged moorings NE of the city gave first hints to a possible harbour infrastructure (Faber 1982). In addition to questions of urban layout, architecture and epigraphic monuments (Šarić 1982; Margetić 1984) also the Roman military presence in Osor was discussed, with a focus on the interpretation of a *stela* dedicated to a Roman naval officer (Kuričić 2012; Šašel Kos 2017). Osor was also the focus of large-scale rescue excavations led by the Croatian Conservation Institute between 2022 and 2025 that made a significant contribution to the history of the town, particularly its Roman period (Baričević 2023). The rise of Christianity and the emergence of new sacral architecture in the late Antiquity (e.g. Turković and Maraković 2005) played a significant role in the city and strengthened in this way its regional importance into the Middle Ages (Bully et al. 2024).

Roman origin is assumed for some other villages on the Cres-Lošinj archipelago as well (Imamović 1975). The settlement pattern, on Cres and smaller islands, includes also numerous *villae rusticae* (Ćus-Rukonić 1982; Ćus-Rukonić 2001). These have not yet been the subject of large-scale, systematic research, but remains

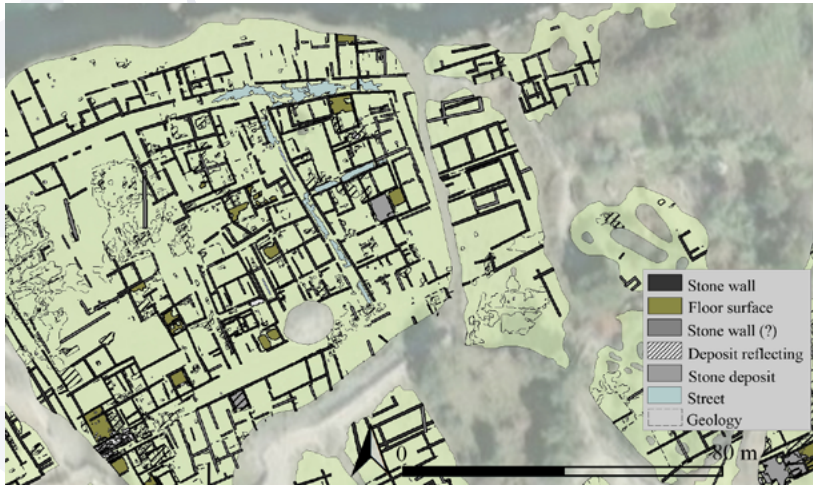


Figure 3: NW Part of the Roman Osor in the Results of the Ground Penetrating Radar Survey 2023–24 Indicating the Layout of the City, Including the Streets and *Insulae* (elaborated by Geosphere Austria, 2024)

of Roman rural settlements have been recorded during research into late Antique and early medieval architecture (e.g. Bully and Čaušević-Bully 2012).

Recent Research Results

Osor

Research into the landscape of the Osor region has been ongoing since 2012 (Doneus et al. 2015). After large-scale geophysical measurements in 2014/15 (Doneus et al. 2017), Osor was the focus of a second geophysical survey in autumn 2023/spring 2024. The results, which are being prepared for publication, provide an insight into the NE-SW oriented street grid of a small town with a diameter of about 300 m and the *insulae* measuring 1×2 *actus* (fig. 3). The *forum* was situated in the SW of the city, and its location was confirmed during archaeological rescue excavations in the main square in 2022–24 (Baričević 2023).

To the west, the city borders the Osor Channel, which separates the islands of Cres and Lošinj, providing a navigable route between Osor Bay and the Lošinj Channel to the south. A separate article in this volume discusses the importance of the Osor Channel for (Roman) shipping, as well as the issues related to coastal changes and the presumed location of city harbours.

In recent years, systematic and large-scale analyses of archaeological remote sensing data have also enabled the stratigraphic information contained within the airborne laser scanning data surrounding Osor to be analysed. Based on the relative chronology of the dry stone walls outside the city limits, evidence of a Roman system of dry stone walls was discovered (Doneus et al. 2022). These features were dated using the OSL profiling and dating method (OSL-PD), which yielded a date range of AD 200 ± 100 (Doneus et al. 2024). Furthermore, there is an obvious spatial connection between the layout of the Roman Osor and land surveying, as the boundary lines of the surveying system are oriented according to the city's location, considering the location of the *forum*, where the *umbilicus* (the intersection of the survey axes) may be assumed.

Overall, these results provide the first clear evidence of municipal land surveying on the Croatian islands.

Beli

Archaeological Prospection

The successful application of archaeological prospection methods in the evaluation of Roman cities hinges on the use of appropriate techniques, as well as on the topographical conditions and the state of preservation of the

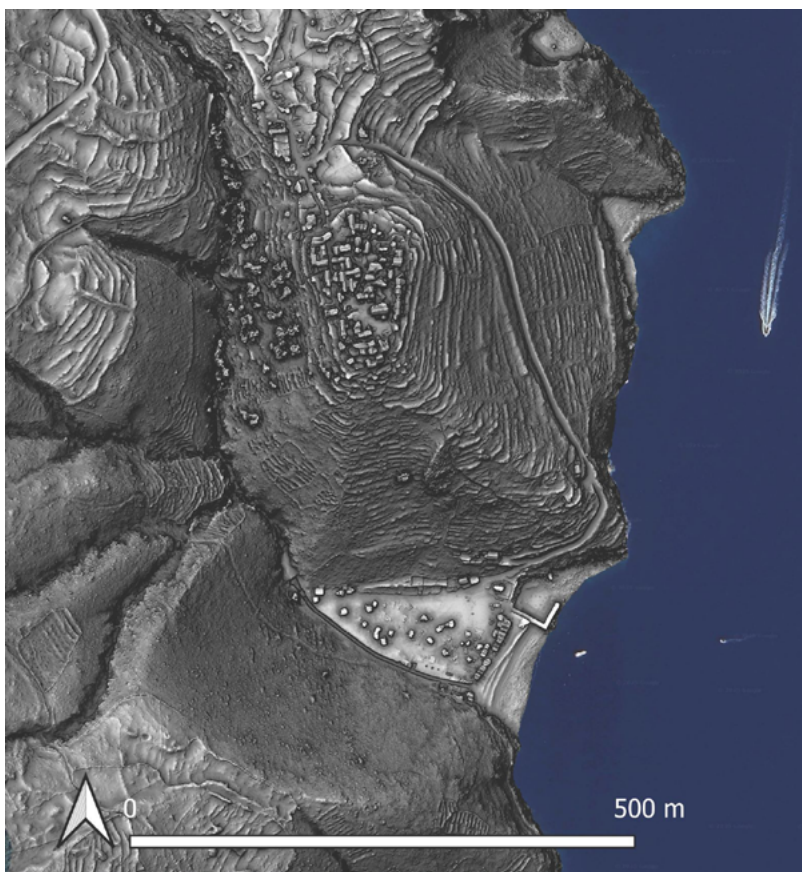


Figure 4: The ALS/ALB Archaeological Combined eVAT Data Visualisation of Beli Reveals the Steep Terrain and Numerous Agro-Pastoral Relics (project-owned ALS/ALB data, visualisation by Michael Doneus, Orthophoto: Google Earth. Image © 2025 Airbus. Elaborated by Nives Doneus, 2025)

archaeological structures. For example, Osor is an extremely favourable location for geophysical prospection due to its accessible, vegetation-free terrain (see fig. 3). In contrast, prospection surveys have contributed little to the understanding of Roman settlement processes in Beli and the surrounding area.

Designed as a hilltop settlement, Beli lies approx. 130 metres above sea level and has a built-up area within the city walls of approx. 170 x 100 metres (fig. 2). Remote sensing project data was acquired by means of airborne laser scanning (ALS) and airborne laser bathymetry (ALB) in 2023, covering among other areas also Beli region (fig. 4). The landscape is characterised by agricultural remains, most of which are no longer in use today. Agricultural plots are located on small, flat areas to the north and west of the village of Beli, while former agricultural ter-

aces stretch from sea level to the city walls. The ALS data revealed no Roman land surveying in the vicinity of Beli (Doneus et al. 2024). In Pod Beli Bay, which is sheltered from the wind and weather by stone breakwaters, ALB data show no discernible submerged structures down to a depth of 10 metres.

The settlement area in Beli is very compact, leaving hardly any unbuilt spaces for modern geophysical surveys. For this reason, geophysical measurements in spring 2024 were only carried out on the church square and at the entrance to the village (fig. 5). Even though the measurements were successful, the results could not provide any new insights into possible Roman or post-Roman building periods, as the measurement areas were too limited.



Figure 5: A Geophysical Survey of the Main Square in Beli with a Handheld Ground-Penetrating Radar System (elaborated by Nives Doneus, 2024)

Mortar Analysis

Research in the Osor region indicates that archaeological remote sensing is especially effective at demonstrating the diversity, extent and complexity of past land use (Doneus et al. 2024). Many of these traces have not been classified as archaeological remains or sites and have received little attention in archaeological research. One reason is certainly the fact that, until recently, archaeological methods could not deal with large-scale land use remains that did not contain any datable finds. However, these are not the only archaeological category difficult to date. Stone structures or buildings, with or without mortar binding, can also pose a challenge when additional dating information is lacking.

Dating building structures with mortar binding is often difficult when using construction techniques as a primary reference. Even if early Roman, late Roman and early medieval walls can be visually distinguished from each other and apparently use different mortar bindings, their respective dating remains only an estimate without the accompanying archaeological material. Although mortar analyses cannot always be applied successfully, and the dates obtained may be unclear, they can provide a means

of acquiring chronological information from structures like bridges (Sironić et al. 2022) or aqueducts (Sironić et al. 2019) that otherwise could not be dated.

Radiocarbon dating of mortar is based on the fact that, during hardening, the lime in the mortar absorbs CO_2 from the atmosphere and preserves it in the binder as calcite (CaCO_3), thus containing information about the date of formation (Daugbjerg et al. 2020). However, the dating of mortars is not straightforward, since, in addition to the binder calcite, mortars also contain carbonates from other sources, such as aggregate, unburned carbonate rock used for lime production and recrystallised carbonates.

Furthermore, the quality of the mortar compromises the accuracy of the radiocarbon dating. As there is still no universal method for the radiocarbon dating of mortar, physical analysis (petrography and XRD) and chemical analysis (carbonate content, kinetic curve, carbon stable isotope content ($\delta^{13}\text{C}$) and relation of radiocarbon content ($a^{14}\text{C}$) of CO_2 fractions) must be considered in parallel. To further confirm dates obtained through mortar dating, different approaches involving dating of inclusions, sequen-



Figure 6: Aerial Image of Beli, Showing the Sampling Point for The Mortar Dating (Red Dot), a Relevant Section of the City Wall, and the Mortar Sample in Detail (project-owned aerial image, elaborated by Nives Doneus, 2025)

tial dissolution and extrapolation can be considered (Sironić et al. 2023; Sironić et al. 2024).

As part of the project, one of the mortar samples was taken from the city wall of Beli. Currently, there have been no archaeological investigations of the city wall, which is only partially preserved due to later additions and extensions. It is also only partially visible at ground level due to dense vegetation. The degree of preservation is also difficult to determine based on the above-ground sections, since these are largely of more recent origin. The mortar sample was taken on the east side of the village, on the exterior of the city wall at its lowest point and directly on the limestone rock (fig. 6).

The radiocarbon dating of the Beli sample (Zagreb Radiocarbon Laboratory identification number Z-9011) was performed using the sequential dissolution and extrapolation approach. Since the ^{14}C dating of mortar depends on the quality of the sample, the result of the ^{14}C mortar analysis have to consider the data collected during the preparation of sample pointing to the reliability of the dating, as well as the results

from the physical analysis done prior to the sample preparation. The thin-section petrography and XRD analysis proved that the sample did not contain calcite recrystallization or magnesite which could lead to carbon contamination or delayed hardening (see the protocol section).

The principle of the approach of sequential dissolution and data extrapolation is to collect only the carbon form binder and reduce the amount of contamination originating from geogenic carbonate to a minimum. Both binder and geogenic carbonates, besides being chemically the same, have also the same crystal form (calcite). The main difference is their morphology; the binder is softer and reacts quicker with acids forming CO_2 . By selecting certain grain fraction (GF) of mortar and sequentially collecting portions of CO_2 produced during reaction of GF with acid, the initial CO_2 fractions mostly contain carbon from binder, while in further CO_2 fractions the binder to geogenic ratio drops. By extrapolating the ^{14}C content of the collected fractions at the initial point (time = 0), the ^{14}C content containing pure binder carbon,

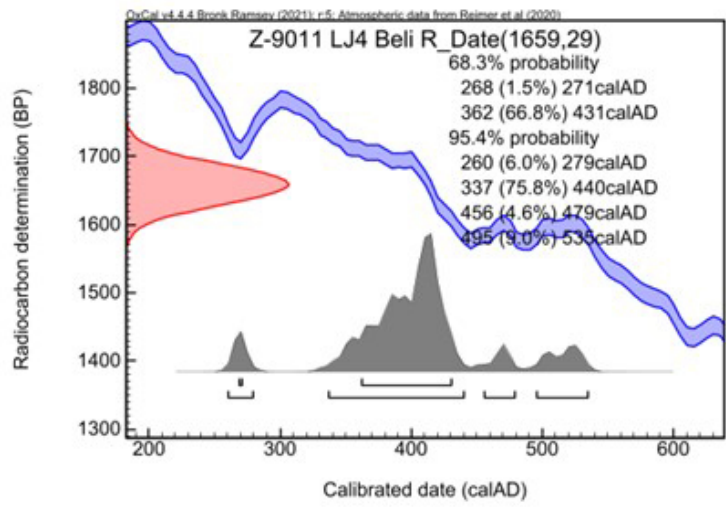


Figure 7: ¹⁴C – 1 Calibrated Result of the Extrapolated ¹⁴C Value for Sample of Beli (elaborated by Andreja Sironić)

and information of the true date of mortar formation, can be calculated.

The Beli sample (Z-9011) had 70.4 % of carbonate content (as CaCO₃) and point at which the kinetic curve (velocity of CO₂ production in time during sample reaction with acid) starts to stagnate (pc) is 25%. The carbon content is high confirming that the mortar is non-hydraulic and so reliable for ¹⁴C dating. However, pc value is a bit low (at well preserved samples pc is about 60 %) implying possible contamination by geogenic carbon, which could make result too old. To confirm/deny the contamination with geogenic carbon, the δ¹³C values are used since they point to origin of carbon, binder carbon has values –20 to –9 ‰, while geogenic carbon has higher values around 0‰. For the measured CO₂ fractions (tbl. 2) all δ¹³C values are low (from –17.5 to –18.0‰) proving that the carbon originates predominantly from binder. The difference between a¹⁴C values of the first and the second fractions are low (tbl. 1), and a¹⁴C value of the whole amount GF also does not stand out from the first two fractions proving that the selected grain size of mortar is predominantly comprised of the binder. From the a¹⁴C values the extrapolated a¹⁴C value of 81.3 ± 0.4 pMC and radiocarbon age 1660 ± 30 BP are calculated. From radiocarbon age calibrated dates are obtained (fig. 7).

Table 2: Carbon Isotope Results for CO₂ Fractions and the Whole Amount of Mortar Sample From Beli (Z, A – Zagreb Radiocarbon Laboratory ID numbers, UGAMS – CAIS ID number, δ¹³C – uncertainty 0.1 ‰)

Name			Measured values		
Z	A	UGAMS	CO ₂ fraction size	δ ¹³ C (‰)	a ¹⁴ C (pMC)
9069	3768	75903	1 st fraction, 6 %	-17.5	80.7 ± 0.3
9070	3769	75904	2 nd fraction 19 %	-17.8	78.7 ± 0.3
9011	3723	75446	Whole amount GF (100%)	-18.0	75.1 ± 0.2

The calibrated date for this sample spans cal AD 260–535 (95.4 % probability range). The highest probability range for the Beli sample is from cal AD 337–440 placing it in 4th/5th century AD.

Discussion

The results of the current projects demonstrate that previous debates on Roman cities on the island of Cres neglected one crucial aspect: the spatial dimension of Roman urbanisation and the traces it left behind. This is particularly evident in the case of the Roman city of Osor, where excavation and archaeological prospection results paint a historically consistent picture. The loca-

tion, size and layout of the city, as well as the associated land surveying, all lead to the same conclusion: the Iron Age settlement was succeeded by a regional Roman centre following a successful transformation in the early imperial period. Furthermore, a comparison between Beli, Cres and Osor, suggests that, based on current knowledge, only Osor meets the criteria for the construction of a *curia* under the leadership of *duumviri* (CIL III 3148 (10131)) during Tiberius's reign (AD 14–37).

The absence of archaeological sources that would confirm the existence of an early imperial town or settlement in Beli is problematic and must be addressed if we are to improve our understanding of the region's Roman history. Apart from its mention as the location where the Tiberian inscription was found, there is currently no other hint of a small Roman town in the 1st c. AD. This refers not only to the lack of confirmation from archaeological excavations or prospection data, but also to Beli's geographical location, which do not align with those of a typical early imperial trading or coastal town. The dating of the mortar in the town wall at Beli points to late Antiquity. This raises the legitimate question of why, in 1771, Fortis gave the village of Beli as the location of the epigraphic monument CIL III 3148 (10131). Although this question can only be answered hypothetically today, it is nevertheless worth exploring.

Alberto Fortis and His Work

A. Fortis scientific interests and personal opinions were shaped by the context of his time. Therefore, 250 years later, his words should be taken for what they are: personal impressions and narratives from the perspective of a naturalist from the end of the 18th century. As a result, his assessment of the country and its people is sometimes rather harsh, as when he describes the island's inhabitants as 'ugly, poor and lazy' (Fortis 1771, 40). Fortis (1771, 135) also adopts S. Giustiniani's comment from the mid-16th century, according to which many Latin and Greek inscriptions were found in Osor in his time. This

report also owed more to the (political) spirit of the time than to reality, as we can now assume that these were not Greek but Glagolitic inscriptions (e.g. Klen 1984).

Archaeological objects like statues or epigraphic monuments were of general interest even before Fortis' voyage in 1770/71. Nicola Dinarizio (Fortis 2014, 305, note 79), Bishop of Osor (1745–1757), created the first epigraphic collection of the archipelago in Osor during his term of office (Fortis 1771, 136). However, by the time of Fortis's travels in 1770/71, N. Dinarizio had already passed away in 1764, so the information about the locations of the epigraphic monuments was most likely based on the notes of Canon and Archdeacon Sovich (CIL III, 399), who had documented the diocesan search for inscriptions. Fortis' report also shows that he did not actually see epigraphic monuments *in situ*, but only as part of the Osor collection. Only the inscription from the island of Susak (CIL III 3147) was observed by him (1771, 121, 242) 'under a miserable hut' (the inscription is now lost, see Čus-Rukonić 2001, 243). It is therefore possible that the inscription CIL III 3148 (10131) was mistakenly attributed to Beli. While this hypothesis cannot be verified, neither can the information provided by Fortis be regarded as proven archaeological fact.

Roman Beli

Based on information collected in Osor, A. Fortis was the first scientist to conclude that Beli had a significant regional importance in Roman times (Fortis 1771, 40): '[T]he castle of Caput insulae stood proudly during the reign of Tiberius, home to a flourishing Roman civilisation.' T. Mommsen's adoption of the discovery details (CIL III, 1873, Part 1, 399) lent scientific credibility to the circumstances of the discovery, meaning that every subsequent study cited the CIL work and listed Beli as the original finding spot. For regional or North Adriatic archaeological research, Italian-language publications such as those by Ignazio Mitis (1913a) were crucial in establishing the Fortis claims as archaeological

facts. Mitis begins his brief historical account of Beli with the words (Mitis 1913a, 12): '[S]tood the magnificent castle of Caput Insulae, seat of a flourishing Roman civilisation at the time of Tiberius.' He adopts the keywords *caput insulae*, Latin for 'head of the island' (Fortis 1771, 137) as a synonym for Beli and uses information about the epigraphic monument from the time of Tiberius without even referencing Fortis by name. However, he admits elsewhere in the publication that he is familiar with his work (Mitis 1913a, 15). Finally, I. Mitis (1913a, 14) provides inaccurate information about the inscription's discovery, stating that it was found in 1775.

This detailed examination of I. Mitis's publication is not intended to highlight errors; it is merely one example of how quickly a historical narrative can develop and become established. In 1925, Silvio Mitis (1925, 77) adopted Ignazio Mitis's information about Beli, thereby introducing the term *caput insulae* to those interested in the younger history of the Cres Island. Consequently, most subsequent academic publications and popular science books have relied on I. Mitis's article and upheld the archaeological assessment of the site as a Roman town (e.g. Fučić 1990, 17). Ćus-Rukonić's comment (1984, 235) in her summary of the history of research on the archipelago, which states that I. Mitis reported on his excavations in Beli and the existence of a *forum* and *curia* in 1913, seems to be a misinterpretation of I. Mitis' reports. In fact, I. Mitis did assume the existence of these buildings in Beli based on the Tiberian inscription but did not provide any physical evidence or excavation results to support these claims.

Admittedly, several epigraphic monuments were found around Beli (Šarić 1982). The authors also do not intend to deny the existence of a Roman population in the region, but rather to point out that, aside from CIL III 3148 (10131) mention, there is no evidence of an early imperial period in Beli. Also from a spatial perspective, the location, shape and size of the settlement provide no indication of a *municipium*, as the basic requirements of a typical small Roman

coastal town cannot be met. The area within the city walls, which measures 170 by 100 metres, is only half the size of the *municipium Aporus* and, due to the relief, the typical early imperial city plan seen in Osor cannot be realised here. The remains of the *templum*, *curia* and *forum* referred to by Ćus-Rukonić (1982, 14) or of building remains by E. Imamović (1975, 223) cannot be confirmed by any archaeological evidence; they most likely merely reiterate the views of I. Mitis in 1913.

The absence of Roman surveying remains outside Beli can be attributed to the challenging terrain and/or the fact that Beli was not a *municipium*. The elevated position on the eastern side of Cres likely provided a defensive advantage and excellent visibility during the early imperial era onwards. However, this exposed location is also the reason for the lack of an adequate harbour. The stormy north-easterly wind (Croat. *burra*), to which Beli is extremely exposed, needs no explanation for any Croatian coast resident and influences everyday life in Beli to this day (for more on the geography of the island of Cres, see Stražičić 1981). The evidence cited by Imamović (1975, 223–4) or Stražičić (1980, 215) for a Roman harbour in Pod Beli Bay, located below the village, originates from a note by S. Mitis (1927, 91) and could not stand up to thorough scientific review. Also, the so-called Roman bridge of Beli is just part of the region's tradition. The first mention probably dates back to I. Mitis (1913a, 17). Despite a complete lack of scientific evidence to support its Roman origins, it is referenced in archaeological publications regularly (e.g. Imamović 1973).

In the last 100 years no new architectural, epigraphic or other archaeological evidence has come to light in Beli or been brought to the attention of archaeologists. In an area where prehistoric, Roman and younger settlement activities can be expected, this missing archaeological record can only be found by systematic archaeological excavations. Given this state of research, any discussion about the Roman administrative network on the island of Cres (summary in

Starac 2000, 78–80) is obsolete and can only be conducted once more absolute data from Beli are available and the Roman Cres is better defined (see the following chapter). In the moment, the late Antique dating of the mortar sample from the city wall is the first chronological date for a possible Roman presence in Beli. At the same time, we have to see this date for what it is: a successful dating exercise, but one that, without further research, is insufficient to prove the presence of a late Antique settlement. Here, to use of further mortar dating and OSL-PD dating method would help to establish a firm chronological database. For this reason, we refrain from drawing comparisons with late Antique hilltop settlements in the northern Adriatic. However, we strongly hope that these new results will stimulate a fresh debate about Beli and his role in the region. Late Antique coins (Mitis 1913a, 17) and the 239 AD milestone (CIL III 3210, CIL III 10162, CIL XVII 400234) found in the Beli area provide further limited evidence of a late Antique presence at the northern end of the island of Cres.

Roman Cres

Compared to the archaeological results from Osor, it is currently highly challenging to reconstruct the history of the Roman settlement of *Crexi*. However, references in ancient sources (Plin. Nat. hist. III, 140) and the continued use of the name suggest that a Roman settlement called *Crexi* may indeed have existed near the present-day town of Cres. Since the beginning of archaeological research on the archipelago, it has been presumed that the Roman city was located in or near the present-day town of Cres, for example on the hill of Sv. Bartolomej or Loveški (e.g. Čače 1992–93, 17–8). The discussion about the Roman Cres has therefore long been an integral part of the island's archaeology (e.g. Čus-Rukonić 2014; Margetić 1984; Imamović 1975). However, one issue has not yet been raised: Can or should the written mention of *Crexi* be taken as evidence of an early Roman town? S. Čače observed as early as 1992–93 (footnote 76) that

the term '*Crexi*' is almost certainly a demonym rather than a toponym. Only Ptolemy (2.16.8) records *Kreksa* as an actual place-name.

Archaeological evidence has confirmed Roman settlement activities in and around Cres, including the scattered remains of Roman walls in the town area, graves (Čus-Rukonić, 2014, 20–2) and a few inscriptions (Šarić 1982). However, when it comes to the question of the early Roman town of *Crexi*, there is currently insufficient physical evidence to support this view. The most important structural elements of an early imperial *municipium* are still missing: a recognisable Roman city layout, a corresponding city grid with *insulae*, and any indication of a *forum* or other public buildings or spaces. The notion that the CIL III 3148 (10131) inscription regarding the construction of a *curia* refers to *Crexi* and can therefore be used as evidence of a Roman *forum* in Cres (Čus-Rukonić 2014, 24) is, with all due respect, merely speculative and not an archaeological fact. The discovery of individual Roman walls seems also to be insufficient for a reconstruction of the Roman street grid and the location of the *cardo* and *decumanus*, as proposed by Čus-Rukonić (2014, 22, 24).

Although the development of the city in modern times (Borić 2011) has probably erased much of its historical substance, it is striking that there is currently no evidence to support the existence of an early Roman city of *Crexi*, unlike in other places on the Kvarner Islands. In the towns of Krk, Osor and Rab, various clues have survived despite subsequent settlement occupation. In Osor and Krk, these are physical remains of city walls (e.g. Faber 2000 with older literature); in Krk and Rab, relevant inscriptions were found (e.g. Glavičić 2009; Margetić 1987). Furthermore, Roman Osor has been verified in recent decades during all construction projects within the city walls, which were accompanied by rescue excavations (unpublished reports). Nothing comparable applies to the town of Cres. For this reason, it may be worth considering whether the lack of clear evidence for a Roman *municipium* *Crexi* actually represents the

archaeological facts, rather than being a reflection of the current state of research.

Attempts to locate Roman *Crexi* using remote sensing data (airborne laser scanning and aerial archaeology) also failed to produce satisfactory results. There may be several reasons for this. For successful localisation using archaeological remote sensing, visible or partially preserved building structures are required. An example is the Roman Fulfinum (Omišalj), which was identified by preserved building structures (Čaušević-Bully and Valent 2015). Another factor that makes archaeological remote sensing challenging is the high density of cultivated plots around the town of Cres. While these form exceptional landscape features (Kremenić et al. 2021), they obstruct the visibility of other remains of past land use. Evidence of Roman land surveying only extends as far as just south of Cres (Doneus et al. 2024). If there were any further Roman dry stone walls around Cres, they could not be identified for the same reason. However, the absence of Roman land surveying around the present-day town of Cres may also be related to the challenging terrain or the settlement's lack of a legal basis for land surveying.

Conclusion

If we accept that the Tiberius inscription does not originate from Beli but was mistakenly attributed to it, we must ask where it actually comes from. Currently, all research results point to Roman Osor, supporting the transformation of the idea of Osor as a main Roman town on the island of Cres into an archaeological fact.

One could argue that the current state of research on Beli and Cres does not allow for such a statement. This would be correct if archaeology relied solely on luck and time to find evidence for an academic thesis, rather than employing a variety of methodological approaches. Archaeological finds, including epigraphic inscriptions, constitute only a portion of the sources accessible to archaeologists. Another way to obtain results is through the large-scale interpretation of landscape features. Considering the traces of the

Roman era on the archipelago as a whole, including the spatial components of Roman land use, offers a different perspective. After all, the spatial components of systematic Roman settlement expansion also bear witness to history, not just monuments and artefacts. This is the case in Osor: Given its location and size, and the presence of evidence for urban building structures and coherent land surveying, it is currently the only location on the island of Cres that can be considered an Imperial Roman city.

The work of regional researchers such as Alberto Fortis remains of particular interest due to its value as a historical document, providing detailed accounts of the researchers' impressions, as well as the natural and historical background. Even if some details are debated today – like the provenance of the epigraphic monument CIL III 3148 (10131) – his work remains a key source of information. Without Fortis, many valuable archaeological relics would have been lost due to the changing political landscape and the two world wars. The field of science continues to benefit from his efforts to this day.

Acknowledgements

The paper presented here is part of the research project Osor beyond the myth, funded by the Austrian Science Fund (FWF): Grant-DOI: 10.55776/I6039 and the project Mortar analyses of archaeological monuments in the Mediterranean climate regions, which is funded by the OeAD – Austria's Agency for Education and Internationalisation (HR18/2024) and the Croatian Ministry of Science, Education and Youth. For open access purposes, the author has applied a CC BY public copyright license to any accepted manuscript version arising from this submission.

Geophysical measurements were conducted by GeoSphere Austria. Tomislav Anić kindly gave us a guided tour of Beli, helped us access various properties in and around Beli, and helped during our geophysical measurements, for which we are most thankful. We are grateful to the reviewers

whose comments and corrections helped us to improve the final version of this article.

Mortar analysis protocol

The mortar sample from Beli was pretreated and prepared in form of graphite targets for the accelerator mass spectrometry (AMS) at the Zagreb Radiocarbon Laboratory, Ruđer Bošković Institute, Zagreb, Croatia.

Prior to preparing the sample for radiocarbon analysis, the sample was tested for pH using phenolphthalein to check if it was completely hardened (is not still absorbing atmospheric CO₂). Further pre-analysis included petrography of thin layers to check for recrystallisation, as well as X-ray analysis to check for the presence of magnesite, which could indicate delayed hardening (Daugbjerg et al., 2020). After all the tests returned negative results (no reactivity, no recrystallisation and no magnesite content), the sample preparation was proceeded.

The selected part of mortar was cryogenically treated (heated to 80 °C and cooled to –196 °C by liquid nitrogen, at least 5 times) and gently broken by hammer. The sample was dry sieved to collect 32–63 μm grain size fraction (GF). The amount of carbonate as CaCO₃ was analyzed by producing CO₂ from the known amount of sample. From GF a kinetic curve was developed by monitoring the velocity of CO₂ production during reaction with 85 % H₃PO₄. From the kinetic curve the required amount of CO₂ for the first and the second CO₂ fraction was calculated (Sironić et al. 2023). CO₂ fractions were obtained by using an equivalent amount of 2 % HCl. From each CO₂ fraction the graphite was produced and obtained ¹⁴C result at the Center for Applied Isotope Studies, University of Georgia, USA (Cherkinsky et al. 2010; Krajcar Bronić et al. 2010; Sironić et al. 2013). One ¹⁴C result was also obtained from the whole amount of the GF. Along with each ¹⁴C result, the result of the ¹³C content (δ¹³C) was obtained. From the shape of the kinetic curve, the content of carbonate in the sample, the shape of ¹⁴C amount vs carbon content curve and δ¹³C values of each

CO₂ analysis it was decided if the extrapolated result for radiocarbon date of mortar is reliable.

The δ¹³C values were measured on Isotope Ratio Mass Spectrometer and are expressed in per mill relative to Vienna Pee Dee Belemnite and have uncertainty of 0.1‰. ¹⁴C content (¹⁴C/¹³C values) was measured on accelerator mass spectrometer (AMS) at the CAIS. ¹⁴C values are normalized to δ¹³C of –25‰ and expressed as percent modern carbon (a¹⁴C) and as age before present (BP) (Stuiver and Polach 1977; Mook and van der Plicht 1999).

Figures

SRTM – Shuttle Radar Topography Mission, NASA EarthData, <https://www.earthdata.nasa.gov/data/instruments/srtm>

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Summary

The framework that integrates the various aspects of Roman history in the Cres–Lošinj archipelago has existed for around 250 years. When interest in antiquity was just beginning to grow, travel literature was also gaining prominence. Alberto Fortis's 1771 travelogue exemplifies this peri-

od for the islands of Cres and Lošinj. It is not only the earliest publication of its kind on the archipelago, but also the first to record crucial archaeological information for the study of the islands' history and culture. This includes epigraphic monuments such as the CIL III 3148 (10131) inscription, which refers to the construction of a curia during the reign of Tiberius. According to Fortis, this inscription originates from the small village of Beli, at the northern tip of Cres.

Debates concerning the number of urban centres on Cres, and their role within the administrative structure, have persisted since Fortis's time. The discussion has focused not only on whether three independent Roman towns existed, but also on their precise locations.

Since 2023, the Austrian–Slovenian project 'Osor beyond the myth' has focused on Osor. The new findings provide insights into the impact of Roman urbanisation across the Cres–Lošinj archipelago, as well as clarifying the debate concerning Roman towns on Cres. This study also draws on results from a second project, a joint Croatian–Austrian initiative investigating the radiocarbon dating of historical mortar from the Cres–Lošinj archipelago. Mortar dating from the city walls of Beli provides direct evidence concerning the history of Roman urbanisation on Cres.

Given well-founded suspicions that the archipelago's most important epigraphic source had been misattributed, the archaeological evidence for the three presumed Roman towns – Osor, Cres, and Beli – was compared. In doing so, it was necessary to consider not only individual epigraphic monuments but also traces of the Roman period across the archipelago as a whole, as only this approach reveals the full significance of Roman presence. In addition to monuments and artefacts, the spatial patterns of systematic Roman settlement expansion testify to this history.

The results confirm that Osor can be identified as the Roman centre of Cres and that the inscription CIL III 3148 (10131) likely originates there. The location of Roman Cres remains unknown. Mortar dating indicates that Beli was settled in Late Antiquity, but no evidence supports the notion that it functioned as a Roman town during the Early Imperial period.

Povzetek

Okvir, ki združuje različne vidike rimske zgodovine na arhipelagu Cres–Lošinj, obstaja približno 250 let. V času, ko se je zanimanje za antiko šele začelo krepiti, so postali pomembni tudi potopisi. Potopis Alberta Fortisa iz leta 1771 odraža to obdobje v primeru otokov Cres in Lošinj. Gre ne le za najzgodnejšo tovrstno publikacijo o arhipelagu, temveč tudi za prvo, ki navaja ključne arheološke podatke za preučevanje zgodovine in kulture otokov. Sem sodijo epigrafski spomeniki, kot je napis *CIL III 3148* (10131), ki se nanaša na gradnjo kurije v času vladavine Tiberija. Po Fortisu naj bi ta napis izviral iz majhne vasi Beli na severnem delu Cresa.

Debata o številu urbanih središč na Cresu in njihovem pomenu v upravni strukturi poteka že od Fortisovega časa. V ospredju je vprašanje, ali so obstajala tri samostojna rimska mest in kakšna je bila njihova natančna lega.

Od leta 2023 se na Osor osredotoča avstrijsko-slovenski projekt Osor onkraj mita. Novi rezultati osvetljujejo vpliv rimske urbanizacije na celoten arhipelag Cres–Lošinj ter prispevajo k razjasnit-

vi razprave o rimskih mestih na Cresu. Razprava v prispevku temelji tudi na rezultatih drugega, hrvaško-avstrijskega projekta, ki preučuje radiokarbonsko datiranje zgodovinskega materiala iz malte na arhipelagu. Rezultati za obzidja mesteca Beli ponujajo neposredne dokaze o zgodovini rimske urbanizacije na Cresu.

Glede na utemeljene sume, da je bil najpomembnejši epigrafski vir arhipelaga napačno pripisan, smo primerjali arheološke vire treh domnenih rimskih mest: Osorja, Cresa in Belega. Pri tem je bilo treba upoštevati ne le posamezne epigrafske spomenike, temveč tudi sledove rimskega obdobja na celotnem arhipelagu, saj lahko le tako razumemo polni pomen rimske prisotnosti. Poleg spomenikov in predmetov materialne kulture o tej zgodovini pričajo tudi prostorski vzorci sistematične rimske poselitve.

Rezultati potrjujejo, da je Osor rimsko središče Cresa in da napis *CIL III 3148* (10131) verjetno izhaja od tam. Lega rimskega Cresa ostaja neznan. Datiranje malte kaže, da je bil Beli poseljen v pozni antiki, vendar ni dokazov, da bi bil v zgodnjem cesarstvu rimsko mesto.