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SMALL LITHIC ASSEMBLAGES FROM THE BRONZE AGE TELL PECICA-ŞANŢUL MARE (2008-2011 CAMPAIGNS)

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Abstract. Partly researched by an interdisciplinary American-Romanian archaeological team from 2005 to 2015, the tell at Pecica Şanţul Mare gave us, among the vast number of artifacts discovered, a small number of chipped stone artifacts. Fifty-four of the ones recovered in the 2008-2011 excavation campaigns will be presented here. Chronologically, the site can be divided into four periods: Medieval (X Century), Dacian Iron Age, Middle Bronze Age (with six phases) and Copper Age. Most of the lithic artifacts belong to the Maros/Mureşş culture of the Middle Bronze age. As research question I suggest the following: Are these Bronze Age stone artifacts produced casually, with no intention of standardization? To find out, in this article, I will aim to present the Bronze Age chipped stone materials, using the methodology developed by Debenath and Dibble, and Soriano, with their raw material types, debitage stages, technology and typology, including, but not focusing on those artifacts discovered in the Iron Age, Medieval and Plow zone layers. As a predominant flake industry, it is interesting to note that imported raw materials (Balkan flint and obsidian) hold an important percent of the assemblage. Sickle implements and end scrapers are dominant, and direct hard hammer percussion was the most used. Basic and Non-parametric statistics are done on the Middle Bronze Age data in order to find out if the chipped stone artifacts were in any way standardized.

Keywords: Maros, Mureş Culture, Middle Bronze Age, chipped stones, lithics, Pecica Şanţul Mare.
Introduction

The multi-layered archaeological site at Pecica Şanţul Mare, located less than 30 km west from Arad has been known in literature since 1898\(^1\), with Medieval, Iron, Bronze and Copper Age deposits\(^2\). This short article will try to fill in the big literature gap surrounding Bronze Age lithics in Romania through the analysis of the chipped stone artifacts discovered during the 2008-2011 archaeological campaigns both on and off the tell. Chipped stone artifacts are definitely not in the spotlight of Romanian Bronze Age archaeological research, as they are neither beautifully shaped and decorated, like ceramics, nor bestow a significant fascination and excitement on the archaeologist, like bronze. They also reduce drastically in number over time, being replaced by better or easier tools made from alloys.

A total of 55 pieces were recovered during these campaigns, from which 54\(^3\) will be presented here according to chronological phases only, due to the extremely low density of artifacts in features and layers. The assemblage can be classified as small, due to the small number of artifacts unearthed at the site.

Stratigraphically, the artifacts were discovered in the following cultural milieus: one from the plow zone, nine from medieval contexts, one from Dacian Iron Age context and the rest from Middle Bronze Age contexts. The pieces collected from the plow zone, Medieval and Iron Age features, probably all come from mixed cultural Bronze Age deposits. Focusing on technology and typology, all were analyzed macroscopically by the author, using the methodology developed by Dibble and Debenath\(^4\), and Soriano, Villa and their collaborators\(^5\).

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1. For a brief research description previous to 2006 and the analysis of obsidian provenance from the 2008 campaign see Rosania, Barker 2009.
2. For recent excavation reports see Nicodemus et al 2015 and O’Shea et al 2011.
3. One quartz pebble has no stratigraphical data attached to it.
The Middle Bronze Age at the site is split into six phases, I and II corresponding to Late Middle Bronze Age and III to Vb to the Florescent Period (see Annex 1 for chronology). The artifact distribution is as follows: two from phase II, 28 from phase III (one off tell, 15 from a platform layer), nine from phase IV (one off tell) and four from phase Va.

This article will present raw materials and debitage products with their technology and typology, and propose the following question: in the age of bronze, are these stone artifacts produced casually, with no intention of standardization?

**Raw Material Types on Layers: Exotic Materials**

Balkan flint (three) and obsidian (13) were determined as clear imports. The more detailed raw material analysis done by K. Biro⁶ was used in this case to complete the list of imported pieces: two Carpathian radiolarites (phase III), one Transdanubian radiolarite (medieval) and one limnic quartzite of the Szurdokpüspöki-Fony type (phase III). The rest are a mixed variety of materials of probable local origin, collected from the riverbed, due to their small core size (37-50 mm), presence of secondary cortex and small blade lengths (17-21mm). Crandell⁷ suggests Metaliferi Mts as a jasper source, Trascău Mts as jasper and chert sources, and Poiana Rusca Mts for Banat flint.

<table>
<thead>
<tr>
<th>Layer Type</th>
<th>Chert</th>
<th>Imports</th>
<th>Rhyolite</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plow zone</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Medieval</td>
<td>5</td>
<td>4</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Iron Age</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Late Period Maros ph. II</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Florescent Period Maros ph. III</td>
<td>18</td>
<td>10</td>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>Florescent Period Maros ph. IV</td>
<td>6</td>
<td>3</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Florescent Period Maros ph. Va</td>
<td>2</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Grand Total</td>
<td>33</td>
<td>20</td>
<td>1</td>
<td>54</td>
</tr>
</tbody>
</table>

Table 1. Raw material types according to phases

---

⁶ Biro unpublished, report used with the permission of the author.
⁷ Crandell 2012, p. 71; Crandell 2014, Table 2, p. 27-31.
As for the imports, the obsidian source for the analyzed Middle Bronze Age pieces is at Vinicky C1a point in Slovakia\(^8\), and the one for Balkan flint is in northern Bulgaria\(^9\). The Bakony Mountains are the source for the various Transdanubian radiolarites, and the Matra-Bükk for limnoquartzites\(^10\). The raw material distribution in Bronze Age phases is as follows (see Table 1 for other phases):

1. The Late period (phase II) contains one chert\(^11\) stone. The analyzed sample does not include the artifacts discovered during the previous archaeological campaigns, largely stemming from phase II layers\(^12\).

2. Phase III of the Florescent period, with a total of 29 pieces, contains 18 chert pieces, (out of which one is Banat flint), six obsidians, one Szurdokpüspöki-Fony limnoquartzite, one Balkan flint and one rhyolite.

3. Phase IV of the Florescent period, with a total of nine pieces, contains six chert pieces, two obsidians and one Balkan flint.

4. Phase Va of the Florescent Period contains two pieces of chert and two imports (one being an imported Balkan flint and one obsidian).

**Debitage Products**

As seen in Table 2A, both cores (Pl. 1.7-8) were discovered in phase III contexts, together with 17 flakes, five blade-like flakes, one blade and four indeterminable. Phase IV includes

---

\(^8\) Barker and Rosania 2009, p. 25.
\(^10\) Biro 1998, Table 2, p. 4.
\(^11\) In this paper, chert it is to be understood in its broad sense, as all sedimentary, organically formed SiO\(_2\).
\(^12\) The materials from the 2005-2007 and 2011-2015 campaigns are currently under research by a colleague.
six flakes, two blade-like flakes and one indeterminable, while phase V has four flakes, and phase II has one flake (Pl. 2.1). On the two cores the debitage was pursued from multiple directions. Their measurements are 37x29x18 and 50x42x35 mm, the latter showing a last removed flake having its negative at 30x40 mm. Both are made from chert, with a visible cortex surface (less than 50%), the bigger one also showing patina. The small one is burnt, one flake that exploded from it also being recovered and refitted to the core.

<table>
<thead>
<tr>
<th></th>
<th>Flake</th>
<th>Blade-like</th>
<th>Indet.</th>
<th>Blade</th>
<th>Core</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plow zone</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Medieval</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Iron Age</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Late Period Maros ph. II</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Florescent Period Maros ph. III</td>
<td>17</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Florescent Period Maros ph. IV</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Florescent Period Maros ph. Va</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Grand Total</td>
<td>36</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>54</td>
</tr>
</tbody>
</table>

Table 2A. Debitage products according to phases

In the next table (Tab. 2B), the blade-like flake and blade categories were merged to better see the distribution of classes during the Bronze Age. Here, the low number of artifacts only allows for a limited choice of statistical tests. To find out if there was a connection between raw material and debitage types, I used Fisher’s exact test and Yate’s continuity correction (applied to the two by two table formed by the first two categories of Table 2B: flakes and blades versus chert and imports). The Fisher exact test statistic value is 0.004678 and the Chi Square has a p value of 0.0100219, both results being significant at a value of p < 0.05. So, statistically speaking, raw material plays a role in the outcome of this flake-oriented industry, with a preference for imported blades.
Considering the width and thickness of the pieces belonging to the Florescent Period (their lengths are mostly altered by breakage), no standardization can be detected, as seen in Table 3. There is, however, a bigger density spot around the 15 millimeter width by five millimeter thickness mark. The corrected coefficient of variation for these pieces is 47% for width and 83% for thickness. For the length of complete pieces (flakes and blades), it is 56%. Overall, we can say that the Bronze Age lithics are a very heterogeneous group.

Table 3. Florescent period: Kernel density estimation and width-thickness plot

Technologically, these products were probably produced using direct hammer percussion with hard and soft hammers. From the total number of pieces exhibiting percussion bulbs
and platforms (34), prominent and normal bulbs are the most common, in combination with faceted and flat platforms. Some bulbs also exhibit errailure, which happens on nine Florescent Period artifacts (two on medieval artifacts and one on Iron Age artifacts).

Using the blade debitage division developed by Soriano et al (see Annex 2 for a clarification of stages), the following categories resulted (Tab. 4):

In the third phase, we have two blades coming from the optimal main debitage stage (B1): one made from obsidian and the other from chert; two coming from the main debitage stage but are blades with lateral cortex (less than 50%) and uni- or bilateral scars (B6) made from obsidian, and one from the initial debitage stage with less than 50% cortex (A4) made from imported limnoquartzite. Phase IV is poorly represented with one obsidian blade from the initial debitage stage, an acrete blade (A1).

An interesting fact is that out of six Bronze Age blades, one is probably of local origin. We cannot talk about on site blade debitage as long as no cores made from their respective raw material types and/or their debitage byproducts were found. One obsidian acrete blade discovered in the fourth phase is not very relevant, and could have been imported as a blank. This is changing for phase III, during which it is possible to talk about on site debitage, given the higher number of pieces with cortex (10 out of 29, including the two cores, not including the two cortical blades from the B6 category), the high number of flakes from local raw materials (17) and the core presence.

Unfortunately, for the other phases, both the blade and flake assemblages are too small to undoubtedly say if we have on-site blade debitage. It might also be that the knapping was done in another area or outside tell.
Table 4. Blade debitage stages

Functionality

From the total of 19 tools, phase III of the Florescent period is the richest in implements, with three end scrapers (Pl.1.2, 1.6), four sickle implements (Pl. 1.3), two sickle implements with double functionality, one as a side scraper (Pl.1.4) and one as retouched blade (Pl.1.1), one retouched blade and two truncations (Pl.1.5). Only three pieces come from phase IV, two of them being sickle implements (Pl.2.2) and one a retouched blade (Pl.2.3). Lastly, one sickle implement comes from phase Va (Pl.2.4). The typological category of “sickle implement” might also include objects used in threshing (in something like a *tribulum*), but, not being familiar with the macroscopic differentiation, I was not able to determine the precise activity these artifacts were used in.

Table 5. Functionality according to phases

The tools were primarily manufactured on flakes, 12 out of the 15 tools having this kind of blank. What is noteworthy is that some implements were used for a double purpose: we have composite tools that are both scrapers and sickle inserts.

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<sup>13</sup> A detailed microscopic differentiation is described by Anderson et al. 2004 in Table 1, p. 98.
And, as seen in Table. 5, the striking majority of implements are sickle inserts.

In terms of retouch morphology, denticulate retouch is the most common\textsuperscript{14} for Bronze Age sites, and the Pecica site is no exception. Out of 42 Florescent period materials, 16 were retouched, nine times with denticulate retouch (Pl. 1.3, 1.4, Pl. 2.2-4). It is probable that all tools were used more than one time, and were not made to be discarded after one use. Scrapers in general have angles of retouch ranging from 40 to 80 degrees and 30-40 degrees for denticulate inserts. So far, pieces with more than one gloss covered area have not been discovered, but two pieces are completely covered in shine (one distal piece recovered from medieval contexts, one complete flake from the platform layer of the third phase.).

**Conclusions**

The Pecica Bronze Age lithics assemblage, although small in number, yields some interesting results.

As raw materials, the local community chose both chert, of probably local origin, and imports; they are a mixed variety of materials which could have easily been collected from the riverbed, due to the small blade lengths (17-21 mm), small core sizes (31-50 mm) and presence of secondary cortex. It is unclear if knapping was done on site taking into account the low number of materials, number further spread among the different chronological phases. However, due to the fact that the assemblage predominantly contains flakes, with cores and blades from the initial debitage stage also present, especially in phase III of the Florescent period, this is probable. On-site blade debitage is, however, unlikely. Moreover, the sample size is much too small to state any of this without doubt.

\textsuperscript{14} Horváth 2012, p. 142; Gurova 2014a, p. 92.
Technologically, this predominantly flake-oriented industry was made through hard hammer percussion. The high number of flakes with prominent bulbs exhibiting errailure scars and flat, facetted or dihedral platforms, suggest that.

Typologically, during the Middle Bronze Age at the site, sickle implements were recovered in great number (seven), followed by end scrapers (three), composite tools (sickle inserts and scrapers) and truncations (two from each). About 80% of these tools use flakes as their blanks.

Florescent period artifacts were chosen for a few more statistical calculations. Except for two blades and 19 flakes, all others are fragmentary, so no reliable length-width ratios can be analyzed. However, the corrected coefficient of variation was calculated for the length of the complete pieces as well as for the width and thickness. The results show that there is a great level of dispersion around the mean, all coefficients of variation ranging above 45%, especially when dealing with thickness (83%), meaning we have a case of high variability in the sample.

Taking into account all the above mentioned results, I am now able to advance an answer to the question that guided this article. There is good reason to believe that these tools were produced casually, as they were needed, with no intention of standardization.

A broader comparison with other contemporary Bronze Age sites is hard to initiate because published chipped stone assemblages are, to my knowledge, very few. There are 20 lithics collected from Klárafalva\textsuperscript{15} Middle Bronze Age deposits that can be neatly compared to the Pecica assemblage. Out of them, 55% are finished tools, mostly made on transversal flakes, and six out of the 11 tools are sickle inserts (sickle/knife combination). In terms of raw material procurement, the North Hungarian Mountains are the primary source for

\textsuperscript{15} Biro unpublished.
nine Carpathian radiolarites, one Csesztve type silex and two possible Ércelô type limnoquartzites, and the Transdanubian mountains for two Szentgal flints, with the rest being most likely collected from the Mureș or nearby Tisza river beds. As for in-site knapping, Biro does not exclude local production.

Duffy\textsuperscript{16} presented the raw material distribution for micro-regional surface collections in the Köros region (Sarkad 24, Sarkad 88, Tarhos 2, Tarhos 19, Tarhos 32, Bélmegyer 45, Bélmegyer 2, Békés 179, Békés 178) and from the Tarhos 26 excavation. A total of 67 artifacts were recovered, 34 from the northern Carpathians (out of which 10 obsidian), six from southwest Hungary (Mecsek Mts), seven far distance imports (Balkan, Banat and Prut flint) and 20 quartz and quartzite pieces.

Farther away, the Middle Bronze Age sites of the Benta valley\textsuperscript{17} (Százhalombatta-Földvár as main centre with Százhalombatta-MOL, Tárnok, Sóskút and Bia as secondary centres/fortified settlements) show some common points with Pecica, but also regional differences: sickle implements were also the main tool type and denticulate retouch the more common, in this case with local production and local raw materials (Buda hornstone). Obsidian presence in sites is extremely low, with 1 to 2% obsidian in sites. At Százhalombatta-Földvár, there is clear evidence of in site knapping and recurrent retouching\textsuperscript{18}.

Through imports and cultural traditions, the interactions between the people of Vatya, Mureș and Vatina groups are known in literature\textsuperscript{19}, but more similarities and differences would have to be correlated in future studies, when more and detailed lithic assemblages will be published.

\textsuperscript{16} Duffy 2010, Table 9.3, p. 286.
\textsuperscript{17} Anna Priskin 2013, September.
\textsuperscript{18} Horváth 2005, p. 150-151.
\textsuperscript{19} See Fischl, Reményi 2013 for a very concise summary of Bronze Age research in Hungary.
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Ph. III:
Plate 2

# Annex 1

**Bronze Age Chronology at Pecica Şanţul Mare** (After Nicodemus et al. 2015, Table 1)

<table>
<thead>
<tr>
<th>Pecica Period</th>
<th>Phase</th>
<th>Date (cal. BC)</th>
<th>Site Layers</th>
<th>Structures</th>
<th>Major Developments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medieval</td>
<td>Árpád</td>
<td>AD 1000-1100*</td>
<td></td>
<td>Str. 9</td>
<td></td>
</tr>
<tr>
<td>Iron Age</td>
<td>Dacian</td>
<td>300-100</td>
<td>(intrusive pits)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late Period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle Bronze Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floresent Period</td>
<td>1</td>
<td>1600-1500</td>
<td>B1-3</td>
<td>Str. 0</td>
<td>final MBA occupation</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1720-1600</td>
<td>C1-3</td>
<td>Str. 0, 1</td>
<td>decline in occupation intensity, settlement contraction</td>
</tr>
<tr>
<td>Early Period</td>
<td>3</td>
<td>1770-1720</td>
<td>C4-5/ D0-2</td>
<td>Str. 2, 4, 10</td>
<td>peak metalurgical production, platform construction, settlement expansion</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1820-1770</td>
<td>D3, E1</td>
<td>Str 3, 4</td>
<td>peak horse breeding, ritual bone deposits</td>
</tr>
<tr>
<td></td>
<td>5a</td>
<td>1850-1820</td>
<td>E2-3</td>
<td>Str 5-8</td>
<td>increase in occupation intensity; final combed ware, initial baroque ceramics</td>
</tr>
<tr>
<td>Early Bronze Age</td>
<td>5b</td>
<td>1900-1850</td>
<td>E4-5</td>
<td>Str. 11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1900-1850</td>
<td>E6+</td>
<td></td>
<td>(2005 trench)</td>
</tr>
<tr>
<td>Middle Copper Age</td>
<td>7</td>
<td>2000-1900</td>
<td>I</td>
<td>Str. 12</td>
<td>(2014 trench) final rusticated ware ceramics</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3960-3760</td>
<td>J-L</td>
<td></td>
<td>(2014 trench)</td>
</tr>
</tbody>
</table>

*Date from off-tell Medieval Structure 9 (in test unit 3)

**Medieval and Dacian layers and features previously excavated in block area by Oğan (1978), only several deep Dacian pits cutting into Bronze Age deposits left *in situ* and dated
Annex 2

Blade classification based on their position on the core flaking surface (after Soriano 2007, p. 685, Fig. 4.)

**A: Initial stage**
A1: Crested blades with one or two prepared versants
A2: Entirely cortical blades
A3: Blades with more than 50% of cortex (or natural surface)

**B: Main production phase**
Blades from the central part of the debitage surface
B1: Blades produced during the optimal phase of the debitage, without cortex, with unidirectional or bidirectional scars
   B2: Blades with distal cortical edge
   B3: Plunging blades preserving a portion of the opposite striking platform, and unidirectional or bidirectional scars
   B4: Plunging blades preserving a portion of the opposite cortical end, and unidirectional or bidirectional scars
Blades from the sides of the debitage surface
B5: Blades directly underlying a crested blade with symmetrical or asymmetrical section and unidirectional or bidirectional scars
   B6: Blades with a lateral cortical edge (less than 50% of cortex) and unidirectional or bidirectional scars
   B7: Blades with a cortical or natural steep back and unidirectional orbidirectional scars
   B8: Blades with a lateral and distal cortical edge (less than 50% of cortex)
   B9: Blades with centripetal dorsal scars on one side only
   B10: Blades with a cortical or natural steep back and distal cortical edge
   B11: Plunging blades of type B4+B6 (blades with a lateral cortical edge and plunging on a cortical end)
B12: Plunging blades of type B4+B7 (blades with a cortical steep back and plunging on a cortical end)
B13: Plunging blade of type B+B6 (blades with a lateral cortical edge and plunging on a portion of the opposite striking platform)
B14: Plunging blade of type B3+B7 (blades with a cortical steep back and plunging on a portion of the opposite striking platform)

C: Core maintenance blades
C1: Crested blade of second generation (crest along the midline of the blade)
C2: Crested blade of second generation (crest in lateral position)

D: Other
D1: Generic crested blades (that cannot be classed as first or second generation)
D2: Blades that fall outside any of the listed category

E: Indeterminate blades
E1: Unclassifiable pieces as a result of damage, breakage or irregular raw material