Online Resources 1: Supplementary results and tables

From Stone to Tool: How Raw Materials Influenced Upper Paleolithic Technology in Southwestern Iberia (Vale Boi). Archaeological and Anthropological Sciences

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# Assemblage description

## Gravettian (levels 6-7)

The sample studied for the Gravettian occupation (>2012 excavations) of the Terrace area included 766 artifacts. Of these, 209 (27.28%) have an indeterminate chert type ([Table 1](#tbl-general-gravettian)). Chalcedony (T1) and local cherts (T2-5) show a total of 247 artefacts (32.25%). Non-local cherts show different numbers of artefacts depending on the type, with T6 and T7 showing the highest values (169 or 22.06% of the total assemblage, and 86 or 11.23%, respectively); the other non-local cherts have artefact counts lower than 20 per type. The TL cherts also show smaller numbers, with 12 artefacts, corresponding to 7 different types of TL cherts [Table 2](#tbl-TL-classes).

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| Table 1: Number and percentage of techno-typological classes by cherts type from the Gravettian assemblage (levels 6 and 7) of the Terrace area of Vale Boi.   | CLASS\_ELONG | T1 | T2-5 | T6 | T7 | T8 | T9 | T10 | TL | INDET | Total | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Flake | 5 (14.29%) | 60 (28.30%) | 41 (24.26%) | 16 (18.60%) | 3 (33.33%) |  | 7 (38.89%) | 3 (25.00%) | 53 (25.36%) | 188 (24.54%) | | Elongated blank | 1 (2.86%) | 16 (7.55%) | 3 (1.78%) | 5 (5.81%) |  | 1 (6.25%) |  |  | 5 (2.39%) | 31 (4.05%) | | Blank fragment | 9 (25.71%) | 46 (21.70%) | 24 (14.20%) | 21 (24.42%) | 2 (22.22%) | 4 (25.00%) | 3 (16.67%) | 2 (16.67%) | 65 (31.10%) | 176 (22.98%) | | Burin spall |  | 11 (5.19%) | 12 (7.10%) | 4 (4.65%) |  |  |  | 1 (8.33%) | 4 (1.91%) | 32 (4.18%) | | Core | 3 (8.57%) | 11 (5.19%) | 6 (3.55%) | 3 (3.49%) |  | 1 (6.25%) | 2 (11.11%) |  | 4 (1.91%) | 30 (3.92%) | | Core fragment | 2 (5.71%) | 8 (3.77%) | 2 (1.18%) | 1 (1.16%) | 1 (11.11%) | 1 (6.25%) | 1 (5.56%) |  | 1 (0.48%) | 17 (2.22%) | | Core prep product |  | 3 (1.42%) | 2 (1.18%) | 2 (2.33%) |  | 1 (6.25%) |  | 2 (16.67%) |  | 10 (1.31%) | | Retouched | 3 (8.57%) | 33 (15.57%) | 55 (32.54%) | 23 (26.74%) | 3 (33.33%) | 1 (6.25%) | 2 (11.11%) | 4 (33.33%) | 32 (15.31%) | 156 (20.37%) | | Retouched fragment |  | 2 (0.94%) | 3 (1.78%) | 1 (1.16%) |  |  | 1 (5.56%) |  | 7 (3.35%) | 14 (1.83%) | | Shatter | 12 (34.29%) | 22 (10.38%) | 21 (12.43%) | 10 (11.63%) |  | 7 (43.75%) | 2 (11.11%) |  | 38 (18.18%) | 112 (14.62%) | | Total | 35 (100.00%) | 212 (100.00%) | 169 (100.00%) | 86 (100.00%) | 9 (100.00%) | 16 (100.00%) | 18 (100.00%) | 12 (100.00%) | 209 (100.00%) | 766 (100.00%) | |

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| Table 2: Trace lithologies cherts (TL) from the Gravettian and Proto-Solutrean assemblages of the Terrace and Solutrean assemblage from the Shelter and corresponding technological class.   | Technocomplex | TL | ID | CLASS | RETOUCHEDPIECETYPOLOGY | | --- | --- | --- | --- | --- | | Gravettian | TL01 | H21-4539 | Blank | NA | | Gravettian | TL01 | I19-3495 | CorePreparProd | NA | | Gravettian | TL01 | I20-3966 | BurinSpall | NA | | Gravettian | TL02 | I19-2943 | RetouchedPiece | Burin | | Proto-Solutrean | TL03 | I18-2163 | RetouchedPiece | Endscraper | | Gravettian | TL04 | H19-4063 | RetouchedPiece | Endscraper | | Gravettian | TL04 | I19-3586 | CorePreparProd | NA | | Gravettian | TL05 | H20-4067 | BlankFrag | NA | | Gravettian | TL05 | J18-1125 | Blank | NA | | Gravettian | TL06 | I21-3955 | RetouchedPiece | Retouched blank | | Proto-Solutrean | TL09 | I20-2857 | Blank | NA | | Proto-Solutrean | TL09 | I21-3483 | Shatter | NA | | Gravettian | TL09 | H21-4790 | BlankFrag | NA | | Gravettian | TL09 | I20-3850 | Blank | NA | | Gravettian | TL10 | H18-3626 | RetouchedPiece | Burin | | Solutrean | TL14 | 08-5395 | Flake | NA | |

[Table 1](#tbl-general-gravettian) shows the number and percentages of technological classes per chert type. For local cherts, blanks (including blank fragments) represent more than 50% of the artefacts. Cores and core maintenance products are only present in small frequencies: <10% and <2%, respectively. Retouched tools seem to be especially relevant in local T2-5 cherts (~16%), making them the most frequent class after blanks and blank fragments, followed by shatter (~10%). T1 (chalcedony) shows similar patterns to other local cherts, although with higher percentages of shatter (34.3%).

When compared to local cherts, non-local chert types (especially T6 and T7) show similar percentages of blanks (n=68 or 40% and 42`or ~50%, respectively) but higher percentages of retouched tools (~30%). Cores, core fragments and core preparation and maintenance products are also present in all non-local cherts (excluding TL) even if in percentages below 4% (n<4), as well as shatter (~12%). The exception is T6 that shows the highest numbers of cores and core fragments (n=8), although with low frequencies (4.6%). The TL cherts show mostly blanks and blank fragments (n=3 and n=2, respectively), and retouched tools (n=4).

As seen in [Table 3](#tbl-retouch-gravettian), 170 retouched tools were identified, with 39 (22.94%) having an unidentified chert type. From the identified chert types, 38 (22.35%) of retouched tools are from local types, 89 (52.35%) from non-local cherts and 4 are from the TL group. From all chert types, T6 shows the highest numbers of retouched pieces (n=58, 34.12%). Regarding typologies, 8 types of retouched tools were identified (excluding retouched tool fragments). All these typologies were found in the non-local chert group, while only 5 retouched tool typologies were identified in local cherts/chalcedony. The most common typologies identified in the assemblage (and for all chert types) were burins (n=54), endscrapers (n=18), retouched blanks (n=38) and splintered pieces (n=26). From all these, the majority were produced in non-local chert, mainly T6 and in lesser numbers T7. Although in lesser numbers as well, backed tools were also identified (n=7), but only present in non-local chert types (T6 and T7). The presence of burin spalls in local chert, especially T2 (n=11) and non-local cherts (T6 with n=12 and T7 with n=4) is expected due to the prevalence of burins ([Table 1](#tbl-general-gravettian)).

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| Table 3: Retouched tools (n) by chert type of the Gravettian assemblage (levels 6 and 7) of the Terrace area.   | Typology | T1 | T2-5 | T6 | T7 | T8 | T9 | T10 | TL | INDET | Total | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Backed tool |  |  | 3 | 2 |  |  |  |  | 2 | 7 | | Burin | 1 | 13 | 17 | 10 | 1 |  |  | 2 | 10 | 54 | | Denticulate |  |  | 1 | 1 |  |  |  |  | 2 | 4 | | Endscraper | 2 | 4 | 3 |  |  |  | 2 | 1 | 6 | 18 | | Notch |  | 3 | 7 | 1 |  |  |  |  | 2 | 13 | | Perforator |  |  |  | 1 |  |  |  |  |  | 1 | | Retouched blank |  | 6 | 17 | 5 | 1 |  |  | 1 | 8 | 38 | | Retouched blank fragment |  | 2 | 1 |  |  |  |  |  |  | 3 | | Retouched piece fragment |  |  |  | 1 |  |  | 1 |  | 4 | 6 | | Splintered piece |  | 7 | 9 | 3 | 1 | 1 |  |  | 5 | 26 | | Total | 3 | 35 | 58 | 24 | 3 | 1 | 3 | 4 | 39 | 170 | |

## Proto-Solutrean (levels 4E and top of level 5)

The final lithic sample from the Proto-Solutrean assemblage (levels 4E and top of level 5), consists of 635 artifacts. Of these, 167 (26.3%) have an indeterminate chert type. Local cherts correspond to 335 artefacts (52.76%), with T4 being the most present local chert. Non-local types are present in smaller numbers (n=130 or 20.47%), with T6 and T7 being the most relevant (n=60 and n=47, respectively), and the TL group includes 3 artefacts, corresponding to 2 types of TL cherts [Table 2](#tbl-TL-classes).

When crossing the lithic class with chert type ([Table 4](#tbl-general-proto)), we see that the local types show high frequency of blanks (>50%, including blank fragments), followed by shatter (~20-30%). Cores are present in small numbers (n=28), corresponding to ~10% of the classes in local types, with the exception of T1 (chalcedony), with no cores. Core preparation and maintenance products are absent in all local cherts. For non-local types, especially those with higher number of artefacts (T6-T8), blanks and blank fragments are the most frequent class (48.3%, 53.1% and 69.2%, respectively). Retouched tools are present in smaller frequencies for the previous mentioned chert types (~17-23%). For T6 the absence of cores but the presence of shatter and a single core preparation and maintenance product suggests knapping on site; all other non-local types show at least 1 core and frequently the presence of shatter. As expected, the TL artifacts include a blank and a retouched. However, a shatter was also identified [Table 2](#tbl-TL-classes).

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| Table 4: Number and percentage of techno-typological classes by chert type from the Proto-Solutrean assemblage (levels 4E and top of level 5) of the Terrace area of Vale Boi.   | CLASS\_ELONG | T1 | T2-5 | T6 | T7 | T8 | T9 | T10 | TL | INDET | Total | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Flake | 12 (37.50%) | 111 (36.63%) | 18 (30.00%) | 13 (27.66%) | 4 (30.77%) | 1 (11.11%) | 1 (100.00%) | 1 (33.33%) | 57 (34.13%) | 218 (34.33%) | | Elongated blank | 4 (12.50%) | 27 (8.91%) | 5 (8.33%) | 6 (12.77%) | 2 (15.38%) |  |  |  | 13 (7.78%) | 57 (8.98%) | | Blank fragment | 5 (15.62%) | 39 (12.87%) | 6 (10.00%) | 6 (12.77%) | 3 (23.08%) | 2 (22.22%) |  |  | 30 (17.96%) | 91 (14.33%) | | Burin spall |  | 1 (0.33%) |  |  |  |  |  |  |  | 1 (0.16%) | | Core |  | 28 (9.24%) |  | 2 (4.26%) | 1 (7.69%) | 1 (11.11%) |  |  | 4 (2.40%) | 36 (5.67%) | | Core fragment |  | 4 (1.32%) |  | 2 (4.26%) |  |  |  |  |  | 6 (0.94%) | | Core prep product |  |  | 1 (1.67%) | 1 (2.13%) |  |  |  |  | 2 (1.20%) | 4 (0.63%) | | Retouched | 1 (3.12%) | 22 (7.26%) | 9 (15.00%) | 9 (19.15%) | 3 (23.08%) | 1 (11.11%) |  | 1 (33.33%) | 13 (7.78%) | 59 (9.29%) | | Retouched fragment |  | 3 (0.99%) | 1 (1.67%) |  |  |  |  |  | 2 (1.20%) | 6 (0.94%) | | Shatter | 10 (31.25%) | 68 (22.44%) | 20 (33.33%) | 8 (17.02%) |  | 4 (44.44%) |  | 1 (33.33%) | 46 (27.54%) | 157 (24.72%) | | Total | 32 (100.00%) | 303 (100.00%) | 60 (100.00%) | 47 (100.00%) | 13 (100.00%) | 9 (100.00%) | 1 (100.00%) | 3 (100.00%) | 167 (100.00%) | 635 (100.00%) | |

In total, 65 chert retouched tools were identified, with 23.1% (n=15) having an unidentified chert type ([Table 5](#tbl-retouch-proto)). A total of 26 (40%) retouched tools correspond to local cherts, while 24 (36.92%) correspond to non-local and TL cherts. As seen in [Table 5](#tbl-retouch-proto), 11 different types of retouched tools were identified. Endscrapers (n=18), retouched blanks (n=14), splintered pieces (n=11) and burins (n=8) were the most prevalent. Local raw materials show 8 different typologies, with Vale Comprido points, Solutrean retouch and notches being present only in the local types, even if in small numbers. Non-local cherts show 8 different typologies of retouched tools. Perforator-endscraper, truncation and backed bladelet typologies can only be found in non-local varieties, albeit also in small numbers.

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| Table 5: Retouched tools (n) by chert type of the Proto-Solutrean assemblage (levels 4E and top of level 5) of the Terrace area.   | Typology | T1 | T2-5 | T6 | T7 | T8 | T9 | TL | INDET | Total | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Backed tool |  |  |  | 1 |  |  |  | 1 | 2 | | Burin |  | 5 | 1 |  | 1 |  |  | 1 | 8 | | Denticulate |  | 1 |  | 1 |  |  |  |  | 2 | | Endscraper |  | 6 | 4 | 1 |  |  | 1 | 6 | 18 | | Notch |  | 1 |  |  |  |  |  | 2 | 3 | | Perforator-endscraper |  |  | 1 |  |  |  |  |  | 1 | | Retouched blank |  | 6 | 1 | 3 | 1 | 1 |  | 2 | 14 | | Solutrean retouch |  | 1 |  |  |  |  |  |  | 1 | | Splintered piece |  | 5 | 2 | 3 |  |  |  | 1 | 11 | | Truncation |  |  | 1 |  | 1 |  |  | 2 | 4 | | Vale Comprido Point | 1 |  |  |  |  |  |  |  | 1 | | Total | 1 | 25 | 10 | 9 | 3 | 1 | 1 | 15 | 65 | |

## Solutrean (levels A to C)

The Solutrean assemblages show similar patterns to those observed in previous assemblages. The final sample from levels A, B and C from the Solutrean occupations of the Shelter area consists of 910 artifacts. Of these, 201 (21.99%) correspond to the indeterminate chert group. Local cherts correspond to 564 (61.71%) artefacts, mostly from T2. Non-local cherts (including the TL group) correspond to 145 (15.86%) artefacts, mostly from T6 (n=85).

When crossing the class data with type of raw material ([Table 6](#tbl-general-solutrean)), we see that for local chert, the majority of the debitage is composed of blanks (~80%). Cores are also present (~10%), alongside a small percentage of core preparation and maintenance products (1.3%). In comparison to debitage products, retouched tools are scarce in the sample (~3%). Non-local cherts, especially T6 and T8, show similar patterns to the local cherts, with high percentages of blanks (>50%). Cores and core preparation and maintenance are also present in small percentages (~6-3% and 3.5% only for T6, respectively), as well as retouched tools (<10%). However, these specific results are truncated by the lack of shatter, which were not present in the sample used for the study (see Materials and Methods section).

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| Table 6: Number and percentage of techno-typological classes by chert type from the Solutrean assemblage (levels A to C) of the Shelter area of Vale Boi.   | CLASS | T1 | T2-5 | T6 | T7 | T8 | T9 | T10 | T11 | TL | INDET | Total | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Flake | 10 (62.50%) | 230 (41.97%) | 41 (48.24%) | 2 (22.22%) | 14 (46.67%) | 1 (33.33%) |  | 7 (43.75%) | 1 (100.00%) | 87 (43.28%) | 393 (43.19%) | | Elongated blank | 1 (6.25%) | 97 (17.70%) | 7 (8.24%) | 2 (22.22%) | 5 (16.67%) |  |  | 1 (6.25%) |  | 15 (7.46%) | 128 (14.07%) | | Thinning flake |  | 4 (0.73%) | 1 (1.18%) |  | 3 (10.00%) | 1 (33.33%) |  | 1 (6.25%) |  | 10 (4.98%) | 20 (2.20%) | | Blank fragment | 2 (12.50%) | 131 (23.91%) | 21 (24.71%) | 4 (44.44%) | 5 (16.67%) |  | 1 (100.00%) | 4 (25.00%) |  | 67 (33.33%) | 235 (25.82%) | | Burin spall |  | 1 (0.18%) |  |  |  |  |  |  |  |  | 1 (0.11%) | | Core |  | 59 (10.77%) | 5 (5.88%) |  | 1 (3.33%) | 1 (33.33%) |  |  |  | 6 (2.99%) | 72 (7.91%) | | Core fragment |  | 3 (0.55%) |  |  |  |  |  |  |  |  | 3 (0.33%) | | Core prep product |  | 7 (1.28%) | 3 (3.53%) |  |  |  |  |  |  |  | 10 (1.10%) | | Retouched | 2 (12.50%) | 8 (1.46%) | 6 (7.06%) | 1 (11.11%) | 1 (3.33%) |  |  | 3 (18.75%) |  | 12 (5.97%) | 33 (3.63%) | | Retouched fragment | 1 (6.25%) | 8 (1.46%) | 1 (1.18%) |  | 1 (3.33%) |  |  |  |  | 4 (1.99%) | 15 (1.65%) | | Shatter |  |  |  |  |  |  |  |  |  |  |  | | Total | 16 (100.00%) | 548 (100.00%) | 85 (100.00%) | 9 (100.00%) | 30 (100.00%) | 3 (100.00%) | 1 (100.00%) | 16 (100.00%) | 1 (100.00%) | 201 (100.00%) | 910 (100.00%) | |

The analysed Solutrean sample has a total of 43 retouched tools (complete and fragments), with 17 corresponding to local cherts and 13 to non-local cherts, with the remaining being cherts of unidentified type. These results are significantly reduced from the original dataset, possibly due to no bucket coordinates being used. From the 43 retouched tools, 10 different typologies were identified (without accounting for fragments). The typologies which are most frequently present in the studied sample are bifacial blanks (n=10). Two types of points were identified: shouldered points (n=3, including fragments) and tanged and winged points (n=4). Other frequent retouched typologies are retouched blanks (n=7), notches (n=5), splintered pieces (n=5) and endscrapers (n=4). Local types show a higher variability retouched typologies (9 types), although this may be related to the higher number of tools. In comparison, Type 6 shows only 5 different typologies.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 7: Retouched tools (n) by chert type of the Solutrean assemblage (level A to C) of the Shelter area.   | Typology | T1 | T2-5 | T6 | T7 | T8 | T11 | INDET | Total | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Bifacial blank | 1 | 5 | 1 |  | 1 |  | 2 | 10 | | Burin |  |  | 1 |  |  |  |  | 1 | | Denticulate |  | 1 |  |  |  |  | 1 | 2 | | Endscraper |  | 2 |  |  |  |  | 2 | 4 | | Notch |  | 1 | 1 |  | 1 | 1 | 1 | 5 | | Retouched blank |  | 1 | 2 |  |  | 2 | 2 | 7 | | Retouched piece fragment |  |  |  |  |  |  | 1 | 1 | | Shouldered point |  | 1 |  | 1 |  |  | 1 | 3 | | Splintered piece | 2 |  | 2 |  |  |  | 1 | 5 | | Tanged and winged point |  | 2 |  |  |  |  | 2 | 4 | | Truncation |  | 1 |  |  |  |  |  | 1 | | Total | 3 | 14 | 7 | 1 | 2 | 3 | 13 | 43 | |

# Tool-to-debitage ratios

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (a) Tools-to-debitage ratio by chert type of the Gravettian assemblage (levels 6 and 7) of the Terrace area.   | RMTYPE | Blank | RetouchedPiece | sum | Tool/Blank | | --- | --- | --- | --- | --- | | T1 | 8 | 3 | 11 | 0.3750000 | | T2 | 40 | 19 | 59 | 0.4750000 | | T3 | 8 | 4 | 12 | 0.5000000 | | T4 | 8 | 2 | 10 | 0.2500000 | | T5 | 31 | 8 | 39 | 0.2580645 | | T6 | 48 | 55 | 103 | 1.1458333 | | T7 | 25 | 23 | 48 | 0.9200000 | | T8 | 3 | 3 | 6 | 1.0000000 | | T10 | 7 | 2 | 9 | 0.2857143 | | TL | 4 | 4 | 8 | 1.0000000 | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (b) Tools-to-debitage ratio by chert type of the Proto-Solutrean assemblage (levels 4E and top of level 5) of the Terrace area.   | RMTYPE | Blank | RetouchedPiece | sum | Tool/Blank | | --- | --- | --- | --- | --- | | T1 | 19 | 1 | 20 | 0.0526316 | | T2 | 35 | 8 | 43 | 0.2285714 | | T3 | 15 | 2 | 17 | 0.1333333 | | T4 | 81 | 7 | 88 | 0.0864198 | | T5 | 24 | 5 | 29 | 0.2083333 | | T6 | 27 | 9 | 36 | 0.3333333 | | T7 | 22 | 9 | 31 | 0.4090909 | | T8 | 6 | 3 | 9 | 0.5000000 | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (c) Tools-to-debitage ratio by chert type of the Solutrean assemblage (levels A to C) of the Shelter area.   | RMTYPE | Blank | RetouchedPiece | sum | Tool/Blank | | --- | --- | --- | --- | --- | | T1 | 11 | 2 | 13 | 0.1818182 | | T2 | 359 | 9 | 368 | 0.0250696 | | T4 | 8 | 0 | 8 | 0.0000000 | | T5 | 18 | 1 | 19 | 0.0555556 | | T6 | 56 | 6 | 62 | 0.1071429 | | T7 | 5 | 1 | 6 | 0.2000000 | | T8 | 25 | 1 | 26 | 0.0400000 | | T11 | 9 | 3 | 12 | 0.3333333 | | |

Table 8: Tools-to-debitage ratio by chert type of the Gravettian (a), Proto-Solutrean (b) and Solutrean (c) assemblages.

# Blank-to-core ratios

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (a) Blank-to-core ratio by chert type of the Gravettian assemblage (levels 6 and 7) of the Terrace area.   | RMTYPE | Blank | Core | sum | Blank/Core | | --- | --- | --- | --- | --- | | T1 | 8 | 3 | 11 | 2.666667 | | T2 | 40 | 11 | 51 | 3.636364 | | T3 | 8 | 0 | 8 | Inf | | T4 | 8 | 0 | 8 | Inf | | T5 | 31 | 0 | 31 | Inf | | T6 | 48 | 6 | 54 | 8.000000 | | T7 | 25 | 3 | 28 | 8.333333 | | T10 | 7 | 2 | 9 | 3.500000 | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (b) Blank-to-core ratio by chert type of the Proto-Solutrean assemblage (levels 4E and top of level 5) of the Terrace area.   | RMTYPE | Blank | Core | sum | Blank/Core | | --- | --- | --- | --- | --- | | T1 | 19 | 0 | 19 | Inf | | T2 | 35 | 4 | 39 | 8.750000 | | T3 | 15 | 5 | 20 | 3.000000 | | T4 | 81 | 13 | 94 | 6.230769 | | T5 | 24 | 6 | 30 | 4.000000 | | T6 | 27 | 0 | 27 | Inf | | T7 | 22 | 2 | 24 | 11.000000 | | T8 | 6 | 1 | 7 | 6.000000 | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (c) Blank-to-core ratio by chert type of the Solutrean assemblage (levels A to C) of the Shelter area.   | RMTYPE | Blank | Core | sum | Blank/Core | | --- | --- | --- | --- | --- | | T1 | 11 | 0 | 11 | Inf | | T2 | 359 | 50 | 409 | 7.180000 | | T4 | 8 | 2 | 10 | 4.000000 | | T5 | 18 | 7 | 25 | 2.571429 | | T6 | 56 | 5 | 61 | 11.200000 | | T8 | 25 | 1 | 26 | 25.000000 | | T11 | 9 | 0 | 9 | Inf | | |

Table 9: Blank-to-core ratio by chert type of the Gravettian (a), Proto-Solutrean (b) and Solutrean (c) assemblages.

# Measurements descriptive statistics

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (a) Mean and SD for Max width, Length and Weight measurements of flakes.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Flake | 21.14400 | 6.842465 | 23.31000 | 6.638509 | 3.780000 | 2.4066574 | | T2-5 | Flake | 23.36233 | 9.153043 | 29.14650 | 11.915010 | 6.740000 | 10.4329855 | | T6 | Flake | 19.61366 | 7.058163 | 20.78317 | 6.298627 | 2.629268 | 1.9334223 | | T7 | Flake | 20.12187 | 5.837771 | 22.84000 | 4.707820 | 2.993750 | 2.2860355 | | T8 | Flake | 21.60000 | 8.872705 | 25.91333 | 9.660566 | 6.266667 | 6.6455499 | | T10 | Flake | 28.20571 | 6.909438 | 29.53000 | 8.811443 | 8.485714 | 5.2014192 | | TL | Flake | 23.08667 | 2.057093 | 24.18667 | 2.288435 | 3.300000 | 0.6557439 | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (b) Mean and SD for Max width, Length and Weight measurements of elongated blanks.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Elongated blank | 8.740000 | NA | 25.15000 | NA | 0.8000000 | NA | | T2-5 | Elongated blank | 10.893125 | 3.1091772 | 31.33188 | 11.157076 | 2.1562500 | 2.1253921 | | T6 | Elongated blank | 6.793333 | 0.6466323 | 24.03667 | 2.611328 | 0.3333333 | 0.2081666 | | T7 | Elongated blank | 9.546000 | 2.6704644 | 24.95200 | 6.160809 | 1.0000000 | 0.7071068 | | T9 | Elongated blank | 12.960000 | NA | 28.41000 | NA | 2.2000000 | NA | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (c) Mean and SD for Max width, Length and Weight measurements of cores.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Core | 24.13333 | 6.092892 | 31.33333 | 12.418669 | 15.50000 | 5.629387 | | T2-5 | Core | 27.57091 | 6.619282 | 28.36091 | 6.978917 | 21.31818 | 11.439040 | | T6 | Core | 27.90000 | 7.318019 | 25.08833 | 9.885892 | 12.63333 | 6.470136 | | T7 | Core | 33.53333 | 6.747098 | 27.03333 | 7.715137 | 21.26667 | 21.128496 | | T9 | Core | 37.60000 | NA | 21.05000 | NA | 13.10000 | NA | | T10 | Core | 28.91000 | 24.197194 | 23.44500 | 0.205061 | 32.45000 | 41.648589 | | |

Table 10: Mean and standard deviation (SD) for Max width, Length and Weight measurements of flakes (a), elongated blanks (b) and cores (c) by chert type of the Gravettian assemblage (levels 6-7) of the Terrace area.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (a) Mean and SD for Max width, Length and Weight measurements of flakes.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Flake | 18.82333 | 3.905256 | 21.87417 | 9.184152 | 2.825000 | 2.0181562 | | T2-5 | Flake | 19.56243 | 6.288279 | 23.42270 | 7.159274 | 3.778378 | 4.3129278 | | T6 | Flake | 16.99556 | 3.481714 | 19.82889 | 3.999244 | 2.600000 | 1.6495989 | | T7 | Flake | 19.00154 | 4.325205 | 20.45308 | 5.241886 | 2.330769 | 0.9629682 | | T8 | Flake | 16.39000 | 1.924734 | 19.09500 | 2.668964 | 1.300000 | 0.7615773 | | T9 | Flake | 13.49000 | NA | 19.37000 | NA | 0.800000 | NA | | T10 | Flake | 34.73000 | NA | 31.36000 | NA | 12.000000 | NA | | TL | Flake | 23.98000 | NA | 20.27000 | NA | 3.500000 | NA | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (b) Mean and SD for Max width, Length and Weight measurements of elongated blanks.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Elongated blank | 16.08000 | 9.1562219 | 38.74000 | 16.0558795 | 7.025000 | 10.4490430 | | T2-5 | Elongated blank | 11.76963 | 4.2724506 | 29.93741 | 9.9047326 | 2.288889 | 2.5979775 | | T6 | Elongated blank | 10.48800 | 3.2717151 | 23.67200 | 5.6412250 | 0.880000 | 0.6942622 | | T7 | Elongated blank | 12.17000 | 3.7656713 | 28.66667 | 9.8499029 | 2.350000 | 2.4287857 | | T8 | Elongated blank | 7.90000 | 0.9050967 | 18.19500 | 0.8131728 | 0.450000 | 0.2121320 | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (c) Mean and SD for Max width, Length and Weight measurements of cores.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T2-5 | Core | 29.77893 | 7.109754 | 27.5775 | 10.218979 | 22.50 | 17.5262343 | | T7 | Core | 22.63000 | 1.753625 | 20.9150 | 1.067731 | 7.35 | 0.9192388 | | T8 | Core | 29.33000 | NA | 27.6300 | NA | 9.70 | NA | | T9 | Core | 18.41000 | NA | 28.1500 | NA | 16.90 | NA | | |

Table 11: Mean and standard deviation (SD) for Max width, Length and Weight measurements of flakes (a), elongated blanks (b) and cores (c) by chert type of the Proto-Solutrean assemblage (levels 4E and top of level 5) of the Terrace area.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (a) Mean and SD for Max width, Length and Weight measurements of flakes.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Flake | 20.62700 | 8.318198 | 20.78200 | 4.449754 | 3.070000 | 2.5250083 | | T2-5 | Flake | 19.95898 | 6.668743 | 25.25791 | 7.237591 | 3.067111 | 3.1035813 | | T6 | Flake | 20.81902 | 7.033183 | 21.61439 | 7.469027 | 2.543902 | 2.7665004 | | T7 | Flake | 25.20000 | NA | 41.70000 | NA | 8.000000 | NA | | T8 | Flake | 21.38786 | 8.888839 | 22.40643 | 5.231237 | 2.064286 | 2.2953489 | | T9 | Flake | 33.64000 | NA | 20.74000 | NA | 3.500000 | NA | | T11 | Flake | 20.73429 | 5.996968 | 23.10429 | 5.407189 | 1.742857 | 0.9449112 | | TL | Flake | 50.82000 | NA | 41.56000 | NA | 13.900000 | NA | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (b) Mean and SD for Max width, Length and Weight measurements of elongated blanks.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T1 | Elongated blank | 9.35000 | NA | 29.89000 | NA | 0.700000 | NA | | T2-5 | Elongated blank | 11.66814 | 3.080941 | 29.82876 | 8.256812 | 1.780412 | 1.7672153 | | T6 | Elongated blank | 10.74000 | 1.890873 | 27.90000 | 5.941307 | 1.028571 | 0.6156684 | | T7 | Elongated blank | 10.22000 | NA | 28.51000 | NA | 1.100000 | NA | | T8 | Elongated blank | 9.49200 | 1.841893 | 23.79600 | 3.207356 | 0.780000 | 0.5630275 | | T11 | Elongated blank | 10.44000 | NA | 24.99000 | NA | 1.000000 | NA | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (c) Mean and SD for Max width, Length and Weight measurements of cores.   | RMTYPE | CLASS | MAXWIDTH\_mean | MAXWIDTH\_sd | LENGTH\_mean | LENGTH\_sd | WEIGHT\_mean | WEIGHT\_sd | | --- | --- | --- | --- | --- | --- | --- | --- | | T2-5 | Core | 30.45702 | 7.667828 | 29.86246 | 8.250923 | 22.05158 | 19.28408 | | T6 | Core | 26.45000 | 9.485196 | 30.04000 | 14.381632 | 18.28000 | 18.21722 | | T8 | Core | 10.73000 | NA | 20.09000 | NA | 2.60000 | NA | | T9 | Core | 30.86000 | NA | 36.38000 | NA | 17.50000 | NA | | |

Table 12: Mean and standard deviation (SD) for Max width, Length and Weight measurements of flakes (a), elongated blanks (b) and cores (c) by chert type of the Solutrean assemblage (levels A to C) of the Shelter area.

# Measurements non-parametric statistical analysis

A Mann-Whitney U statistical test was conducted to determine whether there are differences in the measurements (weight, length and width) of blanks and cores between local and non-local cherts. To do this, all local cherts (including chalcedony) were grouped in a Local category (L) while all non-local cherts were grouped in a non-local category (NL). Type 10 and TL cherts were excluded from the NL grouping to avoid adding cherts which are the result of probable different procurement strategies and clearly deviate from the other cherts in terms regarding the measurements. The Solutrean assemblage is not represented in the core statistics due to the small sample size of both local and non-local categories.

The results indicate generally significant differences in blank measurements between local and non-local cherts in all technocomplexes; in almost all measurements and groups, local cherts show higher medians [Table 13 (a)](#tbl-pvalue-1). Length seems to be consistently significant (p < 0.01 and < 0.001) between the two groups in all assemblages, with local cherts showing higher median lengths than non-local cherts. In the Gravettian and Proto-Solutrean assemblages, weight is also significantly different between local and non-local blanks (p < 0.05), with local cherts presenting higher medians. In comparison, width differences show no statistical significance, with exception of the Solutrean assemblage. In the Solutrean, blank width is significant (p < 0.05) with the non-local category showing higher medians compared local cherts.

Regarding the cores, in almost all measurements and groups local cherts show higher means than non-local cherts [Table 13 (b)](#tbl-pvalue-2). Despite these differences, the results are not significant (p > 0.05). It is important to note, however, that the sample size for cores in the Gravettian assemblage and non-local cherts in the Solutrean assemblage are smaller (n < 15) than the blank sample size.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (a) Median values and p value results for the Mann-Whitney U statistical test applied to blank measurements.   | Technocomplex | Variable | L\_median | NL\_median | P\_value | | --- | --- | --- | --- | --- | | Gravettian | Weight | 2.8 | 1.9 | 0.01210\* | |  | Length | 25.8 | 21.2 | 0.00009\*\*\* | |  | Width | 19.1 | 17.8 | 0.31050 | |  | (n) | 82 | 69 | - | | Proto-Solutrean | Weight | 2.2 | 1.7 | 0.04659\* | |  | Length | 23.4 | 19.4 | 0.00476\*\* | |  | Width | 16.8 | 16.6 | 0.05725 | |  | (n) | 154 | 49 | - | | Solutrean | Weight | 1.7 | 1.5 | 0.08876 | |  | Length | 25.1 | 21.9 | 0.00059\*\*\* | |  | Width | 16.6 | 18.8 | 0.02856\* | |  | (n) | 342 | 86 | - | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | (b) Median values and p value results for the Mann-Whitney U statistical test applied to core measurements.   | Technocomplex | Variable | L\_median | NL\_median | P\_value | | --- | --- | --- | --- | --- | | Gravettian | Weight | 20 | 11.8 | 0.241 | |  | Length | 29.6 | 21.9 | 0.230 | |  | Width | 27.6 | 29.7 | 0.334 | |  | (n) | 14 | 10 | - | | Solutrean | Weight | 16.5 | 11.7 | 0.224 | |  | Length | 28.3 | 25.6 | 0.662 | |  | Width | 30.7 | 26.0 | 0.166 | |  | (n) | 59 | 7 | - | | |

Table 13: Median values and p value results for the Mann-Whitney U statistical test applied to blank (a) and core (b) measurements (Weight, Length and Max width). All local chert types were grouped in the L category and non-local groups in the NL category. (n) corresponds to the total number of samples used for the statistical tests. \* corresponds to significant p values (<0.05), \*\* to very significant p values (< 0.01) and \*\*\* to highly significant p values (0.001).