THE OBSIDIAN OF THE LM IIIB:1 AND IIIA:2 PERIODS

by

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The presentation of the LM IIIB:1 and LM IIIA:2 period material from the Kastelli excavations will be treated similarly in terms of context grouping (floor deposits, construction/levelling deposits, pits and accumulated/related deposits) to those already presented in the two previous volumes (*GSE* II: LM IIIC and *GSE* III: LM IIIB:2).[1]

RAW MATERIAL AND REDUCTION TECHNIQUES

Thus far LM IIIB:1 and LM IIIA:2 contexts at Kastelli have mainly revealed obsidian pieces and very few flints. Most are of grey opaque (LM IIIB:1: 126/22%, LM IIIA:2: 30/28%) and black opaque material (LM IIIB:1: 358/62%, LM IIIA:2: 61/57%), with the remainder being grey translucent (LM IIIB:1: 35/7%, LM IIIA:2: 5/5%) and black translucent (LM IIIB:1: 60/10%, LM IIIA:2: 10/9%). Six flint fragments have been identified from LM IIIB:1 (73-S 162, 77-S 066, 78-S 028, 80-S 027, 84-S 026, 84-S 034) and a small worn piece of raw material (82-S 012). Three are dark grey in colour, two creamy-buff, and one dark brown. Flint colouring can be quite varied, even from a single source, and chemical or physical analysis might possibly identify the origin.

All the obsidian finds from the LM IIIB:1 and LM IIIA:2 Kastelli deposits originated from Melian quarries,[2] and, as suggested for the previous LM IIIC and LM IIIB:2 material, the raw or roughly worked obsidian blocks may have been acquired with other commodities. The inhabitants of Kastelli may have collected obsidian directly on procurement expeditions, during occasional trips to Melos, or have obtained it via "down the line" obsidian trade routes from other Cretan sites (i.e. from western sites such as Nopigeia in Kissamos, or Kythera).[3] The few flint pieces found in the LM IIIB:1 context must be of local, native provenance.

As emphasized in the previous commentary on the obsidian of the LM IIIC and LM IIIB:2 periods, it should be noted that the LM IIIB:1 and LM IIIA:2 obsidian have also been studied and classified according to morphological and technological features; different flaking stages were considered (from the imported raw material to flaked tertiary products). No micro wear use traces studies were carried out for LM IIIB:1 and LM IIIA:2 obsidian. *Senso strictu* tools are considered by type and in terms of degree and morphology of retouch.

From the LM IIIB:1 level 579 obsidian pieces were taken (and only 6 flint pieces), whereas from the LM IIIA:2 only 106 obsidians (and no flints) were found.

Most LM IIIB:1 (275/47.66%) fragments were found in accumulated/related deposits (isolated areas, various trench levels, architectural remains). A considerable amount of LM IIIB:1 material (172/29.8%) was found in construction/levelling deposits (associated with rooms – construction levels; room interiors – walls, various rooms and spatial deposits) and also in pits (73/12.65%). 59 fragments (10%) were found in floor associations. As for LM IIIA:2 contexts, most of the obsidian (46/43.3%) was uncovered in the construction/levelling deposits and also in pits (43/40%). Of the rest, 16/15% pieces were found in accumulated/related deposits and only 1/0.9% in a floor deposit (*Table 1a-1b*).

In the Kastelli LM IIIB:1 and LM IIIA:2 contexts (*Table 5a-5b*), the primary products were identified in a few examples (IIIB:1: 21/3.6%, IIIA:2: 5/4.8%), originating from nodule shaping, and corresponding to the initial flaking phase (*Pl. 267a-c*). There is also one small piece of unworked raw material from LM IIIB:1 associations. However, a significant increase in the amount of secondary products was recorded (LM IIIB:1: 47/8.1%, LM IIIA:2: 9/8.6%) in comparison to primary ones. Some of those fragments (chips and waste material) display partial cortex removal and may well be associated with the initial flaking phase. Others (blades, flakes, bladelets), which are tertiary products, correspond well to the later stages of flaking, because the cortex removal process was, on occasion, found to be rudimentary or incomplete (*Pl. 265*, 77-OB 117a; *Table 5a-5b*).[4]

Evidently it is difficult to clearly distinguish products that have derived from core shaping and those coming from the reduction of the core itself. For this reason, the percentages of

[1] Comparable material from the LM IIIB:1-LM IIIA:2 chipped-stone industry is, for the most part, unpublished. Cf. Torrence 1985, 469-474; Bialor 1986, 707.

[2] It is remarked that the grey coloured obsidian probably originated from the Adamas or Demenegaki quarries of Melos, and the black/black-translucent variety from the Chondro Vouno quarry. Geroulanos 1986, 310. For raw material cf. Perlès 1990, 4; Moundrea-Agrafioti 1990, 393.

[3] Renfrew *et al.* 1965, 241; Perlès 1990, 1; Torrence 1986a, 96; Geroulanos 1986, 310; Renfrew 1972, 166; Torrence 1982, 197; Moundrea-Agrafioti 1990, 393; Kardulias 1992, 434-436.

[4] The same has been noted at Akrotiri, Moundrea-Agrafioti 1990, 395.

core shaping and core reduction products, represented in *Table 2a-2b*, should be considered as approximations. From the LM IIIB:1 Kastelli context, 40% are considered as resulting from core reduction and 9.7% from core shaping, whereas in the LM IIIA:2 context, 42.5% of the finds are considered as core reduction products, and 11.3% as those of core shaping. In both contexts the percentages of cortical pieces and the by-products of core shaping are not so high as to lead to the conclusion that the working process had taken place *in situ*, inside the settlement area. The raw material may initially have been worked in a remote area of the settlement, or the pre-shaped cores may have been imported.[5]

Only very few blades from the LM IIIB:1 and LM IIIA:2 Kastelli periods reveal very little cortex (1.0%), and the same is true of the bladelets (0.5% in LM IIIB:1. *Table 5a-5b*). Moreover, there is a restricted number of LM IIIB:1-LM IIIA:2 blades, bladelets and flakes with partial cortex removal (LM IIIB:1: 5.3%, LM IIIA:2: 6.8%; *Pl. 269a*). Some of these pieces show peripheral use retouch or spontaneous retouch (LM IIIB:1: 1.0%, LM IIIA:2: 4.7%; *Pl. 263*, 70-OB 142) indicating that these products were used directly as they came from the core, and thus indicating the inherent value of the raw material.[6] Cortical obsidians are numerous at the Akrotiri settlement (20.9%),[7] and the percentage of cortical pieces at the Phylakopi Sanctuary and Sector PLa is considerably higher within certain levels or floors (from 57.2% to 74.8%).[8]

LM IIIB:1 and LM IIIA:2 debris, or waste by-products, amounted respectively to 11.1% and 10.5% of the total finds (*Table 1a-1b*). These percentages demonstrate a rather careful flaking process with a low error rate, and indicate real economy in terms of the raw material.[9] From the nodule-shaping process the finds also included: (a) those polygonal, usually cortical pieces, without butt, classified as amorphous core parts and related to the initial stages of the cortex removal from the raw material (LM IIIB:1: 0.9%, LM IIIA:2: 1.9%. *Table 1a-1b*), and (b) core tablets remaining from the creation or preparation of the core platform (LM IIIB:1: 2/0.3%, LM IIIA:2: 1/1.0%. *Table 2a-2b*).

The morphology of the parallel-sided blades and bladelets (*Table 8a-8b*) suggests the use mainly of pressure flaking in the production of the artefacts. The Kastelli blades and bladelets are usually unretouched, retaining their sharp edges and a distinct cutting ability; they were therefore mostly adapted as cutting implements (*Table 3a-3b. Pl. 269a-c*).[10]

Other technical features that are characteristic of the BA chipped-stone industry are crested blades (first, second and third row), corresponding bladelets (LM IIIB:1: 45/7.8% crested blades, 13/2.2% crested bladelets [*Table 2a*] and LM IIIA:2: 7/6.8% crested blades, no fragment of crested bladelet [*Table 2b*] *Pls. 263, 268d, 269a*),[11] rejuvenation flakes and chips (*Pls. 264, 268a, 269a*)[12] from the flaking renewal of the pressure platform (LM IIIB:1: 61/10.7% [*Table 2a*] and LM IIIA:2: 15/14.3% [*Table 2b*]). Therefore, a relatively frequent rejuvenation of the pressure platform is well indicated by these percentages, which were also slightly higher than those of Akrotiri (5.8% crested pieces, 4.6% rejuvenation pieces).[13] Almost corresponding amounts to the total of LM IIIB:1 Kastelli crested pieces were found at Aghia Irini (10%) and Pseira (3.6% of the primary total).[14] A higher volume of crested pieces was found at Phylakopi (22%),[15] whereas the percentages of crested pieces from other sites are relatively low in comparison to the Kastelli LM IIIB:1 and LM IIIA:2 finds.[16]

Cores found in the LM IIIB:1 and LM IIIA:2 contexts at Kastelli were in the final stages of reduction (*Tables 1a-1b, 9a-9b*). The knappers at Kastelli did their best to exhaust the cores entirely before discarding them.[17] There were six exhausted cores in the LM IIIB:1 context (1.0% of the total. *Pls. 263* and *268b*, 71-OB 463), one single exhausted bladelet core (1.0% of the total) in LM IIIA:2 (*Pl. 263*, 84-OB 049), and also one blank that shows elements of a semi-cylindrical blade core (*Pls. 264* and *268a*, 77-OB 138a). The LM IIIB:1-core grouping includes: 1 indeterminate, exhausted blade core; 1 semi-cylindrical blade core (*Pl. 268a*, 77-OB 034b); 2 semi-cylindrical bladelet cores (*Pl. 263*, 71-OB 463; *Pl. 268a*, 73-OB 234); and 2 flat or tabular bladelet cores with two opposing detachment faces (*Pl. 268a*, 77-OB 113d). Flat (or tabular) and semi-cylindrical cores are frequent finds in BA contexts.[18]

In most cases the platform is faceted and, as a result, LM IIIB:1 and LM IIIA:2 Kastelli has a higher percentage of faceted and dihedral butts amongst blades and bladelets compared to other butt types (*Table 7a-7b*). Cores represent just 1.3% of the Akrotiri chipped-stone finds[19] and 1% of the Lerna IV material (EH III). The highest finds are at the LM settlement at Pseira (12.4% of the total).[20] There is only one unmodified nodule and only one piece of unworked raw material in the LM IIIB:1 context, and none from LM IIIA:2 Kastelli (*Table 1a-1b*; *Pls. 263* and *268c*, 71-OB 649). This evidence, in association with the percentages of primary and secondary products, emphasizes the suggestion already put forward that either the Kastelli pre-formed nodules were imports, or that the initial task of shaping the unworked raw material was perhaps undertaken in an area other than that of the investigated settlement.

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[5] Perlès 1990, 4.
[6] Torrence 1979, 80.
[7] Moundrea-Agrafioti 1990, 394.
[8] Torrence 1985, 475, table C1, C2. The economy of use of the raw material itself is, in the main, related to the distance of the site from the point of supply.
[9] Cf. supra n. 4. As no flotation or sieving procedures were carried out, it was not possible to confirm whether all the obsidian debris or waste products, especially tiny fragments, were collected.
[10] Torrence 1979, 74. For the Messenian sites: Blitzer 1999, 84-87.
[11] Torrence 1979, 72; Cherry & Torrence 1984, 20; Van Horn 1980, 488.
[12] Effenterre, H. van 1969, 18-20, pl. 5; Séfériadès 1975, 25.
[13] Moundrea-Agrafioti 1990, 396.
[14] Dierckx 1999, 211-212.
[15] Torrence 1979, 72, ibid., 1986b, 92-93.
[16] Cf. "Obsidian workshop" at Malia (K17, L17): Séfériadès 1975, 25-26; Effenterre, H. van 1969, 17-21, pl. 5: C5581, C5587, C9293, crested, and also some rejuvenation flakes. Kardulias 1992, 427. At Aghios Stephanos obsidian crested blades are represented by 31 pieces (2.6%).
[17] For comparison cf. Torrence 1986b, 81.
[18] The flat tabular core is the most typical in the Aegean Bronze Age. Cf. Van Horn 1980, 489-491; Torrence 1982, 207-211, figs. 15.11, 15.12.
[19] Moundrea-Agrafioti 1990, 396.
[20] Runnels 1985, 361, tab. 2. Dierckx 1999, 212. Cf. also for Malia: Effenterre, H. van 1969, 19; Séfériadès 1975, 24, 28.

TERTIARY PRODUCTS

Tertiary products represent the four main categories found: blades, bladeletes, flakes and chips. *Table 1a-1b* shows the percentages of each category found in the different localities of LM IIIB:1 and LM IIIA:2 Kastelli.

The retouched fragments and the tools are presented in *Tables 3a-3b* and *4a-4b*. The percentages of retouched pieces are very low in the LM IIIB:1 and LM IIIA:2 levels, as they were in the LM IIIC and LM IIIB:2 periods also.[21] The majority of tertiary products are unretouched (*Table 3a-3b*) and they probably would have been used just as they came off the core, with unretouched, very sharp (but equally fragile) edges. A considerable number of obsidian pieces show peripheral use retouch or use scars, and are considered tools *a posteriori* (*Table 3a-3b*). As already pointed out, these sharp unretouched pieces were probably intended for special tasks, such as cutting or scraping soft materials, preparing food, treating leather, for use as razors, etc.[22]

The percentages of retouched pieces and tools of *senso strictu*, both in LM IIIB:1 (33 tools/5.7%, including 28 retouched pieces/4.8% from the total of 579) and LM IIIA:2 (5 tools including 4 retouched pieces/8.5% from a total of 106) contexts are considerably lower in comparison with unretouched pieces (LM IIIB:1: 342 pieces/59%; LM IIIA:2: 59 pieces/55%) and pieces with peripheral use retouch (LM IIIB:1: 103 pieces/17.8%; LM IIIA:2: 22 pieces/20.7%. *Tables 3a-3b, 4a-4b*).

A comparable small amount of retouch work is also seen at Akrotiri, where there is a similar high percentage of pieces with peripheral use retouch and pieces bearing discontinuous marginal traces of use.[23] A low percentage of retouched tools is also found at the Phylakopi Sanctuary, at Aghia Irini (Keos) and other BA sites.[24]

There are 161 (27.8%) blades in the LM IIIB:1 Kastelli contexts and 20 (19.0%) from the LM IIIA:2. The majority of the LM IIIB:1 finds were found in accumulated/related deposits (73 blades/26.5%) and in construction/levelling deposits (49 blades/28.5%). Very few blades were extracted from floor deposits (13/22%). The percentages change in the LM IIIA:2 context, where blades were found in pits (9/21%) and construction/levelling deposits (8/17.4%). In LM IIIA:2, blade production seems to have declined in comparison to LM IIIB:1.

The general total of blades included those originating from the initial flaking stages, such as crested blades (first, second and third row – LM IIIB:1: 45/7.8%, LM IIIA:2: 7/6.8%), and secondary blades (LM IIIB:1: 9/1.5%, LM IIIA:2: 1/1.0%. *Tables 2a-b* and *5a-b*, *Pls. 263, 267c*). Blade and flake percentages from the LM IIIB:1 period (27.8% blades, 21.1% flakes) are higher than those of the LM IIIB:2 (20% blades, 19.4% flakes) finds. The predominance of blades in the obsidian assemblages was identified in certain Neolithic and EB settlements such as Dimini, Kitsos Cave, Lerna III, Myrtos, and Debla.[25] Blades represent half the obsidian found at Aghios Stephanos, Laconia (Late Helladic).[26] However, the number of blades found in LM IIIA:2 Kastelli contexts is lower than that of flakes (blades: 20/19.0%, flakes 30/28.6%). This is also noted at LM IIIC Kastelli, where flakes gave higher percentages than blades (20% blades, 25% flakes). There are also other settlement contexts, such as LM Akrotiri (34.6% blades, 55.5% flakes),[27] LM Nerokourou (52.8% blades, 57% flakes), EM/MM Malia (14.93% blades, 84.72% flakes/chips) and the MH-LH Pylos area (27 obsidian blades, 93 obsidian flakes),[28] where the percentages of blades found are lower than those of flakes.

There are higher percentages of parallel-sided, trapezoidal cross-section LM IIIB:1 blades (60.9%) compared to those of triangular section (39.2%. *Pl. 269a-b*; *Table 8*). Blade percentages from LM IIIA:2 Kastelli (50.0% of trapezoidal section and 50% of triangular section) are relatively similar to those of LM IIIB:1. However, in LM IIIB:2 contexts triangular section blades outnumber those of trapezoidal cross-section (55.8% against 42.1%).

Blades, preserved in fragmentary conditions, vary from 0.056 to 0.008 in length and from 0.018 to 0.007 in width. *Table 6a-6b* show the degree and state of preservation of the blades, bladelets and flakes.[29] Only two blades (1.2%; a crested blade: 70-OB 451, and a secondary blade: 71-OB 422) were found intact in the LM IIIB:1 contexts and none in the LM IIIA:2. There are proximal (LM IIIB:1: 43.5%, LM IIIA:2: 50.0%), mesial (LM IIIB:1: 38.5%, LM IIIA:2: 45%), and distal fragments (LM IIIB:1: 16.1%, LM IIIA:2: 5.0%). Blades fracture more easily along their long axis than flakes, consequently a better impression of the frequency of blades is given by estimating the number of proximal fragments.

The butts of the blades revealed in the LM IIIB:1 contexts are mostly faceted (42/57.5%).[30] There are also flat (16/21.9%) and punctiform butts (6/8.2%) and fewer dihedral examples (4/5.5%). Comparable percentages for butts are also attested to on blades from the LM IIIA:2 contexts. Faceted butts represent 40.0%, while both flat and punctiform butts represent 20.0%. There is only one example of the cortical butt, a very rare type, from the LM IIIA:2 context (*Table 7a-7b*). High percentages of faceted, punctiform and flat butts were identified on blades found in the LM IIIC and LM IIIB:2 contexts.[31] The percentages of faceted and dihedral butts are also high at Akrotiri (50.4%).[32] As suggested by experimental

[21] Cf. *GSE* II, 187 and *GSE* III, 280.
[22] Hartmann 1978, 37; Barber 1987, 115; Van Horn 1976, 170.
[23] Moudrea-Agrafioti 1990, 399.
[24] Torrence 1985, 470-478, and 1986b, 91-92, (Period V); Kardulias 1992, 431, Aghios Stephanos (Laconia). At the Pseira LM IA workshop, the retouched blades are represented by 6.6% of the total. Cf. Dierckx 1999, 212.
[25] Moundrea-Agrafioti 1990, 398; Runnels 1985, 361-363, Table 3; Jarman 1972, 326; Warren & Tzedakis 1974, 333; Blitzer 1999, 89, 91 (MH-LH Nichoria).
[26] Kardulias 1992, 431. In the LM IA obsidian workshop at Pseira, the percentage of flakes (initial and tertiary products) is 50.6% of the total, with 55.7% for blades (primary and tertiary). Dierckx 1999, 211-212.
[27] Moundrea-Agrafioti 1990, 397.
[28] Nerokourou: Christopoulou 1989, 77, Table B; Malia: Séfériadès 1975, 24, Pylos: Blitzer 1999, 242-243.
[29] Torrence 1986a, 160.
[30] Torrence 1984, 163-164; Tixier 1984, 62.
[31] *GSE* III, 279.
[32] Moundrea-Agrafioti 1990, Table 5, 398.

processes, pressure flaking could equally well be applied either on well-prepared platforms (facetted, punctiform), or on less well-prepared examples (flat).[33]

Half of the blades found in the LM IIIB:1 context at Kastelli were unretouched (81/50.3%. *Table 3*). A similar situation was identified in the LM IIIB:2 (56.7%) and LM IIIC periods (49%).[34] However, only 30.0% of the LM IIIA:2 blades are unretouched. The amount of unretouched LM IIIB:1 blades is almost the same as that found at Akrotiri (54%), and it is very low compared to Lerna (94%) and Malia (32 blades and bladelets, 74.4%).[35] A considerable number of blades bear peripheral use retouch, or use scars, as well as showing signs of spontaneous retouch (LM IIIB:1: 39%, LM IIIA:2: 55%) that might have occurred during use, or resulted accidentally (*Pl. 269b*). These percentages are higher than the LM IIIB:2 (36.5%) and LM IIIC (26.5%) finds at Kastelli.[36] There, from the LM IIIC to LM IIIA:2, obsidian assemblages show the same very low percentages of retouched blades (LM IIIA:2: 15.0%, LM IIIB:1: 10.5%, LM IIIB:2: 6.8%, LM IIIC: 16.3%). Retouched blades at Aghios Stephanos (Laconia) represent 13% of the finds, and just 6.6% at Pseira.[37] For the latter site, it is important to stress the aforementioned suggestion;[38] that BA chipped-stone industries may be characterized by the frequency of unretouched blades and blades with peripheral use retouch or use scars, suggesting that these blanks were primarily intended for use without further modification.

Bladelets are well represented in the LM IIIB:1 and LM IIIA:2 Kastelli contexts. The majority of LM IIIB:1 bladelets (108/18.7%) are found in accumulated/related deposits (54 pieces) and in construction/levelling deposits (31 pieces) (*Table 1a*). The few LM IIIA:2 bladelets were mainly removed from construction/levelling deposits (8 from a total of 13). Bladelets vary in length from 0.030 to 0.007, and in width from 0.008 to 0.005. Only a few bladelets seem to have resulted from the initial flaking phases in LM IIIB:1 contexts (5 crested, 6 crested second row, 2 crested third row. *Table 2a*; *Pl. 263,* 84-OB 130; *Pl. 269b,* 82-OB 055). Only a secondary bladelet was found in LM IIIA:2 contexts (*Table 2b*).

Most of the bladelets from LM IIIB:1 contexts have parallel sides and trapezoidal cross-section (60.23%, and cf. with 65.59% from LM IIIB:2 contexts), while the rest have a triangular cross-section (39.2%, and cf. with 33.3% from LM IIIB:2 contexts. *Table 8a*). The situation seems to have changed in the LM IIIA:2, with the percentages almost equal for trapezoidal (53.85%) and triangular (46.2%) cross-section bladelets. This is also noted with the blade types of the same period (*Table 8b*; *Pls. 269c-d*). Bladelet fracture is as frequent as blade fracture, and consequently the majority were found in fragmentary condition (*Table 6a-6b*). From the LM IIIB:1 bladelets, 38.9% are mesial fragments, 39.8% proximal, and 18.5% distal. Two intact, small bladelets (1.9%) are found in floor and accumulated/related deposits (length: 0.015, width: 0.008-0.004. *Table 6a*). From the LM IIIA:2 bladelets, 38.5% are mesial fragments, 30.8% proximal, and 30.8% distal (*Table 6b)*.

Bladelet butts are faceted (41.3% in LM IIIB:1, 25.0% in LM IIIA:2), punctiform (21.7% in LM IIIB:1) and flat (19.6% in LM IIIB:1, 50% in LM IIIA:2). Percentages of other types are much lower (*Table 7a-7b*). The predominance of LM IIIB:1 faceted bladelet butts suggests frequent use of well-prepared platforms, common also in the LM IIIB:2 and LM IIIC periods.[39]

Only six fragments of bladelets were found retouched in the LM IIIB:1 context (5.5%) and none in the LM IIIA:2 (*Table 3a-b*), which corresponds to the LM IIIB:2 comparable material (6 pieces/6.5%).[40] However, unretouched examples also predominate as much in the LM IIIB:1 (52.8%) as in the LM IIIA:2 (46.2%). They correspond also with percentages of LM IIIB:2 unretouched bladelets (48.4%). Bladelets bearing peripheral use retouch or scars, were also represented in considerable numbers (LM IIIB:1: 37.0%, LM IIIA:2: 53.8%), showing a clear increase from the LM IIIB:2 (31.2%). 4.6% of the LM IIIB:1 bladelets bear marks of spontaneous or accidental retouch (*Table 3a*; *Pl. 269b, d*).

Obsidian flakes were found in considerable numbers in the LM IIIB:1 and LM IIIA:2 periods. They varied in length from 0.04 to 0.01, and from 0.038 to 0.009 in width. 122 flakes (21.1%) were recorded in the LM IIIB:1 context, a slight increase from the LM IIIB:2 (19.4%). 31 flakes (29.9%) were removed from the LM IIIA:2 context. Among them were cortical flakes, principally primary and secondary (*Table 5a-5b*; *Pl. 267a, c*), originating from initial reduction phases, but flakes also resulted from core reduction, core rejuvenation, from the creation of platform facets, or from the rejuvenation of the striking angle (*Tables 1a-1b, 2a-2b*; *Pl. 263*, 71-OB 658; *Pls. 264, 265, 267c, 268c*).

Many of the LM IIIB:1 flakes were found in accumulated/related deposits (57 pieces/20.7%) and in construction/levelling deposits (30 pieces/17.4%). By contrast, flakes from LM IIIB:2 contexts were unearthed in courtyards and pits (42.4%) and from construction/levelling deposits (35.3%. *Table 1a*).[41] The same applies to LM IIIA:2 contexts, where 14 flakes (33.3%) were found in pits (*Table 1b*). The majority of flakes was found intact (72.1% in the LM IIIB:1, as opposed to 70.3% in LM IIIB:2 and 67.7% in LM IIIA:2 contexts). Distal fragments represented 11.5% of finds in the LM IIIB:1, and 19.4% in the LM IIIA:2. Other fragments are represented in lower percentages (*Table 6a-6b*). Most of the butts are flat, both in LM IIIB:1 (56.1%) and LM IIIA:2 (36%) contexts. The percentages of LM IIIA:2 finds correspond to those of LM IIIB:2 (36.3%. *Table 7a-7b*).[42]

Flakes with cortical butts (LM IIIB:1: 2.8%, LM IIIA:2: 4.0%) derive from the initial flaking process. At Kastelli, as at Akrotiri, it may be assumed that direct, or indirect, percussi-

[33] Pelegrin 1984, 99.
[34] *GSE* III, 279.
[35] Moundrea-Agrafioti 1990, Table 9, 400; Runnels 1985, 367; Séfériadès 1975, 29.
[36] Cf. supra n. 34.
[37] Kardulias 1992, 431; Dierckx 1999, 212. No retouched blades are noted from MH Nichoria in Messenia: Blitzer 1999, 87.
[38] *GSE* III, 279.
[39] *GSE* II, 187, *GSE* III, 279.
[40] *GSE* III, 279.
[41] *GSE* III, 279.
[42] *GSE* III, 280. Flat butts predominate at Akrotiri. Moundrea-Agrafioti 1990, 398.

on was used to detach the flakes. Other butt types are also present in various percentages (*Table 7a-7b*). There are also dihedral (LM IIIB:1: 4.7%, LM IIIA:2: 8.0%) and faceted (LM IIIB:1: 10.3%, LM IIIA:2: 20%) butt types from flakes detached from well-prepared platforms during the processes of core correction/reduction, or rejuvenation.

Most of the LM IIIB:1 (82.3%) and LM IIIA:2 (69.0%) flakes are unretouched (*Table 3a-3b*), as well as the corresponding number of the LM IIIB:2 flakes (81.2%). However, some belong to categories bearing peripheral use retouch or use scars, spontaneous retouch, or retouch resulting from accidental edge damage (LM IIIB:1: 14.75%; LM IIIA:2: 25.8%. *Table 3a-3b*; *Pl. 267c*). There were very few retouched flakes in evidence here as well (LM IIIB:1: 4%; LM IIIA:2: 3.2%. *Table 3a-3b*; *Pl. 265*, 77-OB 117). Percussion flakes were primarily used for their cutting or scraping characteristics.

Chips result from the flaking process during shaping or core reduction (*Pl. 264*, 74-OB 040, 73-OB 035; *Pl. 268a*, 73-OB 230). Their lengths vary from 0.024 to 0.007, and their widths from 0.02 to 0.005. There were fewer chips than flakes in LM IIIB:1 (18.8%) and LM IIIA:2 (26.4%) contexts at Kastelli. The opposite applies in LM IIIB:2, where more chips (21.3%) than flakes were identified.[43] Chips are well represented in the LM IIIB:1 construction/levelling deposits (38 pieces), and accumulated deposits (48 pieces), while a small amount was found in pits (13 pieces) from different areas and in floor deposits associated with rooms (10 pieces. *Table 1a*). By contrast, no chip pieces were found in the LM IIIA:2 floor deposits of the settlement, while the majority came from construction/levelling deposits (14 pieces) and pits (11 pieces. *Table 1b*). Few chips came from the initial flaking stages: cortical (LM IIIB:1: four pieces, LM IIIA:2: none. *Table 5a-5b*), those with partial cortex removal (LM IIIB:1: 10 pieces, LM IIIA:2: two pieces. *Table 5a-5b*), or those showing some cortex traces (LM IIIB:1: 20 pieces, LM IIIA:2: four pieces. *Table 5a-5b*). In most cases some small primary chips probably resulted from crest removal.

Most of the LM IIIB:1 (96.3%) and LM IIIA:2 (92.9%) chips are unretouched. The same also applies for the LM IIIB:2 and LM IIIC contexts (LM IIIB:2: 94.5%, LM IIIC: 97.8%. *Table 3a-3b*). Very few chip pieces (LM IIIB:1: four pieces, LM IIIA:2: two pieces) bear signs of peripheral use retouch or spontaneous retouch, which may suggest they were created accidentally during the flaking process (*Table 3a-3b*).

The apparently low rates of flaking accidents, and especially the very few incidences of hinged and plunging fractures, may indicate either that the Kastelli knappers were highly efficient workers of chipped-stone, or that some of the initial flaking stages took place somewhere outside the excavated areas of the settlement known to date.[44] The number of flaking accidents in the LM IIIB:1 (11 pieces/1.9%) and the LM IIIA:2 (three pieces/2.8%) is apparently lower than that of the LM IIIB:2 (3.52%), and even of the LM IIIC (2.9%) at Kastelli (*Table 9a-9b*; *Pl. 263*, 70-OB 142; *Pl. 267c*, 73-OB 210).

TOOLS

It is known that experimentation and use-wear analysis prove helpful in identifying tool functions, but such studies were not carried out with the LM IIIB:1 and LM IIIA:2 obsidian finds at Kastelli.

Bronze Age lithic industries, especially over the later period of the Bronze Age, are generally characterized by a low number of retouched pieces and tools, and by a relatively high number of blanks bearing peripheral use scars, and splintered pieces. The above conclusion, which characterized the LM IIIB:2 and the LM IIIC periods at Kastelli,[45] may also be applied to the LM IIIB:1 and LM IIIA:2 obsidian assemblages. As shown in *Table 3a-3b*, marginal retouch on blades, bladelets and flakes (28 pieces from the LM IIIB:1, and four pieces from the LM IIIA:2) is partially unilateral or bilateral. In most of the cases, the retouches are short, abrupt or semi-abrupt, having a varied morphology (scaled, stepped or subparallel). Marginal retouch can create sharp or denticulate edges for the formation of a multipurpose tool. Some blades and flakes showing long, total, or discontinuous retouching of various forms could be used as sickle elements in composite tools. Blades have multiple usages, mainly as cutting implements, and probably also as sickle elements on composite tools. As already noted, blades show greater frequency of peripheral use-wear traces than flakes (LM IIIB:1: 15 blades/6.2%, four flakes/3.2%, LM IIIA:2: three blades/15%; one flake/3.2%). The percentages are very low in comparison with those of the LM IIIB:2 (36.5% blades, 12% flakes).

The *senso strictu* tools are represented in a restricted number in the LM IIIB:1 (6.2% of the total) and LM IIIA:2 (4.7%), as they were in the LM IIIB:2 (5.47%) and LM IIIC (5%).[46] Most of the tools were found in accumulated deposits (LM IIIB:1: 14 pieces/38.8%; LM IIIA:2: two pieces/ 40%), the balance being found in construction/levelling deposits (LM IIIB:1: 10 pieces/27%, LM IIIA:2: two pieces/40%) and few in the pits (LM IIIB:1: seven pieces/19.5%, LM IIIA:2: one piece/20%. *Table 4a-4b*). There was a very limited number of tools found in floor deposits in the Kastelli LM IIIB:1 contexts (five pieces/13.8%), and no tool fragments at all were taken from the LM IIIA:2 floor deposits. *Senso strictu* tools were used for cutting, scraping, drilling, or generally for carpentry and hide working. Tools, *senso latu*, showing peripheral use retouch, or marginal discontinuous traces or use (as on blades and bladelets), may be associated with a variety of cutting or scraping tasks.

From the LM IIIB:1 period, ten notched pieces of various types were identified (*Table 4a*; *Pl. 266*, 78-OB 054a-b, 82-OB 019), four scrapers (*Pl. 265*, 82-OB 043b, 72-OB 100, 80-OB 253, 70-OB 204), three points, or piercing tools, with a retouched pointed end (one flake, blade and bladelet. *Pl. 266*, 82-OB 041b, 77-OB 092b), one unretouched point on a bladelet, and three splintered pieces (*Pls. 265, 267b*, 70-OB 146; *Pls.*

[43] *GSE* III, 280.
[44] The standard was similarly high at Phylakopi: Torrence 1986a, 161.
[45] *GSE* II, 187-188; *GSE* III, 280.
[46] See n. 45.

265, 267c, 84-OB 057). Other tool types are represented by few pieces, such as one truncated piece (*Pl. 265*, 84-OB 028), burins on flakes and on bladelet truncations (3 pieces), and one sickle element on a blade (*Pl. 266*). The predominance of geometric pieces (trapezoidal and rectangular types: 11 pieces) (*Pl. 266*, 70-OB 234, 77-OB 035d, 77-OB 155a, 77-OB 104, 77-OB 149c, 77-OB 149e and *Pl. 269d*) has to be emphasized. In the LM IIIA:2 obsidian assemblage, one example of almost every form were found: two points with retouched pointed ends (on blade and flake), one notched piece, an endscraper and a sickle element on blade (*Table 4b*).

The obsidian tools found in the LM IIIB:1 and LM IIIA:2 contexts were mainly notched pieces, but they also included a few fragments from scrapers, simple burins, and sickle elements. Mainly blades seem to have been used as blanks in the manufacture of these tools (=24), but bladelets (=10) and flakes (=eight) were also employed. The geometric pieces found in the LM IIIB:1 context are equally represented with the notched pieces. Therefore we may suppose that notched examples may have derived from the initial stages of the production process for the manufacture of geometric elements, which were probably integrated with composite, multipurpose tools. Obsidian and chert material from MH-LH Messenian sites (MH-LH: Nichoria, Malthi, Pylos) show that blades and flakes were used in the production of denticulated sickle elements.[47]

All the above-mentioned types of tool indicate a specialized production for geometric obsidian pieces, which could be used as simple, double or multiple composite tools. They were probably used hafted, with wooden or bone handles, and employed for cutting (plants, reeds, etc.) and many other tasks. However, the lack of gloss on these pieces may well suggest a different function, and they may have been more simple implements for rudimentary cutting or scraping purposes. Points, simple or retouched, and even burins, may have also been used for incising activities, for the working of bone or ivory, or even as beaded jewellery.[48]

As has already been suggested, the restricted use of *senso strictu* tools seems to have been the case at Kastelli (from LM IIIA:2 to LM IIIC), at LB Phylakopi and Aghios Stephanos,[49] and also at EB Lerna. At Lerna III, tools represent just 7% of total obsidian finds, but the percentage is higher for Lerna IV (approximately 18.5%).[50] A low percentage of tools is also noted at Akrotiri, where 7.9% of flakes, and 14.2% of blades, were retouched.[51] At Aghios Stephanos (Laconia), tools comprise 13.8% of the flaked stone assemblage (obsidian and flint).[52]

The *senso latu* tools include blanks with peripheral, discontinuous use retouch, or use scars. Sometimes the scars were caused by fracturing during the flaking process. Only micro-trace studies can confirm use scars and, therefore, whether they were in fact used as tools. Splintered pieces are fewer in LM IIIB:1 (three pieces/9.1%) than in LM IIIB:2 (six pieces/25%). They belong to the advanced stages of use, showing splintering scars which cover almost all the facets (*Table 4a*). Splintered pieces are frequently discovered in Aegean Bronze Age settlement associations, and were probably used in the manufacture of bone tools and ornaments.[53] Splintered pieces, and also other tool types (retouched pieces, sickle elements, etc.), seem to have been of value to farmers and also to craftsmen.

The LM IIIB:1 and LM IIIA:2 Kastelli periods are generally characterized by a low number of retouched obsidian pieces and by a high number of blanks with peripheral use retouch (or use scars), or, again, *a posteriori* tools that may be associated with many cutting tasks.

FLINT

Flint pieces were removed from accumulated/related deposit and pits in LM IIIB:1 contexts. There is one secondary blade with peripheral use retouch, one irregular unmodified nodule fragment, one cortical flake, and three pieces of debris or waste by-products, including also a small, amorphous, core part. These restricted finds show no evidence of any dedicated form of flint production during the LM IIIB:1 period. Their presence in LM IIIB:1 contexts may be accidental, and these finds should be interpreted as isolated items associated with specialized activities. Future studies on the chipped-stone industry of the Early Bronze and Middle Bronze Age periods at Kastelli may well determine the presence, or not, of flint flaking activities.

CONCLUSION

Men and women in the Late Bronze Age Kastelli settlement needed and used stone tools to acquire and prepare food, as well as to assist them as they worked soft materials (hide, bone, ivory, wood, shell, etc.) into useful items. The LM IIIB:1-IIIA:2 chipped-stone production at Kastelli is characterized by the predominance of skilled pressure techniques in blade and bladelet processing, also witnessed during the LM IIIB:2 and LM IIIC periods. In LM IIIB:1 contexts, blade/bladelet production is represented by 46.5% of the samples, while the flakes and chips total 39.9%, showing an increase in blade/bladelet production in the LM IIIB:1 period as compared to LM IIIB:2 (=38%) and LM IIIC (=40%). The corresponding percentages of flakes/chips in LM IIIB:1 (39.9%) equal those of the LM IIIB:2 (40%), but are lower than the LM IIIC (43%) finds. In the obsidian assemblage from the LM IIIB:1, bladelet cores were represented by four pieces (0.69%) and blade cores by two (0.34%), corresponding well

[47] Blitzer 1999, 243.
[48] Kardulias 1992, 439.
[49] Torrence 1985, 470; Kardulias 1992, 431, 440.
[50] Runnels 1985, Table 9.
[51] Moundrea-Agrafioti 1990, 400-405. Table 9; cf. also Torrence 1986b, 92.
[52] Kardulias 1992, 427. For the LM IA obsidian workshop at Pseira: Dierckx 1999, 213.
[53] The percentage of splintered pieces found at Akrotiri represents 60.3% of the *senso strictu* tools: Moundrea-Agrafioti 1990, 404. Splintered pieces represent 41.8% of MH Lerna, and 78.7% of EH III Lerna finds: Runnels 1985, Table 11.

with the LM IIIB:2 percentages (seven pieces/1.3%. *Table 9a*).

The evidence indicates a blade/bladelet "industry" in the LM IIIB:1, as well as in the following LM IIIB:2 and LM IIIC periods, as indicated earlier. Flakes and chips come from the general shaping and reduction processes of the raw material (primary, secondary, waste by-products, rejuvenation flakes, tertiary products). The frequency of rejuvenation flakes and chips, some of them showing traces of the blank, suggests the frequency of the rejuvenation of the platform and thus the diminution of the core size, which was primarily a blade core before becoming a bladelet core later. This is probably the reason why so few blade cores have been identified in the LM IIIB:1 and LM IIIA:2 contexts at Kastelli. The debris, or waste by-products (LM IIIB:1: 11%, LM IIIA:2: 10.4%), and thick amorphous pieces, produced during the first knapping (IIIB:1: 0.9%, IIIA:2: 1.9%), are not as abundant as they must have been in any systematic activity or work area.

The situation seems to change during LM IIIA:2, where blade/bladelet pressure flaking production is represented by only 31.2% of finds, and flake/chip production by 55.6%. All the above correlated percentages indicate a decrease in the blade/bladelet industry during LM IIIA:2, and an equivalent increase of flake/chip material during the same period (*Table 1a-1b*). This change in the chipped-stone industry at Kastelli is emphasized by other evidence as well, such as the few cores (see *Table 9b*) and the very restricted number of retouched pieces and tools (*Tables 3b, 4b*) found in the LM IIIA:2 obsidian assemblage. Blade technology, which is well-attested to in Kastelli during the LM IIIC, LM IIIB:2 and LM IIIB:1 periods, seems, according to the available percentages, to have declined in the LM IIIA:2.

Tools are restricted in number. Small geometric forms, usually on blades, are found in LM IIIB:1 contexts. Other tools were represented in small percentages. The predominance of *senso latu*, in comparison with *senso strictu* tools probably indicates that Kastelli LM IIIB:1 and LM IIIA:2 flaked stone production turned out multi-purpose obsidian products made by part-time specialists for use by farmers or craftsmen, or even for various mundane tasks. Blades and bladelets remain unretouched, or show use scars (peripheral use retouch or use scars, and discontinuous retouch), and thus were probably used as simple cutting tools. Some of the flakes also bear traces of use, or peripheral use retouch and spontaneous retouch, suggesting their probable use as disposable "tools", because of their limited scraping abilities. In general, the range of tools suggests part-time production of various obsidian items designed for general functions. Part-time production has already been confirmed at Phylakopi and Knossos, as well as at other BA sites[54]. The spatial distribution (in rooms, courtyards, spaces, pits, outside areas, etc.) of obsidian pieces in the LM IIIB:1 and LM IIIA:2 levels at Kastelli, does not provide any evidence for positive identification of an "activity area" or "workshop".[55]

Important Cretan sites, such as Kommos (MM-LM periods),[56] reveal few obsidian artefacts and bear little evidence of the type of stone manufacturing tradition which, in contrast, was evidently so strong at other sites, especially on the Greek mainland. Is it an indication that other raw materials were used for the production of the majority of the implements used for specialized functions, or that this lack of obsidian tools is at least accidental on some Cretan sites? Over the four different periods investigated at the Kastelli settlement (LM IIIC, LM IIIB:2, LM IIIB:1 and LM IIIA:2), the obsidian artefacts were mainly unretouched and had been used for short-term domestic and specialist tasks.

[54] Torrence 1986a, 150-153, 157; Kardulias 1992, 440-441.
[55] For "workshops" cf. Torrence 1979, 79.
[56] Blitzer 1995, 488-489.

Table 1a. Form of the blank of LM IIIB:1 obsidian.

FORM OF THE BLANK	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
Blades	161	27.8%	13	22.0%	49	28.5%	73	26.5%	26	35.6%
Flakes	122	21.1%	17	28.8%	30	17.4%	57	20.7%	18	24.7%
Bladelets	108	18.7%	10	16.9%	31	18.0%	54	19.6%	13	17.8%
Chips	109	18.8%	10	16.9%	38	22.1%	48	17.5%	13	17.8%
Debris or waste by-products of core reduction	58	10.0%	6	10.2%	21	12.2%	28	10.2%	3	4.1%
Debris or waste by-products of the shaping of the nodule	6	1.0%	1	1.7%	1	0.6%	4	1.5%		
Unmodified nodules	1	0.2%					1	0.4%		
Exhausted cores	6	1.0%	1	1.7%			5	1.8%		
Amorphous part of core	5	0.9%	1	1.7%			4	1.5%		
Unworked raw material	1	0.2%					1	0.4%		
Burin spall	2	0.3%			2	1.2%				
TOTAL	579	100%	59		172		275		73	

Table 1b. Form of the blank of LM IIIA:2 obsidian.

FORM OF THE BLANK	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
Blades	20	18.9%	1	100.0%	8	17.4%	2	12.5%	9	20.9%
Flakes	31	29.2%			9	19.6%	7	43.8%	15	34.9%
Bladelets	13	12.3%			8	17.4%	2	12.5%	3	7.0%
Chips	28	26.4%			14	30.4%	3	18.8%	11	25.6%
Debris or waste by-products of core reduction	9	8.5%			7	15.2%	1	6.3%	1	2.3%
Debris or waste by-products of the shaping of the nodule	2	1.9%							2	4.7%
Unmodified nodules										
Exhausted bladelet core	1	0.9%							1	2.3%
Amorphous part of core	2	1.9%					1	6.3%	1	2.3%
Unworked raw material										
Burin spall										
TOTAL	106	100%	1		46		16		43	

Table 2a. Technical features of the LM IIIB:1 period. (The percentages are of the total number, 579.)

TECHNICAL FEATURES	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
Crested blades	11	1.9%			4	0.7%	7	1.2%		
Crested blades 2nd row	21	3.6%	1	0.2%	6	1.0%	12	2.1%	2	0.3%
Crested blades 3rd row	13	2.2%			2	0.3%	8	1.4%	3	0.5%
Rejuvenation flakes	31	5.4%	5	0.9%	7	1.2%	12	2.1%	7	1.2%
Rejuvenation chips	28	4.8%	2	0.3%	9	1.6%	15	2.6%	2	0.3%
Crested bladelet	5	0.9%			2	0.3%	3	0.5%		
2nd row of bladelets	6	1.0%					5	0.9%	1	0.2%
3rd row of bladelets	2	0.3%					2	0.3%		
Core tablet of platform creation	2	0.3%			1	0.2%	1	0.2%		
Rejuvenation flake from semi-cylindrical core	1	0.2%	1	0.2%						
Rejuvenation flake proximal part of core	1	0.2%					1	0.2%		
Products of core reduction	232	40.1%	24	4.1%	70	12.1%	111	19.2%	27	4.7%
Products of core shaping	56	9.7%	7	1.2%	19	3.3%	26	4.5%	4	0.7%
TOTAL	409	70.6%	40		120		203		46	

Table 2b. Technical features of the LM IIIA:2 period. (The percentages are of the total number, 106.)

TECHNICAL FEATURES	TOTAL		Floor deposits	Constructions and levelling deposits		Accumulated and related deposits		Pits	
Crested blades	1	0.9%		1	0.9%				
Crested blades 2nd row	3	2.8%		1	0.9%			2	1.9%
Crested blades 3rd row	3	2.8%		1	0.9%			2	1.9%
Secondary blades	1	0.9%		1	0.9%				
Secondary bladelets	1	0.9%		1	0.9%				
Rejuvenation flakes	9	8.5%		2	1.9%			7	6.6%
Rejuvenation chips	6	5.7%		3	2.8%			3	2.8%
Rejuvenation chip with elements of the blank	1	0.9%		1	0.9%				
Core tablet of the preparation of core tablet	1	0.9%				1	0.9%		
Products of core reduction	45	42.5%		20	18.9%	6	5.7%	19	17.9%
Products of core shaping	12	11.3%		2	1.9%	4	3.8%	6	5.7%
TOTAL	83	78.3%	0	33		11		39	

Table 3a. Obsidian types according to degree of retouch of the LM IIIB:1 period.

TYPES	TOTAL		Blades		Flakes		Bladelets		Chips	
Marginal partial unilateral short retouch	15	3.0%	10	6.2%	2	1.6%	3	2.8%		
Marginal partial bilateral short retouch	8	1.6%	5	3.1%	1	0.8%	2	1.9%		
Distal short retouch	5	1.0%	2	1.2%	2	1.6%	1	0.9%		
Unretouched	342	68.4%	81	50.3%	99	81.1%	57	52.8%	105	96.3%
Peripheral use retouch or use scars	52	10.4%	24	14.9%	5	4.1%	23	21.3%		
Unilateral peripheral use retouch or use scars	5	1.0%	2	1.2%	1	0.8%	1	0.9%	1	0.9%
Bilateral peripheral use retouch or use scars	46	9.2%	29	18.0%	1	0.8%	16	14.8%		
Spontaneous retouch	14	2.8%	5	3.1%	5	4.1%	2	1.9%	2	1.8%
Retouch representing accidental edge damage	13	2.6%	3	1.9%	6	4.9%	3	2.8%	1	0.9%
TOTAL	500		161		122		108		109	

Table 3b. Obsidian types according to degree of retouch of the LM IIIA:2 period.

TYPES	TOTAL		Blades		Flakes		Bladelets		Chips	
Marginal partial unilateral short retouch	1	1.1%			1	3.2%				
Marginal partial bilateral short retouch	2	2.2%	2	10.0%						
Proximal short retouch	1	1.1%	1	5.0%						
Unretouched	60	65.2%	6	30.0%	22	71.0%	6	46.2%	26	92.9%
Peripheral use retouch or use scars	12	13.0%	3	15.0%	5	16.1%	3	23.1%	1	3.6%
Unilateral peripheral use retouch or use scars	2	2.2%	1	5.0%			1	7.7%		
Bilateral peripheral use retouch or use scars	8	8.7%	4	20.0%	1	3.2%	3	23.1%		
Spontaneous retouch	4	4.3%	2	10.0%	1	3.2%			1	3.6%
Retouch representing accidental edge damage	2	2.2%	1	5.0%	1	3.2%				
TOTAL	92		20		31		13		28	

Table 4a. Obsidian tools of the LM IIIB:1 period.

TOOLS	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
Notched piece on blade	3	8.3%			2	20.0%	1	7.1%		
Unretouched notch-on blade	4	11.1%			2	20.0%	1	7.1%	1	14.3%
Notched piece on bladelet	1	2.8%							1	14.3%
Unretouched notch on bladelet	2	5.6%			2	20.0%				
Truncated piece on blade	1	2.8%	1	20.0%						
Burin distal on flake	1	2.8%	1	20.0%						
Burin on blade	1	2.8%					1	7.1%		
Burin on bladelet truncation	1	2.8%			1	10.0%				
Sickle element on blade	1	2.8%			1	10.0%				
End-scraper on flake	1	2.8%					1	7.1%		
End-scraper on bladelet	1	2.8%							1	14.3%
Side-scraper on blade	2	5.6%					2	14.3%		
Splintered piece	3	8.3%					2	14.3%	1	14.3%
Geometric-rectangle on flake	1	2.8%	1	20.0%						
Geometric-trapeze on blade	9	25.0%	2	40.0%	1	10.0%	4	28.6%	2	28.6%
Unretouched point on bladelet	1	2.8%							1	14.3%
Point with retouched pointed end	3	8.3%			1	10.0%	2	14.3%		
TOTAL	36	100%	5		10		14		7	

Table 4b. Obsidian tools of the LM IIIA:2 period.

TOOLS	TOTAL		Floor deposits	Constructions and levelling deposits		Accumulated and related deposits		Pits	
Notched piece on flake	1	20.0%		1	50.0%				
End-scraper on bladelet	1	20.0%				1	50.0%		
Sickle element on blade	1	20.0%		1	50.0%				
Point with retouched pointed end	2	40.0%				1	50.0%	1	100.0%
TOTAL	5			2		2		1	

Table 5a. Cortical obsidian products of the LM IIIB:1 period (The percentages are of the total number, 579.)

CORTEX		
PRIMARY PRODUCTS		
Blades	2	0.3%
Flakes	9	1.5%
Chips	4	0.7%
Debris or waste by-products	4	0.7%
Amorphus part of core	1	0.2%
Unmodified nodules	1	0.2%
TOTAL	21	3.6%
SECONDARY PRODUCTS		
Blades	9	1.5%
Flakes	22	3.8%
Bladelets	2	0.3%
Chips	10	1.7%
Debris or waste by-products of the shaping of the nodule	2	0.3%
Debris or waste by-products of core reduction	2	0.3%
TOTAL	47	8.1%
PRODUCTS WITH VERY LITTLE CORTEX		
Blades	6	1.0%
Flakes	20	3.4%
Bladelets	3	0.5%
Chips	20	3.4%
Exhausted core	1	0.2%
Amorphous part of core	1	0.2%
TOTAL	51	8.8%

Table 5b. Cortical obsidian products of the LM IIIA:2 period (The percentages are of the total number, 106.)

CORTEX		
PRIMARY PRODUCTS		
Flakes	5	4.8%
Chips		
Debris or waste by-products		
TOTAL	5	4.8%
SECONDARY PRODUCTS		
Blades	1	1.0%
Flakes	5	4.8%
Bladelets	1	1.0%
Chips	2	1.9%
TOTAL	9	8.6%
PRODUCTS WITH VERY LITTLE CORTEX		
Blades	1	1.0%
Flakes	6	5.7%
Bladelets		
Chips	4	3.8%
Debris or waste by-products of the shaping of the nodule	2	1.9%
Exhausted core	1	1.0%
Amorphous part of core	1	1.0%
TOTAL	15	14.3%

Table 6a. Degree of conservation of the LM IIIB:1 obsidian blades, bladelets and flakes.

CONSERVATION	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
BLADES										
Intact	2	1.2%			1	2.0%	1	1.4%		
Distal	26	16.1%	3	23.1%	6	12.2%	14	19.2%	3	11.5%
Mesial	62	38.5%	7	53.8%	19	38.8%	25	34.2%	11	42.3%
Proximal	70	43.5%	3	23.1%	23	46.9%	32	43.8%	12	46.2%
Half	1	0.6%					1	1.4%		
TOTAL	161	100%	13		49		73		26	
BLADELETS										
Intact	2	1.9%	1	10.0%			1	1.9%		
Distal	20	18.5%	3	30.0%	1	3.2%	12	22.2%	4	30.8%
Mesial	42	38.9%	3	30.0%	19	61.3%	18	33.3%	2	15.4%
Proximal	43	39.8%	3	30.0%	10	32.3%	23	42.6%	7	53.8%
Half	1	0.9%			1	3.2%				
TOTAL	108	100%	10		31		54		13	
FLAKES										
Intact	88	72.1%	13	76.5%	17	56.7%	42	73.7%	16	88.9%
Distal	14	11.5%	2	11.8%	4	13.3%	7	12.3%	1	5.6%
Mesial	1	0.8%					1	1.8%		
Proximal	11	9.0%	1	5.9%	6	20.0%	3	5.3%	1	5.6%
Irregular-amorphous	2	1.6%			1	3.3%	1	1.8%		
Half	6	4.9%	1	5.9%	2	6.7%	3	5.3%		
TOTAL	122	100%	17		30		57		18	

Table 6b. Degree of conservation of the LM IIIA:2 obsidian blades, bladelets and flakes.

CONSERVATION	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
BLADES										
Distal	1	5.0%							1	11.1%
Mesial	9	45.0%			5	62.5%	1	50.0%	3	33.3%
Proximal	10	50.0%	1	100.0%	3	37.5%	1	50.0%	5	55.6%
TOTAL	20	100.0%	1		8		2		9	
BLADELETS										
Distal	4	30.8%			2	25.0%			2	66.7%
Mesial	5	38.5%			4	50.0%	1	50.0%		
Proximal	4	30.8%			2	25.0%	1	50.0%	1	33.3%
TOTAL	13	100%			8		2		3	
FLAKES										
Intact	21	67.7%			5	55.6%	5	71.4%	11	73.3%
Distal	6	19.4%			2	22.2%	1	14.3%	3	20.0%
Mesial	1	3.2%							1	6.7%
Proximal	3	9.7%			2	22.2%	1	14.3%		
TOTAL	31	100%			9		7		15	

Table 7a. Form of the butt on obsidian blades, bladelets and flakes of the LM IIIB:1 period.

BUTT	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
BLADES										
Indistinct-damaged	3	4.1%			2	8.3%	1	2.9%		
Dihedral	4	5.5%			2	8.3%	2	5.9%		
Faceted	42	57.5%	3	100%	15	62.5%	15	44.1%	9	75.0%
Punctiforme	6	8.2%			2	8.3%	2	5.9%	2	16.7%
Flat	16	21.9%			3	12.5%	12	35.3%	1	8.3%
Linear	1	1.4%					1	2.9%		
Winged	1	1.4%					1	2.9%		
TOTAL	73	100%	3		24		34		12	
BLADELETS										
Dihedral	6	13.0%			1	9.1%	5	20.8%		
Faceted	19	41.3%	2	50.0%	5	45.5%	6	25.0%	6	85.7%
Punctiforme	10	21.7%	2	50.0%	2	18.2%	5	20.8%	1	14.3%
Flat	9	19.6%			2	18.2%	7	29.2%		
Linear	2	4.3%			1	9.1%	1	4.2%		
Winged										
TOTAL	46	100%	4		11		24		7	
FLAKES										
Indistinct-damaged	10	9.3%	2	13.3%	2	7.7%	3	6.1%	3	17.6%
Cortical	3	2.8%	2	13.3%	1	3.8%				
Dihedral	5	4.7%			1	3.8%	3	6.1%	1	5.9%
Faceted	11	10.3%	1	6.7%	1	3.8%	5	10.2%	4	23.5%
Punctiforme	10	9.3%	2	13.3%	3	11.5%	3	6.1%	2	11.8%
Flat	60	56.1%	6	40.0%	15	57.7%	34	69.4%	5	29.4%
Linear	7	6.5%	2	13.3%	2	7.7%	1	2.0%	2	11.8%
Winged	1	0.9%			1	3.8%				
TOTAL	107	100%	15		26		49		17	

Table 8a. Form of the obsidian blades and bladelets of the LM IIIB:1 period.

FORM OF THE BLADE AND BLADELET	TOTAL	
Parallel sides blades, trapezoidal cross-section	81	50.3%
Parallel sides blades, triangular cross-section	27	16.8%
Irregularly parallel sides blades, trapezoidal cross-section	17	10.6%
Irregularly parallel sides blades, triangular cross-section	36	22.4%
TOTAL	161	100.0%
Bladelets, trapezoidal cross-section	63	58.33%
Bladelets triangular cross-section	25	23.1%
Irregularly parallel sides bladelets, trapezoidal cross-section	2	1.9%
Irregularly parallel sides bladelets, triangular cross-section	18	16.7%
TOTAL	108	100%

Table 8b. Form of the obsidian blades and bladelets of the LM IIIA:2 period.

FORM OF THE BLADE AND BLADELET	TOTAL	
Parallel sides blades, trapezoidal cross-section	10	50.0%
Parallel sides blades, triangular cross-section	4	20.0%
Irregularly parallel sides blades, triangular cross-section	6	30.0%
TOTAL	20	100.0%
Bladelets, trapezoidal cross-section	7	53.85%
Bladelets triangular cross-section	3	23.1%
Irregularly parallel sides bladelets, triangular cross-section	3	23.1%
TOTAL	13	100%

Table 7b. Form of the butt on obsidian blades, bladelets and flakes of the LM IIIA:2 period.

BUTT	TOTAL		Floor deposits		Constructions and levelling deposits		Accumulated and related deposits		Pits	
BLADES										
Indistinct-damaged	1	10.0%					1	100.0%		
Cortical	1	10.0%							1	20.0%
Faceted	4	40.0%			3	100.0%			1	20.0%
Punctiforme	2	20.0%							2	40.0%
Flat	2	20.0%	1	100%					1	20.0%
TOTAL	10	100%	1		3		1		5	
BLADELETS										
Dihedral	1	25.0%					1	100.0%		
Faceted	1	25.0%							1	100.0%
Flat	2	50.0%			2	100.0%				
TOTAL	4	100%			2		1		1	
FLAKES										
Indistinct-damaged	1	4.0%							1	8.3%
Cortical	1	4.0%							1	8.3%
Dihedral	2	8.0%			1	14.3%	1	16.7%		
Faceted	5	20.0%			1	14.3%	1	16.7%	3	25.0%
Punctiforme	5	20.0%			2	28.6%	1	16.7%	2	16.7%
Flat	9	36.0%			2	28.6%	3	50.0%	4	33.3%
Linear	2	8.0%			1	14.3%			1	8.3%
TOTAL	25	100%			7		6		12	

Table 9a. Accidents to obsidian chipped stones and obsidian cores of the LM IIIB:1 period. (The percentages are of the total number, 579.)

ACCIDENTS		
Break frank	1	0.2%
Break with tong	2	0.3%
Hinged pieces	2	0.3%
Plunging pieces	1	0.2%
Siret accident	5	0.9%
TOTAL	11	1.89%
CORES		
Undeterminate exhausted blade core	1	0.2%
Semi-cylindrical blade core	1	0.2%
Semi-cylindrical bladelet core	2	0.3%
Flat or tabular bladelet core	2	0.3%
TOTAL	6	1.03%

Table 9b. Accidents to obsidian chipped stones and obsidian cores of the LM IIIA:2 period. (The percentages are of the total number, 106.)

ACCIDENTS		
Break frank	1	0.9%
Break with tong	2	1.9%
TOTAL	3	2.83%
CORES		
Blank comporting elements of semi-cylindrical blade core	1	0.9%
Semi-cylindrical bladelet core – exhausted	1	0.9%
TOTAL	2	1.89%