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Chapter 8

Evidence of Dalmatian Beekeeping in Roman Antiquity

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Summary: Honey pots and beehives have not garnered much interest in studies of the history and archaeology of ancient Dalmatia in the past giving the impression of the absence of such evidence. What evidence does exist forms an important addition to the increasingly more perceptible mosaic of ancient Mediterranean apiculture. The current chapter synthesizes what past research exists on this topic and aggregates that with important new research conducted by the authors concerning archaeological evidence of beekeeping in this region.

Keywords: Central Dalmatia, honey, ceramic beehives, stone beehives, Brač, Novo Selo Bunje, chemical and organic residue analysis

Introduction

Apiculture covers a basic human need, consuming sweet food, a necessity as old as human existence itself (Germanidou 2018: 93). But the process of the production and the use of beekeeping products in the Roman Province Dalmatia has not been documented. This chapter will try to fill this gap, focusing on information gathered with new archaeological excavations and field surveys.

Sites with Shards of Ceramic Beehives in Central Dalmatia (Map 1a)

The most common evidence of beekeeping in Central Dalmatia is shards of ceramic beehives. Such ceramic beehives were widespread in Antiquity in the Mediterranean area (Jones 1976; Rosado and Barreño 1995; Crane 1999: 45-46; Anderson-Stojanović and Jones 2002: 345-376, Morín de Pablos and De Almeida 2014). Ceramic beehives are mentioned by Columella who said that they were not favored because during winter,

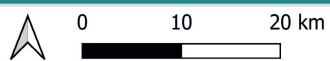
they froze and in summer, burned (Crane 1983: 52), but maybe this depends on the climate and region.

The first published finds of beehives in Dalmatia are from Stari Grad (Pharia) and Stari Grad Plain (Map 1a: 4) on the island Hvar. They are mostly just mentioned in publications without a dating reference or context (Kirigin 2001: 226, T 1: 5; Kirigin 2004: 133-134). A shard is found during the research of a *villa maritima* on the site of Soline, Sv. Klement (Pakleni otoci) (Map 1a: 5) and in Vis (*Issa*) (Map 1a: 6) (Ugarković et al. 2016: 164, Figure 6).

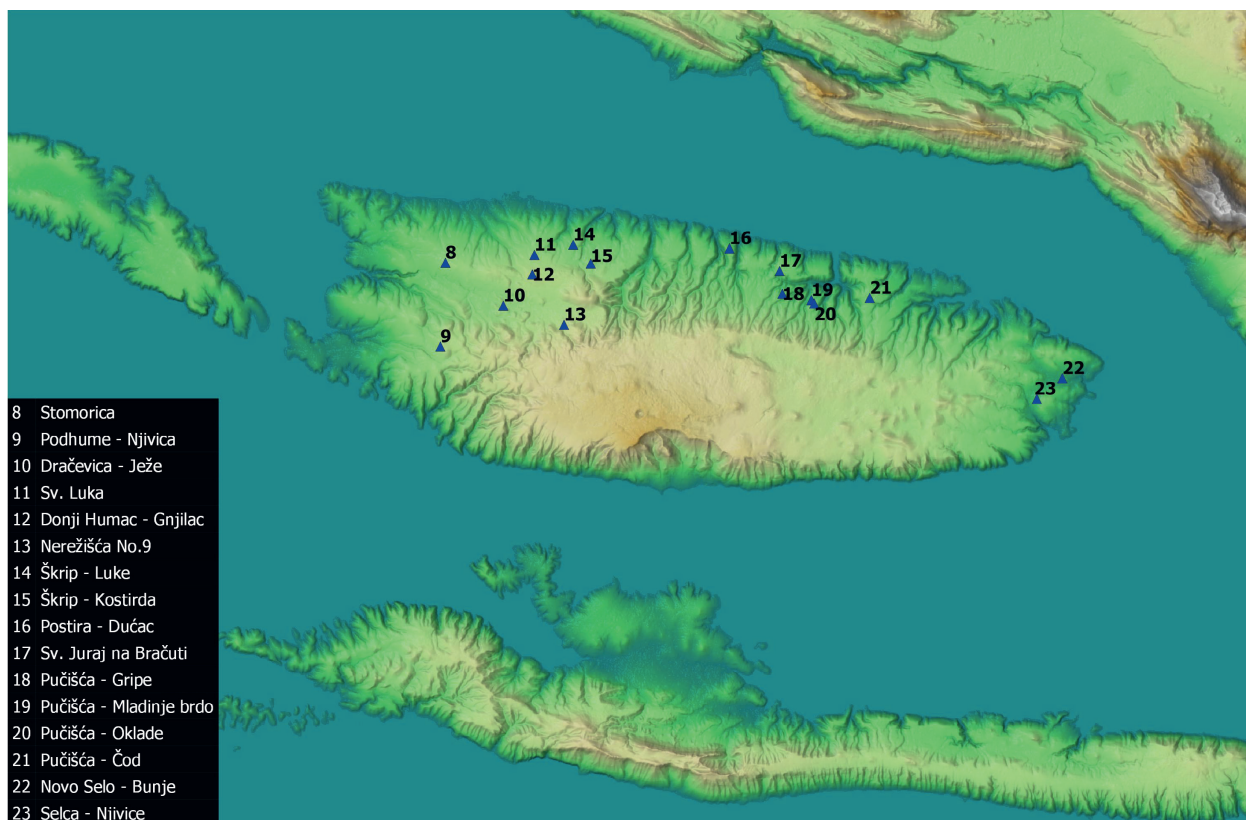
At Vis (*Issa*) along the city walls, architecture has been preserved, only partially researched. In this context numerous fragments of hives have been found.¹

Along the coast, most of beehive shards were found during field surveys. One is located at the late rural Roman site Podgora – Vruje Podspile (Map 1: 7)

¹ <http://baza.iarh.hr/public/locality/detail/1701> viewed 25 October 2020.



Map 1a



Map 1b

Njivica Podhume

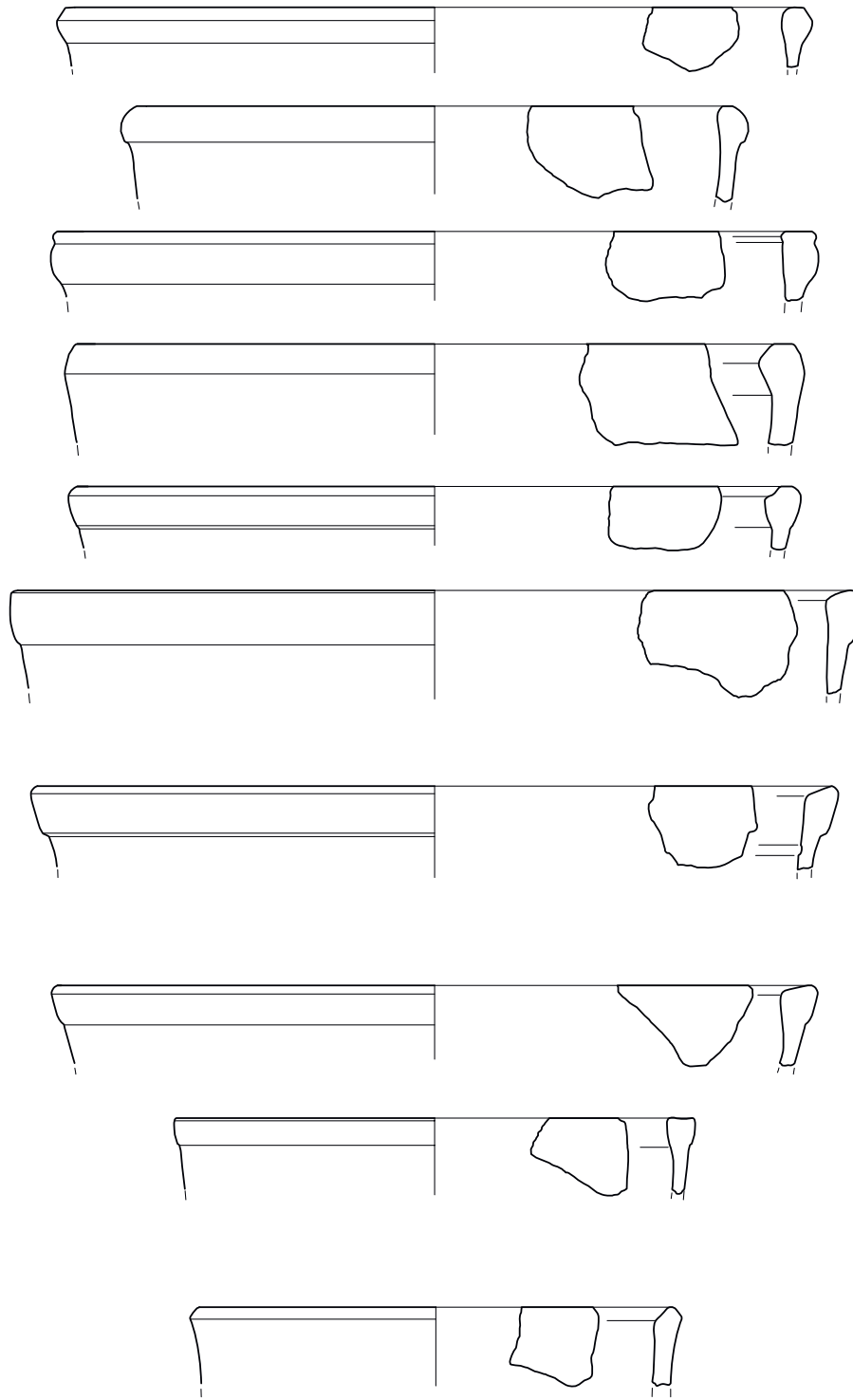


Figure 1. Beehives from the Njivica Podhume site.

(Tomasović 2006: 57, T. XI, 3). There are several finds from hillforts such as Kosmač near Marina (Map 1a: 24), and at the hillfort near hamlet Baradići (Seget Gornji) (Map 1a: 1) (Miletić 2008: 16; Paraman et al. 2020, fig. 33). On Late Iron age hillforts Late Republican and Early Roman amphorae are often found as evidence of trade with the local population. These hives may be part of the same trade and exchange of goods and ideas. Two finds are from urban contexts Trogir (*Tragurium*) (Map 1a: 2) and Stobreč (*Epetion*) (Map 1a: 3) (Paraman et al. 2019: in print; Paraman et al. 2020: T. 1:4; Ugarković and Konestra forthcoming T. 5/40).

The island of Brač (see Map 1b) where the largest number of ceramic beehive fragments is found during archaeological excavations and field surveys will form the case study of the present chapter. The finds can be dated, and for part of them, their context is known. Fragments of beehives have been found at 16 sites on the island of Brač. Some of the sites can be dated to the Late Hellenistic period others to the Late Roman period, but some are exclusively Roman as far as the survey results showed. We present the sites with the basic information available from the surveys, excavations, and bibliography.

The most important site is the Novo Selo Bunje site (Map 1b, 22; Figure 5) excavated since 2015, where many fragments of ceramic beehives have been found and where chemical analysis has been conducted (Jelinčić 2005b; Botte et al. 2016; Botte et al. 2017: 50; Jelinčić Vučković and Botte, 2018: 127-135; Botte et al. 2019). This is the largest site on the island where a Roman *villa rustica* was built in the 1st half of the 1st century CE. The site also offers excellent insight into the rural life in Central Roman Dalmatia. This site has been known to researchers since the beginning of the 20th cent. as parts of the architecture and sarcophagi remains were visible before excavation started. The site is dated from the 1st – 7th century CE. It has a *pars urbana* with small *thermae* or bath and a *pars rustica* with several areas used in the production of the wine and olive oil (Bulić 1914: 105–106; Vrsalović 1960: 33–161; Vrsalović 1968; Zaninović 1968: 357–373; Fisković 1981: 105–137; Cicarelli 1982; Zekan 1992: 9–20; Kovačić 1994: 91–97; Stančić et al. 2004: 110–112; Jelinčić Vučković 2013: 167–174). The beehive finds from Bunje are found in all areas of the site and can be dated from the 2nd century CE.

Stomorica (Map 1b, 8, Figure 3, Figure 9: 4) is one of the largest sites on Roman Brač. It is presumed that a Roman *villa* was built here. The main concentration of the finds is to be found in the vicinity of the church of St. Mary. The church was built in the 12th cent. on the ruins of the Roman architecture still visible on the site. Finds from the prehistoric, late Hellenistic, Early

Roman and Late Antique period can be found: *amphorae*, *dolia*, *tegulae*, *imbrices*, pipes, and pottery (Kovačić and Staničić 1992: 1–2; Stančić et al. 1999: 149; Jelinčić 2005a: 97). Several fragments of beehives were found, too, and one of them belongs to the flat base (Figure 3, Figure 9: 4). A flat base made it possible for the hive to stand upright. This suggests the existence of upright beehives but does not exclude the presence other hive types as tubular or horizontal with the rounded base because so far, we have not encountered any entire hives, only hive fragments.

Pučišća Gripe (Map 1b, 18). During surveys, fragments of amphorae, *dolia*, pottery, and *tegulae* were found, mostly on drywalls (Staničić et al. 1999: 141) next to the road that probably damaged a part of the site. A small quantity of the ceramic beehives was found. Next to the site, there is a location where the remains of stone beehives were found. The lower part of the hive remains without the upper slabs forming a roof which could be removed for the honey collection (Jelinčić 2005a: 101). Finds from Roman Antiquity or any other period were not found among these stone beehives, making the dating impossible. Stone beehives are registered at many sites on the island dating to the late Middle Ages and were in use till the middle of the 20th century. The island of Brač has the most significant concentration of the stone beehives on the Eastern Adriatic (Škrip, Dol, Blaca...) (Domačinović 1980: 130; Faber and Nikolanci 1985: 4–5; Crane 1983: Figure 131, p. 112–113). They are registered around Omiš and Makarska too. It does not come as a surprise because stone is the primary natural resource of the island, and it was on hand for its inhabitants. The hives were built of stone slabs and organized in rows, and hundreds of these beehives existed together.

Selca Njivice (Map 1b, 23; Figure 6: 5–6; Figure 9: 1–2). The site is situated in the eastern part of the Selca cemetery. It is assumed that a Roman *villa rustica* was built here. A large pottery concentration, mostly amphorae and bricks, was found (Čače et al. 1999: 113). A grave dated to the 4th cent. CE was discovered in 1921 (Vrsalović 1960: 92–93) as well as part of the inscription (Bulić 1921: 39; Zekan 1992: 14). A substantial quantity of beehive fragments was found on this site, belonging to the body of the beehive.

Postira Dučac (Map 1b, 16): a large pottery concentration was found on the site with some architectural remains. The finds belong mostly to the Roman period and a small quantity to the Late Hellenistic period and pre-Hellenistic period (Staničić et al. 1999: 139). Fragments of beehives were found here too.

Donji Humac Gnjilac (Map 1b, 12). On this site, a small quantity of Roman and prehistoric pottery was found. The

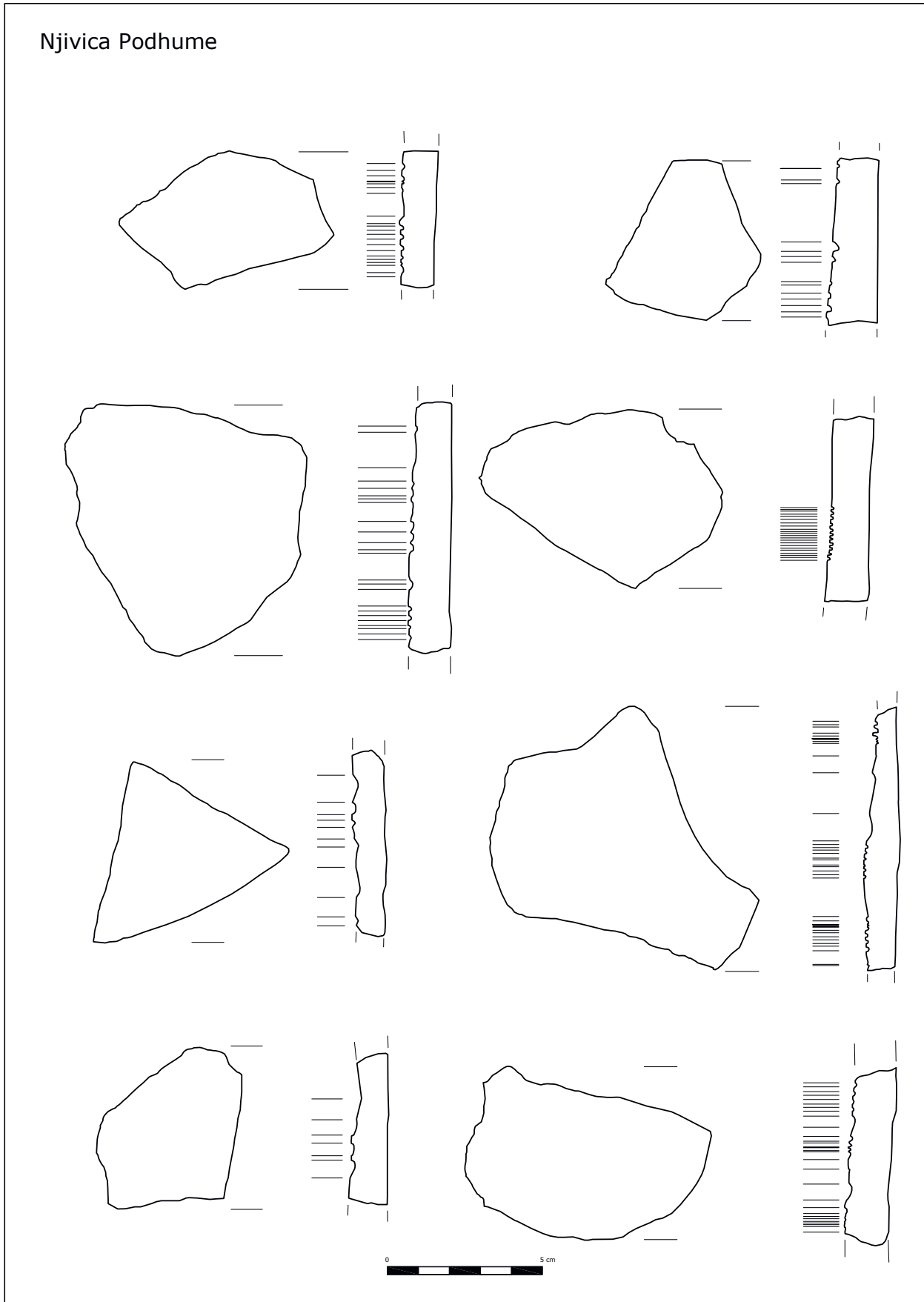


Figure 2. Beehives from the Njivica Podhume site.

Stomorica

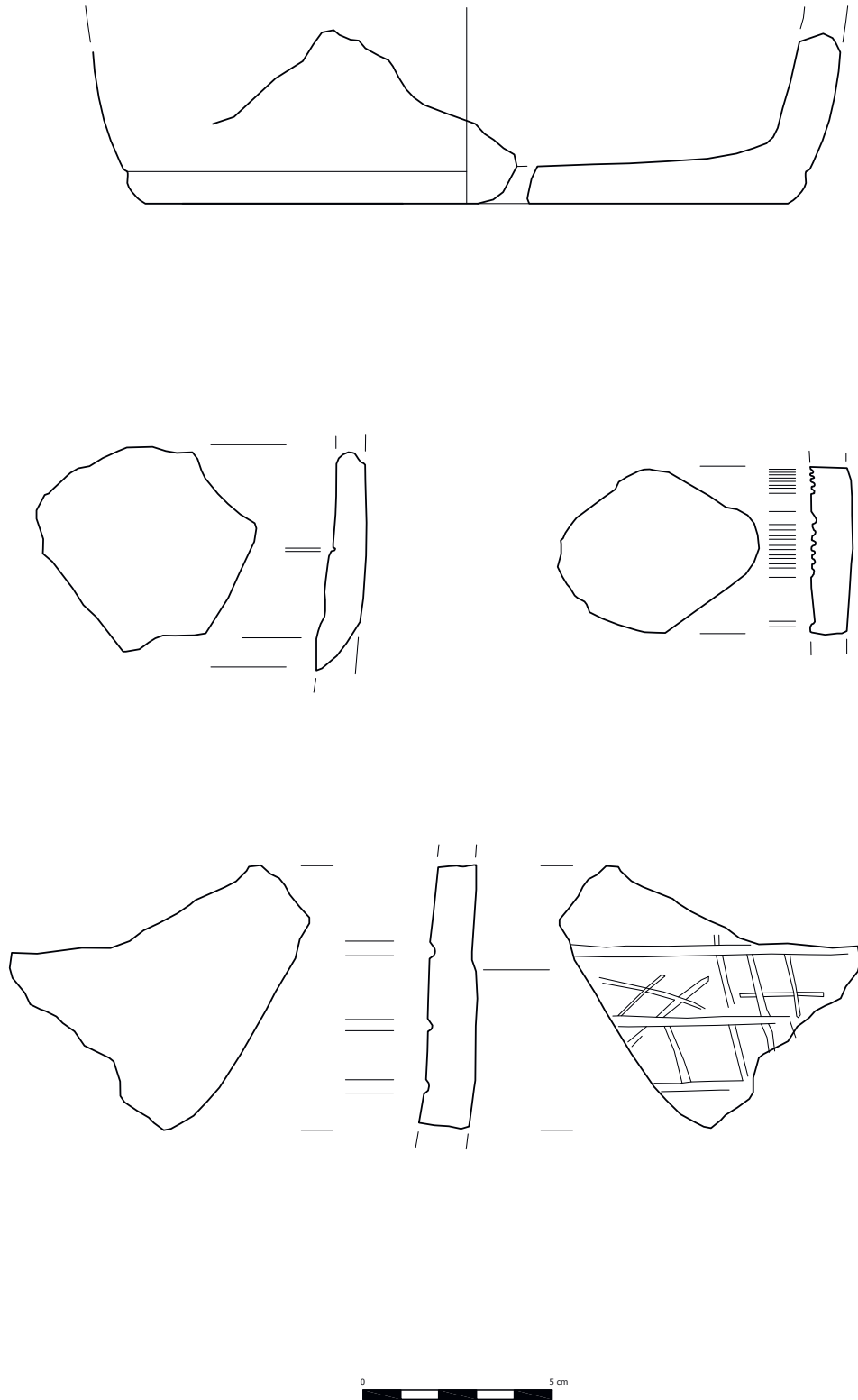


Figure 3. Beehives from the Stomorica site.

finds belong to the amphorae, pots, and iron slag (Stančić *et al.* 1999: 158). Beehive fragments were found too.

Dračevica Ježe (Map 1b, 10): this site was partially damaged during nearby road construction. Some architectural remains can be seen on the site among a large concentration of the pottery, bricks, and mortar (Stančić *et al.* 1999: 147-148). Some of the fragments that were found could have belonged to the beehives mostly because of seemingly shared fabric with the other beehives on the island.

Škrip Kostirda (Map 1, 15). The site is located next to the pond and an old road. A very large concentration of Roman pottery was found (Stančić *et al.* 1999: 168). Some of the pottery of African origin was dated to the 2nd and 3rd century CE. The other pottery fragments belong to the *dolia*, amphorae, and *tegulae* (Jelinčić 2005a: 84-85). An inscription was found here too, and the literature mentions several sarcophagi (Faber and Nikolanci 1985: 24, note. 50, p. IV, 4; Gjurašin 2001: 107; Stančić *et al.* 2004:167). It is assumed that a Roman villa and cemetery existed here. Beehive fragments were found too.

Škrip Luke (Map 1b, 14; Figure 6: 1-2; Figure 7) is one of the largest sites on the island (Stančić 1999: 165; Jelinčić Vučković 2011: 127-149). Some of the drywalls are built with regular stones, and some Roman walls with mortar have been preserved. There are finds of the *tesserae*, mortar, *amphorae*, *tegulae*, pottery, *sarcophagi* remains, coins and an altar with an inscription. The site is dated from the 1st to 5th century CE. Beehive fragments have been found here too.

Pučišća Mladinje brdo (Map 1, 19). A large concentration of finds has been found on this site: *amphorae*, *tegulae*, pottery, glass bracelets, part of a stone column, an altar and *tegulae* with stamps (Pansiana) (Jelinčić 2005a: 67-68; Botte *et al.* 2017). Beehive fragments have been found here too.

Nerežišća Ne 9 (Map 1b, 13). The site is located in the interior part of the island next to a valley with fertile soil. A small quantity of finds has been found here (Stančić *et al.* 1999: 119), among them shards of beehives.

Pučišća Oklade PC-PO (Map 1, 20, Figure 6: 6; Figure 9: 3). A large concentration of finds has been found here. They are dated to the late Hellenistic, Early Principate, and Late Antique period (Stančić *et al.* 1999: 145-146). The finds consist mostly of amphorae, but a few beehive shards were found too.

Sv. Juraj Bračuta (Map 1b, 17). This site is dominated by the Early Medieval church surrounded by a large

concentration of pottery from Prehistory, Late Hellenistic, Early Principate and Late Antique period. Except for the pottery, bricks, glass, and mortar are found (Stančić *et al.* 1999: 139-140) and beehive fragments too.

Pučišća Čôd (Map 1b, 21). This site is one of the largest sites where a Roman *villa* was built. Fragments of pottery, sculpture, *tegulae*, *amphorae*, *dolia*, *tubuli* and graves were found. Some architecture remains can be seen too (Stančić *et al.* 1999: 142; Vrsalović 1960: 80; Cambi 2004: 249). Among the finds, beehive fragments were found too.

Sv. Luka (Map 1b, 11). The Early Medieval church dominates the site. Around the church, one Early Christian sarcophagus can be seen, remains of *dolia*, *amphorae*, bricks, pottery plaster, and other finds (Stančić *et al.* 1999: 152; Vrsalović 1960: 102; Fisković 1981: 121) like beehives.

Podhume Njivica (Map 1b, 9, Figure 1-2, 4, 8). The site offers excellent views over the Splitska vrata and the island of Šolta. Some architectural remains are preserved, probably dating to the 1st century BCE. Finds consist of the remains of *dolia*, *amphorae*, mortar, and Roman pottery. Some of the finds belong to prehistory (Stančić *et al.* 1999: 118), and ceramic beehive shards have been found too.

An Attempt at Creating a Typology (Figure 4)

It would be presumptions to make a typology of the beehives found in Central Dalmatia because so far, only shards of the body, rims, and the base were registered. One of the problems is that this type of pottery is not recognized among most of the scholars in Croatia, and as it often happens, the shards lay in the depots unrecognized and unpublished. Thus, we make here a starting point for the creation of a well-established local typology in the hopes that it will help local scholars recognize this important Dalmatian and Dalmato-Roman economic activity, especially in rural areas. More research is necessary. At present we have seven types of rims with varieties among them (Figure 4). Because we do not possess whole beehives, we cannot attribute the rims to upright or tubular hives. There are at least six identifiable ceramic beehive fabrics (Figure 6). Scoring on these fabrics, a typical characteristic for ceramic beehives in the ancient Mediterranean, when present aids in their recognition of potential hives even from the discovery of a small shard and fabric analysis of those scored varieties aids in identifying those without the typical incised lines.

Njivica Podhume

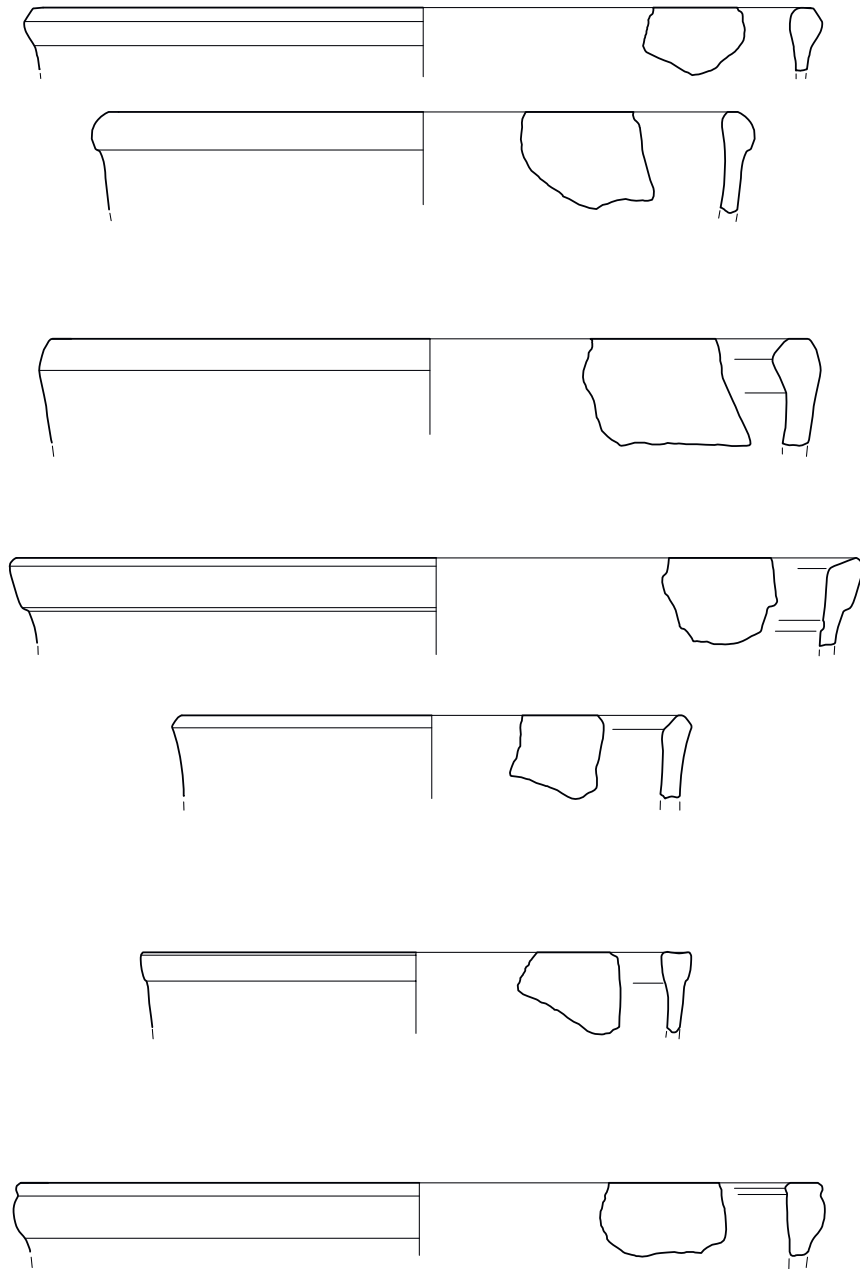


Figure 4. Types of the rims of the beehives from Njivica Podhume site.

The Contribution of Chemical Analyses to Our Understanding of Ancient Honey Production: A Case Study of Novo Selo Bunje

The discoveries made at the Roman villa of Novo Selo Bunje site on the island of Brač, beyond the ceramic forms that had already attracted our attention, were the subject of chemical analyses undertaken to determine the presence of possible markers of the products of the beehive.

Suppose we can identify beehives by their characteristic shape. In that case, chemical and archaeometric analyses do not allow it to be done for transport containers because honey does not leave chemical markers in the wall (pace Bortolin 2008: 14-16), unlike other foodstuffs, like oil and wine. Indeed, honey is mainly constituted of sugars, highly soluble in water and easily lost after deposition. Some scholars interpret the presence of sugars, mainly disaccharides, as chemical evidence of honey (Oliveira *et al.* 2014). This hypothesis is untenable based on the research in biogeochemistry. By analyzing sediment and aerosols from fields, Rogge *et al.* (2006 and 2007) demonstrated disaccharides and mainly mycose is coming from the cellular membranes of soil microorganisms. Also, levoglucosan has yet to be interpreted as an evidence of smoking a hive before collecting honey, but is formed by thermal decomposition of glucose, during cellulose and plant burning. These markers are detected each time the sediment is not removed by washing the potsherd with water before sampling and analysis. Unfortunately, honey does not leave hydrophobic compounds that could be preserved and identified in ceramic vessels. Except low-quality honey that contains some beeswax (hydrophobic and readily identified), well-filtered high-quality honey cannot be detected in ancient ceramics, except in arid contexts such as in Egypt or Saudi Arabia (Garnier 2014).

This approach to chemical analysis on the walls of ceramic containers is not new. These provide valuable information about the product(s) once contained because the latter leaves biochemical markers that are found trapped in the pores of the ceramic. That said, to date, analyses have only revealed wax markers, for example, in Greece (Bortolin 2008: 15). One must take care, however, as mere traces of wax do not necessarily imply a nearby beehive or a link with honey, as wax was also used as a waterproofing agent.

In the specific case of the ceramic fragments from the Roman villa of Bunje (Figure 5), one of the authors (N.G.)

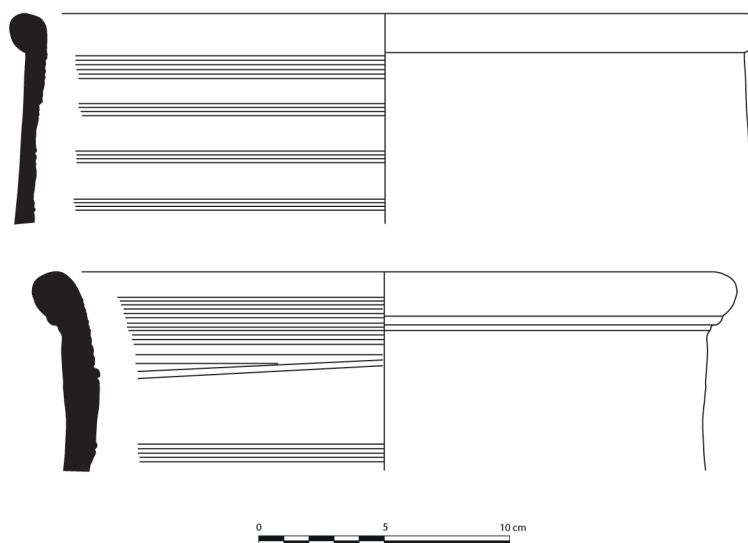


Figure 5. Beehives from the Novo Selo bunje site.

performed the organic residue analysis on some ceramic vessels, used to determine the native organic content from their constitutive chemical markers deposited in the ceramic (Evershed 2008). The chromatographic profile obtained consisted of odd-numbered *n*-alkanes, even-numbered long chain *n*-alcohols, and even-numbered fatty acids (palmitic, oleic, stearic acids and also $C_{24:0}$ to $C_{32:0}$) referred as a distribution characteristic of beeswax (Figure 10) (Garnier *et al.*, 2007; Regert *et al.* 2003). Monoesters derived from palmitic and oleic acids but also 15- and 16-hydroxy palmitic acids confirm this identification (Dodinet and Garnier, forthcoming). This, therefore, has served to confirm that we are in the presence of beehives.

Conclusion

The number of beehives only on the island of Brač suggests that this particular island was a bee-farming center, but we have to keep in mind that this island was the focus of research only lately, and more attention was given to the pottery finds from its numerous sites. During the survey, prior to the excavation on Bunje, only one small beehive fragment was found, but the excavation itself provided us with a significant number of finds. A situation like this is possible at many other sites, and we need to ask ourselves whether the amount of honey produced in the region was for local, provincial, or reflective of even wider trade. We think that more material from the excavation with precise contexts needs to be published in order to make such comparisons and draw wider conclusions. At the very least, we can assume that the honey that was produced on the island of Brač, for example, was more than enough to fill the needs of the local villas and villages and even more to put on the market at *Salona*.

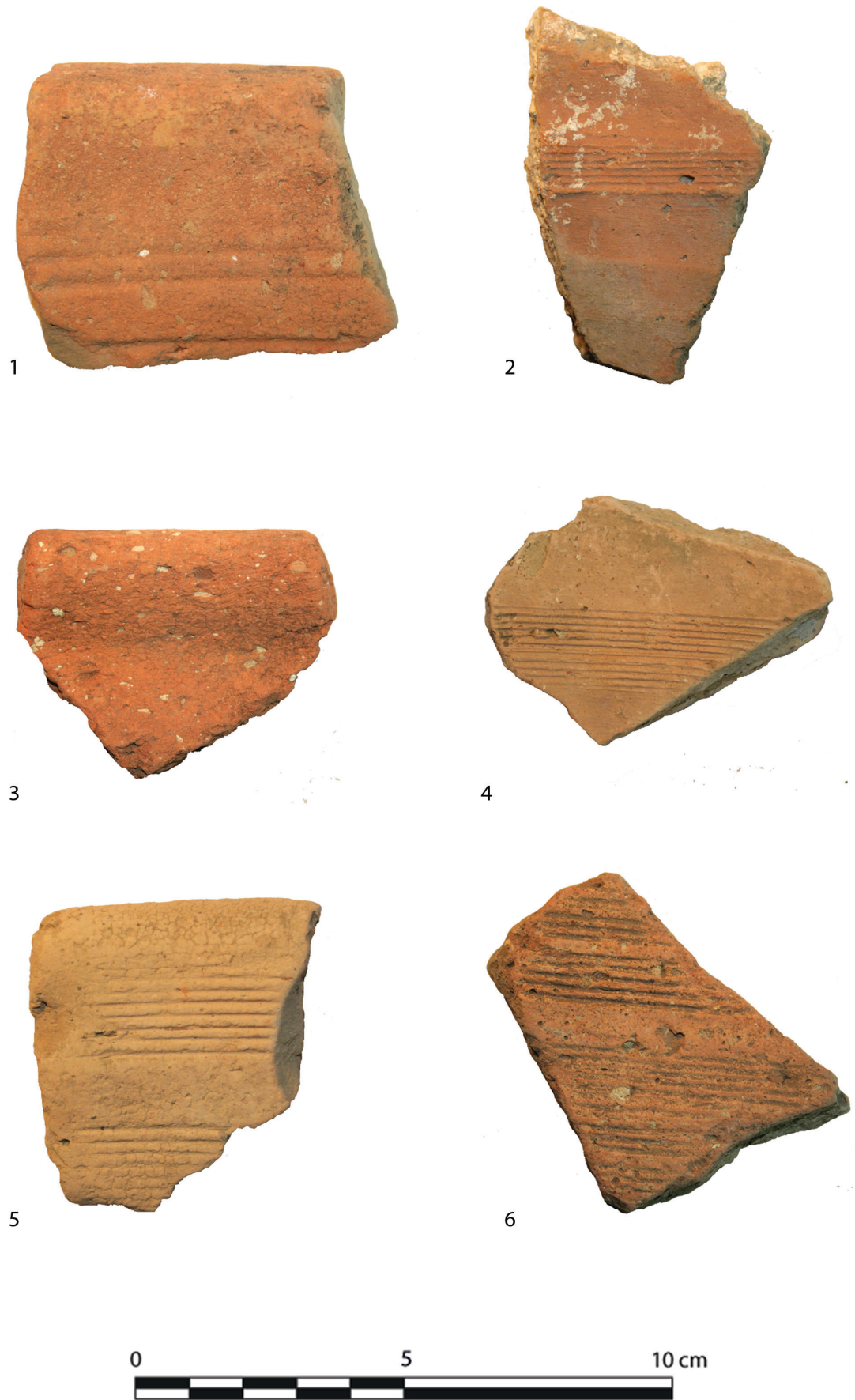


Figure 6. Main fabrics of the beehives from the island of Brač.



1



2



3



4

Figure 7. Beehives from the Škrip Luke site.

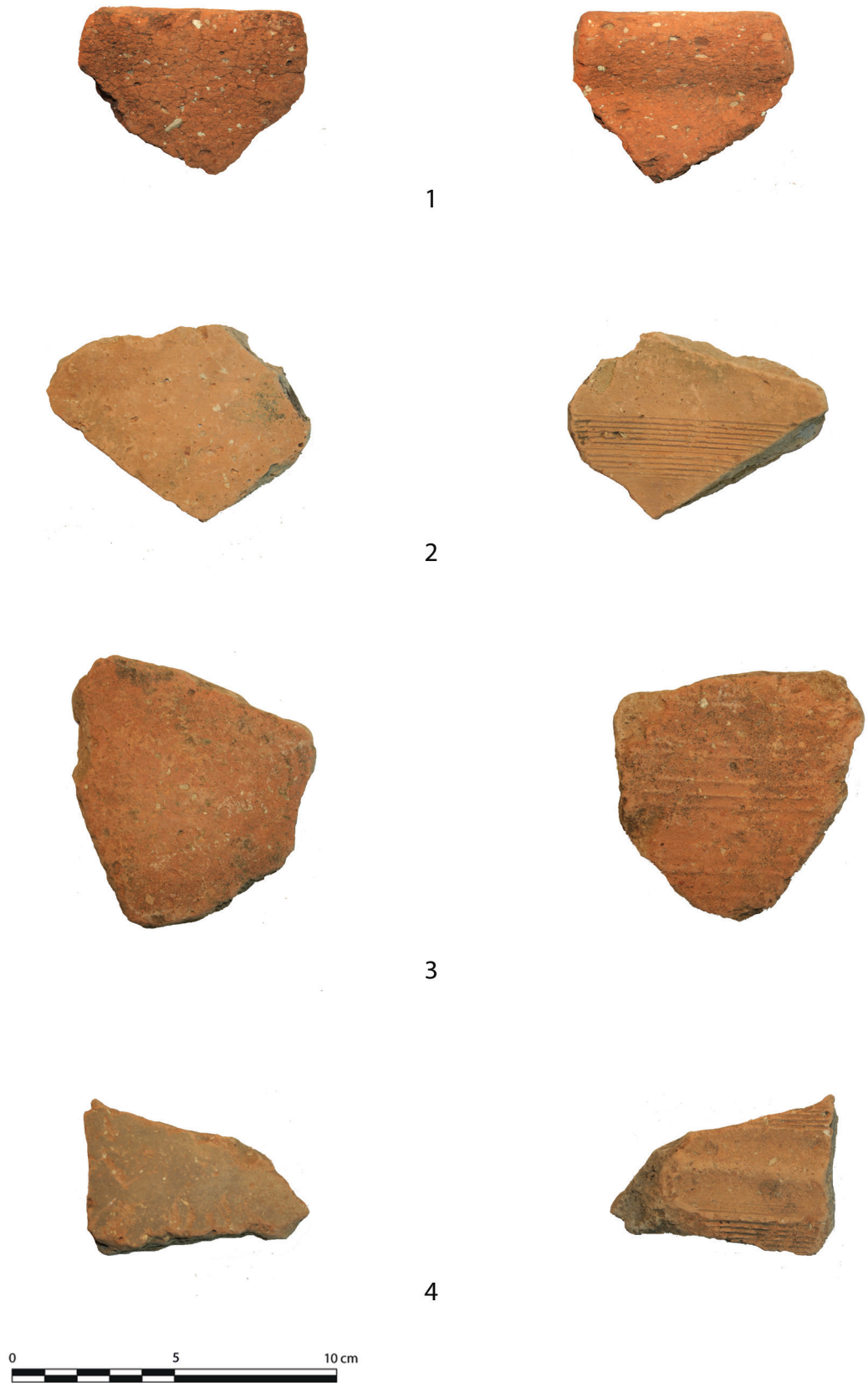


Figure 8. Beehives from the Njivica Podhume site.

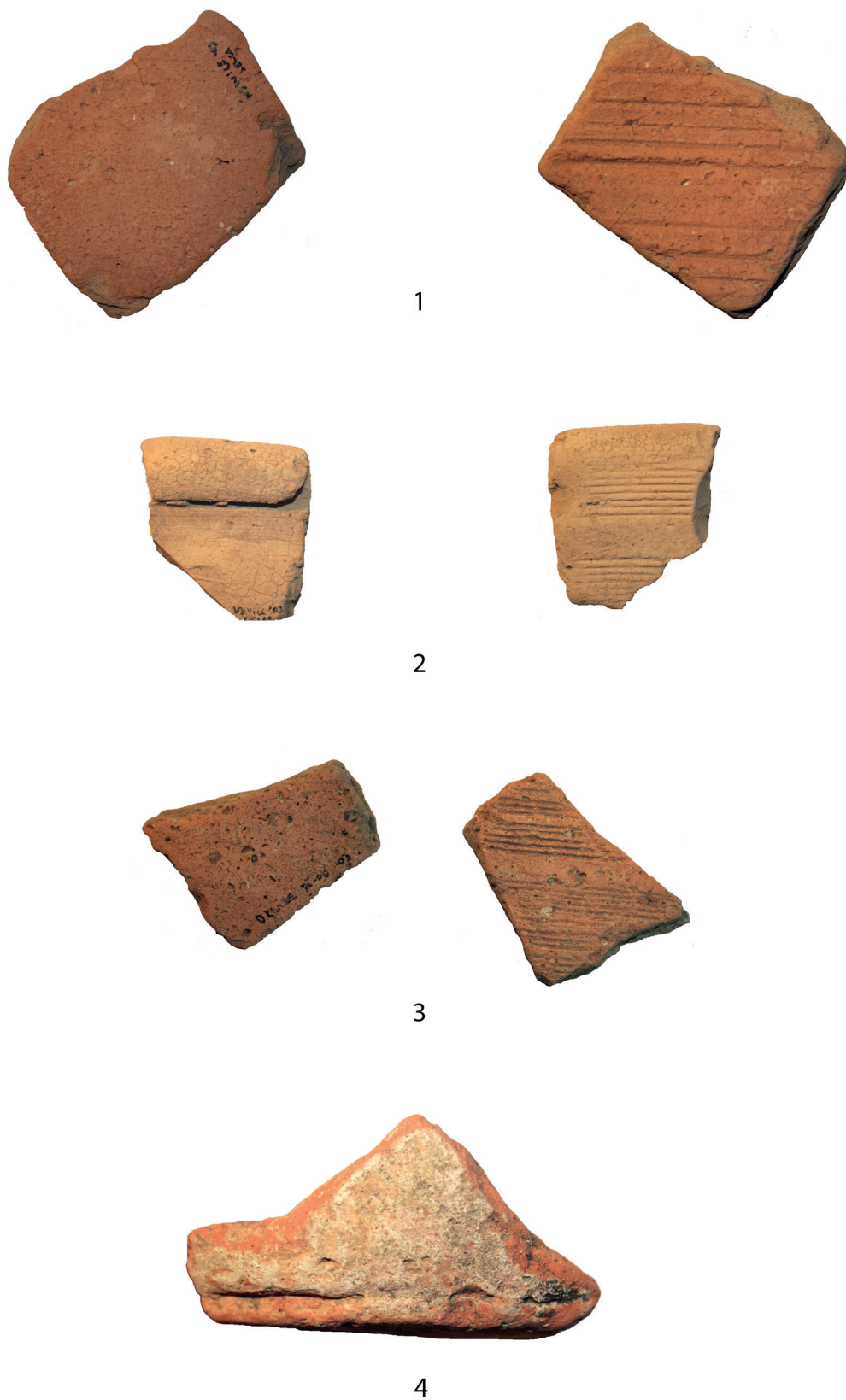


Figure 9. Beehives from the Njivice Selca site (1-2), Oklade (3) and Stomorica (4).

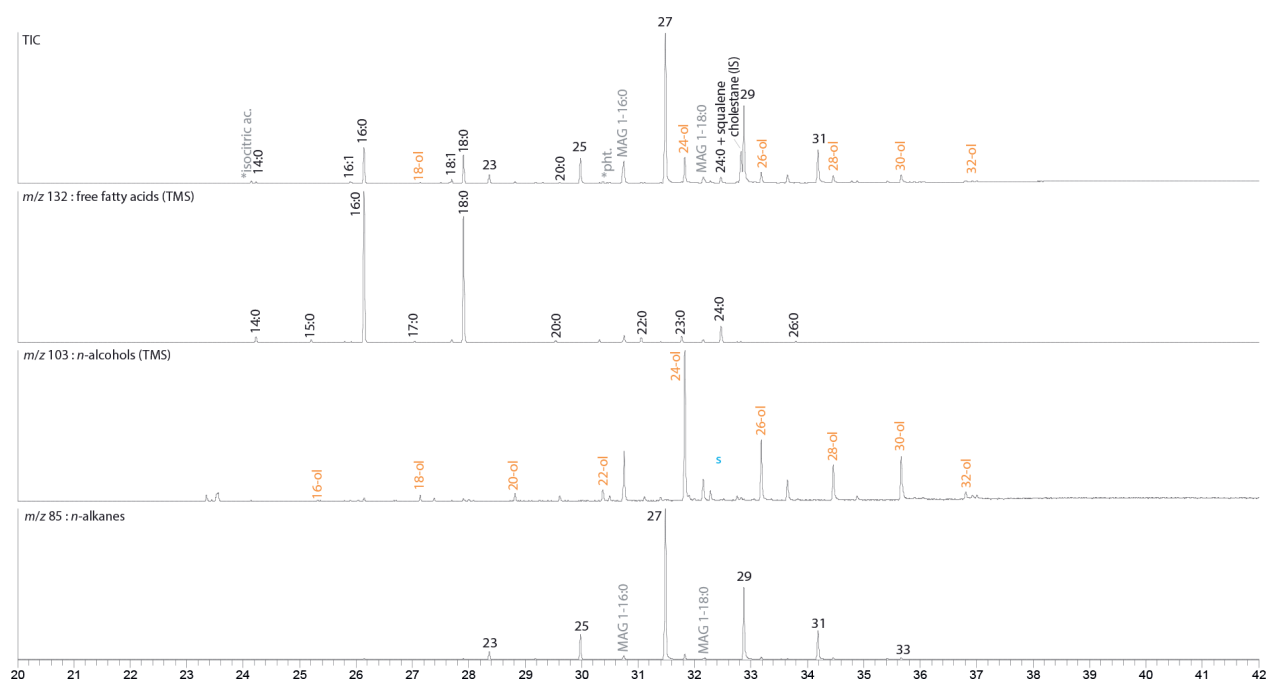


Figure 10. Chromatogram of beehive shards found at the Novo Selo - Bunje site on Brač island © Laboratoire N. Garnier.

It is logical and expected that beehives are found on the Roman rural sites, especially if the area presents a good bee forage. The island of Brač undoubtedly has excellent bee forage, a fact testified by numerous stone beehives used in the last few centuries and toponyms related to bees. Honey was important as a food and as a medicine, and it was necessary to produce it in large amounts to provide for the urban areas or areas without good bee forage. The finds of the hives in the urban centers are more likely to be a testimony of the trade with honey than urban honey production.

Finding beehives fragments on the site of a hillfort dated to the Late Iron Age with finds of Late Republican amphorae so far suggests that the hillfort was part of the trade and not production side. The discoveries of prehistoric beehives so far were not detected in these parts. It is assumed they were made of other materials, perhaps organic material or stone, as presented before. This makes us believe that beehives in the form of a ceramic vessel were not indigenous in Central Dalmatia but brought by Romans or earlier by Greeks.

As for the future, further research in this area should provide more data to see whether some areas were more important in honey production than others and a source of the honey trade. Finding entire hives would give us the possibility to establish a clearer typology. The finds from archaeological contexts and fabric study coupled with typology could help us understand the questions of trade and production of the vessels themselves as an essential part of honey production. We hope that this paper contributed to filling a part of

the gap in the knowledge of Central Dalmatian honey production and will make it easier for others interested in the topic in this area to research these hives.

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