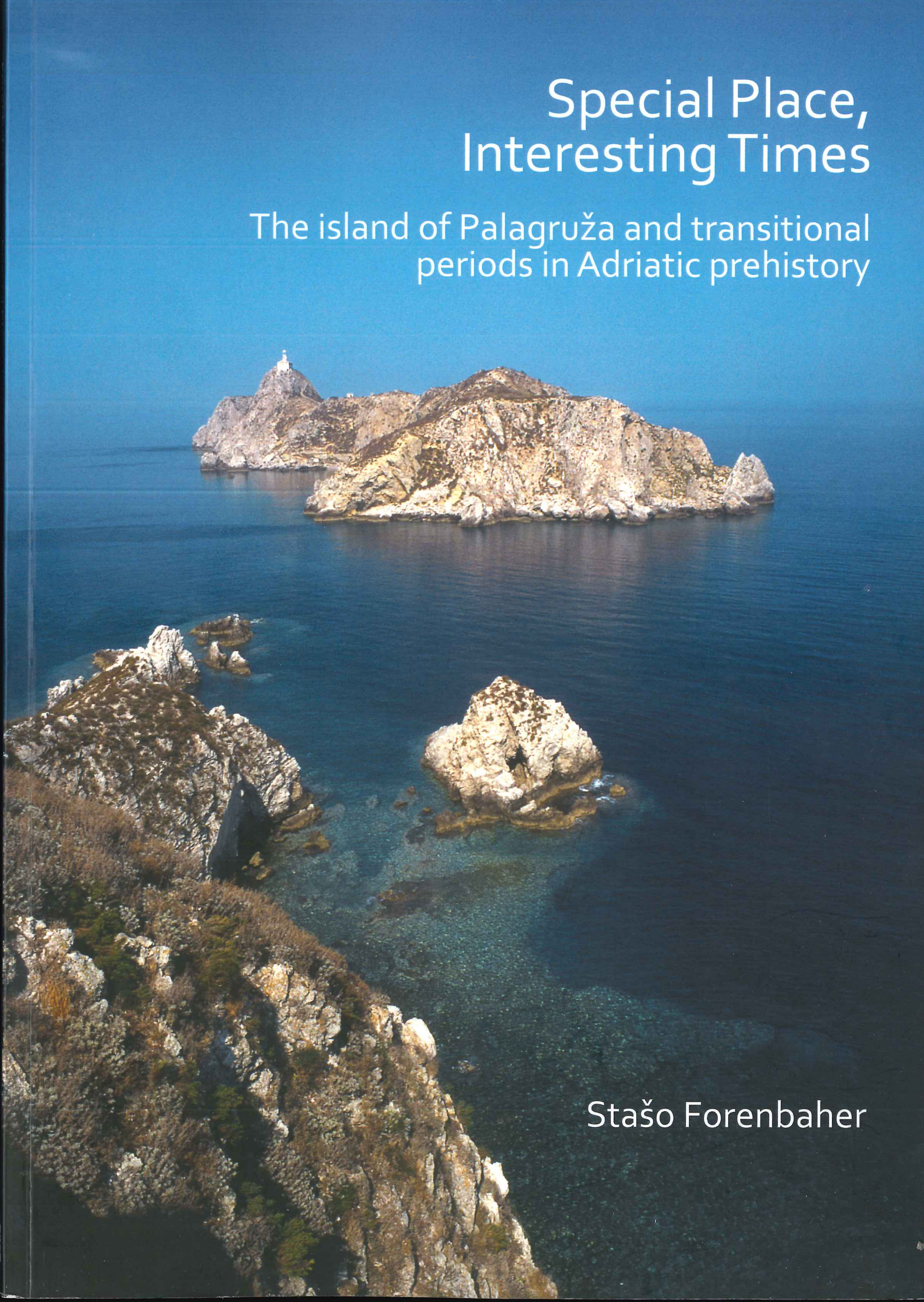
Special Place, Interesting Times

The island of Palagruža and transitional periods in Adriatic prehistory



Stašo Forenbaher

While one might say that prehistory of the Adriatic was always in transition, the rhythm of change was not always the same. On several occasions, a series of changes over a relatively short time period resulted in dramatic transformations. Three crucial episodes of change marked the later Adriatic prehistory. The first one, which took place around year 6000 BC, was a transformation of subsistence strategy, transition from hunting and gathering to farming. The second one was a social transformation that played out in the third millennium BC, when for the first time the power of individuals was clearly expressed by material culture. The third episode, inclusion into the classic Mediterranean civilization, coincided with the end of prehistory in the Adriatic region.

During all of those episodes, travel and connectivity with distant lands played an exceptionally important role, and certain places gained particular importance due to their unique geographic location. Palagruža is among the most prominent such places, its importance being out of all proportion to its physical size. Adriatic prehistory cannot be told without mentioning Palagruža, and prehistory of Palagruža cannot be understood without knowing Adriatic prehistory. Due to its strategic position in the very center of the Adriatic Sea, due to the mystery born of distance and isolation, due to its wild and spectacular landscape, Palagruža indeed is a special place. A reflection of its specialty is an unexpected abundance of high-grade archaeological evidence, dating precisely from the three aforementioned periods marked by radical change.

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With contributions by

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Cover illustration: View of Vela Palagruža from Mala Palagruža (1993)

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Figure 75. Salamandrija, 1-3 oblique truncations on blades, 4 retouched blade segment, 5-6 bifacially retouched blade segments, 7 end scraper on retouched flake, 8 and 10 'pointed blades', 9 gunflint.

2.1.3.9 Obsidian artifacts

2.1.3.9.1 Origin of the raw material
by Robert H. Tykot

2.1.3.9.1.1 Obsidian in Europe and the Mediterranean

Obsidian is a glassy rock that only forms under certain volcanic circumstances. The sharp, yet brittle, nature of obsidian led to its wide use in prehistoric times, while the chemical homogeneity of each source allows us to distinguish them using a variety of analytical methods. In Europe, the only geological sources that were utilized for producing stone tools are on the Italian islands of Lipari (Tykot *et al.* 2006), Palmarola (Tykot *et al.* 2005), Pantelleria (Francaviglia 1988), and Sardinia (Monte Arci) (Tykot 1997; 2002); the Greek islands of Antiparos (Carter and Contreras 2012), Giali (Carter *et al.* 2016), and Melos (Torrence 1986; Frahm *et al.* 2014; Milić 2014); and in the Carpathian Mountains of Hungary, Slovakia, and the Ukraine (Biró 2006; Rosania *et al.* 2008) (Figure 76).

Early analyses of obsidian artifacts from sites in the central Mediterranean region showed that obsidian traveled great distances from the island sources at the beginning of the Neolithic period, when the agricultural way of life involving domesticated plants and animals and the use of ceramics were spreading westward (Hallam *et al.* 1976; Williams-Thorpe *et al.* 1979; 1984). Over the past 25 years, the development of non- or minimally-destructive analytical methods have led to thousands of obsidian artifacts being tested, and statistical comparisons between sites and time periods (De Francesco *et al.* 2012; Tykot 2011; 2014; Tykot *et al.* 2013).

Figure 76. Map showing obsidian sources in Europe and the Mediterranean.

Obsidian from a number of archaeological sites along the Adriatic Sea has now been tested (Figure 77). On the central Italian side, due west from Palagruža and other Dalmatian islands, analyses by Barca *et al.* (2008) and De Francesco *et al.* (2012) have already shown the long distance that obsidian had traveled from Lipari, as well as from Palmarola. In southeastern Italy, even one example from far-away Sardinia was identified at the site of Pulo di Molfetta (Acquafredda *et al.* 2008). In between is the Gargano peninsula and the Tavoliere region of northern Apulia, a major agricultural zone, and the area closest to Palagruža. Analyses at Masseria Candelaro (Acquafredda *et al.* 1998), Passo di Corvo (Mello 1983), and many other sites in the Tavoliere (Brown and Tykot, nd) reinforce the regular presence of Lipari obsidian, while Palmarola obsidian averages about 15% and is only present at about one-third of the sites.

2.1.3.9.1.2 Analytical methods

Over 90% of all obsidian finds from Palagruža were included in the analysis. Most of the 49 obsidian artifacts were first tested in 2009, with the last 9 in 2010, using the same instrument, a Bruker III-V+ portable X-ray fluorescence spectrometer (Tykot 2016) (Figure 78). In 2015, the Bruker III-SD model was used to re-test 12 of the artifacts, to confirm the consistency in analytical results and the identification of four

Figure 77. Map showing sites near the Adriatic Sea with ten or more obsidian artifacts tested.

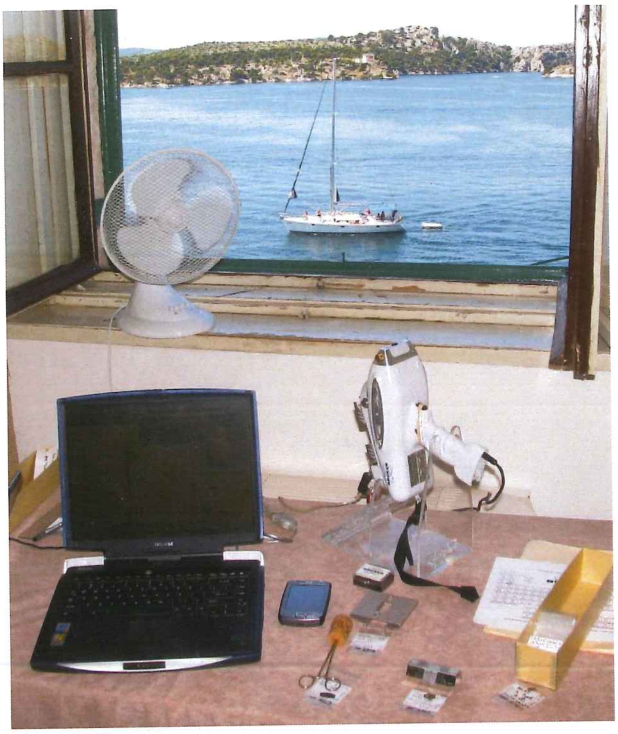

Figure 78. Conducting pXRF analyses on obsidian in Croatia.

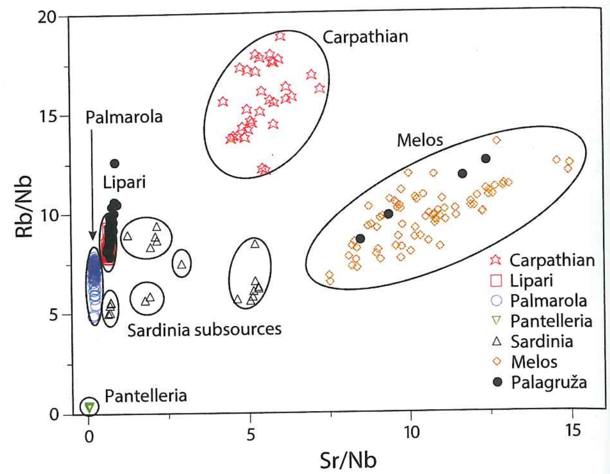

Figure 79. Graph showing the elemental groups for the different sources (Carpathian, Lipari, Palmarola, Pantelleria, Sardinia, Melos) and the Palagruža artifacts.

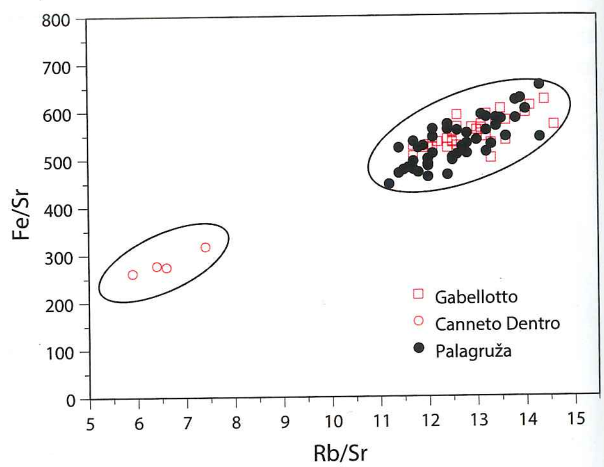

Figure 80. Graph showing the subsources for Lipari, along with 45 of the artifacts tested.

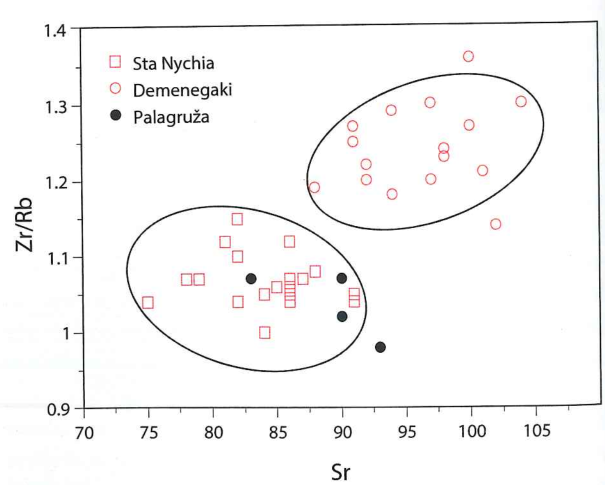

Figure 81. Graph showing the two Melos subgroups, along with four artifacts tested.

'outliers'. Portable, or hand-held, XRF instruments have the same principles as regular energy-dispersive XRF spectrometers, except that the sample remains outside the instrument. The secondary X-rays produced for iron (Fe), and trace elements thorium (Th), rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr), and niobium (Nb) are not absorbed in the air. The analysis is entirely non-destructive, with only basic cleaning of the area to be analyzed (5x7 mm) necessary. Analyses were conducted using settings of 40 kV and 10 μA, and run for 180 seconds while using a filter of 12 mil Al, 1 mil Ti, and 6 mil Cu to enhance the precision of the results. The raw data were calibrated against a series of international standards assembled by the Missouri University Research Reactor, and are directly compared with European and Mediterranean geological obsidian samples analyzed with the same instrument.

2.1.3.9.1.3. Results

For obsidian sourcing in Europe and the Mediterranean, trace element ratios are more than sufficient for assigning artifacts to the different source groups (Figure 79), and even to the subsources for Lipari (Gabellotto, Canneto Dentro) (Figure 80), Melos (Sta Nychia, Demenegaki) (Figure 80), and in the Carpathians. Forty-five of the obsidian artifacts found on Palagruža came from Lipari-Gabellotto, and four from Melos-Sta Nychia. In addition to the few elements used in the graphs to distinguish the obsidian sources, the complete set of data is also consistent with these specific source assignments (Table 13).

Fig. #	USF #	Source	Location	Fe	Th	Rb	Sr	Y	Zr	Nb
1	13419	Lipari	Gabellotto	9009	27	214	18	34	146	23
2	13420	Lipari	Gabellotto	9703	34	216	16	31	133	26
4	13399	Lipari	Gabellotto	10132	30	225	18	28	122	24
5	13432	Melos	Sta Nychia	6444	8	92	90	16	98	11
6	13946	Lipari	Gabellotto	9931	40	247	20	35	142	25
7	13412	Lipari	Gabellotto	9656	27	233	18	27	144	25
8	13413	Lipari	Gabellotto	9809	34	258	18	38	150	26
9	13951	Lipari	Gabellotto	10120	34	236	17	36	142	25
10	13411	Lipari	Gabellotto	10063	33	242	21	33	142	26
11	13400	Lipari	Gabellotto	10048	39	253	20	32	147	30
12	13414	Lipari	Gabellotto	9639	35	257	21	30	147	27
13	13415	Lipari	Gabellotto	9851	31	236	20	35	146	25
14	13408	Lipari	Gabellotto	10133	33	234	18	39	138	24
15	13402	Lipari	Gabellotto	10069	26	228	18	26	130	24
16	13403	Lipari	Gabellotto	10188	35	247	19	30	144	28
17	13421	Lipari	Gabellotto	11057	32	243	17	32	134	19
18	13404	Lipari	Gabellotto	10597	32	246	18	33	142	26
19	13398	Lipari	Gabellotto	10408	31	247	19	34	142	30
21	13409	Lipari	Gabellotto	10800	34	235	19	30	131	22
22	13952	Lipari	Gabellotto	10473	30	240	18	32	143	24
23	13428	Lipari	Gabellotto	9830	39	244	20	36	161	29
24	13406	Lipari	Gabellotto	10249	35	252	21	36	151	28
25	13424	Lipari	Gabellotto	9628	35	241	18	32	143	25
26	13947	Lipari	Gabellotto	11382	40	245	20	30	139	24
27	13410	Lipari	Gabellotto	9941	32	241	19	34	143	30
28	13407	Lipari	Gabellotto	11237	42	245	22	33	141	23
29	13401	Lipari	Gabellotto	10682	32	238	20	33	140	26
30	13945	Lipari	Gabellotto	10888	28	246	19	27	133	25
31	13953	Lipari	Gabellotto	10310	41	243	18	37	143	25
32	13422	Lipari	Gabellotto	10017	32	242	21	32	142	28
33	13418	Lipari	Gabellotto	9856	38	242	20	35	152	28
34	13433	Lipari	Gabellotto	10173	32	241	20	31	148	29
35	13950	Lipari	Gabellotto	10602	41	236	17	35	138	24
36	13416	Lipari	Gabellotto	9236	22	228	18	32	145	28
37	13954	Lipari	Gabellotto	9625	29	227	17	35	138	25
38	13417	Lipari	Gabellotto	10500	39	239	20	33	132	25
40	13423	Lipari	Gabellotto	9534	33	246	19	40	156	28
41	13397	Lipari	Gabellotto	9736	27	213	18	32	123	20
42	13405	Melos	Sta Nychia	6139	8	95	90	15	97	10
43	13434	Lipari	Gabellotto	9773	36	244	21	28	140	28
44	13429	Lipari	Gabellotto	9417	30	230	20	34	152	29
45	13426	Melos	Sta Nychia	6849	8	94	93	13	91	7
46	13435	Lipari	Gabellotto	9513	32	240	18	30	134	25
47	13436	Lipari	Gabellotto	9788	27	245	19	31	142	25
48	13425	Lipari	Gabellotto	11467	33	253	19	32	153	24
49	13430	Melos	Sta Nychia	6670	9	84	83	15	90	7
50	13427	Lipari	Gabellotto	9290	34	234	21	35	154	30
51	13431	Lipari	Gabellotto	10577	33	239	20	32	142	26
52	13944	Lipari	Gabellotto	9115	37	238	20	32	146	25

Table 13. Elemental data (in ppm) and source assignments for the artifacts tested

2.1.3.9.2 TECHNOLOGY AND TYPOLOGY OF THE ARTIFACTS

The obsidian assemblage contains 53 artifacts, which weigh 25 grams in total. Most of them are tiny, their maximum length usually does not surpass 20 mm and their weight is less than 1 gram. The largest among them are lighter than 4 grams and shorter than 30 mm (Figure 82).

Bladelets and tools on bladelets together constitute more than three quarters of the assemblage, while flakes and flake tools constitute less than 20% (Table 14). In addition, only two other artifacts were recovered: a small core fragment, probably of a bladelet core (Figure 82: 52) and a small chunk weighing 2,5 grams (Figure 82: 53).

Forty of the 41 bladelets, including tools on bladelets (Figure 82: 1-41), have subparallel lateral edges and dorsal ridges. Cross section of these prismatic bladelets usually is trapezoidal, less often triangular or polygonal. Not a single complete specimen has been recovered, but only bladelet segments, the longest of them 25 mm long. If we apply the same procedure for bladelet length estimate based on the number of proximal, distal and medial segments and their total length (Forenbaher and Perhoč 2015: 25-28), the average obsidian bladelet would have been around 75 mm long.

Analysis of bladelet width was carried out on a sample of 39 measurable segments (Figure 83). Following Tixier's classic criterion, all of them fall into the bladelet category since none are wider than 12 mm (Tixier 1963). Most of them are between 5 and 10 mm wide, while their average width is 7,4 mm, with a standard deviation of 1,65 mm. Coefficient of variation is 22%, indicating greater standardization of obsidian bladelets, compared to prismatic blades made of chert (coefficient of variation 34%).

Relatively numerous tools constitute 19% of the total assemblage, but many of them are poorly defined. This is exacerbated by postdepositional edge damage, which also was the case with flaked chert artifacts. Consequently, it is sometimes hard to distinguish postdepositional damage from intentional retouch. We followed the same conservative procedures and did not regard microretouch, discontinuous and alternating retouch, irregular marginal retouch, as well as single-blow notches as intentional modifications of the blank. It should be noted that such edge damage is present on more than three quarters of all obsidian artifacts.

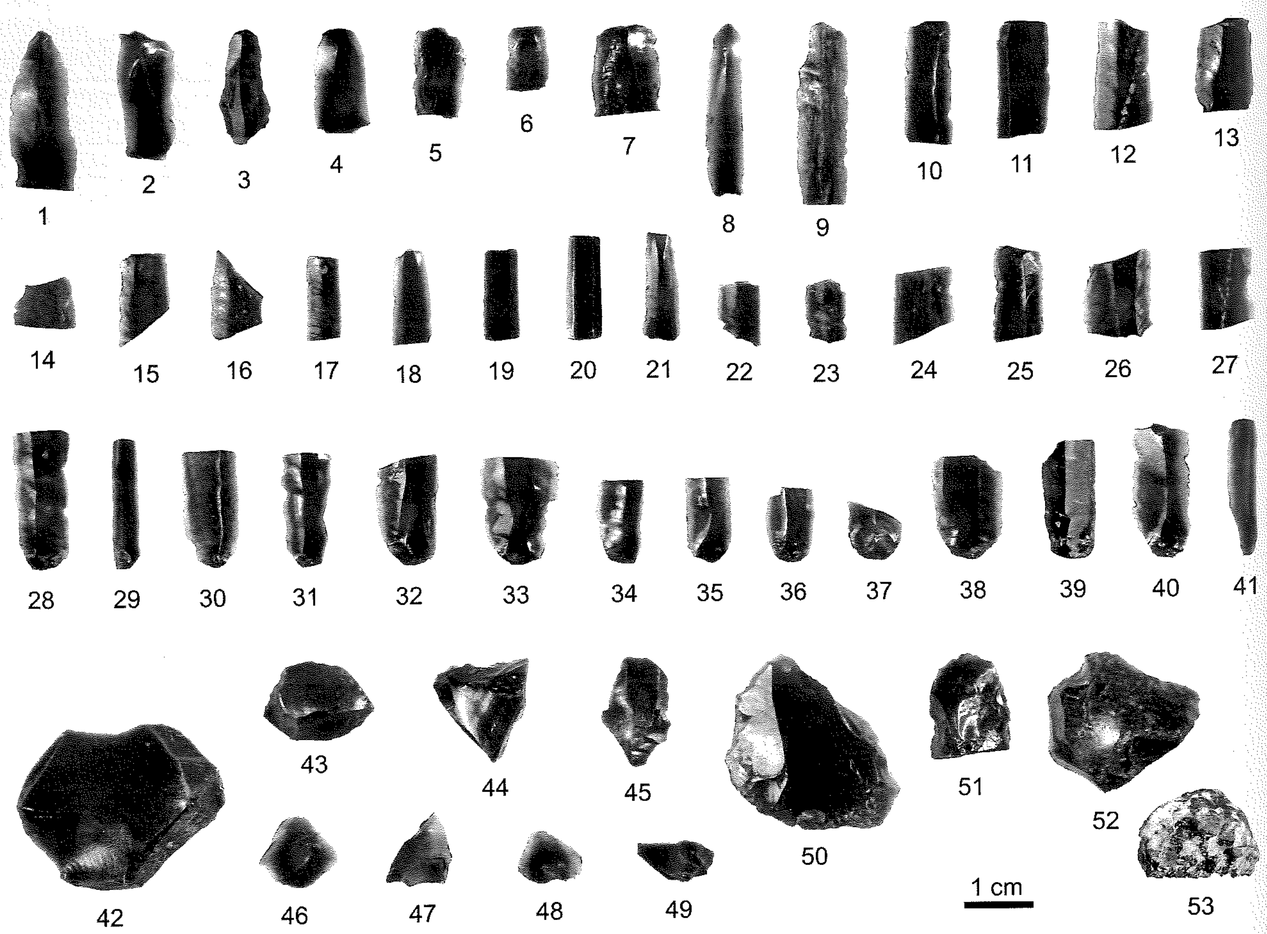

Figure 82. Salamandrija, obsidian artifacts.

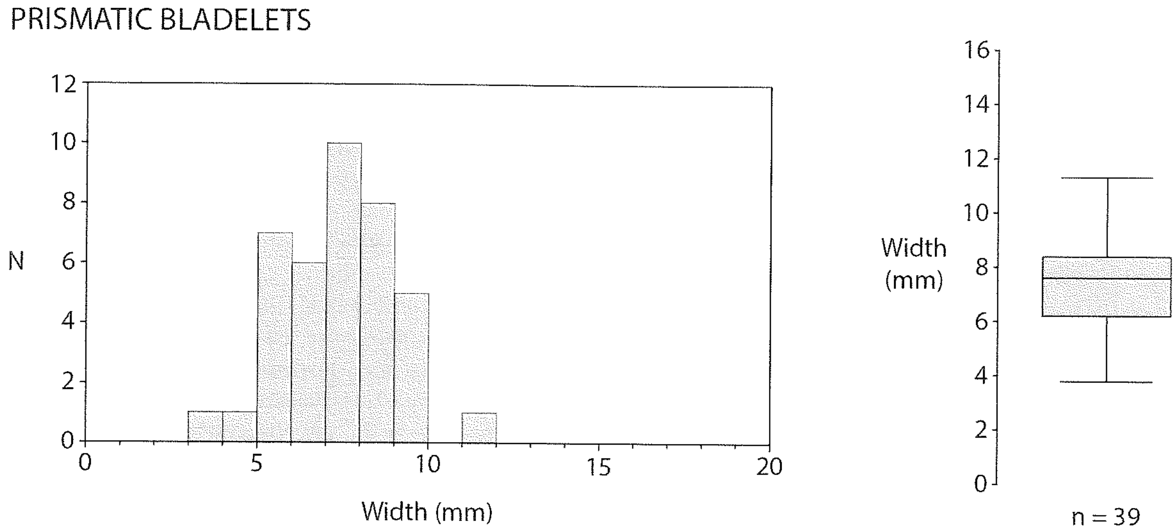

Figure 83. Obsidian prismatic bladelets width histogram and boxplot.

Of the ten artifacts classified as tools, eight are made on bladelets. Among them are three retouched bladelet segments: two with short stretches of marginal retouch near the distal or proximal end of the left lateral edge (Figure 82: 8, 37), and a third one with steeply retouched proximal part of the left lateral edge (Figure 82: 41). One bladelet segment, classified as end scraper, has a steeply retouched distal end (Figure 82: 7), while another has a steeply retouched notch on its right lateral edge (Figure 82: 27). Three bladelet segments were classified as microburins (Figure 82: 38-40). Aside from bladelet tools, there are two rather ill-defined side scrapers on retouched flakes (Figure 82: 50, 51).

The four artifacts made of Melian obsidian do not stand out from the rest of the assemblage by their size or technological and typological characteristics. They include a bladelet segment (Figure 82: 5), a fairly large flake (Figure 82: 42), and a couple of small flakes (Figure 82: 45, 49).

CATEGORY	n	%
Tools	10	19
retouched bladelets	3	
notch on bladelet	1	
end scraper on bladelet	1	
microburin	3	
side scraper on retouched bladelet	2	
Bladelets	33	62
Waste (flakes, cores and debris)	10	19
flakes	8	
core fragment	1	
chunk	1	
TOTAL	53	100

Table 14. Obsidian assemblage break-down (number and frequency)

2.1.3.9.3 TEMPORAL ATTRIBUTION OF THE FINDS

Artifacts made of obsidian are present in small quantities on many prehistoric sites in the eastern Adriatic. The raw material of which they were made usually is Liparian, but there are also rare finds of Carpathian obsidian and obsidian from Palmarola (Tykot 2011: Figure 4: 4). The four artifacts from Palagruža currently represent the only find of Melian obsidian not just in the Adriatic, but also anywhere to the west of Greece (Tykot 2011: 40). A few objects from Grotta del Leone near Pisa, which initially were claimed to be made of Melian obsidian (Bigazzi *et al.* 1986), are no longer mentioned in more recent publications (Bigazzi and Radi 1996; Bigazzi *et al.* 2005).

In the eastern Adriatic, most of the obsidian finds that are accompanied by reliable provenience information were recovered from the second half of the sixth millennium BC (Middle Neolithic) contexts, from caves such as Vela spila on the island of Korčula (Čečuk and Radić 2005: 110), Spila at Nakovana (Forenbaher and Perhoč 2015: 35, 36), or Vaganačka pećina (Forenbaher and Vranjican 1985: 9), and from settlements like Danilo (Korošec 1958: 28, Plate 66: 6-10; Moore *et al.* 2007a: 19), Pokrovnik (Moore *et al.* 2007b: 29), or Sušac (Radić *et al.* 2000: 61). Bladelets of closely similar shape and size as those from Palagruža are quite common. So far, there are no obsidian finds from reliable Early Neolithic contexts, while finds from later contexts are exceptional. Among them is a backed bladelet made of Liparian obsidian from Pupićina peć (Forenbaher 2006b: 243), collected from Horizon G and ascribed to the Late Neolithic based on characteristic pottery, and dated by radiocarbon to the third quarter of the fifth millennium BC. Another example is a flake from burial mound #1 at Mali Mosor, collected from a context marked by Cetina style pottery

(Periša 2006a: 367). In the latter case, it would be very useful to know whether the obsidian was Liparian or Melian (or other!), but the provenience analysis of the raw material has not been carried out yet.

In the Apennine Peninsula, exploitation and exchange of Liparian obsidian decline towards the end of the Copper Age, having reached their zenith in the late fifth and early fourth millennium BC (Robb 2007: 193). As opposed to that, Melian obsidian continues to be mined and exchanged across the Aegean and western Greece, where bladelets and other artifacts made of obsidian continue to appear in settlements (Dörpfeld 1935: 101, Plate 22), burials (Dörpfeld 1927: Attachment 63c: 2, 3, 6) and sanctuaries (Renfrew 2007: 433) until the end of the Early Helladic period around year 2000 BC.

2.1.4 Ground stone artifacts

This small assemblage contains twelve ground stone items. Prominent among them are two complete wrist-guards and four broken ones (Figure 84: 1-6), although the fragments with only a single hole near one end might be pendants, since we do not know whether their other end was also pierced. Aside from them, a few other elongated and flat medial pieces without holes also may be wrist-guard fragments. Other similarly shaped objects are not pierced near the preserved end (Figure 84: 9, 11, 12) and therefore cannot be wrist-guards. One of them is too thick (20 mm) and too heavy to serve as a wrist-guard (Figure 84: 12). As opposed to wrist-guards, these objects are temporally insensitive and may be prehistoric, but also later.

An archer's wristguard is a protective device that prevents injuries to the lower arm, caused by the bow string after its release while shooting arrows. A widely held assumption is that the prehistoric finds, recognized as wrist-guards by archaeologists, were functional objects, attached by string directly to the inside of the lower arm, or to a leather support that is pulled on like a glove or attached to the arm in some other way (Figure 85). Recent work has indicated that many of those objects could not have served that practical purpose due to their size or shape, while finds from undisturbed burials suggest that often they have been attached to the outside of the lower arm (Woodward *et al.* 2006; Fokkens *et al.* 2008). It seems more likely that these were primarily symbolically charged decorative objects, related to the martial status of the archer.

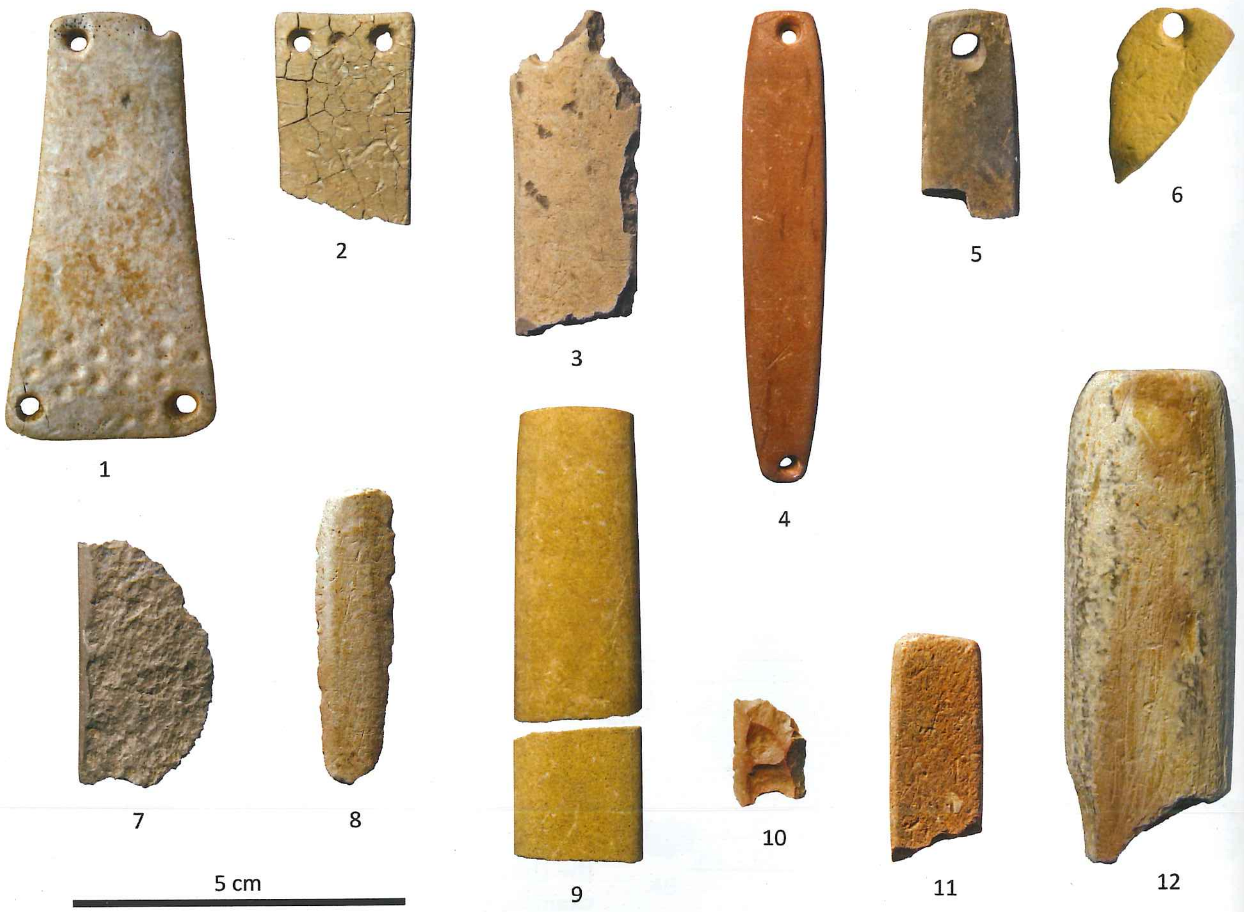

Figure 84. Salamandrija, ground stone objects.