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Techno-typological variability of the late Middle Paleolithic in the southern Balkans

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CHAPTER 4

Denticulate Mousterian As a problem of Taphonomy. Case Study of Crvena stijena and Bioče

Denticulate Mousterian has been defined by the high occurrence of denticulates and notched tools and low presence of scrapers and other well- defined tool forms (Bordes, 1953; Bourgon, 1957). It was subjected to different interpretations, from having a cultural meaning to functional significance (Bordes, 1961) or reflecting a specific socio-economic behavior (Binford and Binford, 1968). Others proposed that the denticulate Mousterian represents a stage in the chronological evolution of Mousterian (Mellars, 1965) and other that it is a related to the type of site occupation and the environmental factors (Rolland, 1981). An argument has also been made that the Denticulate Mousterian is restricted to a region of western France and southern Spain in the context of the late Middle Paleolithic (MP), where it is mainly related to discoidal core reduction, sometime Levallois and differential proportions of scrapers (Jaubert and Mourre, 1996; Thiébaud, 2005). For some researchers, its consistent co-occurrence with discoid core reduction supports the claim of a cultural facies (Delagnes and Rendu, 2011; Discamps et al., 2011; Jaubert et al., 2011). Further work focused on variation that exists within these tools and understanding the technological and behavioural background of these assemblages, from their reduction patterns to them being used as cores or representing intermediate stages of scraper resharpening (Bourguignon et al., 2004; Caspar et al., 2005; Faivre, 2008: 201; Picin et al., 2011).

Taphonomic interpretations, however, pose serious doubt for not only the denticulate pieces themselves (Caspar et al., 2005; Dibble et al., 2008), but also for the existence of a distinct facies dominated by this tool type (Dibble et al., 2006; McBrearty et al., 1998). Many assemblages in Eurasia have been excluded from the list of Denticulate Mousterian group either based on insufficient retouched elements for their

attribution to a specific Mousterian variant or as a result of caution regarding high frequencies of pseudo-tools (Kolobova et al., 2012; Theodoropoulou, 2008; Thiébaud, 2005). While the widespread occurrence of Denticulate Mousterian has been challenged, the question still remains if these tool types prevail in the later phases of the Mousterian on a wider regional scale, as has been observed in SW France. Before addressing the issue of the chronological placing of these industries, it is important to evaluate the taphonomic aspects of the formation of denticulate edges on tools in these assemblages.

Denticulate Mousterian in the Balkans.

Several assemblages in the Balkans have been labeled as Denticulate Mousterian, and many of them can be tentatively placed to later stages of the MP. Since the early days of Paleolithic research in the Adriatic region, the high frequency of denticulates has been noted in numerous open air sites in coastal Dalmatia and its islands, in Mujina cave (Basler, 1983; Batović, 1988; Karavanić, 2000; Karavanić, 2004a; Karavanić et al., 2008; Vujević, 2011; Vujević et al., 2017), and in Crvena stijena (Level XIII classified as Denticulate Mousterian) (Basler, 1975). Higher incidence of denticulates relative to scrapers has been observed in the upper levels of Bioče (Chapter 3). This feature distinguished eastern Adriatic MP from the Thyrrhenian MP which is dominated by scrapers during the same time period, even though they share small size of the artifacts as a common characteristic (Rink et al., 2002). While more often associated with the Mediterranean MP, denticulate rich assemblages are known at other sites as well; e.g. Pešturina (Mihailović and Milošević, 2012), Temanta Dupka (Kozłowski, 2002), and several sites in the north Croatia (Velika pecina, Vindija) (Ahern et al., 2004; Karavanić, 2004b, 2007; Malez, 1979) have been reported to contain significant amount of denticulate tools in late MP layers.

Taphonomic study of lithic artifacts at Crvena stijena and Bioče

A taphonomic perspective is taken here in assessing the increase of denticulate tool types at Crvena stijena and Bioče (Chapter 3) (Table 1). Relatively higher proportion of denticulate tool types is noted in the upper layers at Crvena stijena and more or less

constant denticulate frequencies are noticed at Bioče with a slight increase in the upper levels. The notable presence of denticulate and notched tools warrants a closer look at the potential for pseudo-artifacts. We addressed the question of whether edge morphology of these tool types could have resulted from edge damage modifications due to post-depositional processes that would produce pseudo-tools (e.g. Combe Grenal layer 35, (Thiébaud, 2010)). Table 1 shows frequencies of notches and denticulates per level. All counts in the following analyses are based on assemblage size calculation following Hiscock (2002) that estimates the minimum number of flakes based on the proportions of proximal, mesial, and distal fragments (levels XV and XVII are excluded due to small sample sizes).

Site	Level	Gravel Size (mm)	Gravel Category	Number of retouched pieces	N (%) of denticulates and notches
Crvena stijena	XII	25	Medium	105	18 (17.1%)
	XIII	15-20	Medium	30	4 (13.3%)
	XIV	9	Fine	68	3 (4.4%)
	XV	50	Coarse	4	1 (25%)
	XVI	15	Fine	18	0
	XVIII	15	Fine	111	10 (9%)
Bioče	2	-	-	160	44 (27.5%)
	3	-	-	122	31 (25.4%)
	5	-	-	62	14 (22.6%)
	7	-	-	38	8 (21%)

Table 1. Gravel size characteristic of each levels at Crvena stijena (Morley, 2007) (data not available for Bioče) and proportion of denticulate and notched pieces among the retouched tools.

In lithic studies, edge damage has been considered as a main proxy for taphonomic alterations of lithic assemblages (Dibble et al., 2008; Thiébaud, 2005). One indicator of potential post-depositional modifications is the frequency of flakes with

irregular retouch (types 45-49 on Bordes' type list). The irregularity of the retouch on these pieces presumes that they have been damaged rather than intentionally retouched artifacts, though damage could have resulted from the use as well (Debénath and Dibble, 1994). First, we looked at the proportion of these pieces relative to retouched elements that are included in the F. Bordes' type list; in other words, in this sample we included all tool types, types 46-49, and excluded the unretouched elements, types 1-5, 38. At Crvena stijena, types 46-49 range from 17-41%, and their increase in Denticulate Mousterian Level XIII is apparent and suggest a common taphonomic origin of edge modification for both denticulates and types 46-49 (Table 2). This also explains why denticulate and notch percentages for this level are low; what has been considered as a denticulate/notched tool by former researchers is most likely recorded here as a flakes with irregular/abrupt retouch. At Bioče, flakes with irregular retouch show a relatively lower percentage in Levels 3 and 5, while their increase in the upper layer coincides with a slightly higher percentage of denticulate tools (Table 2).

Site	Level	No of retouched pieces on the F. Bord type list	No (%) * type 45-49
Crvena stijena	XII	141	42 (29.8%)
	XIII	51	21 (41.2%)
	XIV	91	24 (26.4%)
	XV	6	2 (33.3%)
	XVI	30	9 (30%)
	XVIII	134	25 (18.7%)
Bioče	2	206	46 (22.3%)
	3	144	20 (13.9%)
	5	84	12 (14.3%)
	7	45	7 (15.6%)

Table 2. Proportion of flakes with irregular retouch per level. The frequency is calculated from the sample of all the retouched tools on Bordes' list including types 45-49, but without technological types 1, 2, 3, 5, 38.

For the purposes of the taphonomic study, edge damage was recorded for all artifacts in the studied assemblages in the following intervals: 1-face, 2-face, rolled, use-like damage, and no damage¹. To be recorded as damage, an edge needs to bear more damage than one or two small removals on the edge (McBrearty et al., 1998), but not extensive enough to be recorded as types 45-49. Use-like damage is recorded on pieces that bear damage that is rather continuous and not too invasive. Retouched tools are excluded because of the difficulty of recognizing damage on the retouched edge and because tools may contain damage due to use. These factors could bias the results. The sample includes complete and proximal flakes and tools, and shatter pieces. Figure 1 shows that at Bioče, relative to other levels, Level 2 has a somewhat higher damage incidence, which corresponds to more denticulate/notched and 45-49 flake type frequencies. At Crvena stijena, higher damage frequencies are observed in Levels XIII, XVI (though sample size is small in the latter) and XIV at Crvena stijena (Fig. 1), likewise corresponding to the higher presence of type 45-49 flakes.

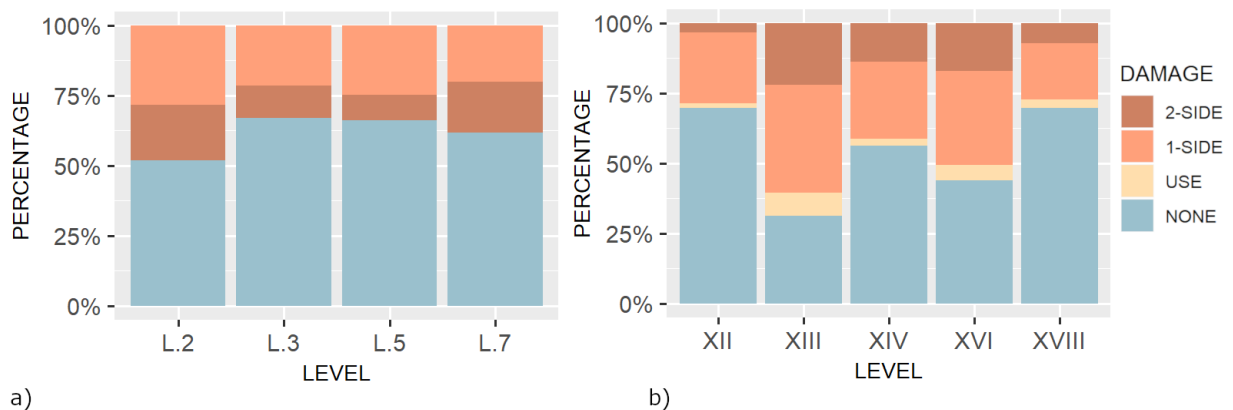


Figure 1. Relative frequencies of edge damage at a) Bioče and b) Crvena stijena.

Increase in edge damage and pseudo-tools is expected to happen in gravelly sediments, anthropic sediments where the contact between artifacts or trampling (Flenniken and Haggerty, 1979; McBrearty et al., 1998; Nielsen, 2011). Experimental work (McPherron et al., 2014) has showed that gravel size and low edge angles on artifacts

¹ Here, rolled damage is excluded from the analysis since that kind of damage is not related to formation of pseudo-artifacts relevant for the question of Denticulate Mousterian.

can substantially increase the amount of edge damage on flakes. While this study considered trampling as a postdepositional process and its effects on damage, many geological processes can move artifacts within or with sediment and produce damage on their edges in a similar way. A lithological study of the sediments is available for Crvena stijena (Morley, 2007), but not for Bioče, therefore, a relationship of the frequencies of denticulate tools, flakes with irregular retouch and edge damage will be examined in the Crvena stijena assemblages. The lithological study showed differences in gravel sizes (Table 1) with an important observation that layer XIII is one of the layers with the coarsest sediments in the entire sequence (Morley, 2007: 331). With the same gravel size category, layers XII and XIII show significantly different amounts of damage. A Chi-square test is used to test if the proportion of damage is the same in both levels (use-like damage is excluded here) and shows them to be significantly different ($\chi^2 = 47.753$, $df = 1$, $p < .001$) with the highest frequency of edge damaged pieces in layer XIII (Figure 1a). Aside from gravel size being roughly equal in layers XII and XIII, the coarser character of layer XIII can be responsible for higher frequencies of pieces with irregular retouch, edge damaged pieces and consequently, denticulate tool types. Level XII shows the highest frequencies of undamaged pieces (not significantly different than Level XVIII that has finer coarse gravel, $\chi^2 = .073$, $df = 1$, $p = .8$) leading to the conclusion that an increase in denticulate tool types is not related to taphonomic causes. These data strongly suggest that the frequencies of denticulates in Level XIII of Crvena stijena is most likely a result of taphonomic alterations rather than the intentional production of tools with denticulated/notched edges. The higher occurrence of these tool types in Level XII of Crvena stijena appears as not significantly affected by postdepositional processes. Furthermore, most of the damage is one-sided. Likewise, we can hypothesize that the Level XIV damage patterns may be related to use assuming negligible effect of gravels due to their small size. In line with this is a characteristic continuous marginal retouch on many thin flakes in this level that are less likely to result from postdepositional damage (Chapter 3).

Reevaluating Denticulate Mousterian in the Balkans

The assemblage of Level XIII at Crvena stijena, that was named Denticulate

Mousterian back in the 1970s and served as a reference for comparing other denticulate rich assemblages in the region, is deposited in a coarse layer with the densest gravel component of all layers at Crvena stijena and exhibits the highest edge damage rates. In this light, we can almost certainly rule out its Denticulate Mousterian designation. With the similar gravel size, Level XII contains less taphonomically sensitive damage patterns while still having higher denticulate counts; this pattern most likely is not related to taphonomic but instead anthropogenic factors.

At Mujina cave, higher proportions of denticulate artifacts are found in layers that are less gravelly, which contradicts expectations outlined here. However, some denticulate pieces from this site resemble microdenticulation (Rink et al., 2002 Fig. 4) which warrants a closer look at the pseudo-retouch formation. Several sites in north Croatia, Velika pecina and Vindija have been reported to contain significant amount of denticulate tools in late MP layers (Ahern et al., 2004; Karavanić, 2007; Malez, 1979). Postdepositional processes have been identified at Vindija (Bruner, 2009), though it is not clear whether they would produce extensive damage of artifacts that would result in distinct typological signature. At Pešturina, in Serbia, it is likely that the edges of denticulated tools in the MP levels are attributable to taphonomic processes (Mihailović and Milošević, 2012).

This study suggests that the reality of Denticulate Mousterian should be questioned on a site by site basis, with regard to the post-depositional factors that could introduce pseudo-retouch. At least some Balkan assemblages previously known as Denticulate Mousterian, such as Level XIII at Crvena stijena, should no longer be considered as a reference point for this type of industry. This, however, does not imply that all denticulate-rich assemblages are resulting from post-depositional damage. Rise in these tool types is a feature of many late MP assemblages in this region, stemming most likely from the reduced number of scrapers (Chapter 4). In this sense, a comparison can be made with late MP in SW France where an increase in these tool types is seen in the late Mousterian (Jaubert et al., 2011; Thiébaud, 2010).

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