Seasonal Mining Camp or Long-Term Mining Village?

Answers from Mineralogical Correlation of Late Bronze Age Pottery Temper and Adjacent Tin Placer Sands, West Serbia

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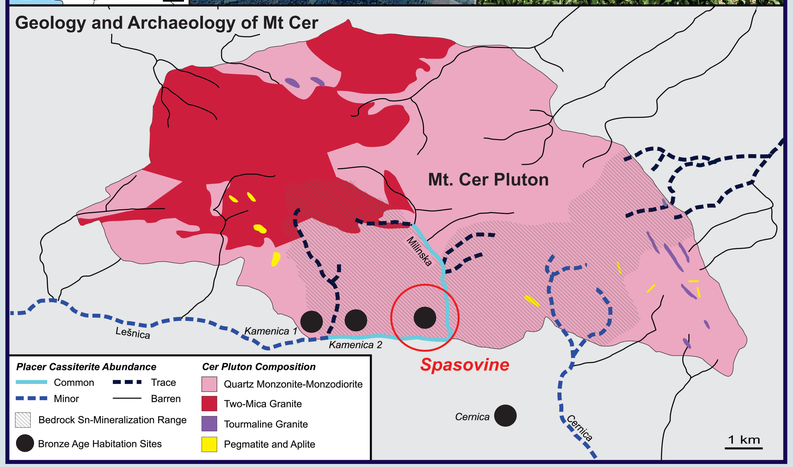
INTRODUCTION

The gravels of the Milinska River in west Serbia contain detrital cassiterite weathered from the post-tectonic granitic pluton of Mt. Cer. During pedestrian archaeological surveys, Late Bronze Age pottery sherds were recovered on the river terrace of Spasovine, on the west bank of the Milinska River in West Serbia. The correlation of Bronze Age artifacts with tin-bearing sediments suggests that the site was inhabited for tin mining in the Late Bronze Age. However, as of yet, no in-situ Bronze Age structures (homes, hearths, kilns) have been discovered. The pottery sherds themselves are abraded and rounded, indicating transport and reworking, likely due to agricultural tilling and natural erosion of the terrace. Thus it may be that structures associated with settlement sites have been destroyed, leaving only fragments that lack context.

Whether this site represents a long term habitation site or a temporary seasonal camp is uncertain. To address this question, compositional analysis of sand temper within the pottery sherds was performed and compared to that of sands from the Milinska River to determine whether the pottery was made using local material (i.e. made on site). If so, it would indicate that structures such as kilns must have existed, suggesting that the habitation was long term in nature, but associated structures were destroyed.



COMPOSITION OF MILINSKA RIVER SAND

Bulk samples from Milinska were collected (see site on map in column 1) and compositionally separated. Magnetite was removed with a hand-magnet and weight percent was determined. Garnet was separated from the remaining sample using a Frantz Magnetic Separator and weight percent was determined. The composition of the remaining gravel was determined using a PLM (point counted) and confirmed using SEM-EDS.

The predominant mineral in the heavy mineral fraction is spessartine-almandine (Mn-Fe) garnet (~70%). Other common minerals include allanite, hornblende and titanite. Tin bearing minerals (cassiterite, euxenite, microlite) are also present.

Milinska River Composition

Mineral	%
Garnet	72.0
Allanite	11.3
Titanite	8.2
Hornblende	4.0
Magnetite	1.9
Apatite	0.4
Tourmaline	0.4
Biotite	0.2
Muscovite	0.2
Plagioclase	0.2
Quartz	0.2
Cassiterite	0.1
Columbite	0.1
Dolomite	0.1
Epidote	0.1
Rutile	0.1
Zircon	0.1
Bismuth	Trace
Calcite	Trace
Chlorite	Trace
Euxenite	Trace
Gahnite	Trace
Hematite	Trace
Ilmenite	Trace
Ixiolite	Trace
K Feldspar	Trace
Monazite	Trace
Pb-Glass	Trace

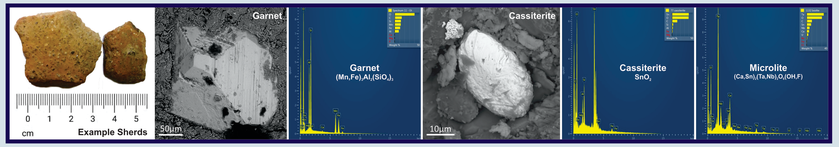
COMPOSITION OF POTTERY TEMPER

Representative pottery sherds from Spasovine were selected. Surface minerals were identified with a binocular microscope. The coarse sand temper is predominantly Qtz and Fsp. Pottery sherds on which garnet grains were observed (7 samples) were kept intact. The remaining 24 sherds were crushed and sieved. Heavy minerals were separated (sodium polytungstate). Minerals were identified using SEM-EDS.

Mn-Fe-garnet is the predominant heavy mineral. Other abundant minerals included Hbl, Tur and Opx. Two Sn-bearing minerals (cassiterite and microlite) were also found. Cassiterite occurs in seven shreds, all Mn-Fe garnet-bearing. The samples can be compositionally divided into three groupings: high garnet, low garnet, garnet absent (hornblende abundant). These can be further subdivided based on the abundance of Tur, Opx, Aln, and Ttn.

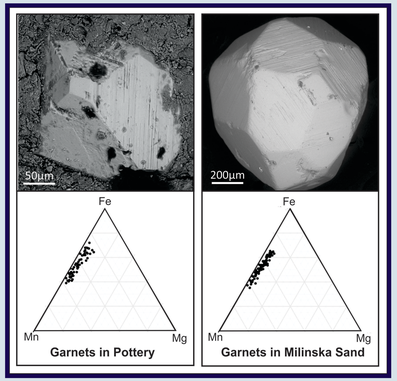
% Composition of Pottery

	Garnet Abundant						Garnet Low					Garnet Absent	
					Ttn dom.	Tur dom.	Opx dominant			Aln dom.	Hbl dom.	Hbl dominant	
	11	13	18	21	5	17	1	2	4	9	10	3	24
Garnet	25	24	30	34	33	33	7	8	7	8	8		
Hornblende	8	12	25	25		8	19	25	14		33	68	62
Cassiterite		6	10		4		7			8		5	
Tourmaline		12				50	12			15			
Orthopyroxene							14	17	14				
Titanite	8	25		13	41		2			8	16	23	
Epidote		8		4			5	8	21	8	4		8
Biotite		6	5				2				4		
Muscovite	25						5						
Apatite		6					17	8			4		8
Zircon							2	8					
Chlorite							2						
Rutile	8		10	2			2				8		
Ilmenite								8					
Pyrite	17							8	7	8			
Sphalerite	8		10					7					
Allanite			10	21	15					38	13		15
Tremolite		12		2	1		7	8			13	5	6
	n=12	n=17	n=20	n=53	n=27	n=12	n=42	n=12	n=14	n=13	n=24	n=22	n=13



CONCLUSIONS

Garnets that were found in both the Milinska River gravels, and in the pottery sherds from Spasovine, exhibit the same compositional range (spessartine-almandine rich). These garnets are of similar size to those that occur in granitic rocks in the Mt. Cer pluton. This, along with the presence of Sn-bearing minerals in both river sands and pottery, demonstrates conclusively that the pottery was constructed using sediment from the Milinska River.



Some sherds were found to contain lower percentages of garnets, higher percentages of Opx and Hbl, but still contain trace cassiterite. This is more compositionally similar to the gravels of the Kamenica River , 4km to the west (see map in first panel).

Therefore, the majority of pottery from Spasovine was fired on site from local materials. The subordinate garnet-absent (hornblende-dominant) sherds are likely made from foreign materials, and so a small proportion of the pottery at Spasovine was imported from an unknown site. Thus, kilns and associated structures must have been present at Spasovine, indicating that long-term (probably seasonal) habitation was likely.