

6
MONOGRAFIJE CPA

NOVA ODKRITJA MED ALPAMI IN ČRNIM MORJEM
REZULTATI RAZISKAV RIMSKODOBNIH NAJDIŠČ
V OBDOBJU MED LETI 2005 IN 2015

ZBORNİK 1. MEDNARODNEGA ARHEOLOŠKEGA SIMPOZIJA,
PTUJ, 8. IN 9. OKTOBER 2015



MMXVIII

6
MONOGRAFIJE CPA

NOVA ODKRITJA MED ALPAMI IN ČRNIM MORJEM
REZULTATI RAZISKAV RIMSKODOBNIH NAJDIŠČ
V OBDOBJU MED LETI 2005 IN 2015

ZBORNİK 1. MEDNARODNEGA ARHEOLOŠKEGA SIMPOZIJA,
PTUJ, 8. IN 9. OKTOBER 2015

NEW DISCOVERIES BETWEEN THE ALPS AND THE
BLACK SEA
RESULTS FROM THE ROMAN SITES
IN THE PERIOD BETWEEN 2005 AND 2015

PROCEEDINGS OF THE 1ST INTERNATIONAL ARCHAEOLOGICAL
CONFERENCE, PTUJ, 8TH AND 9TH OCTOBER 2015

IN MEMORIAM IVA MIKL CURK

UREDNIKI/EDITORS: MAJA JANEŽIČ, BARBARA NADBATH, TADEJA MULH, IVAN ŽIŽEK



MMXVIII

Monografije CPA 6

Nova odkritja med Alpami in Črnim morjem

Rezultati raziskav rimskodobnih najdišč v obdobju med leti 2005 in 2015

Zbornik 1. mednarodnega arheološkega simpozija, Ptuj, 8. in 9. oktober 2015

New Discoveries between the Alps and the Black Sea

Results from the Roman Sites in the Period between 2005 and 2015

Proceedings of the 1st International Archaeological Conference, Ptuj, 8th and 9th October 2015

In memoriam Iva Mikl Curk

izdajatelj / issued by

Zavod za varstvo kulturne dediščine Slovenije

Poljanska cesta 40, SI-1000 Ljubljana

<http://www.zvkds.si>

uredniški odbor / editorial board

Maja Janežič, glavna urednica / editor in chief

Barbara Nadbath, odgovorna urednica / senior editor

Tadeja Mulh, članica / member

Nives Zupančič, oblikovalka zbirke in likovna urednica /
graphic design editor

Vanja Celin, tehnična urednica / technical editor

recenzenti / reviewed by

Eleni Schindler Kaudelka

Philip Mason

Gašper Rutar

Ivana Ožanić Roguljić

prevod v angleški jezik / english translation

Meta Osredkar, Maja Sužnik

lektoriranje / proof-reading

Philip Mason

oblikovanje in prelom / design and typeset by

Andrejka Likar Kofol

tebnična priprava / technical editing

Andrejka Likar Kofol

fotografiji na naslovnici / cover photographs by

Sergej Pukšič (obesek/pendant), Nathan Anderson

Spletna izdaja

Za vsebino članka odgovarjajo avtorji. / Authors are
responsible for the content of the articles.

Vse edicije zbirke Monografije CPA so brezplačne. Naj-
dete jih na povezavah: / All copies of CPA monograph
series are free of charge. You can find them on the fol-
lowing links:

<http://www.zvkds.si/sl/kategorija-publikacije/e-knjige>

<https://www.dlib.si/>

© 2018 Zavod za varstvo kulturne dediščine Slovenije

Vse pravice pridržane. / All rights reserved.

ISSN 2630-208X

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in
univerzitetni knjižnici v Ljubljani

COBISS.SI-ID=298964992

ISBN 978-961-6990-37-0 (pdf)

Spoštovani,

na Ptujskem gradu je 8. in 9. oktobra 2015 potekal 1. mednarodni arheološki simpozij z naslovom: *Nova odkritja med Alpami in Črnim morjem. Rezultati raziskav rimskodobnih najdišč v obdobju med leti 2005 in 2015. In memoriam Iva Mikl Curk.*

Simpozij sta organizirala Zavod za varstvo kulturne dediščine, Center za preventivno arheologijo in Pokrajinski muzej Ptuj Ormož.

V veliko veselje nam je bilo, da se je simpozij odvijal ravno na Ptuju. Kraj simpozija seveda ni bil izbran naključno. Gre za najpomembnejše rimsko mesto na območju današnje Slovenije in eno izmed arheološko najbogatejših mest v Sloveniji. Najpomembnejši kriterij za izbiro kraja našega prvega simpozija pa je bila množica arheoloških raziskav, ki so se na Ptuju izvajale v preteklih letih, in so prinesle številne novosti v poznavanju razvoja in življenja Petovione. Seveda pa številne raziskave niso potekale le na območju današnjega Ptuja. Tako smo organizirali simpozij, kjer so lahko kolegi iz Slovenije in bližnje ali daljne okolice predstavili aktualne rezultate raziskav rimskih najdišč ter razmislek in njihovo vključitev v širši kontekst ekonomskega, socialnega in družbenega dogajanja v rimskem obdobju. Kolegi iz Slovenije, Hrvaške, Avstrije, Italije, Srbije in Madžarske so se na vabilo množično odzvali. Tako smo poslušali 39 predavanj in si ogledali 12 plakatov.

Kot že sam naslov simpozija pove, smo ga posvetili cenjeni arheologinji dr. Ivi Mikl Curk, ki je dolga leta službovala znotraj Zavoda za varstvo kulturne dediščine Slovenije (tedaj Republiškega zavoda za varstvo naravne in kulturne dediščine). Bila je naša vodilna konservatorica za arheološko dediščino z mednarodnim ugledom in častna članica ICOMOS združenja. S svojim znanjem je doprinesla k številnim obnovam in vključevanju arheoloških spomenikov v moderne urbane celote ter orala ledino pri varovanju in valoriziranju arheološke dediščine v povojnem obdobju. Seveda pa Ivo Mikl Curk na Ptuj veže predvsem njena raziskovalna dejavnost, ki jo je posvetila predvsem rimskemu cesarskemu mestu oz. koloniji Ulpiji Trajani Petovioni in njenemu keramičnemu gradivu. Svoje raziskave je strnila in predstavila v več kot 70 delih.

Naša največja želja je bila, da prispevke simpozija tudi objavimo. V zadnjih treh letih smo temu posvetili veliko časa. Rezultat našega truda je sedaj tu pred nami; obsežna publikacija o novih dognanjih z različnih področij rimske provincialne arheologije. Želimo si, da bo to knjiga, ki jo bomo še dolgo uporabljali tako zaradi predstavljenih aktualnih interpretacij kot zaradi prvič predstavljenih terenskih raziskav.

Zahvaljujemo se Ministrstvu za kulturo Republike Slovenije ter Mestni občini Ptuj za podporo pri organizaciji simpozija. Prav tako se zahvaljujemo kolegom iz organizacijskega odbora, ki so pripomogli k izvedbi simpozija ter objavi zbornika, in seveda vsem predavateljem in udeležencem simpozija za njihova predavanja, plakate in ne nazadnje oddane prispevke.

Uredniški odbor

Dear reader,

The 1st International Archaeological Symposium entitled: *New Discoveries between the Alps and the Black Sea. Results from the Roman Sites in the Period between 2005 and 2015. In memoriam Iva Mikl Curk*, took place at Ptuj Castle on the 8th and 9th October 2015.

The Symposium was organised by the Institute for the Protection of Cultural Heritage of Slovenia, Centre for Preventive Archaeology and the Ptuj Ormož Regional Museum.

We were especially pleased that the Symposium took place in Ptuj. Indeed the venue was not chosen by chance. Ptuj was the most important Roman town in what is now modern Slovenia and one of the richest towns in the country in terms of archaeological heritage. The most important criterion for the selection of the location of the first symposium was the vast amount of archaeological research undertaken in Ptuj in recent years, which brought many new insights into the development and lifeways of Poetovio. However much research has also taken place outside the area of modern Ptuj. Thus, the Symposium presented an opportunity for our colleagues from Slovenia and beyond to present the results of their research into Roman period sites, as well as their integration into the wider context of economic and social events in the Roman period. The invitation elicited a massive response by colleagues from Slovenia, Croatia, Austria, Italy, Serbia and Hungary, which gave us an opportunity to listen to 39 lectures and view 12 posters.

As the title of the Symposium suggests, the event held in honour of our esteemed colleague Dr. Iva Mikl Curk, who worked for a number of years at the Institute for the Protection of Cultural Heritage of Slovenia (the Institute for the Protection of Natural and Cultural Heritage of the Republic of Slovenia). She was our leading conservator for archaeological heritage with an international reputation and an honorary member of the ICOMOS council. Her vast knowledge contributed to numerous cases of the restoration and inclusion of archaeological monuments in modern urban units. She also broke new ground in the field of the protection and valorisation of archaeological heritage in the post-war period. Iva Mikl Curk was connected with Ptuj primarily through her research activities, which were mainly focused on the Roman imperial town, or Colonia Ulpia Traiana Poetovio, and its pottery. Her research has been presented and published in more than 70 works.

It was our greatest desire that the contributions to this symposium should be published. Over the last three years, we have devoted a lot of time and effort to this end. The result of our efforts is now before you; an extensive publication on new results from various areas of Roman provincial archaeology. We hope this will be a book that will long have currency, both for its presentation of current interpretations and of new fieldwork in the wider area of the Roman empire, which is published here for the first time.

We would like to thank the Ministry of Culture of the Republic of Slovenia and the Municipality of Ptuj for their support with the organisation of the Symposium. Furthermore, we would like to thank our colleagues from the Organising Committee, who contributed to the organisation and execution of the Symposium and the publication of this collection, as well as all the speakers and participants of the Symposium for their lectures, posters, and last but not least, for their contributions, which are published in this volume.

The Editorial Board

Vsebina

Contents

- 11 **Zum Publikationsvorhaben „Urgeschichte und Römerzeit in der Steiermark“**
The publication of the „Urgeschichte und Römerzeit in der Steiermark“ project
Bernhard Hebert
- 17 **Novejše arheološke raziskave rimskega podeželja v severovzhodni Sloveniji**
Recent Archaeological Researches of the Roman Period in North-eastern Slovenia
Andrej Magdič
- 31 **New Aspects of Roman *villae* in Styria, Austria**
Novi pogledi na rimske vile na avstrijskem Štajerskem
Susanne Lamm, Patrick Marko
- 45 **The Roman Countryside of Prekmurje**
Rimsko podeželje Prekmurja
Aleksandra Bugar, Mitja Guštin
- 65 **Sledovi rimske zemljiške razdelitve na Krasu**
Traces of Roman Land Division on the Karst
Dimitrij Mlekuž
- 77 **On the edge of the known. The quarry landscape at Podpeč**
Na robu znanega. Kamnolomska krajina v Podpeči
Bojan Djurić, Luka Gale, Edisa Lozić, Igor Rižnar
- 89 **A volcanic eruption around AD 180 and its archaeological evidence**
Izbruh vulkana okoli leta 180 n. št. in arheološki dokazi
Heinrich Zabehlicky, Wolfgang Vetters
- 93 ***Municipium Claudium Aguntum* – Excavations in the City Centre (2006-2015)**
Municipium Claudium Aguntum – Izkopavanja v mestnem središču (2006-2015)
Martin Auer
- 115 **Excavations of the Roman Sites in Lika (Croatia): Žuta Lokva, Lički Ribnik**
Izkopavanja rimskodobnih najdišč v Liki (Hrvaška): Žuta Lokva in Lički Ribnik
Ivana Ožanić Roguljič, Tatjana Kolak

- 127 **Pottery workshops in the coastal area of Roman Dalmatia: landscape, spatial organization, ownership**
Lončarske delavnice na obalnem delu rimskodobne Dalmacije: krajina, prostorska organizacija, lastništvo
Ana Konestra, Goranka Lipovac Vrkljan
- 143 **Rimskodobni lončarski obrat na Otoku pri Metliki**
The Roman Pottery Manufacturing Site at Otok near Metlika
Katarina Udovč, Manca Vinazza
- 159 **Dokumentiranje poškodb žledoloma – naselbina Ivanjk, Šmartno v Tuhinjski dolini**
The documentation of damages due to frost breaking trees – the settlement of Ivanjk, Šmartno in Tuhinj valley, Slovenia
Maja Jerala, Dimitrij Mlekuž, Blaž Orehek
- 175 **From Crucium to Uinperch: new approaches to the Roman period in the middle Krka valley in eastern Slovenia**
Od naselja *Crucium* do kraja *Uinperch*: novi pristopi k rimskemu obdobju v osrednji dolini reke Krke v vzhodni Sloveniji.
Philip Mason
- 185 **Izgubljeni relief s krilatim genijem iz Celja**
The lost relief of the winged genius from Celje
Katarina Šmid
- 195 **Votivni daritvi z Drnovega**
Votive offerings from Drnovo
Eva Butina
- 205 **Bustum pokop v Navportu (Vrhnika)**
The bustum burial in Nauportus (Vrhnika)
Tadeja Mulh, Mija Černe
- 229 **A chance epigraphic discovery in Spodnja Šiška (Ljubljana, Slovenia)**
Naključno epigrafsko odkritje v Spodnji Šiški (Ljubljana, Slovenija)
Julijana Visočnik, Bernarda Županek
- 235 **Sledi metalurško-kovaške dejavnosti na najdišču Polje pri Vodicah**
Traces of Metallurgical-Forging Activities at the Polje pri Vodicach Archaeological Site
Maja Lavrič, Maja Bricelj
- 245 **Rimskodobna zemljiška razdelitev v Prekmurju**
Roman land division in the Prekmurje region
Gašper Rutar

- 253 Pokrajine umrlih: struktura in dinamika severnega grobišča Emone**
Landscapes of the deceased: the structure and dynamics of the northern Emona necropolis
Bernarda Županek
- 281 Keramični skupek vile rustike Polje pri Vodica**
Ceramic Assemblages from the Roman Site Polje pri Vodica
Tina Žerjal
- 303 Arheološke raziskave na lokaciji I. osnovne šole v Celju**
Results of the Archaeological Investigation at the I. osnovna šola Site in Celje
Maja Bausovac
- 315 Lamps in Abruzzo: The Evidence from Monte Pallano**
Oljenke iz Abruca: Gradivo iz Monte Pallana
Archer Martin
- 327 La ceramica comune depurata del Magdalensberg 2**
Keramika skupnosti na Štalenskem vrhu
Eleni Schindler Kaudelka, Valentina Mantovani
- 401 The First Late Antique Composite Combs in Western Illyricum: Roman or Barbarian?**
Prvi poznoantični sestavljeni glavniki iz Zahodnega Ilirika: rimski ali barbarski?
Gojko Tica

Pottery workshops in the coastal area of Roman Dalmatia: landscape, spatial organization, ownership*

Lončarske delavnice na obalnem delu rimskodobne Dalmacije:
krajina, prostorska organizacija, lastništvo

Ana Konestra, Goranka Lipovac Vrkljan

Izveček: V prispevku poskušamo oceniti lončarske in keramične modele, ki so prisotni v rimski provinci Dalmaciji, natančneje v njenem najsevernejšem delu (*Liburnia*), in sicer: na eni strani s povzemanjem znanih podatkov o proizvodnih zmogljivostih, lokaciji in izkoriščanju krajine ter na drugi s samimi izdelki in njihovo distribucijo. Širok spekter različnih podatkov, ki segajo od arheoloških in zgodovinskih do geoloških in palinoloških, se uporablja za rekonstrukcijo kronologije lončarske in keramične proizvodnje v Dalmaciji in Liburniji ter povezovanje te industrije z drugimi vejami antičnega gospodarstva. Glede na rezultate nedavnih raziskav lahko prepoznamo modele, ki pomagajo razumeti organizacijo poselitve, proizvodnjo in povpraševanje na trgu ter nam nenazadnje tudi pomagajo pri rekonstrukciji vseh kulturnih sprememb in družbenih procesov, ki so zaznamovali zgodnje cesarsko obdobje na vzhodnem Jadranu, pa tudi gospodarski razvoj v poznejših obdobjih.

Ključne besede: lončenina in keramična produkcija, peči, *figlinae*, rimska Dalmacija, Liburnija, gospodarski procesi, kulturna krajina

Abstract: The paper's aim is to try to assess pottery and ceramics production models present in the Roman province *Dalmatia*, more specifically for its northernmost part (*Liburnia*), by summarising known data on production facilities, location and landscape exploitation as well as products and their distribution. A wide array of typologically different data, spanning from archaeological and historical to geological and palinological, is used to reconstruct the onset and the chronology of pottery and ceramic production in Dalmatia and Liburnia, and to link this industry to other branches of the ancient economy. Though still in progress, recent research shows that some general models can be discerned, helping understanding rural settlement organisation, urban production and market demands as well, and finally aiding the reconstruction of all those cultural changes and social processes that marked the early Imperial period on the eastern Adriatic, but also the economic developments occurring at later periods.

Keywords: pottery and ceramics production, kilns, *figlinae*, Roman Dalmatia, Liburnia, economic processes, cultural landscape

From the late Hellenistic period Dalmatia has intensively joined Mediterranean commerce, not only as importer of foreign pottery, but also, thanks to its landscape characteristics, natural resources and regional economic developments, as a producer.

Production, commerce, exchange and consumption of goods have all widely influenced the formation of

a cultural landscape and the dynamisms of economic and social processes. Depending on the richness of natural resources, communication infrastructure and market demands, local, regional and provincial pottery workshops began to develop. On the basis of the differentiation and/or specialization of their produce assortment and its quantities, along with the awareness to the application of wider trends and fashions, it is possible to reconstruct the level of technological development of the various categories of workshops and follow the mobility of knowledge

* This paper stems from the activities carried out within the project RED – Roman economy in Dalmatia: production, distribution and demand in the light of pottery workshops (HRZZ, IP-11-2013-3973).

and skills of the various artisans or the workshop's orientation to either regional or provincial markets. In the light of economic and cultural integration, or acculturation, of different areas of the province Dalmatia in the Roman world, pottery production centres, their products and their distribution destinations can provide us with a whole set of new data. This paper will focus on Roman pottery production using as a case study the northernmost region of province Dalmatia, ancient Liburnia (North-eastern Adriatic) (*Fig 1*).

The environment of the Dalmatian coast

The eastern Adriatic coast and adjacent islands are part of the Croatian karst belt,¹ which presents essentially two major geological features, the dominant Mesozoic and Tertiary rocks (limestone and dolomite) and occasional Eocene flysch deposits between the limestone.² Such geological setting is influenced by the relief's characteristics, synclines and anticlines, that form coastal mountain ranges (Velebit) and hilly ridges on the major islands.³ These, in combination with climatic factors,⁴ favour the erosion and dispersion of soil deposits from the coastal bedrock, in particular in the flysch zones, while preserving it in the woodland and pasture areas, and create different karst formations such as sinkholes, *dolinas* and karst valleys.⁵ On the other hand, it is the rare flysch areas, which present different lithological sediments, including clay or marl,⁶ that areas suitable for cultivation are more common.⁷ Large flysch areas occur in particular in Istria, Ravni Kotari, in Central (Kaštela-Split) and Southern Dalmatia.⁸ Smaller flysch areas are present in

the Kvarner coastal area and on some of the islands, in particular the Vinodol valley and the island of Rab.⁹ Relief and geological features unique to the karst have been shaped by anthropogenic activity to create a cultivated landscapes, adapting it to the needs of agriculture and pastoralism, which main feature are dry-wall structures enclosing and dividing the land.¹⁰ On the other hand, along the coast, the numerous coves and bays, often characterised by stream's or river's confluences, have been key in the development of stable settlement.

Paleoclimatic and archeobotanic data for the Liburnian region is scarce, just as are ancient sources, providing only sporadic mentions of the potential economic activities of the eastern Adriatic: wool production,¹¹ wine and olive oil,¹² while cereals are mentioned for the japodian hinterland.¹³ Nevertheless, some information for the Kvarner area is provided by karst lake sediments (Lake Vrana, Cres island) which seem to indicate changes in the vegetation and an onset of deforestation as early as the Bronze age (or even the Neolithic).¹⁴ The formation of most of the current vegetation layer occurred in later prehistory and Roman times with the onset of *Quercus ilicis* forest,¹⁵ while a sharp change in vegetation has been noted during the 1st century BC with the appearance of walnut and chestnut, which are usually recorded in the period of transition to Roman occupation.¹⁶ *Olea* and *Vitis*, also present in the sediment dated to this time might indicate cultivation, while other data is indicative of settlement in the area of the lake.¹⁷ In continental northern Dalmatia (Ravni Kotari) soil analysis has detected landscape melioration from the Bronze Age onwards, with an increase

1 Bogunović, Bensa 2006, 1.

2 Mihevc, Prelovšek 2010.

3 Vujović 2009, 1.

4 i.e. seasonal heavy rain, Topić *et al.* 2006, 130, 135.

5 Anić, Perica 2003, 175; Topić *et al.* 2006, 128; Butorac *et al.* 2009, 166.

6 Babić, Zupanić 1998, 176, 190; Toševski *et al.* 2012, 50–52.

7 Bogunović, Bensa 2006, 1.

8 Marjanac, Čosović 2000, 93; for a complete list of flysch areas see Toševski *et al.* 2012, 48, Tab. 1.

9 Benac *et al.* 2007, 201–202, sl. 1.

10 Anić, Perica 2003, 175.

11 Martial, Epigrammata, XIII, 140; Pliny, Naturalis Historia, 8. 191; Varon, De re rustica, 2.10.6.

12 Apicius, De re coquinaria, 1.5 in Matijašić 1998; Glicksman 2005, 201–212; Jadrić 2007.

13 Spelt and proso millet, Strabo, VII 5,4 in Sanader 2006, 162.

14 Schmidt *et al.* 2000, 126.

15 Schmidt *et al.* 2000, 127.

16 Schmidt *et al.* 2000, 126 with earlier bibliography.

17 Schmidt *et al.* 2000, 126, 127.

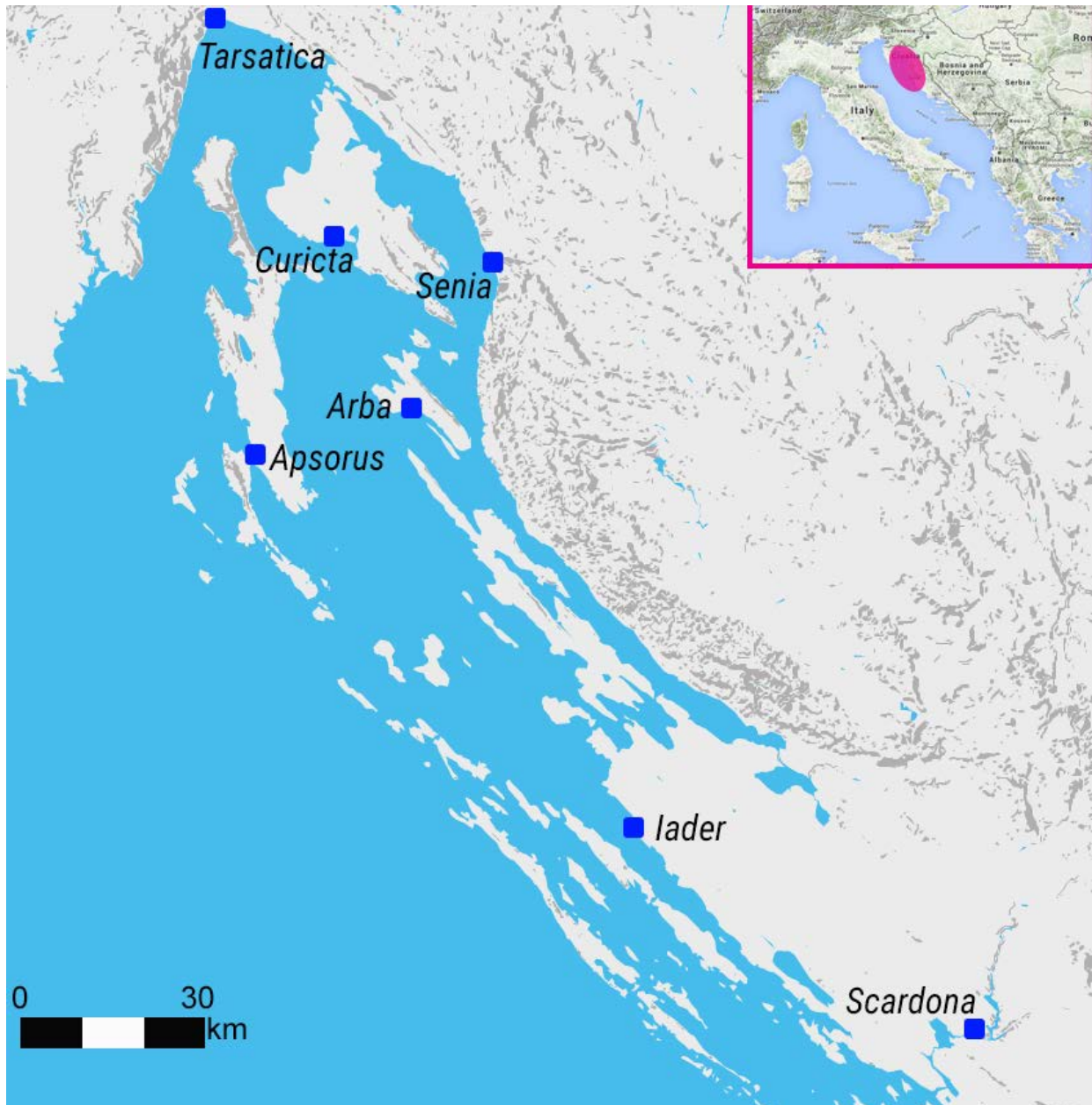


Figure 1 Area of ancient Liburnia with noted some of the major Roman settlements (base map: Google maps/Snazzy maps).

during Roman times, and with substantial loss of good pasture.¹⁸ More details gained from the Bokinjačko blato sediments show anthropogenic influences on the vegetation from the Eneolithic onwards, mainly with indicators of a pastoral economy, while antiquity is again marked by a peak in *Olea* and *Vitis* pollen.¹⁹ Similarly, results gained from archeobotanic studies on the vegetation in the area of the Roman harbour of Zaton show a typical Mediterranean crop

agriculture,²⁰ while sites in the hinterland (Danilo), show signs of cereal cultivation from Roman times onwards.²¹ A similar situation²² has been detected for Istria as well.²³

Such changes occurring in the landscape of the Kvarner region during the 1st century BC, but also in the neighbouring areas of Istria and northern Dalmatia,

18 Shiel, Chapman 1988 39, 42, fig. 2.2.

19 Šoštarić 2005, 386 with earlier bibliography.

20 Šoštarić 2005, 386; Gluščević *et al.* 2006, 155.

21 Šoštarić 2005, 386–387.

22 i.e. the importance of olives, followed by *Vitis vinifera*, *Ficus carica*, *Pinus pinea*.

23 Šoštarić, Küster 2001; Šoštarić 2005, 387.



Figure 2 Identified pottery and CBM kiln/figlinae of Roman date in the Province Dalmatia (base map: Google maps).

indicate that a change in land management and rural activities coincided with the establishment of more stable contacts with Rome and the later formal establishment of Roman rule. Moreover, they are indicative of new economic possibilities that these new cultures (olive, grape) brought forward. Roman style pottery production is one of the markers of this process of landscape and cultural change characterizing the 1st century BC, while in central Dalmatia this process was already in action during Hellenistic times with the production of various greyware pottery and probably amphorae.²⁴

Pottery production in the province Dalmatia: an overview

Research on pottery workshops in the province Dalmatia (Fig. 2) has so far been oriented to their identification on the basis of archaeological remains interpreted as workshop facilities. As no kilns datable to earlier times have been discovered,²⁵ Bronze and Iron age pottery production is supposed on the bases of material's examinations only.²⁶ The earliest pottery kilns are those excavated at Vis (*Issa*) where Hellenistic and Roman pottery production is inferred on the basis of these, but also finds of numerous pottery

24 Brusić 2000, 7–17; Kirigin *et al.* 2002; Kirigin *et al.* 2005, 13–15.

25 Barbarić 2012, 37.

26 Šešelj, Vuković 2012/2013, 347.

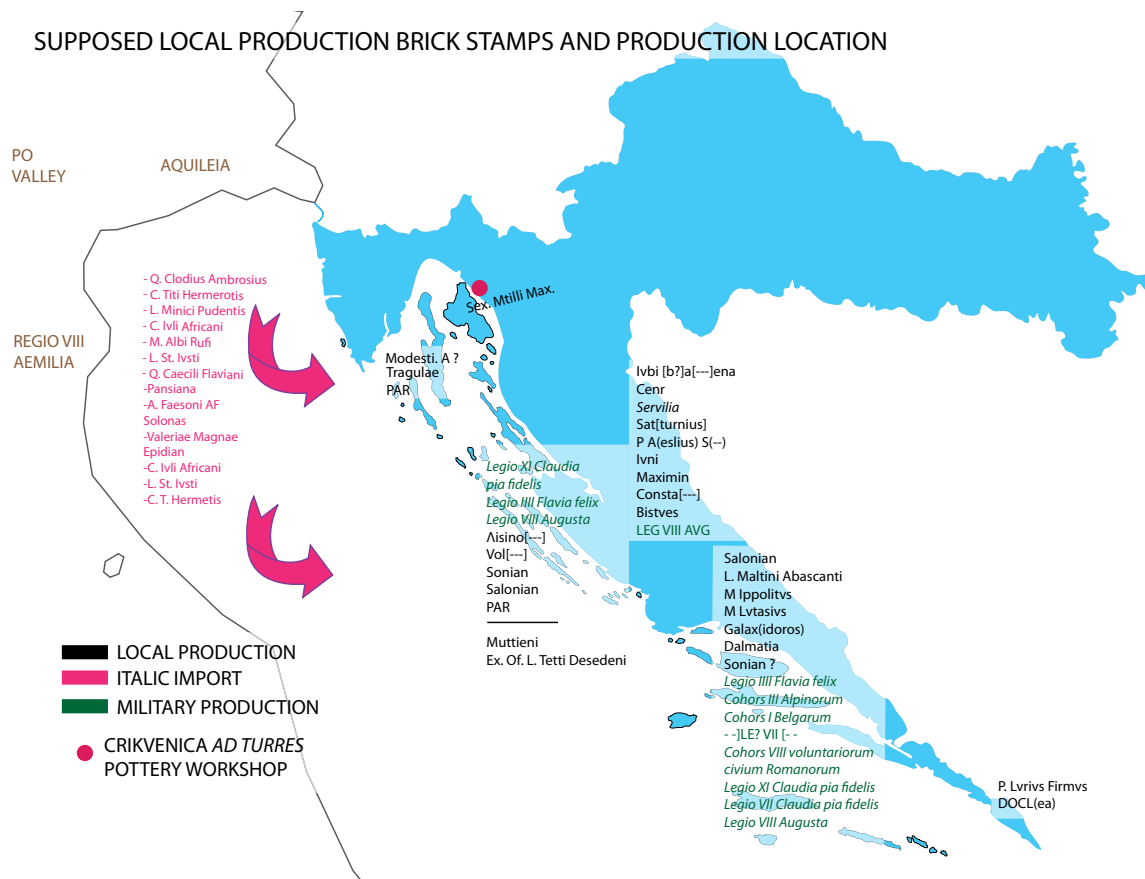


Figure 3 Distribution of imported and locally produced stamped tiles in the Province Dalmatia (based on: Matijašić 1983; 1988; Mardešić 2006; Dodig 2007; Pedišić, Podrug 2008; Lipovac Vrkljan 2009; Tončinić et al. 2011; Ilkić, Parica 2017; and bibliography therein).

wasters.²⁷ At **Hvar** (*Pharos*) amphorae production datable to Hellenistic times has also been supposed, accompanied by that of CBM, loom-weights, fine, coarse and cooking wares, and terracotta figurines.²⁸ Recently, archaeometric analysis is being carried out on materials from the Hellenistic settlements and sanctuaries of central Dalmatia in order to further characterize their pottery production.²⁹ The first mention of certain traces of Roman CBM production is that linked to the military camp in *Burnum* (Ivoševci near Kistanje in continental northern Dalmatia), more precisely to the nearby site Smrdelje - Rivine where, in 1895, L. Marun identified four pottery kilns, which, linked to the numerous finds of legionary brick stamps, brought forward

the possibility of CBM production.³⁰ Although the kilns are now lost, the area still abounds with finds of wasters and localized clay deposits are present, just as a water source.³¹ On the bases of tile stamps CBM production at Smrdelje can be traced from the mid-1st to the beginning of the 2nd century.³² In the late 19th century another pottery production has been inferred on the basis of *tegulae* stamps³³ from the site **sv. Petar – Soline and Risika – Paprata on the island of Krk.**³⁴ Sticotti and Nowotny state the toponym *le fornaci* for the location at sv. Petar-Soline, and both K. Patch and J. J. Wilkes localized Sex-

27 Čargo, Miše 2010.

28 Katić 1999–2000; Kirigin et al. 2002; Jeličić Radonić, Katić 2015, 140–145.

29 Šegvić et al. 2012; Miše et al. 2015; Šegvić et al. 2016.

30 Pedišić, Podrug 2008, 85–86 with earlier bibliography; Miletić 2011, 267.

31 Pedišić, Podrug 2008, 85, n. 4; Miletić 2011, 267.

32 Borzić 2014, 292.

33 DE SALT(u) SEX(ti) M(e)TILLI MAX(imi).

34 Sticotti, Nowotny 1896, 167–168.

tus' figlina in the area of Soline bay.³⁵

Numerous other, mainly CBM productions, have been supposed on the eastern Adriatic coast on the bases of tile stamps, and which have been summarised in (Fig. 3). Pottery production, on the other hand, has been supposed on the basis of finds such as thin-walled ware³⁶ (Fig. 4) and jugs with inscriptions bearing local toponyms³⁷ (*Felix Arba, Salona*).

The next site linked with pottery production identified on the basis of kiln finds is that of Dinjiška, and an amphorae and pottery workshop has been supposed at Novalja, both on the island of Pag.³⁸

In the last decade, a number of direct indicators of production have been identified in the northern part of the province Dalmatia (Liburnia), adding new insights to the aforementioned data, which was, as well, concentrated in Liburnia.³⁹ The first major discovery was that of Crikvenica's pottery workshop⁴⁰ which allowed to locate the production of the aforementioned *Sex. Metilius Maximus* stamps in this figlina. Nevertheless, Soline bay still remains a viable candidate for a pottery workshop, maybe even belonging to the same owner, as later research recorded the presence of overfired pottery and other wasters.⁴¹ A single isolated kiln has been excavated at the site Rakitnica-Tri bunara in the hinterland of Vodice.⁴² After a series of test trenches and geophysical surveying, no other structure has been located at the site, and all finds are limited to tegulae and coarse pottery.⁴³

On the island of Rab (Lopar municipality), pottery production has been confirmed at two sites, in Podšilo and Mahučine bays. In the first case, a seemingly isolated kiln has been excavated⁴⁴ and later linked to



Figure 4 Example of thin-walled ware beaker of supposedly local eastern-Adriatic production (courtesy of Janaf collection, photo and drawing A. Konestra).

the nearby sites of Beli grad and Podkućine, which present architectural remains and finds of Roman pottery.⁴⁵ At Mahučine bay, on the basis of a large quantity of pottery wasters and kiln fragments, the location of one or more pottery kilns has been supposed, and later backed up by geophysical surveying.⁴⁶ No other ancient structures have so far been confirmed at the site, but on cape Zidine, located across the Loparska vala cove, a large, probably later Roman rural site, has been identified.⁴⁷ A third, recently identified kiln, is located at Gonar (Rab municipality), and might be connected to the nearby roman estate of Kaštelina in Kampor.⁴⁸ The most recent find is that of Plemići bay (Rtina, Ražanac municipality) to the north of Nin (*Aenona*).⁴⁹ The sporadic finds of two tile stamps (*M[VTTIENI]* and *EX OF L TETTI DE[SEDES]*)⁵⁰ support the possibility to locate here a long-lasting and complex

35 Sticotti, Nowotny 1896, 168; Wilkes 1979, 501; Wilkes 1979, 70; Pedišić, Podrug 2008, 103 with earlier bibliography.

36 Brusić 1999, 30–31, 118–119.

37 see in Nedved 1990, 7: CIL III 14336; Brusić *et al.* 2012, 108, Fig. 8.

38 Gluščević 1988, 73–74, 82.

39 For an overview see also Lipovac Vrkljan, Šiljeg 2012.

40 Starac 1991; Lipovac Vrkljan 2009.

41 Lipovac Vrkljan, Starac 2007; Lipovac Vrkljan, Šiljeg 2012, 18.

42 Brajković 2011.

43 Brajković 2011, 98–100.

44 Lipovac Vrkljan, Šiljeg 2010.

45 Lipovac Vrkljan, Šiljeg 2012, 21, 28; Lipovac Vrkljan *et al.* 2014, 206.

46 Lipovac Vrkljan *et al.* 2015.

47 Skelac, Radić Rossi 2006.

48 The site has been identified during filed surveys carried out by R. Starac, who we thank for this information. Upon visiting the site no clear evidence of the nature and dating of the kiln could be confirmed, as its structure is severely damaged by sea erosion, though a few tegulae fragments have been collected on the nearby beach.

49 Ilkić 2013.

50 Ilkić, Parica 2017.

CBM and probably amphorae production centre, whose features are though still to be defined.

Production typology, chronology, scale and distribution

Recent data sheds new light on the problem of pottery production in Roman Dalmatia, pointing to a series of issues that can now be outlined in more depth. Firstly, in addition to military production, this new evidence can be typologically divided in isolated kilns, kilns connected to rural sites (*villas*), while only Crikvenica's workshop can with certainty be defined as such and interpreted as a protoindustrial pottery production complex. As far as regarding kilns or facilities connected with urban settlements they seem to belong to an earlier date – mostly late Hellenistic in the case of Vis and the supposed pottery production on Hvar and at Resnik.⁵¹ Production in *Salona* and *Asseria*, hinted by both stamps and other pottery types, is yet to be located. Such subdivision can underline the different aims for setting up pottery production, but also the degree of specialisation the production achieved and how longstanding its duration was. It can also give us a hint to the economic significance of the products of each within a broader, regional, or local market.

Of particular interest is the typology of products which have so far been identified for the aforementioned sites, and their chronology. The earliest phase of Roman pottery production is that of Crikvenica's *figlina*, and with all probability the one localised in Plemići bay. For Crikvenica, evidence of a wide range of products has been established, while imported finds and ¹⁴C dates place the initial phases of production setup in the late 1st century BC. The end of production is additionally supported by the find of graves within the *figlina*'s waste⁵² placing it before the half of the 3rd century. Tile stamp from Crikvenica's pottery production centre allowed to determine its owner, *Sex. Metillius Maximus*, and un-

derstand its connection to the estate which he must have possessed in the environs (*a saltus*). At Crikvenica all ceramics and pottery classes are typologically rather diverse, with six types of CBM, more than 90 types of household pottery and 13 types of amphorae, to which loom-weights and particular shapes can be added,⁵³ so this production established itself as a general supplier of ceramic goods to the wider market of the region. In fact, Crikvenica's exports have been identified in the area spanning from Tarsatica in the north to the river Krka (*Titius*) in the south.⁵⁴ But typological and distribution data points also to the commercialisation of agricultural products from Sextus Metillius' saltus which must have been carried in the amphorae produced at the *figlina*.

At the site in Plemići bay, spatial extension, wasters concentration and typology, although still to be defined with more precision, do confirm the existence of a larger complex producing various classes of materials, so far identified as CBM and amphorae.⁵⁵ Dating of this complex can only be supposed on the basis of amphorae typology⁵⁶ which, on the trail of italic amphorae types such as Forlimpopoli, can be dated from the 1st to the 4th century AD, but was probably confined within the early Imperial times.⁵⁷ The afore-mentioned presence of two types of stamps of supposedly local production might indicate two phases of production marked by two different owners and/or organisational systems.

Spatial organisation within the workshops has so far been explored only at Crikvenica, thanks to ten years of systematic excavations. This allowed to define the main features of the workshop, such as kilns, clay decanting pits, open-air areas, but also roofed spaces.⁵⁸ The production possibilities of the *figlina* can be seen as a full-time enterprise, as the diversification of

51 Kirigin *et al.* 2002; Šegvić *et al.* 2012.

52 Konestra, Ožanić Roguljić 2016.

53 Ožanić Roguljić 2012.

54 Lipovac Vrkljan, Ožanić Roguljić 2013, 259–261.

55 Ilkić 2013; Bekić, Pešić 2014, 103, t. 5; Ilkić, Parica 2017; and personal assessment by the authors.

56 flat-bottomed Adriatic amphorae, Bekić, Pešić 2014, 103, t. 5.

57 A fragment of a Shindler Kaudelka 68 thin-walled cup (Schindler Kaudelka 1975) has been found during field survey, providing a mid-1st century date.

58 presenting different phases, Lipovac Vrkljan *et al.* 2016.

facilities, presenting both open-air and roofed spaces, allowed all-year production within the complex.⁵⁹

On the other hand, both sites on the island of Rab point to CBM production only, and ¹⁴C dates of samples from the kiln in Podršilo bay place it in the 3rd century.⁶⁰ The same products typology has been identified at Rakitnica – Tri bunara, whose chronology has not been established due to a lack of datable evidence.⁶¹ The site could be linked to the nearby Velika Mrdakovica late Iron age hillfort and Roman settlement, but also to a site which might have been located on the plains in its vicinity.⁶² In any case, Rakitnica's find point to a short-lived production, perhaps established to fulfil the needs of a particular construction phase of one of the nearby sites. Similarly, the sites on Lopar seem to have been destined to provide CBM for the rural estates of Cape Zidine and those in Podšilo bay. Although, an interesting connection could also be established with a phase of urban infrastructure improvement at the nearby urban sites of *Arba* and *Senia* testified by late 2nd and 3rd century inscriptions.⁶³ A similar interpretation has been proposed for the *DALMATIA* tile stamps whose production has been localised in the environs of Diocletian's palace, for the construction of which it might have been established.⁶⁴

The lack of structures around the aforementioned kilns, doubtful only in the Podšilo case, could provide additional support for the temporary (or seasonal) character of the Mahučina and Rakitnica kilns.

These finds and some of their features provide interesting insights for a broader reconstruction of the economy of ancient Liburnia. Amphorae production at both Crikvenica and Plemići support the integration of this facility within larger rural and coastal estates, as has been recorded for several Istrian⁶⁵ and

north Italian sites. This is certainly true for Crikvenica, where data on ownership and location is given by tile stamps. Tile distribution, in addition to that of amphorae, does provide evidence for a commercial aim of CBM production which could be linked to an early phase of urban development in *Liburnia*.⁶⁶ A tile stamp occurring within the Plemići bay waste has been identified at nearby *Aenona*.⁶⁷

Whether the examples from the island of Rab point to a different nature of the estates they might be connected to is doubtful, as more research is needed to better understand their nature and activities, just as the range of their distribution. In any case, distribution data from Crikvenica's workshop supports the existence of a regional pottery and CBM trading network parallel to that of imported wares and *tegulae* (see *Fig. 2* for the main stamps), and the new finds from Plemići might be indicative of this as well.

Productive landscapes: the choice of location

Finally, a tentative interpretation of the locations chosen for setting up pottery production will be discussed.

Setting up pottery production occurs in those areas where clay availability is present, but two other factors, water and fuel, are key as well.⁶⁸ Moreover, according to D. Arnold, the availability of good quality raw materials triggers not as much the onset of ceramic's production, which might occur either way, as it influences its development into full-time specialisation.⁶⁹ Another key factor is the distance to those resources.⁷⁰ Ethnographic studies have shown that distance covered to clay resources depends on the re-

59 Arnold 2011, 91.

60 Lipovac Vrkljan, Šiljeg 2009, 27; Lipovac Vrkljan *et al.* 2014.

61 Brajković 2011, 99–100.

62 Brajković 2011, 100.

63 i. e. Balnea renovation inscription from Senj, CIL III, 10054; for Rab see Nedved 1990, 19–25.

64 Sanader 2006, 175.

65 Loron, Červar and Fažana see Bulić, Koncani Uhač 2011; Carre, Tassaux 2012.

66 *Sex. Metillius Maximus* tile stamps are present at Tarsatica – first phase of the thermal complex, Cickini rural estate (?) on the island of Krk, *Arrupium*, Preko on the island of Ugljan, and on two shipwrecks off Lošinj and Susak islands, Lipovac Vrkljan, Ožanić Roguljić 2013.

67 Ilkić, Parica, 2017, 105, n. 4.

68 Degryse, Poblome 2008, 233; Rieger, Möller 2011, 159–160.

69 Arnold 1985, 32.

70 Arnold 1985, 32–33; Arnold 2011, 85.

lief and transport technology, varying for clays used to shape the body, those for the slip, and for temper material, but staying within 1 and 50 km. More precisely, profitable sourcing of clay for shaping the bodies happens between 1 and 7 km, while for late Antique Sagalassos distances for good quality clay are around eight km.⁷¹ In Roman Britain distances have been proven to arrive at 20 km, as wheeled carts and probably roads could have been used for transport.⁷² As discernible from its geology, areas of clay deposits in northern Dalmatia, usually linked with the flysh geology, are limited. Nevertheless, they do occur in those areas where Roman pottery workshops have been identified (i. e. Crikvenica, Plemići, Lopar). Even more significant is the location of some of the identified workshops directly within clay deposits, as it is the case of Crikvenica and Plemići bay, which often present substantial thickness, allowing for the use of raw materials found on site. The same has been noted for the Rakitnica – Tri bunara kiln.⁷³ Moreover, the location of Crikvenica's workshop presents the possibility to source clay from deposits located at some distance, allowing, perhaps, for a differentiation of raw materials within the different productions.⁷⁴ In fact around Crikvenica, various clay and marl deposits have been located, with a major outcrop at the landslide Slani potok located at less than 4 km from the *figlina* site, while the others are located even closer. Nevertheless, so far no evidence of ancient clay pits has been identified.

On the other hand, the kilns on the island of Rab seem to have been located at somewhat different locations, though Podšilo bay is characterized by flysh with silty sand deposits. On Rab, no large clay deposits have been identified, so the located kilns must have utilized material available in smaller deposits, which, in the case of Podšilo, might have washed away due to erosion. In the vicinity of Mahučine bay, two ponds and a deposit of clayey soil

have been identified above the site,⁷⁵ but the coastal area of Lopar bay is highly eroded due to recent anthropic interventions.⁷⁶

If clay availability might have been a key element in broadly choosing pottery workshops locations, water must have been a micro-topographic factor, as all sites are located close to permanent or periodic streams or ponds. Crikvenica's *figlina* is located on the shores of the river Dubračina, which might also be responsible for the thick clay deposit on which the site lays and which covered the site prior to excavation, as investigations at its estuary showed significant sediment accumulation.⁷⁷ The other sites lay also close to water sources: at Plemići the Jaruga stream, at Smredelje the Kukalj stream, at Podšilo a temporary stream, at Mahučine and Rakitnica ponds and wells, while only at Gonar, at this point, no water source was detected. Similarly, a small lake (Jezerca) and some ponds located close to Soline bay (island of Krk) could have provided both water and clay for the supposed pottery production facilities.

The third resource to be secured was the combustible, which is, due to the current state of research, the hardest to pinpoint and analyse. In the cases of the so far excavated kilns in Liburnia, wood stands out as the primarily, if not only, combustion material. Crikvenica's tile stamp additionally confirms this as it states the placement of the *figlina* within a *saltus*, usually understood as, on the one hand, a large wooded property, while on the other, as a land subjected to particular fiscal policies.⁷⁸ *Figlinas* functioning within *salti* have been noted in various regions, most notably in northern Italy with the Pansiana operating within an imperial *saltus*,⁷⁹ or in *Gallia*, where the *saltus Arverne* hosted, among other industries, that of ceramics production, with its most prominent centre in Lezoux.⁸⁰ One of the main products of this *saltus*, and also a prerogative for other activities (mining, pottery production) are the large quantities of

71 Degryse, Poblome 2008, 233, 245 with earlier bibliography.

72 Arnold 2011, 89.

73 Brajković 2011.

74 for a similar situation see Degryse, Poblome 2008, 245; for different sourcing possibilities see Graham 2006, 47.

75 Lipovac Vrkljan *et al.* 2014; Lipovac Vrkljan *et al.* 2015.

76 Benac *et al.* 2012.

77 Crmarić *et al.* 2007.

78 Soricelli 2004, 97–98.

79 Pellicioni 2012, 73 ss.

80 Vigouroux 1962, 212, 216.

wood that the *saltus* could provide.⁸¹ Whether this analogies could explain the role *Sex. Metillius' saltus* is yet to be determined, but our current understanding seems to point in that direction, while further research should explore the scope and extension of this property and its economic possibilities. For other production centres or isolated kilns information on the setting within a larger property is scanty, thus nothing is known on character of the surrounding areas with significant certainty. New data from Plemići, with tegulae bearing the *EX OF* notation,⁸² broaden the varieties of workshop settings present in Liburnia and provide us with potential new data on workshop organisation.

Nevertheless, all areas could have provided enough wood at least for temporary or seasonal production. Such data can be gathered on the basis of current woodland coverage, historic data provided by later sources, and for Antiquity, by palinology (see above). In fact, from the late Middle Ages onwards the eastern Adriatic played a key role in supplying Venice with high quality wood: in particular areas such as Istria, Krk island, the environs of Rijeka, Bakar and Senj⁸³ and the island of Rab⁸⁴ provided wood mainly for shipbuilding. Other sources bear evidence of the existence of vast forests along the coast, southwards at least to Zadar, and subsequent intense deforestation.⁸⁵

Finally, location is closely connected to the possibilities of transportation which allow for products marketing. While all but one (Rakitnica) so far identified production centres are located by the shore, thus allowing for seaborne transport, only Crikvenica and Plemići have so far yielded evidence for the existence of docking facilities. At Plemići these have been identified as two docks crossing the bay at either side of the site,⁸⁶ while at Crikvenica the existence of such facilities has been inferred on the basis of small finds, underwater finds and the geo-morpholo-

gy of the area prior to recent coastal rearrangements and fillings. Road connections are, on the other hand, fairly evident as Crikvenica (*Ad Turres*) was part of the road networks crossing the eastern Adriatic from Aquileia to Salona and Diracchium, as demonstrated by the Peutinger's Map (section IV)⁸⁷ and possibly by traces of the road located on various sites of the Vinodol hinterland.⁸⁸

Spreading of a know-how and emergence of diverse production models

It is in the imports that local *figlinas* found their inspiration, as Roman style CBM was unknown in the region previous to the arrival of the first italic products⁸⁹ and the connection with italic flat-bottom amphorae has already been mentioned.

This familiarity with italic shapes is noticeable in other classes as well. In fact, an abrupt change in pottery style is visible at the late Iron age – Roman imperial age passage. Though some authors note a resemblance of certain coarse ware shapes of the two periods,⁹⁰ there is a clear typological break between the two traditions as new classes are being introduced. The spread of Roman style pottery happened as early as the 2nd century BC (greco-italic and Lamboglia 2 amphorae, black-glazed fine wares, early thin-walled ware shapes), but local production began at a much later date and could be linked with the actual arrival of Italics who aided the establishment of pottery production either on their newly acquired estates. This process of gradual land acquisition and production establishment is visible in the configuration of Crikvenica's workshop but also in the kilns' typologies identified in the Liburnian region, which are always of the Cuomo di Caprio IIb type, while, though still unrecorded, previous pottery production

81 Vigouroux 1962, 214–216.

82 Ilkić, Parica 2017, 106, n. 6.

83 Lazzarini 2014, 31, 37.

84 Rauš, Matić 1987, 100, 102.

85 Štefanec 2003, 340–345.

86 Ilkić, Parica 2017, 105.

87 http://www.euratlas.net/cartogra/peutinger/4_picenum/ (1.4.2016).

88 Lipovac Vrkljan, Starac 2014, 97.

89 I.e. Pansiana tegulae, Matijašić 1989, 63–64; Pedišić, Podrug 2008, 88–94.

90 Borzić 2014, 292.

was certainly carried out in differently shaped kilns.⁹¹ This makes the possibility of foreign ownership providing also foreign know-how for the establishment of production as a viable explanation for the first phase of production identified through the 1st–2nd century AD, while the role of the local potters is yet to be determined and could be connected to location choices linked to raw material availability.

By analysing landscape features, workshop's organisation, ownership models, product distribution and chronology so far discussed, a set of different production models arises.

The early organisation of ceramics production sees it within larger estates (such as *saltns*) which seem to follow the integration of Liburnia in the Roman state and the subsequent arrival of entrepreneurs from Italy. Such characteristics are discernible at Crikvenica and perhaps at Plemići as well. These sites point towards production models that integrate a vast scale infrastructure and full-time commitment of a skilled labour force that acts on behalf of an independent owner, though the seasonality of certain tasks is not excluded (i.e. kiln firing). Another feature of this production model is vast availabilities of raw materials which favour full-time specialisation⁹² and allow for a market oriented production.

Early production onset is discernible at military production sites as well, but they developed in a different context⁹³ and their market orientation is, with all probability, fairly limited. Smaller scale production facilities, which are seen at sites on Rab and at Rakitnica, seems to have a later onset, a more limited production output and smaller scale distribution. In fact, these latter cases do have in common a more

targeted production, developed for the needs of the rural estates they operated in and seemingly comprising exclusively of CBM. A similar situation can be implied for those production facilities identified or supposed within towns (*Vis, Asseria, Salona* etc.). A major very evident difference is certainly that of production diversification, so while at Crikvenica a large array of products might imply a larger work force and different market demands, the second phase kilns seem to have aimed at satisfying the needs of a local community (being it a rural estate, a town or a smaller settlement).

The first model of production, which can be linked to the manufactory model proposed by Peacock,⁹⁴ though presenting similarities with the nucleated workshop models as well,⁹⁵ seems to interest the early Imperial age, as activities at this *figlinas*, from the currently available evidence, cease with the end of the 2nd century. Such evolution could be linked with similar production centres of the western Adriatic, whose typological evolution (from Dr. 2–4 to flat-bottomed amphorae) Crikvenica seems to follow at least within its amphorae production, but whose activities span well into the 3rd century.⁹⁶ Its demise can also, just as that of similar Italic productions, be linked to the ever more prominent import of amphorae born commodities from the Eastern Mediterranean and Northern Africa.⁹⁷

The second and later model, more readily connectable with estate production models, is that of the seemingly isolated kilns whose purpose could be that of providing CBM for the construction phases of the nearby rural estates, and would thus fit within a time frame when Italic *tegulae* stopped arriving on the eastern Adriatic, at least at the scale recorded before.⁹⁸

The possibility that these kilns could have provided CBM for a wave of urban reconstruction recorded for Rab, Senj and *Tarsatica*, is yet to be analysed.

91 Earlier pottery was fired on open fires or within pits (Barbarić 2012, 16–17; for a general overview Šimić-Kanaet 1996, 151–153). A potential parallel for kiln's construction could be that of the Bronze age kilns uncovered at Monkodonja hillfort in Istria (see Buršić Matijašić 1998, 29, 49–50), though no kilns have been so far identified on Liburnian territory (for present-day Dalmatia see Barbarić 2012, 37).

92 Arnold 1985, 32.

93 That of government participation, Peacock 1987, 15–21, which can be compared to the retainer workshop model as seen by Costin 1991, 9.

94 Peacock 1997, 18–19.

95 Costin 1991, 8.

96 Pannella 1989, 156–161, 163.

97 For wine see Pannella 1989, 166.

98 Matijašić 1989, 65–66.

Concluding remarks

By combining data gathered from landscape, production facilities and products, and products' distribution analysis, a preliminary overview of the models of pottery and CBM production on the Eastern Adriatic has been proposed.

As some data is still being processed (such as archaeometric analysis of clays and pottery from Liburnia⁹⁹), this picture is open to re-elaboration, reinterpretation and integration, being in fact a starting point to be tested as new information is obtained. Also, future finds of pottery and CBM kilns or *figlinae* will help to broaden our understanding of all analysed aspects. While pottery and CBM production holds a dual value as indicator of ancient economic activities, being a product in its own right, but also an indirect indi-

cator of other production activities such as agriculture, its role in shedding light on the ancient economy is being ever more recognised. Thus, by analysing this industry we have also tried to establish a link to a more general productive and economic picture of the north-eastern Adriatic through the first centuries of Roman rule in the area. Though indirectly, a vibrant agro-pastoral landscape has been supposed, organised within differently organised rural estates, while links to maritime resources and woodland exploitation can be also inferred, backed by data gathered through interdisciplinary research activities. Further analysis on each of the afore-mentioned sites will help in pinpointing local specificities, creating a more detailed local economic picture and helping answer those questions that have here been only preliminarily tackled.

Bibliography

ANIĆ, B. and D. PERICA 2003, Structural features of cultural landscape in the karst area (landscape in transition) / Strukturne in oblikovne značilnosti kraške kulturne krajine (pokrajina v preobrazbi). – *Acta carsologica* 32/1, 173–188.

ARNOLD, D. 1985, *Ceramic Theory and Cultural Process*. – Cambridge.

ARNOLD, D. 2011, Ceramic Theory and Cultural Process after 25 Years. – *Ethnoarchaeology* 3 (1), 63–98.

BABIĆ, L.J. and J. ZUPANIĆ 1998, Nearshore Deposits in the Middle Eocene Clastic Succession in Northern Dalmatia (Dinarides, Croatia). – *Geologia Croatica* 51/2, 175–193.

BARBARIĆ, V. 2012, *Tipologija lončarije iz kasnoga brončanoga i željeznoga doba s područja Dalmacije*. – PhD dissertation. Filozofski fakultet, Zagreb.

BEKIĆ, L. and M. PEŠIĆ 2014, Pokazatelji pomorske trgovine na istočnoj obali jadrana na osnovu nalaza amfora iz dvije rimske luke. – *Histria archaeologica* 45, 95–112.

BENAC, Č., I. RUŽIĆ and E. ŽIC 2007, Ranjivost obala u području Kvarnera. – *Pomorski zbornik* 44/1, 201–214.

BENAC, Č., I. RUŽIĆ, K. LJUTIĆ and A. FERENAC-GRUBIŠIĆ 2012, Ranjivost obala otoka Raba. – In: J. Andrić and R. Lončarić (eds.), *Rapski zbornik II*, Rab, 235–243.

BOGUNOVIĆ, M. and A. BENZA 2006, Tla krša – temeljni čimbenik biljne proizvodnje. – In: B. Biondić and J. Božičević (eds.), *Hrvatski krš i gospodarski razvoj*, Zagreb, 41–50.

BORZIĆ, I. 2014, Keramičko kuhinjsko posuđe XI. legije s lokaliteta Burnum–Amfiteatar. – In: G. Lipovac Vrkljan, B. Šiljeg, I. Ožanić Roguljić and A. Konestra (eds.), *Rimske keramičarske i staklarske radionice. Proizvodnja i trgovina na jadranskom prostoru. Zbornik 2. međunarodnog arheološkog kolokvija, Crikvenica 28.–29. listopada 2011*, Crikvenica, 287–300.

BRAJKOVIĆ, T. 2011, Lokalitet Rakitnica – Tri bunara u vodičkom zaleđu. – In: G. Lipovac Vrkljan, I. Radić Rossi and B. Šiljeg (eds.), *Rimske keramičarske i staklarske radionice. Proizvodnja i trgovina na jadranskom prostoru. Zbornik 1. međunarodnog arheološkog kolokvija, Crikvenica 23.–24. listopada 2008*, Crikvenica, 95–101.

BRUSIĆ, Z. 2000, *Hellenistic and Roman Relief Pottery in Liburnia (North-East Adriatic, Croatia)*. – BAR International series XXX, Oxford.

BRUSIĆ, Z., M. ILKIĆ, M. MEŠTROV, M. PARICA and I. RADIĆ ROSSI 2012, Histoire des recherches à Pakoštane. – In: G. Boetto, I. Raadić Rossi, S. Marlier and Z. Brusić (eds.), *L'épave de Pakoštane, Croatie (fin IV^e - début V^e siècle par. J.–C.). Résultats d'un projet de recherche franco-croate*, *Archaeonautica* 17, 105–151.

BULIĆ, D. and I. KONCANI UHAČ 2011, The Pottery Workshop at Fažana and its Transformation in the Late Roman Period. – *Histria Archaeologica* 41, 109–146.

BURŠIĆ MATIJAŠIĆ, K. 1998, *Gradina Monkodonja. Tipološko-statistička obrada keramičkih nalaza srednjobrončanodobne istarske gradine Monkodonja kod Rovinja*. – Monografije

99 The archaeometric analysis are being carried out within the project RED: Roman economy in Dalmatia (HRZZ, IP-11-2013-3973).

i katalozi 9, Arheološki muzej Istra, Pula.

BUTORAC, L., V. TOPIĆ and G. JELIĆ 2009, Površinsko otjecanje oborina i gubici tla u opožarenim kulturama alepskog bora (*Pinus halepensis* Mill.) na koluviju / Surface runoff and soil loss in burnt stands of aleppo pine (*Pinus halepensis* Mill.) growing on colluvial soils. – *Šumarski list* 3–4, CXXXIII, 165–174.

CARRE, M. B. and F. TASSAUX 2012, Kompleks sveta Marina, Lorun i Červar. – In: M. B. Carre, V. Kovačić and F. Tassaux, (eds.), *Sjeverno priobalje Poreštine u antici, Zavičajni muzej Poreštine, CNRS Centre Camille Jullian, Ausonius*. – Maison de Archaeologie, Poreč, 94–106.

COSTIN, C. L. 1991, Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production. – *Archaeological Method and Theory* 3, 1–56.

CRMARIĆ, R., M. JURAČIĆ, Č. BENAC and I. RUŽIĆ 2007, Sedimentacija na ušću Dubračine i Novljanske Ričine, Vinodolski kanal. – In: D. Gereš (eds.), *Zbornik radova, 4. Hrvatska konferencija o vodama. Hrvatske vode i Europska unija. – Izazovi i mogućnosti, Opatija 17.–19. svibnja 2007*, Opatija.

ČARGO, B. and M. MIŠE 2010, Lončarska proizvodnja u Isi / Pottery Production in Issa. – *Vjesnik za arheologiju i povijest dalmatinsku* 103, 7–40.

DEGRYSE, P. and J. POBLOME 2008, Clays for mass production of table and common wares, amphorae and architectural ceramics at Sagalassos. – In: P. Degryse and M. Waelkens (eds.), *Sagalassos VI. Geo- and Bio-archaeology at Sagalassos and in its Territory*, Leuven, 231–254.

DODIG, R. 2007, Rimski vojni pečati na crijepu iz Ljubuškoga. – *Opuscula archaeologica* 31, 143–163.

GLICKSMAN, K. 2005, Internal and external trade in the Roman province of Dalmatia. – *Opuscula archaeologica* 29, 189–230.

GLUŠČEVIĆ, S. 1988, Antička keramika s otoka Paga. – In: Ž. Rapanić (eds.), *Arheološka istraživanja na otocima Krku, Rabu, Pagu i u hrvatskom primorju. Znanstveni skup Krk, 24.–27.IX.1985*, Zagreb, 73–87.

GLUŠČEVIĆ, S., M. JURIŠIĆ, R. ŠOŠTARIĆ and S. VUJČIĆ KARLO 2006, Evidence for the Nutrition of Sailors from the Roman Harbour at Zaton near Zadar. – *Archaeologia Maritima Mediterranea* 3, 147–161.

GRAHAM, S. 2006, *EX FIGLINIS: The Network Dynamics of the Tiber Valley Brick Industry in the Hinterland of Rome*. – BAR International Series 1468, Oxford.

ILKIĆ, M. 2013, Uvala Plemići između Rtine i Ljupča. – In: A. Uglešić and I. Fadić (eds.), *50 godina Odjela za arheologiju Sveučilišta u Zadru, Zadar*, 52–53.

ILKIĆ, M. and M. PARICA 2017, Podmorski arheološki nalazi u okolici Ljupča. – In: J. Faričićand and J. Lenkić (eds.), *Župa Ljubač – zrcalo povijesnih i geografskih mijena u sjeverozapadnom dijelu Ravnih Kotara, Zadar*, 98–112.

JADRIĆ, I. 2007, Primjeri za trgovinu vinom i maslinovim uljem u rimskoj provinciji Dalmaciji. – *Histria antiqua* 15,

353–361.

JELIĆIĆ RADONIĆ, J. and M. KATIĆ 2015, *Pharos. Osnivanje antičkog grada I. U osvjet 2400. obljetnice utemeljenja*. – Biblioteka knjiga mediterana 86, Split.

KATIĆ, M. 1999–2000, Uvod u proučavanje keramičkih radionica Farosa. – *Opuscula archaeologica* 23–34, 49–58.

KIRIGIN, B., J. HAYES and P. LEACH 2002, Local pottery production at Pharos. – In: N. Cambi, S. Čače and B. Kirigin (eds.), *Grčki utjecaj na istočnoj obali Jadrana – zbornik radova / Greek Influence along the East Adriatic Coast – proceedings*, Split, 241–260.

KIRIGIN, B., T. KATUNARIĆ and L. ŠEŠELJ 2005, Amfore i fina keramika (od 4. do 1. st. pr. Kr.) iz srednje Dalmacije: preliminarni ekonomski i socijalni pokazatelji. – *Vjesnik za arheologiju i povijest dalmatinsku* 98, 7–21.

KONESTRA, A. and I. OŽANIĆ ROGULJIĆ 2016, Illuminating the way: later roman factory lamp from a grave context in Crikvenica. – In: G. Lipovac Vrkljan, M. Ugarković and I. Ožanić Roguljić (eds.), *Roman and Late Antique Roman Lamps: Production and Distribution, Contacts on the Mediterranean, E-ZIA 1*, Zagreb, 149–155.

LAZZARINI, A. 2014, Remi per le galee. Dai boschi della Carnia all'Arsenale di Venezia. – In: A. Fornasin and C. Povololo (eds.), *Per Furio. Studi in onore di Furio Bianco*, Udine, 29–38.

LIPOVAC VRKLJAN, G. and R. STARAC 2007, Soline – uvala Sv. Petra (otok Krk). – *Annales Instituti Archaeologici* 3, 97–98.

LIPOVAC VRKLJAN, G. 2009, L'officina ceramica di Crikvenica. – In: S. Pesavento Mattioli and M.-B. Carre (eds.), *Olio e pesce in epoca romana: produzione e commercio nelle regioni dell'alto Adriatico, Atti del convegno (Padova, 16 febbraio 2007)*, Padova, 309–314.

LIPOVAC VRKLJAN, G. and I. OŽANIĆ ROGULJIĆ 2013, Distribucija crikveničke keramike kao prilog poznavanju rimskog gospodarstva. – *Senjski zbornik* 40, 255–270.

LIPOVAC VRKLJAN, G. and B. ŠILJEG 2010, Lopar-Podšilo, zaštitno arheološko istraživanje rimske keramičarske peći 2009. – *Annales Instituti Archaeologici* 6, 64–69.

LIPOVAC VRKLJAN, G. and B. ŠILJEG 2012, Prilog antičkoj topografiji otoka Raba – rimska keramičarska peć na Loparu. – *Senjski zbornik* 39, 5–34.

LIPOVAC VRKLJAN, G. and R. STARAC 2014, Antička mikrotopografija Hrvatskog primorja. – In: G. Lipovac Vrkljan, B. Šiljeg, I. Ožanić Roguljić and A. Konestra (eds.), *Rimske keramičarske i staklarske radionice. Proizvodnja i trgovina na jadranskom prostoru. Zbornik 2. međunarodnog arheološkog kolokvija, Crikvenica 28.–29. listopada 2011*, Crikvenica, 93–105.

LIPOVAC VRKLJAN, G., B. ŠILJEG, I. OŽANIĆ ROGULJIĆ, A. KONESTRA, I. KOSTEŠIĆ and N. ŠEGVIĆ 2014, Projekt Arheološka topografija otoka Raba: rezultati terenskog pregleda poluotoka Lopara u 2013. godini. – *Annales Instituti Archaeologici* 10, 202–208.

LIPOVAC VRKLJAN, G., B. MUŠIĆ, B. ŠILJEG and

- A. KONESTRA 2015, Geofizička istraživanja antičkih struktura u uvali Mahučina na otoku Rabu (općina Lopar) 2014. godine (projekt RED, Hrvatska zaklada za znanost). – *Annales Instituti Archaeologici* 11, 80–82.
- LIPOVAC VRKLJAN, G., I. VALENT, A. KONESTRA and I. OŽANIĆ ROGULJIĆ 2016, Antički proizvodni keramičarski kompleks u Crikvenici – zaključna istraživanja 2015. godine. – *Annales Instituti Archaeologici* XII, 144–151.
- MARDEŠIĆ, J. 2006, Tegule s pečatima iz starog fonda arheološke zbirke u Vidu kod Metkovića. – *Vjesnik za arheologiju i povijest dalmatinsku* 99, 99–112.
- MARJANAC, T. and V. ČOSVIĆ 2000, Tertiary Depositional History of Eastern Adriatic Realm. – *Vijesti Hrvatskoga geološkog društva* 37/2, 93–103.
- MATIJAŠIĆ, R. 1983, Cronografia dei bolli laterizi della figulina Pansiana nelle regioni adriatiche. – *Antiquité* 95–2, 961–995.
- MATIJAŠIĆ, R. 1989, Rimske krovne opeke s radioničkim žigovima na području sjeverne Liburnije. – In: Ž. Rapanić (ed.), *Arheološka istraživanja na otocima Krku, Rabu, Pagu i u hrvatskom primorju. Znanstveni skup Krk, 24–27.IX.1985*, Zagreb, 61–71.
- MATIJAŠIĆ, R. 1998, *Gospodarstvo antičke Istre. Arheološki ostaci kao izvor za poznavanje društveno-gospodarskih odnosa u Istri u antici (I. st. pr. Kr. - III. st. posl. Kr.)*. – Povijest Istre, knjiga 4, Pula.
- MIHEVC, A. and M. PRELOVŠEK 2010, Geographical Position and General Overview. – In: A. Mihevc, M. Prelovšek and N. Zupan Hajna (eds.), *Introduction to the Dinaric Karst*, Postojna, 6–8.
- MILETIĆ, Ž. 2011, Production of tegulae in Burnum in the context of building activities. – In: G. Lipovac Vrkljan, I. Radić Rossi and B. Šiljeg (eds.), *Rimske keramičarske i staklarske radionice. Proizvodnja i trgovina na jadranskom prostoru. Zbornik 1. međunarodnog arheološkog kolokvija, Crikvenica 23.–24. listopada 2008*, Crikvenica, 263–277.
- MIŠE, M., I. KATONA SERNEELS and V. SERNEELS 2015, Ancient Ceramic production on Central Dalmatian islands, southern Croatia: raw material, kilns and fine ware. – *EMAC 2015. 13th European meeting on ancient ceramics (Athens 2015)*, Conference programme and abstracts, Athens, O–32.
- NEDVED, B. 1990, *Felix Arba. Pregled povijesti i sponika otoka Rabau rano rimsko doba*. – Rab.
- OŽANIĆ ROGULJIĆ, I. 2012, Pottery from the workshop of Sextus Metilius Maximus (Crikvenica–Igralište/Ad Turre, Northern Dalmatia). – *Rei cretariae Romanae fautorum acta* 42, 125–132.
- PANELLA, C. 1989, Le anfore italiane del II secolo D.C. – In: *Amphores romaines et histoire économique. Dix ans de recherche, Actes du colloque de Sienne (22–24 mai 1986)*, Rome, 139–178.
- PEACOCK, D. P. S. 1997, *La ceramica romana tra archeologia ed etnografia*. – Bari.
- PEDIŠIĆ, I. and E. PODRUG, 2008, Antički opekarski pečati iz fundusa Muzeja grada Šibenika / Roman brick workshop stamps from the collection of the Šibenik City Museum. – *Opuscula archaeologica* 31, 81–141.
- PELLICIONI, M. T. 2012, *La Pansiana in Adriatico. Tegole romane per navigare tra le sponde*. – Ferrara.
- RAUŠ, Đ. and S. MATIĆ 1987, Gospodarenje i namjena rapskih šuma u prošlosti, sadašnjosti i budućnosti. – In: A. Mohorovičić (ed.), *Rapski zbornik, Zbornik radova sa znanstvenog skupa o otoku Rabu održanog od 25. do 27. listopada 1984. godine*, Zagreb, 99–110.
- RIEGER, A. K. and H. MÖLLER 2011, Kilns, Commodities and Consumers: Greco-Roman Pottery Production in Eastern Marmarica (Northwestern Egypt). – *Archäologischer Anzeiger* 1(1), 141–170.
- SANADER, M. 2006, O antičkoj provincijalnoj arheologiji u Hrvatskoj s naglaskom na gospodarstvo. – *Opuscula Archaeologica* 30, 143–182.
- SCHMIDT, R., J. MÜLLER, R. DRESCHER-SCHNEIDER, R. KRISAI, K. SZEROCZYŃSKA and A. BARIĆ 2000, Changes in lake level and trophy at Lake Vrana, a large karstic lake on the Island of Cres (Croatia), with respect to palaeoclimate and anthropogenic impacts during the last approx. 16,000 years. – *Journal of Limnology* 59(2), 113–130.
- SHIEL, R. S. and J. C. CHAPMAN 1988, The extent of change in the agricultural landscape of Dalmatia, Yugoslavia, as a result of 8,000 years of land management. – In: J. C. Chapman, J. Bintliff, V. Gaffney and B. Slapšak (eds.), *Recent Developments in Yugoslav Archaeology*, BAR International Series 431, Oxford, 31–43.
- SKELAC, G. and I. RADIĆ ROSSI 2006, Punta Zidine. – *Hrvatski arheološki godišnjak* 2, 272–274.
- ŠOŠTARIĆ, R. 2005, The development of postglacial vegetation in coastal Croatia. – *Acta Botanica Croatica* 64 (2), 383–390.
- SORICELLI, G. 2004, Saltus. – In: A. Storchi Marino (ed.), *Economia, amministrazione e fiscalità nel mondo romano. Ricerche lessicali*, Bari, 97–123.
- ŠEGVIĆ, B., L. ŠEŠELJ, D. SLOVENEK and R. FERREIRO MAEHLMANN 2012, Composition, Technology of Manufacture, and Circulation of Hellenistic Pottery from the Eastern Adriatic: A Case Study of Three Archaeological Sites along the Dalmatian Coast, Croatia. – *Geoarchaeology* 27 (1), 63–87.
- ŠEGVIĆ, B., M. UGARKOVIĆ, A. SÜSSENBERGER and A. MOSCARIELLO 2016, Compositional properties and provenance of Hellenistic pottery from the necropolis of Issa with evidences on the cross-Adriatic and the Mediterranean-scale trade. – *Mediterranean Archaeology and Archaeometry* 16 (1), 23–52.
- ŠEŠELJ, L. and M. VUKOVIĆ 2012/2013, Liburnsko naselje u Radovinu: preliminarna analiza keramičkog ma-

- terijala / Liburnian settlement in Radovin: preliminary analysis of pottery assemblage. – *Diadora* 26/27, 333–350.
- ŠIMIĆ-KANAET, Z. 1996, Razvoj lončarskih peći i tehnologije pečenja na prapovijesnim i antičkim primjerima. – *Opuscula archaeologica* 20, 151–177.
- ŠOŠTARIĆ, R. and H. KÜSTER 2001, Roman plant remains from Veli Brijun (island of Brioni), Croatia. – *Vegetation History and Archaeobotany* 10 (4), 227–233.
- STARAC, R. 1991, Antička keramika sa lokaliteta „Igralište“ u Crikvenici. – *Vinodolski zbornik* 6, 221–235.
- STICOTTI, P. and E. NOWOTNY 1896, Aus Liburnien und Istrien. – *Archäologisch-epigraphische Mittheilungen* XIX/2, 159–180.
- ŠTEFANEC, N. 2003, Trgovina drvetom na Triplex Confiniumu ili kako izvući novac iz senjskih šuma (1600–1630)? – In: D. Roksandić, I. Mimica, N. Štefanec and V. Glunčić-Bužančić (eds.), *Triplex Confinium (1500-1800): Ekohistorija, Zbornik radova sa međunarodnog znanstvenog skupa održanog od 3. do 7. svibnja 2000. godine u Zadru*, Split, 337–362.
- TONČINIĆ, D., A. TABAK and A. LIBRENJAK 2011, Rimski vojni pečati u cetinskoj krajini. – In: A. Librenjak and D. Tončinić (eds.), *Arheološka istraživanja u cetinskoj krajini. Radovi kolokvija „Rimska vojska u procesu romaniziranja Provincije Dalmacije“*, Zagreb, 361–379.
- TOPIĆ, V., L. BUTORAC and G. JELIĆ 2006, Površinsko otjecanje padalina i erozija tla u šumskim ekosustavima alepskog bora / Surface rainfall flowoff and soil erosion in forest ecosystems of aleppo pine. – *Radovi šumarskog instituta, Izvanredno izdanje* 9, 127–137.
- TOŠEVSKI, A., D. GRGEC and B. PADOVAN 2012, Osnovno o genezi, sastavu i trošenju eocenskog fliša hrvatskog obalnog pojasa / Some characteristics of eocene flysch genesis, composition and weathering in croatian coast belt. – *Rudarsko-geološko-naftni zbornik* 25, 47–62.
- VIGOUROUX, C. 1962, Le Saltus arverne, complexe économique. – *Revue archéologique du Centre de la France* 1/3, 211–220.
- VUJOVIĆ, D. 2009, The Relationship Between the Middle Palaeolithic Sites in the Zadar Hinterland and the Zadar Islands. – In: S. Forenbaher (ed.), *A Connecting Sea: Maritime Interaction in Adriatic Prehistory*, BAR International Series 2037, Oxford, 1–11.
- WILKES, J. J. 1979, Importation and Manufacture of Stamped Bricks and Tiles in the Roman Province of Dalmatia. – In: A. Mc Whirr (ed.), *Roman Brick and Tile. Studies in Manufacture, Distribution and Use in the Western Empire*, BAR International Series 68, Oxford, 65–72.

Online resources

- M. VALERII MARTIALIS, Epigrammata, XIII, 140; (<http://www.perseus.tufts.edu/hopper/text?doc=urn:cts:latinLit:phi1294.phi002.perseus-lat1:1.pr>)
- C. PLINIUS SECUNDUS, Naturalis Historia, 8. 191; (http://penelope.uchicago.edu/Thayer/l/roman/texts/pliny_the_elder/8*.html)
- MARCUS TERENTIUS VARRO, De re rustica, 2. 196, 10; (http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Varro/de_Re_Rustica/2*.html#2.18)

dr. Ana Konestra
Institute of Archaeology
Ljudevita Gaja 32
HR-10000 Zagreb
ana.konestra@gmail.com

dr. Goranka Lipovac Vrkljan
Institute of Archaeology
Ljudevita Gaja 32
HR-10000 Zagreb
gorankalv@gmail.com

