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Rimski svjetionik i stara crkva
sv. Mihovila na Palagruži

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U radu se raspravlja o vremenu i uzrocima gradnje kasnoantičke utvrde na Veloj Palagruži. Arheološki dokazi korištenja tog objekta kontekstualiziraju se s povijesnim okolnostima plovidbe Jadranom u 5. st. po. Kr. Usporedbama sa sličnim arhitektonskim primjerima raspravlja se o prirodi korištenja utvrde kao boravišta posade s glavnom zadaćom održavanja svjetlosne signalizacije tijekom sezone plovidbe Jadranom. Ukazuje se na povijesne okolnosti koje su vjerojatno dovele do napuštanja utvrde kao dijela većeg maritimnog sustava koji slabi prema kraju 5. stoljeća. Raspravlja se o položaju prve crkve sv. Mihovila, adaptirane unutar ostataka rimske utvrde, vjerojatno u 9. stoljeću.

Ključne riječi: Palagruža, rimski svjetionik, dužjadranska plovidba, Classe, Sv. Mihovil

The Roman lighthouse and
old Church of St. Michael on
Palagruža

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This work contains a discussion of the exact dating and reasons for construction of the fort on Vela Palagruža in Late Antiquity. Archaeological evidence of the use of this building is contextualized within the historical circumstances of navigation on the Adriatic Sea in the 5th century AD. Comparisons to similar architectural examples are used to discuss the nature of the fortification's use as lodgings by crew with the primary task of maintaining light signalization during the sailing season on the Adriatic. The historical circumstances that probably led to the abandonment of the fortification as a part of a larger but, at the end of the 5th century, deteriorating maritime system are presented. The exact location of the first Church of St. Michael, adapted inside the remains of the Roman fortification, probably in the 9th century, is discussed.

Key words: Palagruža, Roman lighthouse, Adriatic long-distance navigation, Classe, St. Michael

Uvod

Nakon prvih izvješća o arheološkim nalazima s otoka iz 1876., Carla de Marchesettija i Richarda F. Burtona, Vela je Palagruža predmetom znanstvenog istraživanja postala tek 1992.-2012. U tom se razdoblju odvijalo sustavno arheološko istraživanje pod vodstvom Branka Kirigina, muzejskog savjetnika Arheološkog muzeja u Splitu.¹ Od objave prvih rezultata tih istraživanja važnost otoka Palagruže i njegova arhipelaga za jadransku navigaciju tijekom povijesti sustavno se naglašava u literaturi. U vremenu modernih navigacijskih naprava i pomagala najveći jadranski svjetionik, Palagruža, koji je godine 1875. izgradila Austro-Ugarska Monarhija, tj. njezina Pomorska vlada u Trstu, sustavno podsjeća na glavnu ulogu koju je čovjek namijenio ovom otoku u povijesti, a koja je tema ovog rada. Odabir teme potaknut je zahvalnošću Branku Kiriginu, prijatelju, učitelju i kolegi, u povodu njegove obljetnice. Rad na njoj trajao je od prvog sudjelovanja u istraživanju na Palagruži, a nastavio se na brojne produktivne rasprave koje su se odvijale tijekom istraživanja na tom pučinskom otoku. Rezultat prilažem uz zahvalnost Kiri na svim konstruktivnim kritikama, kako dosadašnjim, tako i budućim.

Jadranski most i grčka jadranska navigacija

Može se ustvrditi kako je važnost Palagruže dvojaka te da ovisi o glavnim plovidbenim pravcima u pojedinim vremenskim razdobljima. Jedan aspekt proizlazi iz pozicije kao točke u maritimnom prostoru koja predstavlja vezu između srednjodalmatinskih pučinskih otoka s istočne obale Jadrana te otoka Pianosa, Tremita i poluotoka Gargano sa zapadne obale. Tako Palagruža čini dio tzv. jadranskog mosta, termina koji označava prekojadransku plovidbenu rutu pri kojoj je uvijek vidljiva barem jedna kopnena točka,² što je ključna strateška pogodnost Palagruže.³ Iskorištena je već u ranim fazama povijesti, što je potvrđeno nalazima neolitičkih *impresso* ulomaka.⁴ Skup nalaza iz vremena kasnog eneolitika/ranoga brončanoga doba pokazao je da je Palagruža za nositelje cetinske kulture nedvojbeno imala veliko navigacijsko, a vjerojatno i vjersko značenje.⁵ Na otoku nisu pronađeni

1 Kirigin 2012, str. 38-43.

2 Forenbaher, Kaiser 2016, str. 156.

3 Kirigin, Čače 1998; Forenbaher, Kaiser 1999; Kirigin *et al.* 2009; Kirigin 2013.

4 O važnosti Palagruže u vezi sa širenjem zemljoradnje sa zapadne na istočnu obalu Jadrana u 6. tisućljeću pr. Kr. vidi Forenbaher 1999, str. 525-528; Forenbaher 2009, str. 235-237.

5 Forenbaher 2009, str. 238.

Introduction

After the first reports on archaeological finds from the island in 1876 by Carlo de Marchesetti and Richard F. Burton, Vela Palagruža only became the scientific interest from 1992 to 2012. During this period, systematic research was conducted under the leadership of Branko Kirigin, an Senior research fellow at the Archaeological Museum in Split.¹ Since the publication of the first results of this research, the importance of the island of Palagruža and its archipelago to Adriatic navigation over the course of history has been systematically emphasized in the relevant literature. In a time of modern navigational devices, the largest Adriatic lighthouse at Palagruža, which was constructed in 1875 by the Austro-Hungarian Monarchy (i.e., its Maritime Authority in Trieste), systematically recalls the primary role assigned to this island by men throughout history, which is the topic of this paper. The selection of the topic was driven by gratitude to Branko Kirigin, a friend, teacher and colleague, on the occasion of his anniversary. Work on it began during initial participation in research on Palagruža, and continued on numerous productive debates which took part during the course of research on this offshore island. I present the result with gratitude to Kiro for all of his constructive criticism, both now and in the future.

The Adriatic bridge and Greek navigation on the Adriatic

It may be said that Palagruža has dual importance, and that it has depended on the primary navigation routes in different periods of history. One aspect ensues from its position as a point in the maritime space which constitutes a link between the offshore central Dalmatian islands and the eastern shore of the Adriatic with the islands of Pianosa, the Tremiti and the Gargano Promontory on its western shore. Palagruža therefore constitutes a part of the so-called Adriatic bridge, a term denoting the trans-Adriatic route on which at least one mainland point is always visible,² which is the key strategic advantage of Palagruža.³ This fact had been exploited in the earliest phases of history, as confirmed by finds of Neolithic Impressed Ware potsherds.⁴ A set of finds from the late

1 Kirigin 2012, pp. 38-43.

2 Forenbaher, Kaiser 2016, p. 156.

3 Kirigin, Čače 1998; Forenbaher, Kaiser 1999; Kirigin *et al.* 2009; Kirigin 2013.

4 On the importance of Palagruža tied to the spread of agriculture on the western and eastern Adriatic shores in the 6th millennium BC, see Forenbaher 1999, pp. 525-528; Forenbaher 2009, pp. 235-237.

materijalni ostaci iz vremena između tih dvaju razdoblja posjeta Palagruži kao ni iz dugog razdoblja nakon ranobrončanodobne faze. Kako arheološki nalazi s obje jadranske obale dokazuju kontinuirane prekojadranske kontakte, važnost Palagruže kao pomorskog orijentira u prekojadranskoj navigaciji i tada je bila velika, no očito se na otoku pomorci, iz nama nepoznatih razloga, nisu zaustavljali.

Palagruža dobiva bitno drugačiju ulogu u arhaiskom i klasičnom razdoblju, kada se u Jadranu intenzivira dužjadranska plovidba grčkih trgovačkih brodova prema sjevernojadranskim trgovačkim središtima, Adriji i Spini.⁶ Tragovi grčkih posjeta Palagruži i prinošenja žrtava Diomedu od kasnog 6. st. pr. Kr. posvjedočeni su brojnim nalazima iz slojeva uništenog svetišta na lokalitetu Salamandrija.⁷ Među njima su osobito informativni grafiti na posudama koji pokazuju grčko porijeklo dedikanata.⁸ Njihovo je čitanje omogućilo tumačenje povećanja važnosti otoka za plovidbu Jadranom u arhaiskom razdoblju, kada je postao ključnom orijentacijskom točkom u dugoj i važnoj pomorskoj ruti prema delti rijeke Pada, za koju znamo da je bila bitna u mikenskom razdoblju.⁹

Na osnovi interpretacije arheoloških nalaza možemo ustvrditi kako, nakon ranoga brončanog doba, Palagružu od 4. st. pr. Kr. ponovno posjećuju pomorci i na prekojadranskoj ruti, i to kako bi častili Diomeda.¹⁰ Prema poznatim nalazima čini se kako su ti posjeti trajali otprilike do 1. st. po. Kr.¹¹ Ipak, s obzirom na izostanak latinskih grafiti na posudama ostavljenima u svetištu, način njegova funkcioniranja u posljednjoj fazi još uvijek nije jasan.¹² Nakon toga opada intenzitet posjeta Palagruži, o čemu govori gotovo potpun izostanak nalaza iz 2. i 3. st. po. Kr. iz konteksta vezanih uz svetište.

Rimsko kapitaliziranje strateške važnosti Palagruže

Arheološkim je istraživanjima utvrđeno kako je na Veloj Palagruži u vrijeme kasne antike, vjerojatno krajem 4. stoljeća,¹³ izgrađen veći zidani objekt

Eneolithic/early Bronze Age has shown that Palagruža had undoubtedly great navigational, and possibly also religious, significance for the people of the Cetina culture group.⁵ No remains from the time between these two periods of visits to Palagruža have been found, nor from the long period after the early Bronze Age phase. Since archaeological finds from both sides of the Adriatic prove the continuity of trans-Adriatic contacts, the importance of Palagruža as a maritime orientation point in trans-Adriatic navigation was considerable even then, but it is apparent that sailors - for reasons unknown to us - did not stop on the island itself.

Palagruža acquired a significantly different role in the Archaic and Classical eras, when long-distance navigation by Greek merchant vessels toward the northern Adriatic emporia hubs of Adria and Spina intensified.⁶ The traces of Greek visits to Palagruža and the placement of offerings to Diomedes from the late 6th century BC are attested in numerous finds from layers of the devastated sanctuary at the Salamandrija site.⁷ These include the particularly informative graffiti on vessels, that show the Greek origin of the dedicants.⁸ The reading enabled the interpretation of the increase of importance of the island to navigation on the Adriatic in the Archaic period, when it became a crucial orientation point on the long and vital navigation route toward the Po River delta, which we know was important in the Mycenaean period.⁹

Based on an interpretation of archaeological finds, it may be stated that after the early Bronze Age, Palagruža was once more visited by sailors on the trans-Adriatic route as of the 4th century BC, so that they could pay tribute to Diomedes.¹⁰ Based on the finds, it would appear that these visits endured until at least the 1st century AD.¹¹ Even so, given the absence of graffiti in latin language on the pottery left at the sanctuary, its function in that final phase is still not entirely clear.¹² Thereafter the intensity of visits to Palagruža waned, as indicated by the almost complete lack of finds from the 2nd and 3rd centuries AD in contexts tied to the sanctuary.

6 Kirigin 2012, str. 54-55.

7 Kirigin, Čače 1998; Kirigin *et al.* 2009; Kirigin *et al.* 2010a; Miše 2017.

8 Kirigin *et al.* 2009, str. 141.

9 Kirigin *et al.* 2009, str. 150; Kirigin 2012, str. 53.

10 Bonačić Mandinić 2013, str. 368-371; Miše 2015.

11 Miše, Šešelj 2008, str. 113-119.

12 Kirigin 2012, str. 71.

13 Izrazita većina nalaza iz terenskog pregleda koji je prethodio iskopavanju te onih iz sačuvanih stratigrafskih cjelina iz vremena života utvrde pripadaju razdoblju prve tri četvrtine 5. stoljeća. Vidi kod Hayes 1994,

5 Forenbaher 2009, p. 238.

6 Kirigin 2012, pp. 54-55.

7 Kirigin, Čače 1998; Kirigin *et al.* 2009; Kirigin *et al.* 2010a; Miše 2017.

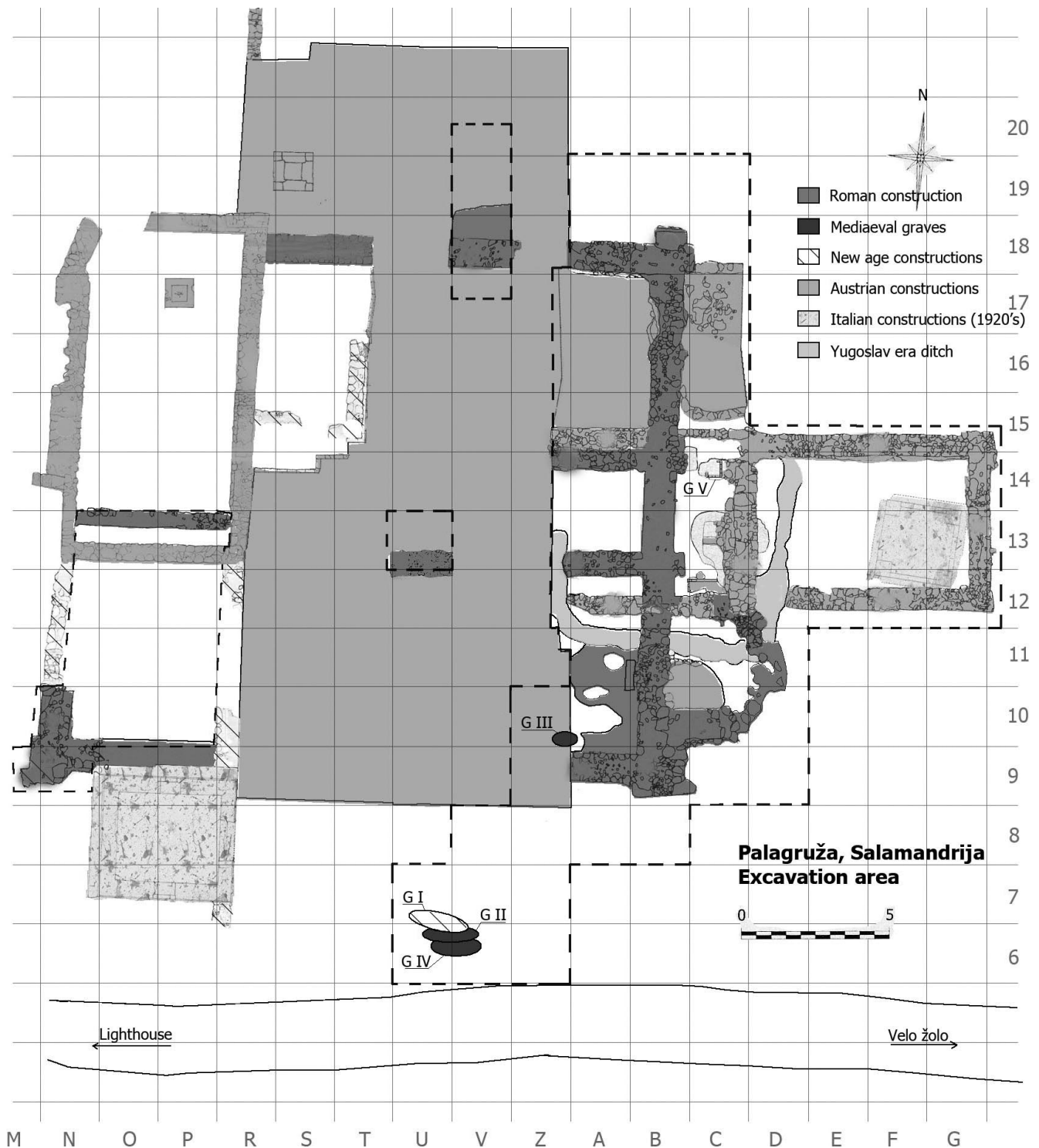
8 Kirigin *et al.* 2009, p. 141.

9 Kirigin *et al.* 2009, p. 150; Kirigin 2012, p. 53.

10 Bonačić Mandinić 2013, pp. 368-371; Miše 2015.

11 Miše, Šešelj 2008, pp. 113-119.

12 Kirigin 2012, p. 71.



Sl. 1. Situacijski nacrt Salamandrije (prema terenskoj dokumentaciji Palagruža - AMS izradio V. Barbarić)
 Fig. 1. Layout sketch of Salamandrija (based on AMS Palagruža field documentation by V. Barbarić)

str. 544; Kirigin 1994, str. 430-431. U internom izvješčaju Projekta *Jadranski otoci* za lončariju s Palagruže John Hayes kaže (između ostalog): "... surface finds show a particular concentration of pottery from the later 4th century A.D. until the end of the 5th century", i dalje: "Specifically 6th-century types are absent, indicating a terminal date around A.D. 470-500."

The Roman capitalization of Palagruža’s strategic importance

Archaeological research has confirmed that a large building was built on the Salamandrija plateau on Vela Palagruža in Late Antiquity, probably at the

na zaravni Salamandrija. U okviru aktivnosti koje su prethodile gradnji, s tog je mjesta uklonjen kompletan sediment i postojeće zidane strukture. Njihovo je postojanje dokumentirano tek izmještenim ostacima građevinskog materijala i krovnog crijepa koji pripadaju slojevima pripreme terena za rimsku gradnju, dok su ostaci svih starijih slojeva deponirani niz dvije padine.¹⁴ Nakon temeljite pripreme terena, koja je uključila i mjestimično ravnjanje geološke podloge, tehnikom *opus incertum* izgrađen je objekt oblika nepravilnog pravokutnika-paralelograma, dimenzija oko 21 x 19 m (sl. 1). Vanjski su zidovi ujednačene debljine od 90 cm, a na trima je istraženim uglovima konstrukcija pojačana križnim kontraforima u širini vanjskih zidova.¹⁵ Kako lokalitet još uvijek nije u potpunosti istražen, unutrašnja je organizacija objekta tek dijelom poznata. U njegovom sjeverozapadnom kutu gotovo je sigurno postojala cisterna.¹⁶ U istočnom je dijelu objekta dokumentirana unutrašnja podjela na tri prostorije, čija dužina prema zapadu još nije utvrđena. Na istočnom su vanjskom zidnom plaštu u pravcima pružanja unutrašnjih pregradnih zidova dozidane plitke lezene-kontrafori. Ulaz za sada nije pronađen, no orijentacija objekta i konfiguracija terena ukazuje na njegovu moguću poziciju s južne strane, na mjestu gdje se počinje spuštati staza prema Velom žolu, koji je jedna od dviju pristupnih točaka na otoku. Naknadno je na istočnom zidu utvrde uz jugoistočni ugao dograđena apsida širine 3 m te je obližnji kontrafor ojačan i pretvoren u kvadratni.¹⁷ Točno vrijeme te dogradnje iskopavanjem i interpretacijom nalaza nije nedvojbeno utvrđeno. Danas su istraženi zidovi većeg dijela utvrde očuvani tek u prvom redu kamena ili kao otisak žbuke na živcu, dok su dijelovi sjevernog vanjskog zida sačuvani do najveće visine od oko 1 m.

Obradeni površinski nalazi s otoka te nalazi iz malog broja istraženih neporemećenih stratigrafskih

end of the 4th century.¹³ As a part of the activities that preceded this construction, the entire sediment and existing masoned structures were removed from that location. Their existence was documented only by the displaced remains of construction materials and roof tiles which were found in the layers formed by preparation of the terrain for Roman construction, while the remains of all of the older materials were deposited down two slopes.¹⁴ After a thorough preparation of the terrain, which included the occasional levelling of the geological base, the building, shaped like an irregular rectangular/parallelogram with dimensions of roughly 21 x 19 m (Fig. 1), was built using the *opus incertum* technique. The external walls had a uniform thickness of 90 cm, and on the three excavated corners the construction was reinforced by angled buttresses at the width of the external walls.¹⁵ Since the site has still not been completely excavated, the building's internal organization has only been partially ascertained. A cistern was almost certainly situated in its north-west corner.¹⁶ Three rooms were documented in the building's eastern section, although their westward length has not yet been ascertained. Shallow pilaster-strips/butresses were added onto the eastern external wall surface in the directions at which the partition walls extend. An entrance has not yet been found, but the building's orientation and the configuration of the terrain indicate a possible location for it on the southern side, at a place where the path begins to descend toward Velo žolo, which is one of the two access points to the island. A 3 m wide apse was subsequently built onto the eastern wall of the fortification, near to its southeastern corner, and the nearby buttress was reinforced and transformed into the clasping buttress.¹⁷ The precise time of this additional

14 Kirigin *et al.* 2010a, str. 78.

15 Sjeverozapadni ugao još uvijek nije istražen.

16 Kirigin 2012, str. 93.

17 Prilikom pripreme završnog izvješća za razdoblje 1992.-2012. pregledom terenske dokumentacije utvrđene su razlike u gradnji koje su primijećene prilikom posljednjih terenskih kampanja, pa je revidiran zaključak koji je neizravno upućivao na činjenicu da je apsida dio izvorne gradnje, naveden kod Kirigin *et al.* 2010a, str. 71, 86. Razlika u zidanju u odnosu na izvornu gradnju teško je primjetna, a sastoji se u debljini zida (100 cm u odnosu na izvornih 90 cm), malom udjelu smrvljene opeke u žbuci unutar ispune zida (kod dograđenog dijela) te činjenici da je u strukturi apside sačuvan otisak lica mozaika koji je bio dio izvorne opreme utvrde (kako pokazuju rezultati istraživanja). Bit će uskoro objavljen (Miše *et al.*, u pripremi).

13 A notable majority of the finds from the field surveys that preceded excavations and those from preserved stratigraphic units from the period of the fort's life date from the first three quarters of the 5th century. See in Hayes 1994, p. 544; Kirigin 1994, pp. 430-431. In the internal report of the Adriatic Islands Project, John Hayes said (among other things) about the pottery from Palagruža: "...surface finds show a particular concentration of pottery from the later 4th century A.D. until the end of the 5th century," and furthermore: "Specifically 6th-century types are absent, indicating a terminal date around A.D. 470-500."

14 Kirigin *et al.* 2010a, p. 78.

15 The north-western corner has still not been excavated.

16 Kirigin 2012, p. 93.

17 During preparations for the final report for the 1992-2012 period, differences in construction observed during the final field excavations were noted after an inspection of the field documentation, so the conclusion according to which the apse was part of the original building, cited



Sl. 2. Dužjadranske plovidbene rute i smjerovi plovidbe. Područje vidljivosti golim okom oko Palagruže označeno je sivim krugom (prema Kirigin et al. 2009, str. 150, sl. 7, T. 3.; doradio V. Barbarić)

Fig. 2. Adriatic long-distance sailing routes and directions (according Kirigin et al. 2009, str. 150, Fig. 7, Pl. 3. highlighting by V. Barbarić)

cjelina nastalih za vrijeme života utvrde pokazuju da se njezina gradnja poklapa s vremenom uzdizanja Ravenne do statusa prijestolnice i porasta važnosti njezine luke Classe, krajem 4. i početkom 5. stoljeća. Kako su cestovne komunikacije toga vremena bile više ili manje kontinuirano ugrožene, tako je pomorska magistrala koja je povezivala trgovišta i središta moći Zapadnog i Istočnog Carstva postala najživljom komunikacijskom rutom 5. stoljeća.¹⁸ O povezanosti

construction has not been unambiguously determined by excavation and the interpretation of finds. Today

in Kirigin *et al.* 2010a, pp. 71, 86, was revised. The difference in the masonry in comparison to the original construction is difficult to notice, and it consists of the thickness of the wall (100 cm in comparison to the original 90 cm), the small share of crushed brick within the plaster of the wall (in added parts) and the fact that an imprint of a face of the mosaic that was part of the original furnishings of the fort was preserved in the structure of the apse (as shown by the results of research). It will be published soon (Miše *et al.*, in press).

18 Goldstein 1992, str. 30. Jasno je da uzroke premještanja prijestolnice Zapadnoga Rimskoga Carstva u Ravennu

rastuće važnosti Palagruže s usponom Ravenne svjedoči i skup nalaza sa Salamandrije koji sadrži tipove lončarije karakteristične upravo za luku Classe 5. stoljeća.¹⁹ Ona svakako proizlazi iz potrebe osiguravanja sigurnosti intenzivnog pomorskog prometa koji je sjeverni Jadran povezivao sa središtima Istočnoga Carstva, ali i drugim područjima Mediterana, osobito sjevernoafričkim provincijama. Pritom ulogu objekta na Palagruži treba promatrati kroz prizmu vizualne kontrole i prenošenja informacija o stanju plovidbe, eventualno vremenske prognoze te, nedvojbeno, signalizacije, u ulozi svjetionika.²⁰ Položaj Palagruže u prometu prema luci Classe značajan je stoga što je ona orijentir na završetku dionice puta koja, slijedeći povoljne struje, ulazi u Jadran te kod Palagruže skreće prema Garganu ili pak nastavlja prema Sušcu i Svecu s vanjske strane istočnojadranskih otoka. S druge strane, Palagruža predstavlja navigacijsku točku na polovici rute iz Classe prema Otrantu, koja slijedi povoljne morske struje duž italske obale te nakon Gargana skreće prema Palagruži i otvorenome moru²¹ (sl. 2). Tom je rutom vjerojatno plovila Gala Placidija s pratnjom u proljeće 423., prije početka sigurnije plovidbene sezone, kada ju je zahvatila oluja dok je bježala iz Ravene u Konstantinopol.²² Još preciznije o trajanju plovidbe svjedoči podatak da je Stilihon u travnju 397. s velikom vojskom od Ravenne do Korinške prevlake doplovio za otprilike šest dana, što svakako podrazumijeva plovidbu bez zaustavljanja, uključujući i noćne dionice.²³

Nasuprot tezama prema kojima pojedini autori plovidbene rute prema sjeverozapadu i Ravenni vide isključivo uz istočnu obalu Jadrana, bez noćne

the excavated walls of most of the fortification have been primarily preserved as individual layers of stone or as imprints of plaster on the bedrock, while its northern external wall has been preserved to a maximum height of approximately 1 m.

The analysed surface finds from the island and the finds from the small number of excavated, undisturbed stratigraphic units formed during the fortification's life show that its construction corresponds to the time of the end of the 4th and the beginning of the 5th centuries, when Ravenna was elevated to the status of capital and its port Classe was growing in importance at the end of the 4th and the beginning of the 5th centuries. Since overland (road) communications of that time were more or less continually under threat, the maritime highway which linked emporia and the centres of power in the Western and Eastern Empires thus became the most vigorous communication route in the 5th century.¹⁸ A set of finds from Salamandrija also testify to the link between the growing importance of Palagruža and the rise of Ravenna, as it contains pottery types typical of the port of Classe in the 5th century.¹⁹ This importance certainly arose from the need to secure the safety of intense maritime traffic which linked the northern Adriatic with the centres of the Eastern Empire, but also with other areas in the Mediterranean, particularly the northern African provinces. In this regard, the building on Palagruža should be observed through the role of visual surveillance and transmission of information on the status of navigation, possibly weather forecasts and, undoubtedly, signalling, in the role of a lighthouse.²⁰ The position of Palagruža in traffic heading toward the port of Classe was significant, because it was a point of orientation at the end of one leg of a voyage which, following favourable currents, enters the Adriatic and turns at Palagruža toward Gargano or continues toward Sušac and Svetac from the external side of the eastern Adriatic islands. On the other hand, Palagruža is the navigational point half-way along the route from

402. treba, uz obrambene razloge, promatrati i u svjetlu važnosti luke Classe u toj ključnoj komunikacijskoj ruti.

19 Skup nalaza s Palagruže predstavlja, kako kaže Hayes (u: Kirigin 1994, str. 430): "...a conspectus of eastern and Western Mediterranean types of the period, comparable (on a smaller scale) to the 5th Century finds from Classe (Ravenna)", te također (Hayes 1994, str. 544) kako Palagruža: "...provides a crucial link between Mediterranean at large and the finds from Classe, supplying examples of exactly the same types of pottery."

20 Kirigin 2012, str. 90-95.

21 Kirigin *et al.* 2009, str. 150, sl. 7, tab. 3; u radu je elaborirana shema orijentacije pri noćnoj plovidbi (143-144), što u većem dijelu dotadašnje literature nije bilo prihvaćeno.

22 Salisbury 2015, str. 133.

23 Salisbury 2015, str. 43-44. Taj podatak bi značio da je flota na putu dugom 650 nm plovila prosječnom brzinom od 4,5 čvorova. Također, ne precizira se jesu li za transport korišteni trgovački ili vojni brodovi.

18 Goldstein 1992, p. 30. It is clear that the causes for the transfer of the seat of the Western Roman Empire to Ravenna in 402 should, besides the defensive reasons, also be viewed in light of the importance of the port of Classe along this key communication route.

19 The set of finds from Palagruža constitutes, as noted by Hayes (in: Kirigin 1994, p. 430): "... a conspectus of Eastern and Western Mediterranean types of the period, comparable (on a smaller scale) to the 5th century finds from Classe (Ravenna)," and also (Hayes 1994, p. 544) that Palagruža: "...provides a crucial link between the Mediterranean at large and the finds from Classe, supplying examples of exactly the same types of pottery."

20 Kirigin 2012, pp. 90-95.

plovidbe,²⁴ ovakva interpretacija dužjadranske navigacije jasno pokazuje potrebu za postojanjem svjetlosne signalizacije na Palagruži.²⁵ S obzirom na rekonstrukciju plovidbenog kalendara u antici, valja pretpostaviti mogućnost da je objekt na Palagruži bio u funkciji samo u sezoni plovidbe, od svibnja do listopada, dok je u drugoj polovici godine bio izvan uporabe, tj. bez posade. Naime, noćna signalizacija u prekojadranskoj plovidbi nije neophodna jer je ta plovidba vremenski kraća te je najdužu dionicu moguće prepliviti tijekom dužeg dana.

Dakle, možemo zaključiti kako komunikacijska uloga utvrde na Palagruži višestruko nadilazi onu defenzivnu, što se vidi i u njezinoj morfologiji koja ne odgovara zahtjevima koji bi se postavili pred utvrdu koja bi se trebala samostalno braniti od eventualnih napada i organizirane opsade većih vojnih jedinica. Nadalje, s obzirom na veličinu,²⁶ ali i uvjete života na otoku, ona nikako nije mogla biti trajno boravište mnogobrojnije posade. O nemogućnosti sigurnog sidrenja i držanja brodova na Palagruži već je dosta rečeno u citiranim radovima, pa svakako treba otpisati percepciju otoka kao mjesta odakle bi bilo moguće fizički kontrolirati brodove koji su prolazili kraj otoka. Iznimno je malo podataka dostupno o funkcioniranju objekata koji su mogli imati dvojaku svrhu, utvrde i svjetionika, poput one koju spominje Rutilije Klaudije Namacijan u blizini Populonije, u opisu svojeg putovanja 416. godine.²⁷ Istu ulogu možemo pretpostaviti i za niz položaja na vanjskom putu uz otoke istočne obale Jadrana. Takva teza može se dokazati isključivo stratigrafskim istraživanjima na ključnim lokacijama, a ona su do sada rijetko provedena.

Classe to Otranto, which follows favourable marine currents along the Italian coast and turns toward Palagruža and the open sea after Gargano²¹ (Fig. 2). Galla Placidia and her entourage probably sailed down this route in the spring of 423, prior to the beginning of the safer sailing season, when she fled from Ravenna to Constantinople²² and when she was caught in a storm. Even more precise information on the duration of the voyage can be found in the note that in April 397 Stilicho and a large army travelled from Ravenna to the Corinthian isthmus in about six days, which certainly implies sailing without stopovers, even at night.²³

As opposed to the views of individual scholars that navigation routes toward the north-west and Ravenna ran exclusively along the eastern shore of the Adriatic, without night-time sailing,²⁴ such this interpretation of Adriatic long-distance navigation clearly demonstrates the need for the existence of light signalling on Palagruža.²⁵ Given the reconstruction of the navigation calendar in Antiquity, one could assume that the lighthouse on Palagruža only functioned during the sailing season, from May to October, while in the other half of the year it was not in use, i.e., not staffed. Night signalling in trans-Adriatic navigation was not essential, because this route is shorter and its longest leg could be traversed during a longer day.

We may therefore conclude that the communication role played by the fort on Palagruža far outweighed its defensive purpose, which is also reflected in its morphology, as it does not comply with the requirements set before a fort that should independently defend against potential attacks and organized sieges by large military contingents. Furthermore, given its size,²⁶ but also the living conditions on the island, it

24 Prometnost tih ruta temeljito je potkrijepljena arheološkim dokazima, no to ih nikako ne čini jedinim rutama prema Ravenni. Vidi Brusić 1993, str. 224-225; Kozličić 2012, str. 17; Gluščević, Grosman 2015, str. 122.

25 Kirigin 2009, str. 150.

26 Prema tipologiji rimskih utvrda koju je, na osnovi pisanih izvora, prethodnih klasifikacija i arheoloških istraživanja predložio Bajenaru (Bajenaru 2010, str. 52, 55-57), ovaj objekt spada u tip manjih utvrda-kula (*turris, burgus*). Njihova je glavna uloga bila komunikacijska, kako na dunavskom limesu, tako, primjerice, i na rubu Sahare ili na otocima istočne obale Jadrana.

27 Namacijan u svojoj poemi opisuje putovanje između Rima i Galije koje je morao poduzeti morskim putem upravo zbog posljedica gotskog razaranja i uništenih cesta, što dočarava vrijeme i opće okolnosti u kojima i Palagruža dobiva na važnosti. Tekst engleskog prijevoda izvornika *Rutilius Namatianus, De Redito suo* dostupan na http://penelope.uchicago.edu/Thayer/e/roman/texts/rutilius_namatianus/text*.html (pristupljeno 23. 6. 2017.).

21 Kirigin *et al.* 2009, p. 150, Fig. 7, Tab. 3; an orientation model for night-time navigation was elaborated in the work (143-144), which had not been accepted in the majority of previous literature.

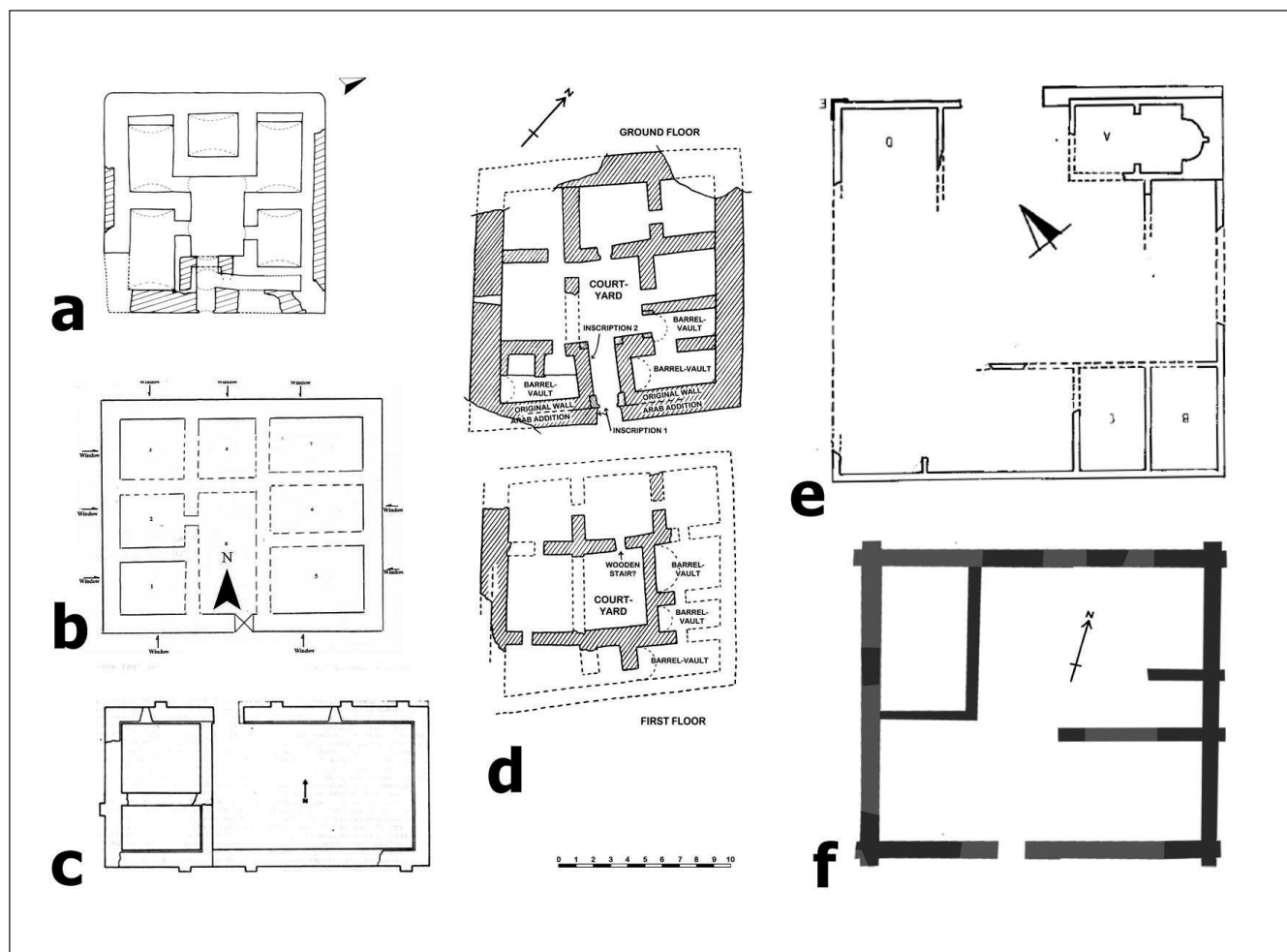
22 Salisbury 2015, p. 133.

23 Salisbury 2015, pp. 43-44. This would mean that the fleet was travelling at an average speed of 4.5 knots on a voyage of 650 nm. Also, it was not specified whether merchant or military vessels were used for transportation.

24 The volume of traffic on these routes has been thoroughly backed by archaeological finds, but this certainly did not make them the sole routes toward Ravenna. See Brusić 1993, pp. 224-225; Kozličić 2012, p. 17; Gluščević, Grosman 2015, p. 122.

25 Kirigin 2009, p. 150.

26 According to the typology of Roman fortifications proposed by Bajenaru on the basis of written sources, previous classifications and archaeological research (Bajenaru 2010, pp. 52, 55-57), this building belongs among the type of smaller forts/towers (*turris, burgus*).



Sl. 3. Utvrde **a** - Gasr Wames (prema Mackensen 2009), **b** - Qasr Laaraija (prema Emrage 2015), **c** - Krajicino, Svetac (prema Kirigin, Milošević 1981), **d** - Gasr Wames (prema Mackensen 2009), **e** - Utrda sv. Jurja, gornja utvrda (prema Regan 2002), **f** - Palagruža (tamnije - istraženo, svjetlije - pretpostavljeno, crtež: V. Barbarić)
Fig. 3. Fortifications **a** - Gasr Wames (according Mackensen 2009), **b** - Qasr Laaraija (according Emrage 2015), **c** - Krajicino, Svetac (according Kirigin, Milošević 1981), **d** - Gasr Wames (according Mackensen 2009), **e** - St. George Fortress, upper fortification (according Regan 2002), **f** - Palagruža (darker - excavated, lighter - assumed, sketch: V. Barbarić)

Među korpusom objavljenih manjih utvrda tipa *turris* i *burgus* iz razdoblja od 3. do 6. stoljeća, za palagrušku utvrdu djelomične usporedbe nalazimo tek na dva primjera na Jadranu, a najbližnje primjere na prilično udaljenom teritoriju rimskih sjevernoafričkih provincija Tripolitanijske i Cirenaike (sl. 3). Na jadranskom prostoru morfološke sličnosti s palagruškom utvrdom tek donekle pokazuju utvrda Krajicino na Svecu i utvrda Sv. Juraj u Caskoj.²⁸ Palagruška utvrda dvostruko je veća od utvrde Krajicino, no općenite sličnosti zamjećuju se u postojanju plitkih lezena-kontrafora te cisterne unutar gabarita utvrde. Debljina zidova nešto je manja na Svecu (68-70 cm), a lezene se ne poklapaju s unutarnjim pregradnim zidovima.

certainly could not have been a permanent residence for a larger crew. The impossibility of secure anchorage and the long-term berthing of vessels at Palagruža have already been covered to a considerable degree in the above-cited works, so the perception of the island as a place whence it would be possible to physically control vessels passing by should certainly be rejected. There are exceptionally meagre data available on the functioning of the buildings which may have had dual roles, fortress and lighthouse, such as the one mentioned by Rutilius Claudius Namatianus as being near Populonia in the description of his voyage

28 Za utvrdu Krajicino: Kirigin, Milošević 1981; za utvrdu Sv. Juraj u Caskoj: Regan 2002.

Their primary role was to serve communications, as on the Danube border, so too, for example, on the edge of the Sahara or on the islands of the eastern Adriatic.

Utvrdna Sv. Juraj iznad Caske na Pagu veći je utvrđeni sklop, unutar kojega jedan dio, tzv. gornja utvrda,²⁹ pokazuje određene sličnosti s palagruškom utvrdom, ponajprije u pogledu unutarnje organizacije prostora. Ima nešto veće dimenzije, no nema kontrafore na uglovima te ima tanje vanjske zidove.³⁰ Promatrajući ukupna saznanja o tom sklopu, upitno je treba li tu tražiti sličnosti s palagruškom utvrdom.

Pri dokumentiranju morfoloških sličnosti s utvrdama na prostoru sjeverne Afrike mora se primijetiti kako su potrebe kojima su prilagođavane te manje utvrde veoma slične onima na Palagruži. Izgrađene su na rubu pustinje te predstavljaju osamljene objekte u prostoru, organizirane u sustav radi kontrole prometa ljudi i robe.³¹ S obzirom na svoju izoliranost i namjenu, izgrađene su kao samodostatne jedinice s prostorom za posadu i zalihe. Poput njih, i utvrda na Palagruži morala je biti samodostatna, što je jasno već iz usporedbe s današnjim načinom funkcioniranja svjetioničarske službe. U pogledu konstrukcije može se primijetiti da su vanjski zidovi tih utvrda redovito nešto deblji od onih na palagruškoj utvrdi, pa je kod ovih prvih naglasak na obrambenim kvalitetama objekta,³² što na Palagruži očito nije bio slučaj. Nadalje, navedeni objekti očuvani su u elevaciji, tako da imamo podatke o unutrašnjoj organizaciji gornjeg kata (Gasr Duib i Gasr Wames), ali i dodatno povišene kvadratne kule koja je stajala nad ulaznim prostorom (Gasr Wames). Vrijeme gradnje tih objekata je različito; Gasr Duib i Gasr Wames datirani su u sredinu 3. stoljeća,³³ dok za dva navedena primjera iz Cirenaike, Qasr al-Mistashi i Qasr Laaraija, autor kao pretpostavljeno vrijeme gradnje navodi 5. stoljeće.³⁴

Promatrajući do sada poznate elemente tlocrta palagruške utvrde, može se utvrditi da je, s obzirom na gabarite, morala postojati unutrašnja podjela prostora koja bi uključivala nekakvo unutrašnje dvorište, kako je vidljivo i na navedenim primjerima. Takvo je dvorište moglo biti korišteno i za impluvij, bazen za filtraciju vode prikupljene putem krovništa pokrivenog crijepom,³⁵ iz kojeg je voda otjecala u cisternu. Moguće je da je manji pravokutni prostor uz istočni zid

in 416.²⁷ The same role may be assumed for a series of positions on the external side of the islands of the eastern Adriatic. Such a theory may only be proven by stratigraphic research at key sites, but thus far such research has been only rarely conducted.

Among the group of published small forts of *turris* and *burgus* type from the 3rd to 6th centuries, partial comparisons to the Palagruža fort can only be found in two examples on the Adriatic, while the most similar examples are found at the rather distant territories of the Roman northern African provinces of Tripolitania and Cyrenaica (Fig. 3). In the Adriatic area, morphological similarities to the Palagruža fort were only found to some degree in the Krajicino fort on the island of Svetac and St. George's fort in Caska.²⁸ The Palagruža fortification is twice as large as Krajicino, but the general similarities can be observed in the existence of shallow pilaster-strips/buttresses and the existence of the cistern inside the fort. The thickness of the walls was somewhat smaller on Svetac (68-70 cm), and the pilaster-strips do not correspond with partition walls. The fort of Sveti Juraj above Caska on the island of Pag is a larger fortified complex, within which one part, the so-called upper fort,²⁹ exhibits certain similarities to the one on Palagruža, mostly in the sense of the internal organization of space. It has somewhat larger dimensions, but no buttresses on the corners, and thinner external walls.³⁰ Considering the overall body of knowledge on this complex, there is some question as to whether similarities with the Palagruža fort should be sought.

When documenting the morphological similarities to the fort from northern Africa, it must be noted that the needs to which these smaller forts were adapted were rather similar to those on Palagruža. They were built at the edge of a desert as isolated forts, organized within the system for the control of the traffic of people and goods.³¹ Given their isolation and purpose,

29 Regan 2002, str. 143-144.

30 Regan 2002, str. 146.

31 U Tripolitaciji Gasr Duib i Gasr Wames, vidi u Mackensen 2009; u Cirenaici nekoliko primjera kod Emrage 2015, no posebno Qasr al-Mistashi i Qasr Laaraija.

32 Gasr Duib ima vanjske zidove debljine 150-165 cm, Gasr Wames 140 cm, a Qasr al-Mistashi 105 cm, dok su zidovi utvrde na Palagruži debljine 90 cm.

33 Mackensen 2009, str. 76, 96.

34 Emrage 2015, str. 213.

35 Ostaci krovnog crijepa zastupljeni su u svim slojevima nastalim nakon propadanja utvrde.

27 In his poem, Namantianus described his voyage between Rome and Gallia which he had to take by sea because of the results of Gothic destruction and devastated roads, which evokes the time and general circumstances in which Palagruža also gained importance. The text of the English translation of the original *Rutilius Namatianus, De Reditosuo* is available at http://penelope.uchicago.edu/Thayer/e/roman/texts/rutilius_namatianus/text*.html (accessed 23 June 2017).

28 On the Krajicino fort: Kirigin, Milošević 1981; for the fort of Sveti Juraj in Caska: Regan 2002.

29 Regan 2002, pp. 143-144.

30 Regan 2002, p. 146.

31 In Tripolitania, Gasr Duib and Gasr Wames, see Mackensen 2009; in Cyrenaica several examples in Emrage 2015, but especially Qasr al-Mistashi and Qasr Laarai.

današnje cisterne bio mjesto gdje je bio takav impluvij. Iskopavanjem su pronađeni i tragovi kuhinjskog prostora,³⁶ za koji je opravdano pretpostaviti kako je iz praktičnih razloga bio presvođen. Dvije lezene koje su dokumentirane s vanjske strane tog prostora na istočnom zidu, u kombinaciji s unutrašnjim zidovima s kojima su usklađene predstavljaju čvrstu bazu nad kojom je mogla biti podignuta zidna masa i prostori prvoga kata, a možda i nekakva kula kakvu vidimo na primjeru Gasr Wames. Zidovi palagruške utvrde svakako su bili odgovarajuće debljine kako bi nosili konstrukciju gornjeg kata podignutog nad svodovima, kao što je to dokumentirano na spomenutim sjevernoafričkim primjerima. Kako vidimo na primjeru Gasr Duib i Gasr Wames, ondje je prvi kat također bio presvođen, a nad njim je bio ravni krov. U našem slučaju takav je krov gotovo sigurno bio natkriven drvenom konstrukcijom s krovnim crijepom zbog sakupljanja kišnice o kojoj je, između ostalog, ovisio boravak ljudi na otoku.

Svjetlosna signalizacija

Uza sve navedene usporedbe, još uvijek nismo blizu detaljnijih saznanja o načinu funkcioniranja svjetlosne signalizacije na Palagruži. O antičkim svjetionicima uglavnom se pisalo na osnovi sakupljenih podataka iz pisanih izvora, epigrafskih spomenika, pojedinih primjeraka skulpture, prikaza na novcu te nekoliko očuvanih objekata, no saznanja koja su sakupljena uglavnom se odnose na primjere dobro poznate još u antici.³⁷ Utvrda na Palagruži u tom je pogledu iznimka, jer su vršena arheološka istraživanja, ali ipak bez rezultata koji bi donijeli dublja saznanja o svjetlosnoj signalizaciji. Nadalje, današnji svjetionik izgrađen je na najvišoj točki otoka, a hrbat koji se prema njemu uzdiže predstavlja vizualnu prepreku za dobar dio vidokruga sa Salamandrije ka zapadu, pa stoga ona, na prvi pogled, ne predstavlja idealan položaj za svjetlosnu signalizaciju. No uzmemo li u obzir pretpostavljene plovidbene rute (vidi gore), ta činjenica uopće ne mora biti presudna za položaj svjetionika jer su brodovi svjetlo s Palagruže tražili na obzoru dolazeći s jugoistoka, iz pravca Gargana ili pak s jugozapada, slijedeći struje koje ih vode u Jadran. Također, s obzirom na informacije o zahtjevnosti radova koji su morali biti poduzeti prilikom gradnje današnjeg svjetionika (uključujući i miniranje)³⁸ te lakšu dostupnost Salamandrije, rimski odabir Salamandrije za gradnju utvrde-svjetionika možda je bio posve logičan.

they were built as self-sufficient units with space for a staff and supplies. Like them, the fort on Palagruža also had to be self-sufficient, which is clear simply by comparison with the modern manner in which the lighthouse service functions. In terms of construction, it may be noted that the external walls of these forts were regularly somewhat thicker than those on the Palagruža fort, so the emphasis on the former buildings was placed on defensive qualities,³² which was obviously not the case at Palagruža. Furthermore, these buildings were preserved in elevation as well, so we have data on the internal organisation of their upper levels (Gasr Duib and Gasr Wames), as well as the additionally elevated square towers that stood above the entrance (Gasr Wames). These forts were built at different times; Gasr Duib and Gasr Wames have been dated to the mid-3rd century,³³ while a construction time in the 5th century has been assumed for the two aforementioned examples from Cyrenaica, Qasr al-Mistashi and Qasr Laaraija.³⁴

Considering the thus far known elements of the floor-plan of the Palagruža fort, it may be asserted that, given the dimensions, there had to have been an internal arrangement of the space that would have included some form of courtyard, as seen in the aforementioned examples. Such a courtyard could have also been used as an impluvium, a basin to filter rainwater collected from the tiled roof,³⁵ from which the water then flowed into a cistern. It is possible that the small rectangular space next to the eastern wall of the current cistern was a place where such an impluvium existed. Excavations also uncovered the traces of a kitchen space,³⁶ for which there are justifiable reasons to assume that it had been vaulted. The two pilaster-strips that were documented on the external side of this area on the eastern wall, in combination with the internal walls with which they were aligned, constitute a firm base on which a wall and the rooms on the first floor could be raised, as well as a possible tower as seen in the example of Gasr Wames. The walls of the Palagruža fort were certainly of the requisite thickness to bear the structure of an upper floor raised on vaults, as documented at the aforementioned northern African examples. As seen in the examples of Gasr Duib and Gasr Wames, the first floors

36 Kirigin *et al.* 2004, str. 209, sl. 2.

37 Vidi kod Giardina 2005; Giardina 2012.

38 Kirigin 2012, str. 123.

32 Gasr Duib has external walls that are 150-165 cm thick, those of Gasr Wames are 140 cm, while those of Qasr al-Mistashi are 105 cm; the walls of the fort on Palagruža are 90 cm thick.

33 Mackensen 2009, pp. 76, 96.

34 Emrage 2015, p. 213.

35 The remains of roof tiles were present in all layers that accumulated after the fort's deterioration.

36 Kirigin *et al.* 2004, p. 209, Fig. 2.

Pitanje goriva koje je korišteno, tipova izvora svjetla i ranih oblika optičkih naprava još je daleko od rješenja. U radovima koji govore o svjetionicima u antici drvo se redovito navodi kao gorivi materijal za svjetlosnu signalizaciju.³⁹ Ipak, za potrebe svjetlosne signalizacije u upotrebi su bila i drugačija goriva, od kojih se u literaturi spominju smola, riblje ulje i biljna ulja.⁴⁰

U antici su postojala strukturirana znanja o upotrebi sustava zrcala, tzv. katoptra.⁴¹ Stoga je opravdano pretpostaviti da je 5. stoljeće poznavalo načine fokusiranja i emitiranja svjetlosti na veću udaljenost te da je upotreba uljanica (u odgovarajućem broju i veličini) u kombinaciji sa sfernim zrcalima u ostakljenom, zatvorenom prostoru mogla pojačati svjetlosni tok do odgovarajuće snage za potrebe signalizacije.⁴² Kako bismo pokušali procijeniti doseg takvih uređaja, potrebno je utvrditi nekoliko vrijednosti.⁴³ Prvo pitanje koje smo sebi postavili jest: kolika treba biti jakost izvora svjetlosti u idealnim uvjetima noću da bi se vidjela s udaljenosti od 22 nm?⁴⁴ Preuzeli smo vrijednost udaljenosti na kojoj je vidljiva svjetlost jedne svijeće po noći (svjetlosna jakost 1 cd) u idealnim uvjetima, koja prema mjerenjima Krisciunasa i Karone iznosi 2576 m.⁴⁵ Sukladno odgovarajućem izračunu⁴⁶ dobili

were also vaulted, while above them there was a flat roof. In the Palagruža case, such a roof would have almost certainly been covered by a wooden structure with roof tiles in order to collect rainwater upon which, among other things, the residence of people on the island would depend.

Light signalization

Even with all of the comparisons above, we are still not close to any more detailed knowledge on the functioning of the light signalization from Palagruža. Knowledge on ancient lighthouses was generally based on data gathered from written sources, epigraphic monuments, individual examples of sculpture, depictions on coins and several preserved buildings, but the information so gathered mostly pertains to examples already well known in Antiquity.³⁷ The fort on Palagruža is an exception in this regard, because archaeological research has been conducted, but nonetheless without results that could yield some deeper knowledge on the light signalization used. Furthermore, the current lighthouse was built on the island's highest point, and the ridge that ascends toward it constitutes a visual barrier for a goodly portion of the westward view from Salamandrija, so at first glance it does not seem to be an ideal position for light signalization. If the assumed navigation routes (see above) are taken into consideration, this fact does not need to be at all crucial to the position of the lighthouse, because vessels sought the light from Palagruža on the horizon coming from the south-west, from the direction of Gargano, or from the east, following the currents that led them into the Adriatic. Also, given the information on the difficulty of the works that had to have been undertaken when constructing the present-day lighthouse (including the use of explosives)³⁸ and the easier accessibility of Salamandrija, the Roman choice of Salamandrija for construction of the lighthouse was entirely logical.

Questions concerning the type of fuel used, the types of light sources and the early forms of optical devices are still far from being resolved. In works that deal with lighthouses in Antiquity, wood is regularly cited as the fuel for light signalization.³⁹ Even so, other fuels were also used for the needs of signalization, of which pitch, fish oil and vegetable oil have been mentioned in the relevant literature.⁴⁰

39 Pa tako i kod Kirigin 2012, str. 92.

40 Giardina 2012, str. 445, 449; treba napomenuti i kako različita biljna ulja redovito imaju mnogo veću kalorijsku vrijednost od drva (oko 39,5 MJ/kg za biljna ulja te 18-19 MJ/kg za različite vrste drva. Za drvo vidi kod Aniszewska, Gendek 2014, str. 234; za ulja kod Gravalos *et al.* 2008, T. 1).

41 Znamo za dva djela naziva *Katoptrika* koja se bave tom problematikom, vjerojatno Euklidovo (Pseudeuklid), sačuvano u kasnijim prijepisima iz 1. st. po. Kr. i Herona Aleksandrijskog, iz 4.-5. st. po. Kr. Vidi detaljnu studiju antičkih teorija o optici kod Smith 1999, koji detaljno razglaba o navedenim djelima, tj. o njihovim sačuvanim dijelovima.

42 Giardina 2012, str. 447, 449; u *Encyclopaedia Britannica*, s.v. Lighthouse navodi se kako su u svjetionicima od 1. stoljeća po. Kr. u upotrebi bile uljanice zatvorene u ostakljenim prostorima: <https://www.britannica.com/topic/lighthouse> (pristupljeno 24. 6. 2017.).

43 Izračune koji se dalje u tekstu navode ne bih mogao ostvariti bez pomoći kolege Ivana Vrljička iz Sveučilišnog odjela za stručne studije Sveučilišta u Splitu, na čemu mu ovim putem najljepše zahvaljujem.

44 S te je udaljenosti u povoljnim vremenskim uvjetima danju moguće vidjeti otok golim okom s morske površine.

45 Krisciunas, Karona 2015.

46 Prema *zakonu obrnutog kvadrata*, tj. kombinirajući vrijednost vidljivosti jedne svijeće po noći i padu osvijetljenja s kvadratom udaljenosti od izvora svjetlosti.

37 See in Giardina 2005; Giardina 2012.

38 Kirigin 2012, p. 123.

39 Including Kirigin 2012, p. 92.

40 Giardina 2012, pp. 445, 449; it should be noted that different vegetable oils have much higher caloric values

smo podatak da je u idealnim uvjetima na 22 nm udaljenosti vidljivo svjetlo izvora svjetlosne jakosti od najmanje 251 cd. Dalje smo se poslužili rezultatima mjerenja osvjetljenja koje proizvode različiti oblici uljanica koje donose Zhu i Zhan.⁴⁷ Njihov je eksperiment proveden na više oblika uljanica, od kojih ona koju nazivaju “teapot structured oil lamp”⁴⁸ oblikom i konstrukcijom odgovara formi antičkih uljanica. Za gorivo su koristili ulje graha i kikirikija, no kako sva biljna ulja imaju približno istu kalorijsku vrijednost,⁴⁹ opravdano je rezultate smatrati relevantnim za usporedbu. Prema njihovim je mjerenjima lampa prosječno davala osvjetljenje od 78,4 luksa na površini udaljenoj 0,115 m, što bi, preračunato,⁵⁰ značilo da je svjetlosna jakost izvora iznosila 1,04 cd. Tako bi, prema prethodnom izračunu potrebne svjetlosne jakosti, za vidljivost na udaljenosti 22 nm, bez optičkih pomagala, bila potrebna svjetlost ukupne jačine 241 uljanice.

No s upotrebom sustava konkavnih ogledala koji bi svjetlost lampe fokusirao u zraku širine 20 stupnjeva, jakost svjetla bi se povećala za 129 puta.⁵¹ To znači da bi, u idealnim uvjetima vidljivosti, idealne fokusiranosti, savršene refleksije ogledala za signalizaciju i noći bez Mjeseca, za vidljivost na udaljenosti od 22 nm bila dovoljna svjetiljka 1,84 jakosti obične uljanice. S obzirom na navedeni niz idealnih uvjeta i vrijednosti koje u realnosti nikada nisu moguće, ovaj izračun služi isključivo da pokaže mogućnost signalizacije, uz znanje koje je u antici bilo dostupno, na manjim i većim udaljenostima čak i s izvorima svjetlosti nešto jačim od običnih uljanica. Sukladno tome, opravdano je pretpostaviti da su mnoge kule ili utvrde na važnim točkama jadranskoga plovnoga puta, pa tako i utvrda na Palagruži, služile i kao svojevrsni svjetionici.

Pregradnja rimske utvrde

U jednom je trenutku, kako je već navedeno, uz jugoistočni ugao utvrde dozidana apsida te je pojačan jugoistočni kontrafor (sl. 4). Prethodno smatrajući da se radi o izvornom dijelu utvrde, o prirodi te dogradnje voditelj istraživanja i suradnici za trajanja

Structured knowledge of mirror systems, the so-called *catopter*, existed in Antiquity.⁴¹ It is therefore justifiable to assume that in the 5th century there was familiarity with methods for focusing and emitting light over great distances and that the use of oil-lamps (in a suitable number and size) combined with spherical mirrors in glass-lined, enclosed spaces could enhance the flow of light to the intensity necessary for use in signalization.⁴² In order to attempt an estimate of the extent of such devices, it will be necessary to ascertain several values.⁴³ The first question that imposed itself to this writer is: how strong does the light source need to be under ideal conditions at night-time to be visible at a distance of 22 nm?⁴⁴ I used the distance over which one candela of luminosity is visible at night (luminous intensity of 1 cd) under ideal conditions, which according to Krisciunas and Carona is 2,576 m.⁴⁵ In line with the corresponding calculation,⁴⁶ I arrived at the result that under ideal conditions a light source with a luminous intensity of not less than 251 cd is visible over a distance of 22 nm. I further used the results of measurement of the illumination produced by various forms of oil-lamps as provided by Zhu and Zhan.⁴⁷ Their experiment was conducted with several forms of oil-lamps, in which those called

than wood (ca. 39.5 MJ/kg for vegetable oil and 18-19 MJ/kg for different types of wood. For wood, see Aniszewska, Gendek 2014, p. 234; for oils see Gravalos *et al.* 2008, Table 1).

47 Zhu, Zhan 2005.

48 Idem, fig. 9.

49 Gravalos *et al.* 2008, Table 1.

50 Prema formuli gdje je svjetlosna jakost jednaka umnošku osvjetljenja i kvadrata udaljenosti u metrima.

51 Pri izračunu povećanja jakosti svjetla uzet je u obzir razmjer između ukupne osvjetljene površine bez korištenja ogledala (kut od 360°) i površine osvjetljene fokusiranjem u zraku (20°).

41 We know of two works under the title *Catoptrics*, which deal with this problem, probably by Euclid (Pseudo-Euclid), preserved in later transcripts from the 1st century AD, and Hero of Alexandria, from the 4th-5th cent. AD. See a more detailed study of ancient optical theories in Smith 1999, who dealt with these works, i.e., their preserved sections, in detail.

42 Giardina 2012, pp. 447, 449; in *Encyclopaedia Britannica*, entry: “Lighthouse,” it specifies that lighthouses from the 1st century onward used oil-lamps enclosed in glass panes: <https://www.britannica.com/topic/lighthouse> (accessed 24 June 2017).

43 The computations used hereinafter could not have been done without assistance from my colleague Ivan Vrljićak from the Department of Professional studies at the University of Split, for which I take this opportunity to thank him.

44 From this distance, it is possible to see the island from the sea surface with the naked eye in favourable weather.

45 Krisciunas, Carona 2015.

46 According to the inverse-square law, i.e., by combining the value of visibility of a single candle at night and the decline in illuminance with the square of the distance from the source of light.

47 Zhu, Zhan 2005.



Sl. 4. Ostaci dogradnje utvrde (foto: AMS - terenska dokumentacija Palagruža, doradio: V. Barbarić)
Fig. 4. Remains of addition to fort (photo: AMS - Palagruža field documentation, highlighting by V. Barbarić)

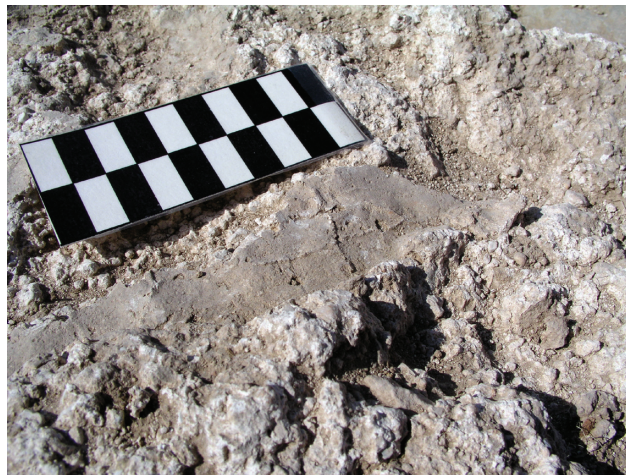
istraživanja nisu detaljnije raspravljali.⁵² Rezultati arheološkog istraživanja pokazali su da se, nedvojbeno, ovdje radi o zahvatu koji je obavljen nakon što je utvrda već bila do neke mjere ili u potpunosti degradirana, jer je u zidnu masu apside ugrađen fragment mozaičnog poda (sl. 5). Da je mozaični pod bio dio izvornog uređenja utvrde, potvrđuju nalazi tesera iz slojeva njezine degradacije.⁵³ Stoga je neophodno tu dogradnju promatrati kao adaptaciju dijela zapuštenog objekta s novom svrhom, koja se dogodila nakon kraja 5. st. S obzirom na ukupni korpus objavljenih antičkih utvrđenja i fortifikacijskih elemenata, veličina dograđene apside teško da ostavlja drugačijih opcija tumačenja namjene tog novog objekta osim dogradnje u funkciji svetišta crkve adaptirane unutar zida utvrde.

Nadalje, neki nalazi iz istraživanja neizravno upućuju na mogućnost da se unutar ostataka rimske utvrde nalazila crkva. S unutarnje strane izvornog vanjskog zida pronađen je ostatak kamenog bloka postavljenog na podnicu od nabijene zemlje, postavljen u osi apside poput praga pred svetištem (sl. 6). Unutar istog prostora je u razdoblju 11.-13. st. sahranjen jedan pokojnik, a s južne strane vanjskog zida još tri, od kojih su dva preminula u 8.-9. st., a jedan je iz razdoblja kraja 17. - sredine 20. st.⁵⁴ Koncentracija ukopa na

52 Prevladavalo je mišljenje da se radi o nekakvoj kuli, vidi Kirigin *et al.* 2010, str. 86.

53 Miše *et al.* u pripremi; Kirigin *et al.* 2010, str. 76.

54 Forenbaher *et al.* 2015; Datacija je pribavljena radiokarbonskim analizama osteoloških uzoraka. Grob unutar zidova (označen kao grob 3) sadržavao je i nekoliko kostiju druge osobe, pa je moguće da su u pitanju barem dva izvorna ukopa u tom prostoru. Vidi kod Forenbaher *et al.* 2015, str. 103, 106. Svi su navedeni



Sl. 5. Otisak lica mozaika u strukturi zida apside (foto: AMS - terenska dokumentacija Palagruža)
Fig. 5. Impression of the face of the mosaic in the structure of the apse wall (photo: AMS - Palagruža field documentation)

“teapot structured oil-lamps”⁴⁸ have a shape and construction that corresponds to the form of oil-lamps in Antiquity. They used castor oil and peanut oil for fuel, but since all vegetable oils have roughly the same caloric value,⁴⁹ there was justifiable cause to treat the results as relevant for comparison. According to their measurements, a lamp emitted an average illuminance of 78.4 lux on a surface 0.115 m away, which, recalculated,⁵⁰ would mean that the luminous intensity of the source is 1.04 cd. Thus, according to the preceding computation of luminous intensity, visibility at a distance of 22 nm without optical aids would require the light of the total intensity of 241 oil lamps.

However, the use of a system of concave mirrors that focused the lamp’s light in a 20-degree wide beam could increase the luminous intensity 129 times.⁵¹ This means that, under ideal visual conditions, ideal focus, a perfect reflection in the signalization mirror and a moonless night, a lantern 1.84 times the intensity of a standard oil-lamp would be necessary for visibility over a distance of 22 nm. Given the aforementioned series of ideal conditions and values which are never possible in reality, this computation

48 Idem, Fig. 9.

49 Gravalos *et al.* 2008, Pl. 1.

50 According to the formula in which the luminous intensity is equal to the multiple of illumination value and the square of the distance value in meters.

51 When calculating the increase in the luminous intensity, the ratio between the total illuminated surface without use of mirrors (360° angle) and the surface illuminated by focusing into a beam (20°) was taken into consideration.



Sl. 6. Ostatak kamenog praga pred apsidom (foto: AMS - terenska dokumentacija Palagruža)

Fig. 6. Remains of stone threshold in front of the apse (photo: AMS - Palagruža field documentation)

ovako malom prostoru ukazuje na mogućnost da su pokojnici sahranjeni na mjestu koje je percipirano kao posvećeno tlo, unutar sakralnog objekta ili pak neposredno uz njega.

Teško je pouzdano utvrditi kada se ta adaptacija mogla dogoditi. Jedna je mogućnost druga polovica 6. stoljeća, po završetku bizantsko-gotskih ratova. No nedostaju nalazi koji se mogu čvršće datirati u to vrijeme. Prvo sljedeće razdoblje u kojem bi bio izgledan takav zahvat jest rani srednji vijek. Već je u izvješćima naglašeno kako su na Palagruži pronađeni tek rijetki srednjovjekovni nalazi, među koje spada ulomak uljanice iz 9.-11. st.,⁵⁵ spomenuti ukopi i primjerak zlatnog novca Romana III. Argira iz 11. st.⁵⁶ Ranom srednjem vijeku mogao bi pripadati i kameni reljef koji je objavio Marchesetti, a na kojem je prikaz troprutoga križa u kružnici.⁵⁷ Stoga bez ikakve dvojbe treba odbaciti interpretaciju da je na Palagruži postojao benediktinski samostan. No to ne isključuje mogućnost da su ondje povremeno boravili pojedini svećenici koji su prakticirali život u izolaciji. Osim asketskog posvećivanja vjeri u izolaciji otoka koji u

grobovi sadržavali kosti odraslih muškaraca koji su se za života bavili pojačanom fizičkom aktivnošću.

55 Kirigin *et al.* 2010, str. 73.

56 Kirigin 2012, str. 98.

57 Iako to nije dobro vidljivo u crtežu, Marchesetti u tekstu navodi kako se radi o troprutoj kružnici. Vidi Marchesetti 1876, str. 291, tab. II, sl. 11; također: Kirigin 2012, sl. 24. Način prikaza na tom fragmentu odgovara stilskoj skupini skulptura iz Istre i srednje Dalmacije koju Ante Milošević, na osnovi stilskih usporedbi sa skulpturom iz Italije, okvirno datira u 8. stoljeće. Vidi Milošević 1999, str. 242-247.

serves exclusively to demonstrate the possibilities of signalization over lesser or greater distances with the knowledge available in Antiquity, even with light sources somewhat stronger than an ordinary oil-lamp. It is therefore justifiable to assume that many of the towers or forts at vital points along the Adriatic navigation route, including the fort on Palagruža, also served as some kind of lighthouses.

Reconstruction of the Roman fort

At one point, as already stated, an apse was added to the south-eastern corner of the fort and the south-eastern buttress was reinforced (Fig. 4). Previously believing that this was an original part of the fort, the research leader and associates did not consider in detail the nature of this element during the research.⁵² The results of archaeological research have undoubtedly shown that this was done after the fort had already been dilapidated entirely or to some degree, because a fragment of the mosaic floor was built into the wall structure of the apse (Fig. 5). That the mosaic floor was part of the original furnishings of the fort has been confirmed by the finds of tesserae from the layers that accumulated during the structure's degradation.⁵³ It is therefore necessary to consider this additional construction as an adaptation of a part of the abandoned building for a new purpose, which occurred after the end of the 5th century. Given the total body of published forts and fortification elements from Antiquity, the size of the added apse leaves few options for the interpretation of its purpose other than additional construction in the function of a sanctuary for a church adapted inside the fort's walls.

Furthermore, certain finds from the research directly point to the possibility that there was a church inside the remains of the Roman fort. The remains of a stone block was found inside of the original external wall, set on a packed dirt floor, and in the axis of the apse like the threshold in front of a sanctuary (Fig. 6). An individual was buried inside the same space sometime in the period from the 11th to 13th centuries, and three more were buried on the southern side of the external wall, of whom two died in the 8th/9th century, and one died sometime in the period spanning from the very end of the 17th to the mid-20th centuries.⁵⁴ The

52 The general view is that this was some type of tower, see Kirigin *et al.* 2010, p. 86.

53 Miše *et al.* under preparation; Kirigin *et al.* 2010, p. 76.

54 Forenbaher *et al.* 2015; The dating was done by radiocarbon analysis of the osteological samples. The grave inside the walls (designated as grave 3) also contained several bones of other persons, so it is possible that



Sl. 7. Prikaz Vele Palagruže na izdvojenoj karti iz druge austrijske vojne izmjere (prilagođeno prema <http://www.mapire.eu/en/map/secondsurvey/>)
 Fig. 7. Vela Palagruža as shown on a separate map from the second Austrian military survey (based on <http://www.mapire.eu/en/map/secondsurvey/>)

potpunosti odgovara predodžbi pustinje, oni su mogli održavati skroman crkveni objekt na Salamandriji. S načinom života koji je tako mogao biti prakticiran, iza njih bi ostali rijetki pokretni ostaci, što odgovara arheološkoj slici Palagruže. S obzirom na važnost te točke u maritimnom prostoru, premda je prema dostupnim podacima teško rekonstruirati okolnosti, ne treba isključiti ni mogućnost da su ti asketi održavali i svjetlosnu signalizaciju, u nama nepoznatom obliku. Primjerice, ime otočića Lučnjaka u Pelješkom kanalu, teško pristupačnog, s ostacima ranokršćanske crkvice, možda otkriva ulogu koju je imao u vrijeme prije modernih navigacijskih naprava, što nalikuje okolnostima na Palagruži i nizu drugih manjih izoliranih otočića.⁵⁸

No pored materijalnih dokaza, za vremensku je kontekstualizaciju gradnje crkve na Palagruži važan odabir njezina titulara, arhandela Mihovila. Poznato je kako je na Palagruži, prije novije crkve sv. Mihovila, građene 70-ih godina 19. stoljeća, postojala starija crkva istog titulara, koju su, prema zapisanoj predaji, izgradili komiški ribari.⁵⁹ Arheološkim iskopavanjem nisu pronađeni dokazi njezina postojanja na prostoru gdje je tražena prema tumačenju opisa koji je donio geograf Ivo Rubić.⁶⁰ No, na prvoj katastarskoj karti Palagruže, koja je izrađena 1851.-1854., za 2. austro-ugarske vojne izmjere, oznaka crkve ucrtana je na

concentration of burials in such a small space points to the possibility that the deceased were buried in an area that was perceived as a sacred ground, inside a sacral building or in its immediate vicinity.

It is difficult to ascertain with any certainty when this adaptation may have occurred. One possibility is the latter half of the 6th century, after the end of the Gothic War. But finds that could allow for certain dating to this time are lacking. The next period that seems plausible for the undertaking of such works is the early Middle Ages. The research reports already contained emphasis that only rare medieval artefacts were found on Palagruža, among them a fragment of an oil-lamp from the 9th to 11th centuries,⁵⁵ the aforementioned burials and an example of a gold coin of Romanos III Argyros from the 11th century.⁵⁶ The stone relief published by Marchesetti, on which there is a depiction of a triple-band cross in a circlet, may also have originated in the early Middle Ages.⁵⁷ Thus, the interpretation that there had been a Benedictine monastery on Palagruža should be rejected. However, this should not exclude the possibility that individual priests may have occasionally resided there to practice life in isolation. Besides an ascetic dedication to their faith in the isolation of an island which entirely corresponded to notions of the desert, they could have also maintained the small church at Salamandrija. By practicing this lifestyle, they would have left only rare movable remains after themselves, which corresponds to the archaeological picture of Palagruža. Given the importance of this point in the maritime area - although it is difficult to reconstruct the circumstances based on available data - one should also not exclude the possibility that these ascetics maintained the light signalization in a manner unknown to us. For example, the name of the difficult-to-access islet of Lučnjak (derived from *luč*, meaning light or torch in Croatian) in the Pelješac Channel with the remains of

there were at least two original burials in the same place. See Forenbaher *et al.* 2015, pp. 103, 106. All of these graves contained the bones of adult men who had engaged in intense physical activities during their lives.

55 Kirigin *et al.* 2010, p. 73.

56 Kirigin 2012, pp. 98.

57 Even though it cannot be seen very well in the illustration, in his text Marchesetti stated that it was a triple-band circlet. See Marchesetti 1876, p. 291, Tav. II, Fig. 11; also Kirigin 2012, Fig. 24. The style of the image on this fragment corresponds to the stylistic group of sculptures from Istria and central Dalmatia which Ante Milošević generally dated to the 8th century based on stylistic comparisons to sculptures from Italy. See Milošević 1999, pp. 242-247.

58 Fisković 1971, str. 156-157; Uroda 2013.

59 Kovačić 1997, str. 42; Kirigin 2012, str. 101.

60 Rubić (1929, str. 130-131) kaže: "Stara crkvice, koja je kasnije, iza zgrađene nove crkvice, na visini od 61 m, služila kao skladište za petroulje, te nova uređena za bogoslužje." Prilikom istraživanja ovaj smo odlomak uvijek tumačili kao prostornu odrednicu položaja stare crkve ("... iza izgrađene nove crkvice ..."), no ona je, zapravo, vremenska odrednica koja nam govori što je s njom bilo nakon što je izgrađena nova. To je usmjerilo potragu za lokacijom starije crkve u pogrešnom smjeru. Vidi kod Kirigin 2012, str. 102-103.

Salamandriji, i to uz simbol ruševina (sl. 7). Budući da je izmjera urađena prije opsežnih intervencija koje su u potpunosti promijenile plato, taj nam podatak daje vrijednu informaciju o položaju starije crkve. Također, prema zapisu sjećanja jednog od sudionika gradnje lanterne na Palagruži, "malena crkvice sv. Miha" nalazila se odmah uz put kojim se penje sa Velog žola, što odgovara tom položaju.⁶¹ Sve te činjenice ukazuju da se starija crkva morala nalaziti upravo na Salamandriji, neposredno uz ostatke rimske utvrde.

Kult sv. Mihovila na Garganu uspostavljen je, prema predaji, od kraja 5. stoljeća u špilji na lokalitetu Monte Sant' Angelo. To najstarije zapadno svetište posvećeno arkandelu Mihovilu do sredine 9. stoljeća postalo je jednim od iznimno značajnih odredišta hodočasnička iz zapadne Europe.⁶² Svetište su 869. poharali Saraceni, koji su od 847. do 871. godine Bari učinili središtem manjeg emirata, što je dovelo do intenzivne pljačke i gusarenja.⁶³ Tek oslobođenjem Barija i Taranta, do 876. godine, stekli su se uvjeti za intenziviranje pomorskog prometa Jadranom, u koji su sigurno bili uključeni i hodočasnici koji su nanovo pohodili Monte Sant' Angelo.⁶⁴ Stoga nije neopravdano pretpostaviti mogućnost adaptacije dijela urušene utvrde na Palagruži u crkvu, krajem 9. stoljeća, posvećenu upravo arkandelu Mihovilu. Takav bi čin predstavljao značajnu komponentu ranosrednjovjekovne sakralizacije maritimnog prostora na najvažnijoj prekojadranskoj ruti, kako je već dokumentirano na nizu primjera i u unutaršnjim vodama istočnoga Jadrana.⁶⁵ Ako je tome tako, ukopi iz 9. stoljeća daju mogućí datum adaptacije ovog dijela utvrde u crkvu, što se u potpunosti poklapa sa spomenutim okolnostima te za gradnju crkve predstavlja mnogo izvjesniji povijesni okvir od 6. stoljeća.

Zaključak

Može se zaključiti kako su najopsežnije intervencije na Palagruži realizirane u razdobljima kad su središta na sjevernom Jadranu počela dobivati značajniju ulogu, te se stoga, posljedično, intenzivirala i izravna plovidba prema sjeveru. Atenska trgovina žitom od arhajskog razdoblja, prometna pomorska magistrala

an Early Christian church perhaps reveals the role it had in the time before modern navigational aids, which resembles the circumstances on Palagruža and a series of other smaller, remote islets.⁵⁸

However, in addition to the physical evidence, the choice of the titular saint, the Archangel Michael, is vital to the chronological contextualization of the construction of the church on Palagruža. It is a known fact that prior to the newer Church of St. Michael, constructed in the 1870, there was an older church with the same titular saint that was, according to local lore, built by fishermen from Komiža (on the island of Vis).⁵⁹ Archaeological excavations did not find any evidence of its existence in the area where it was sought, based on an interpretation of the description provided by geographer Ivo Rubić.⁶⁰ But on the first cadastral map of Palagruža, which was drawn up in 1851-1854 for the second Austro-Hungarian military land survey, the symbol for a church was sketched in at the Salamandrija location, next to the symbol for a ruin (Fig. 7). Since the survey was done prior to major interventions that entirely altered the plateau, this fact provides valuable information on the location of the older church. Additionally, according to the recorded recollections of one of the participants in the construction of the lighthouse on Palagruža, "the little Church of St. Michael" was situated immediately next to the path which ascends from Veli žol, which corresponds to this location.⁶¹ All of these facts show that the older church had to have been situated precisely on Salamandrija, immediately adjacent to the remains of the Roman fort.

The cult of St. Michael on Gargano was established, according to tradition, at the end of the 5th century in a cave at the Monte Sant' Angelo site. This oldest western shrine dedicated to the Archangel Michael became one of the exceptionally important destinations for pilgrims from western Europe by the 9th century.⁶²

61 Kirigin 2012, str. 122.

62 Otranto 2012, str. 179-280. Autor također prenosi zaključak analize brojnih grafita u svetištu, gdje je vidljivo germansko podrijetlo dedikanata.

63 Lapadula 2014, str. 350-352.

64 Sammarco 2014, str. 338.

65 Detaljno se tom temom nedavno pozabavila Ita Praničević Borovac. Vidi Praničević Borovac 2017.

58 Fisković 1971, pp. 156-157; Uroda 2013.

59 Kovačić 1997, p. 42; Kirigin 2012, p. 101.

60 Rubić (1929, pp. 130-131) said: "The old church, which, behind (after!) the newly-built church, at an elevation of 61 m, later served as a storage depot for fuel oil, and a newly arranged one for religious services." During research, this excerpt was always interpreted as a spatial description of the position of the old church ("...behind the newly-built church..."), but it was actually a chronological description which tells us what happened to it after the new one was built. This pointed the search for the location of the older church in the wrong direction. See Kirigin 2012, pp. 102-103.

61 Kirigin 2012, p. 122.

62 Otranto 2012, pp. 179-280. The author also conveyed the conclusion of the analysis of numerous graffiti in

iz Istočnoga Rimskog Carstva prema Classe i Ravenni u 5. stoljeću te intenziviranje austrougarske trgovine preko Trsta u drugoj polovici 19. stoljeća rezultirali su povećanjem važnosti palagruškog otočja u dužjadranskoj navigaciji, pa su upravo u tim razdobljima realizirane značajnije intervencije na Veloj Palagruži. Druga je dimenzija važnosti Palagruže vezana uz prekojadransku navigaciju, no iz nje, barem koliko nam je dosad poznato, nisu proizašle značajnije intervencije na otoku. Iako pitanje vremena njegove gradnje i dalje ostaje otvorenim, u 9. stoljeću na Palagruži gotovo sigurno postoji crkveni objekt posvećen sv. Mihovilu te otočje time postaje dijelom sakraliziranog maritimnog prostora pod zaštitom nebeskog borca protiv zla koje je prijetilo od Saracena. Takvim se činom sakralizacije uloga Palagruže u srednjem vijeku približava onoj iz vremena rane grčke prisutnosti, a veoma je moguće i iz vremena kasnoga bakrenog, odnosno ranoga brončanog doba. Svaka je od navedenih intervencija bila razmjerna specifičnim čimbenicima vremena i moći uključenih aktera, no očito je da je, usprkos zahtjevnosti realizacije zahvata na Palagruži, važnost tih zahvata uvijek opravdavala uloženo.

The shrine was ravaged in 869 by the Saracens, who had made Bari the centre of a minor emirate from 847 to 871, leading to intense looting and piracy.⁶³ It was only after the liberation of Bari and Taranto by 876 that the conditions were created for the intensification of marine traffic on the Adriatic, which certainly included pilgrims who resumed their visits to Monte Sant'Angelo.⁶⁴ It is therefore not without justification to assume the possibility of adaptation of a part of the collapsed fort on Palagruža into a church at the end of the 9th century, dedicated to the Archangel Michael. Such an act would have constituted a significant component of the early medieval sanctification of the maritime zone on the most important trans-Adriatic route, as has already been documented by a series of examples also in the internal waters of the eastern Adriatic.⁶⁵ If this was the case, the burials from the 9th century could provide a possible date for the adaptation of this part of the fort into a church, which fully complies with the aforementioned circumstances, and constitutes a far more certain historical framework for the construction of the church than the 6th century.

Conclusion

It may be concluded that the most extensive interventions on Palagruža were carried out during the periods when the hubs on the northern Adriatic began to assume a more important role, and so direct navigation toward the north intensified as a result. The Athenian grain trade from the Archaic era, the maritime transit route from the Eastern Roman Empire to Classe and Ravenna in the 5th century and the intensification of Austro-Hungarian trade through Trieste in the 19th century resulted in greater importance for the Palagruža archipelago in Adriatic long-distance navigation, so it was precisely during these periods that considerable interventions were made on Vela Palagruža. Another facet of Palagruža's importance is associated with trans-Adriatic navigation, but this, at least to the extent known to us now, did not result in any major interventions on the island. Even though the question of the time of its construction remains open, in the 9th century there certainly was a church building dedicated to St. Michael on Palagruža, and the archipelago therefore became a part of the sanctified maritime zone under the protection of the

the sanctuary, where the Germanic origin of the dedicants is apparent.

63 Lapadula 2014, pp. 350-352.

64 Sammarco 2014, p. 338.

65 Recently Ita Praničević Borovac dealt with this topic thoroughly. See Praničević Borovac 2017.

heavenly warrior against the evil threatened by the Saracens. Such an act of sanctification of Palagruža's role in the Middle Ages resembled that of the era of the early Greek presence, and quite possibly also from the time of the late Copper and early Bronze Age. Each of these interventions was in proportion to the specific factors of time and the power of those involved, but it is obvious that despite the demanding nature of the undertakings on Palagruža, their importance always justified what had been invested.

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