REPORT ON THE FIFTH SEASON OF EXCAVATIONS AT GIRDI QALA AND LOGARDAN

RÉGIS VALLET

CNRS – INSTITUT FRANCAIS DU PROCHE-ORIENT (IFPO)

Logardan, aerial view from the west (2019)

DIRECTORATE OF ANTIQUITIES OF SULEYMANIAH
GENERAL DIRECTORATE OF ANTIQUITIES OF KURDISTAN REGIONAL GOVERNMENT

NOVEMBER 2019

REPORT ON THE FIFTH SEASON OF EXCAVATIONS AT GIRDI QALA AND LOGARDAN

RÉGIS VALLET

CNRS – INSTITUT FRANCAIS DU PROCHE-ORIENT (IFPO)

DIRECTORATE OF ANTIQUITIES OF SULEYMANIAH
GENERAL DIRECTORATE OF ANTIQUITIES OF KURDISTAN REGIONAL GOVERNMENT

NOVEMBER 2019

TABLE OF CONTENT

THE LITHIC ASSEMBLAGES OF GIRDI QALA AND LOGARDAN: PRELIMINARY OBSERVATIONS

Francesca Manclossi

During the 2019 campaign, the chipped stone collections recorded in 2016 and 2018 at Girdi Qala Trench D and Logardan Trench D were the subject of a detailed analysis. The aim of the study, which will continue in the next years, is to offer a better understanding of an important component of 4^{th} -3^{rd} millennia BCE archaeological records. Traditionally considered as a heritage of prehistoric times and poorly considered, protohistoric chipped stone tools can offer important insights on aspects not available from other realms of the material culture.

GIRDI QALA NORTH MOUND (TRENCH D)

The chipped stone collection from Girdi Qala Trench D counts 253 artifacts, which, according to the stratigraphy of the mound, are dated to the Middle Uruk (LC3-early LC 4). Even if the assemblage is quite small, its precise chronological horizon represents a good case study for a first characterization of the lithic industries that, for the period, are still poorly known.

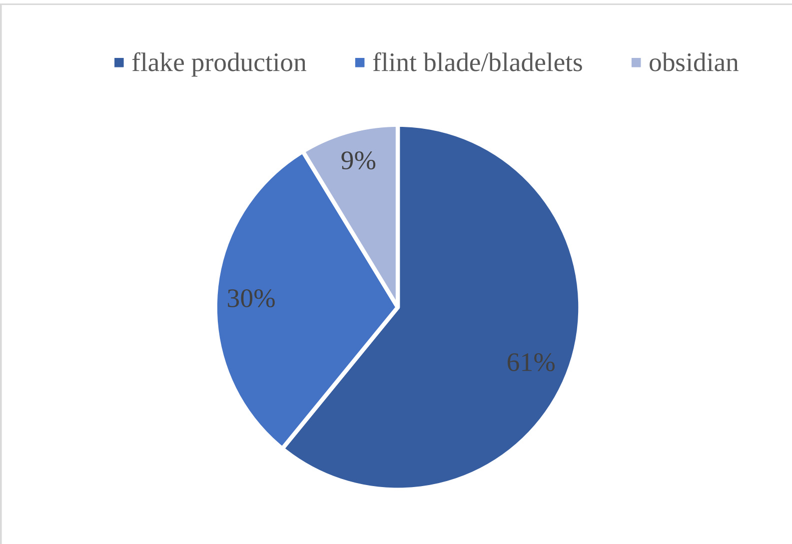

Fig. 1 – The composition of the lithic assemblage of Girdi Qala Trench D.

The chipped stone assemblage can be divided in three main components (Fig. 1). Quantitatively, the better represented is a simple flake-oriented industry, the second is a production of flint blade/bladelets, while the third is a characterized by obsidian artifacts. Beside techno-typological differences, each industry reflects a specific socioeconomic structure, which can offer important information of the organization of ancient societies.

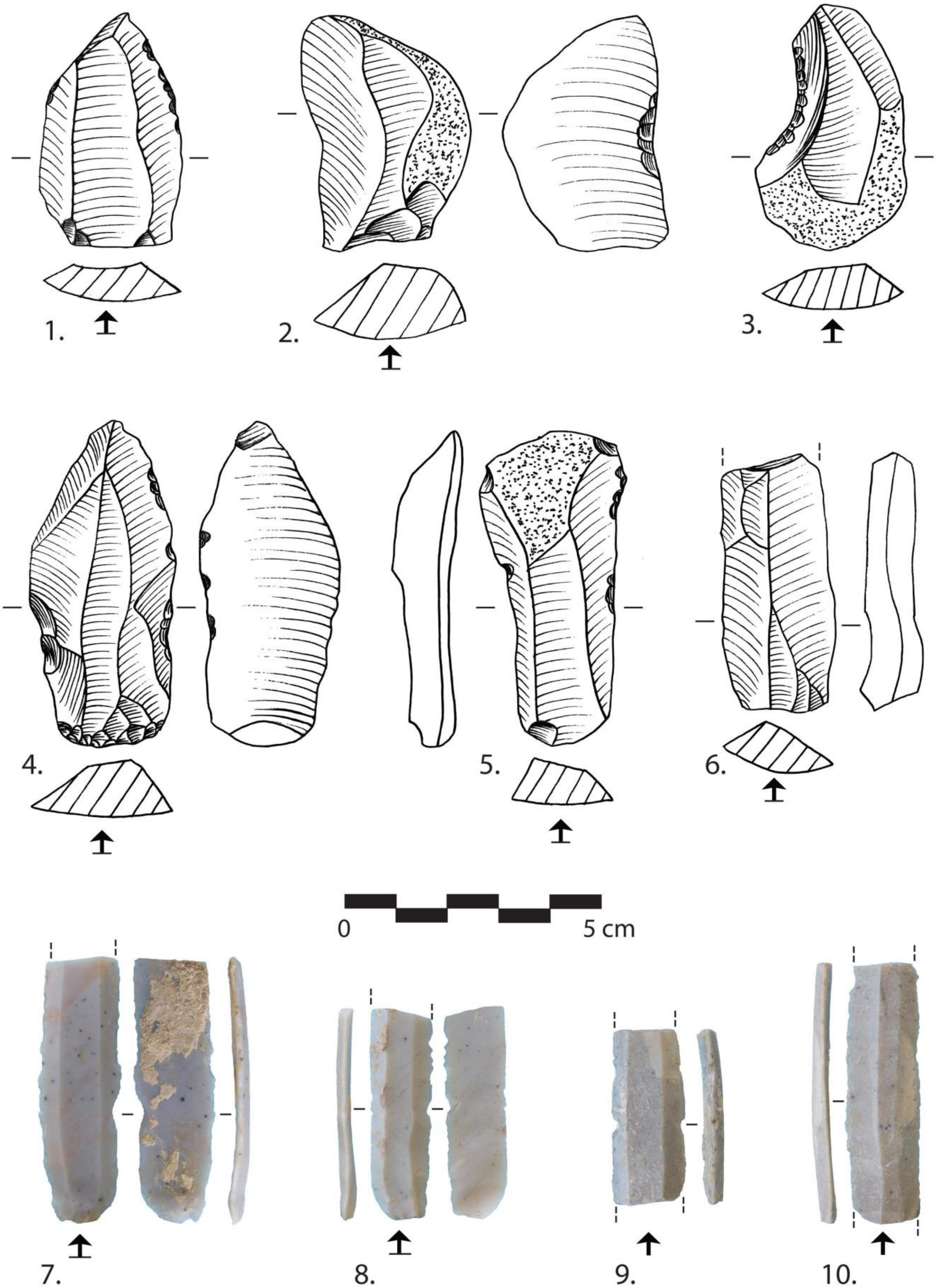

Plate I

The flake industry

Non-diagnostic ad hoc tools characterize the dominant component of the lithic assemblage (Pl. I: 1-3). This industry exhibits all the stages of the chaîne opératoire whith tools, debitage, waste, and cores (Table 1).

Table 1. Composition of the ad hoc industry.

	N	*%*
Core	5	3.3
Waste	77	50.7
Core-trimming element (CTE)	2	1.3
Un-retouched flake	41	27
Retuched flake	27	17.8
Total	*152*	*100.0*

As indicated by the presence of damaged cortex, un-standardized flakes were manufactured by exploiting river cobbles of medium-small size. Given the use of secondary deposits, it is not surprising that raw materials are heterogeneous and vary from fine-grained translucent flint to a less fine-grained brown/grey, and to coarser and multi-colored materials: grey, white, beige and brown, light or dark. The analysis of the texture of the ad hoc products and cores shows a clear dominance of fine/medium-grained flint, and coarse-grained flint is very rare. This suggests that not all the available cobbles were collected, but only the flint with texture appropriate to knapping was selected as raw material. Nevertheless, a fine/medium-grained texture does not automatically mean good quality, and other elements such as fissures, cracks, and inclusions may compromise production. The high frequency of internal irregularities may indicate that the selection of raw material was not strictly limited to specific materials and that the inner homogeneity of the flint was not considered necessary to obtain the desired products and tools.

The cores show only minimal technological investment, as indicated by the presence of only two flakes clearly detached with the intent to remove highly hinged surfaces. The detachment of blanks was conducted after the creation of a simple striking platform, or directly from cortical surfaces, without other adjustments. The same conclusions are supported by the analysis of all detached flakes, un-modified and retouched, which have plain or cortical butts. The observation of preserved proximal ends permits identification of several attributes, which indicate the use of the direct percussion technique. The big platforms, the pronounced bulbs and the well-marked impact points inside the striking platform suggest the utilization of hard stone hammers. The elevated incidence of flaking mistakes, notably hinged fractures, indicates poor control of the force exerted for detaching the flakes, and it is another clue indicating the use of generally unskilled hard hammer direct percussion.

Despite the simple technology, it is possible to recognize some recurrent patterns in the organization of the reduction sequence. The direction of the negatives visible on the cores, the dorsal patterns of all flaked products, and their relation with the knapping axis indicate that flakes are detached in short series of contiguous removals sharing the same striking platform (Fig. 2).

Once one sequence is completed, the block of flint seems to be regarded as a new core and the knapping continues with a new series on the surface where the technical criteria permit detachment of new flakes, generally without previous modifications. The majority of the flakes have unidirectional dorsal scars, usually aligned with the knapping axis. This seems to suggest that most of the series present on the cores were completely independent between them. The presence of unidirectional, perpendicular and multidirectional dorsal patterns, however, indicate that in several cases, subsequent series could share the same knapping surface. These other patterns are often associated with hinge fractures or irregularities in the flint that do not allow continuation of the sequence, and require changing the striking platforms.

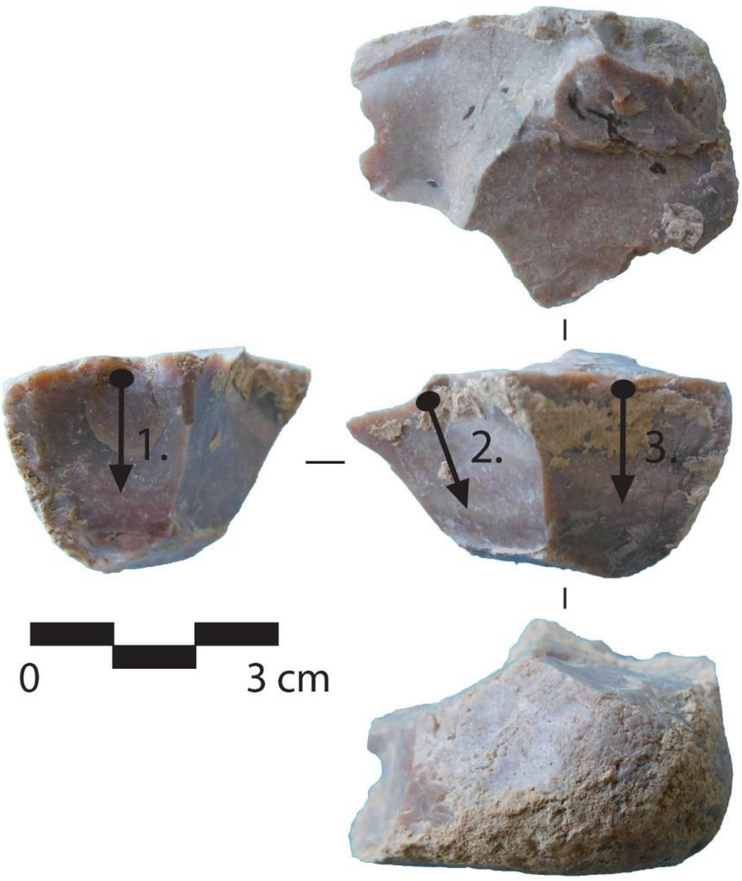

Fig. 2 – Ad hoc core made on a small pebble.

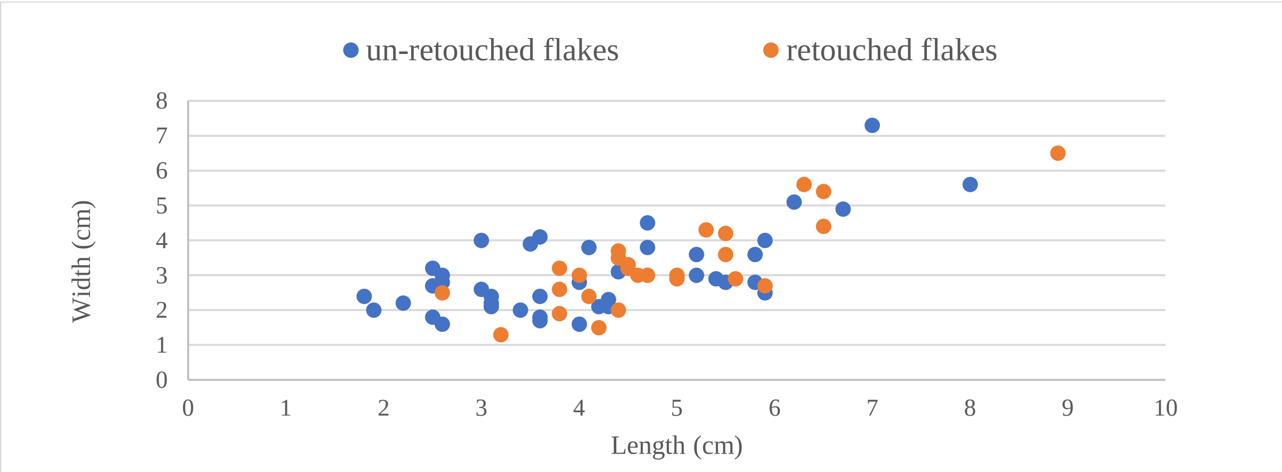

Fig. 2 – Ad hoc blank and tool size.

Flakes are small/medium size, and average dimensions are 4.4± 1.5 cm in length, 3± 1.2 cm in width, and 1.1± 0.7 cm in thickness. The examination of the size of blanks and tools shows that there is a marked overlap in retouched and un-retouched flake length and width dimensions (Fig. 3). These data seem to indicate that size was not a major criterion for selecting the blanks subsequently retouched and transformed in tools.

Among the retouched flakes, only a few items can be classified following typological lists as scrapers (N=5) and notches (N=3). Most of the tools, indeed, show simple retouch varying in delineation, extent, distribution and position, and they can be defined only as retouched flakes. In general, the retouch did not significantly modify the original blanks, and it is present on the more suitable edges that required little transformations. For example, the cortical lateral edges and plunging terminations are rarely retouched. In contrast, natural sharp edges or portions of them were commonly modified. The tool category counts only the artifacts showing intentional retouch that creates specific shapes and edge delineations, and does not include unmodified flakes that, although used, do no show retouch (e.g., Bailly 2006). The high percentage of flakes without intentional retouch might indicate that this group composed the majority of flakes effectively used. As suggested in other studies, the retouch was not the first intent of the knapper producing ad hoc tools; it was employed only when necessary to create suitable edges if they were not automatically created in the production of blanks (Manclossi and Rosen 2019a).

The blade/bladelet industry

The second component of the lithic assemblage is composed by blades/ bladelets, which, according to their technological features can be divided in two main groups: (1) regular blades produced by pressure, and (2) irregular blades produced by direct percussion. In many cases, however, the knapping technique used for detaching regular blades is not well recognizable, especially for the shortest segments, and they might be detached either by pressure or by indirect percussion (Fig. 4).

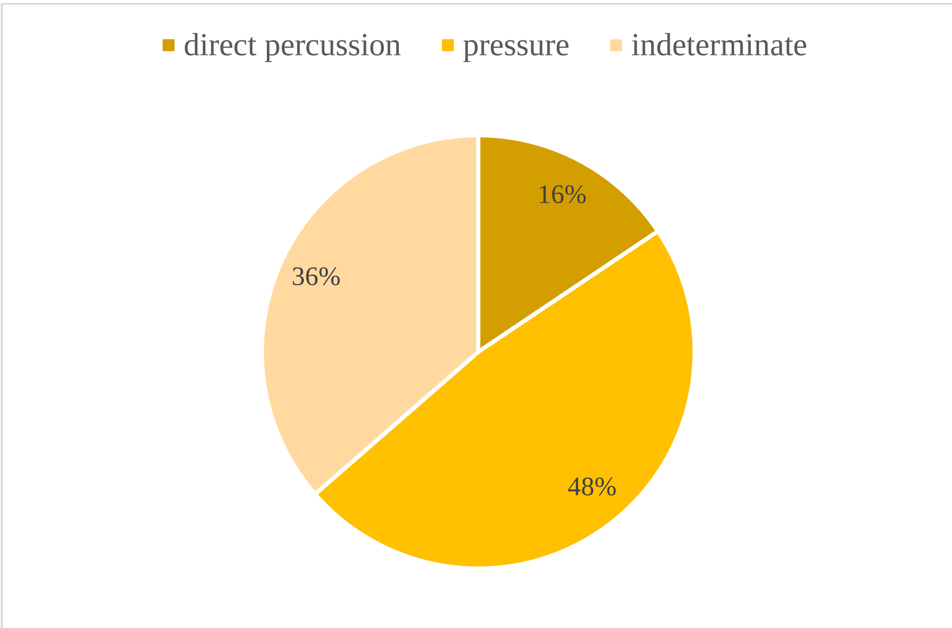

***Fig. 3** – Technological composition of the blade/bladelet industry.*

With regard to the raw materials, blades/bladelets are usually made on fine-grained and homogeneous flint, which differ from that used in the production of ad hoc tools. Different varieties seem to have been exploited, but among the flint used for pressured-blade/ bladelets it is possible to recognize a characteristic light grey-colored chert with small dark inclusions, which do not alter the high quality of the flint.

Blades/bladelets detached by pressure (N= 41) can be recognized by their parallel edges and regular dorsal ridges, which in many cases are perfectly rectilinear; their profiles are almost straight, except for the curved and sharp distal end, and their sections are relatively thin (Pl. I: 7-10; Pl. II: 1-3).

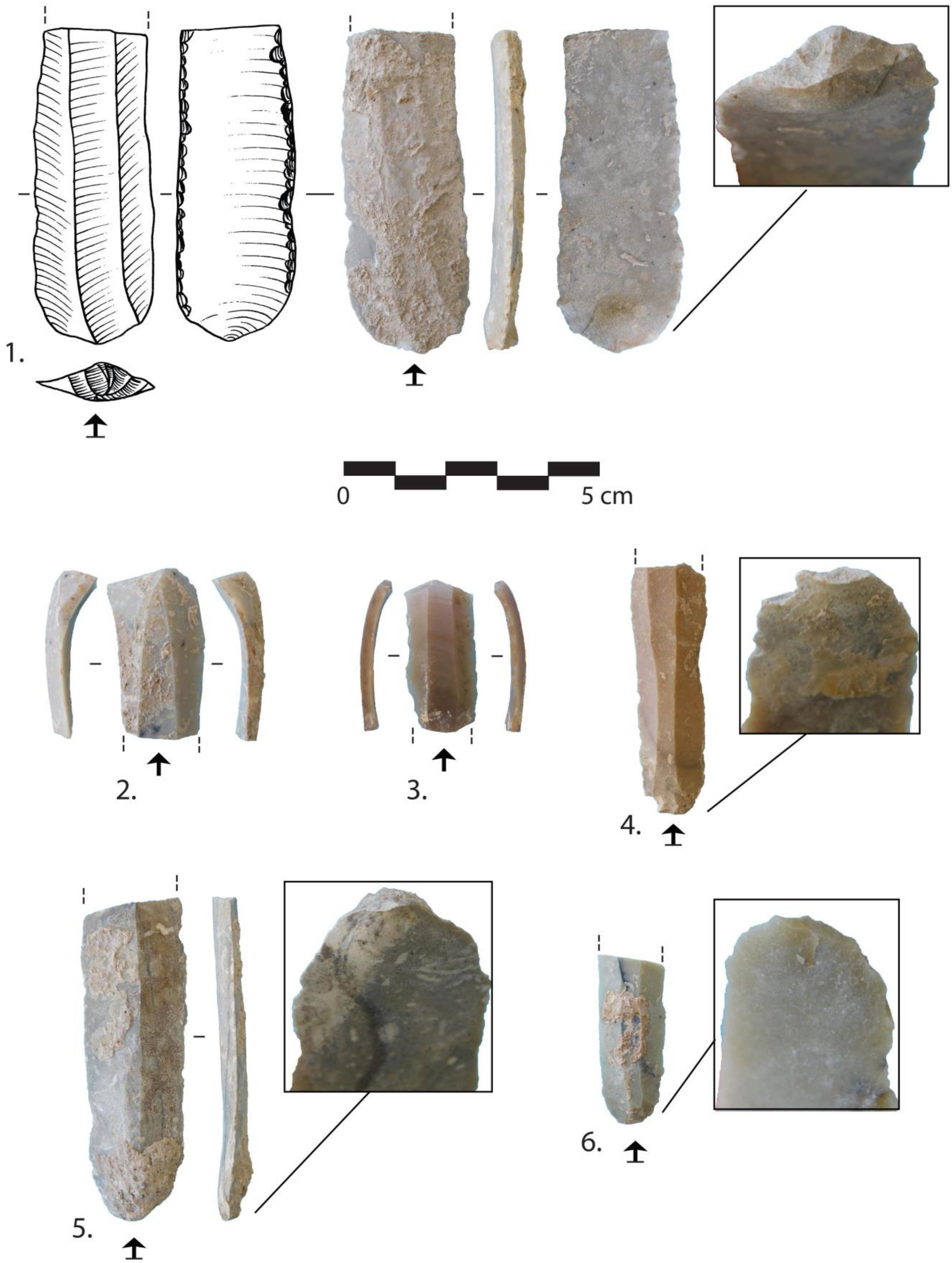

Plate II

In addition to the morphological parameters, some technical attributes (such as the platform preparation and features determined by the detachment process itself) can also be used as arguments for the recognition of the pressure technique and especially for the identification of the pressure stick (Pelegrin 2006). Examining the nine proximal ends recovered in the collection, bulbs are thick, high and short. The butts are small, plain (N=7) or punctiform (N=1). The platform is usually prepared through delicate abrasion, but in one case it is possible to recognize a faceting (Pl. II: 1). The presence of lipped-butts (N= 3) suggests the use of antler pressure sticks (Pl. II: 4-5). In one case, however, a marked crack on the bulb seems to indicate that copper points could be employed (Pl. II: 6). Blades/bladelets have usually a trapezoidal cross-section (ca. 88.9%) although in some cases it is triangular.

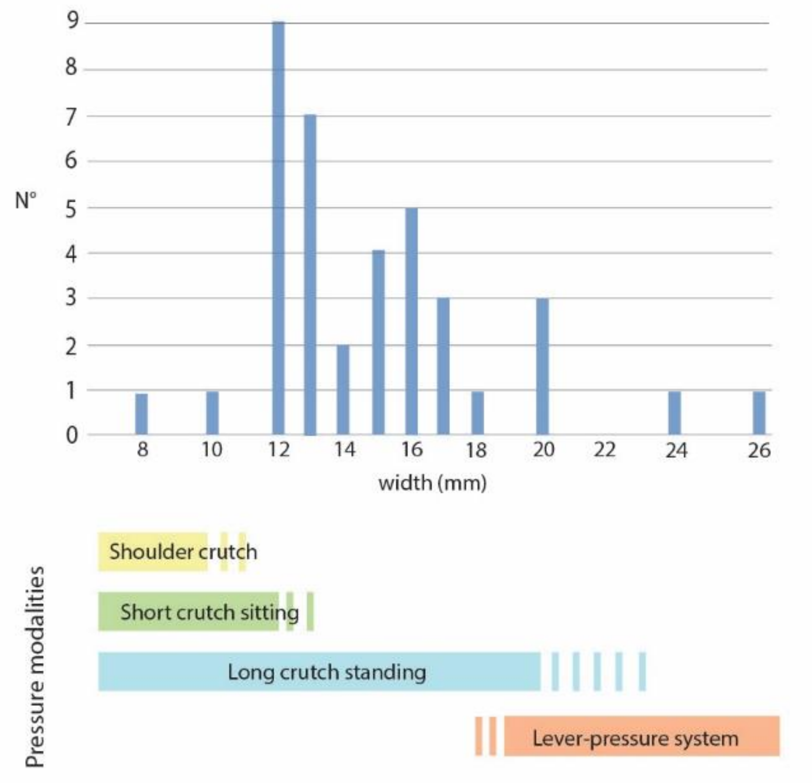

***Fig. 5** – Pressure modalities for blade/ bladelet production.*

Metric analysis can be only partial because of the high frequency of breakage: 46% of the blades are mesial segments with both the extremities fractured (average L= 4± 1.5 cm, W= 2.4± 1.3cm, T= 0.8± 0.6 cm), 31% are proximal segments (average L= 4.1± 1.5 cm, W= 2.4±, 1.2 cm, T= 0.9± 0.6 cm), while 21% are distal fragments (average L= 3.3± 1.1 cm, W= 1.5± 0.3 cm, T= 0.4± 0.2cm). Nevertheless, width frequency informs us about the pressure modes employed for the detachment of blades (Fig. 5). Their width comprises between 8 and 25 mm suggests that at least two different modalities were used, the pressure with long crutch in a standing position and the lever-pressure system, the last one necessary for producing blades larger than 23 mm (Pelegrin 2012). The presence of narrow blades/bladelets, however, does not permit to exclude that simpler pressure modalities, such as those exploiting short or shoulder crutches, were also in use.

In the assemblage, there is a core-tablet showing the negatives of regular and parallel detachments, which suggests that knapping activities related to the production of pressured-blades occurred on-site (Fig. 6.1). This hypothesis is also supported by a core that, however, has been found on the surface and cannot be related to any clear archaeological context. This core has parallel and regular negatives, and the pressure technique is indicated by the orthogonal angle between the striking platform and the knapping surface that is perfectly straight, and the presence of the deep negatives corresponding to high, short and thick bulbs (Fig. 6.2). The size of the core and of its negatives well correspond to the pressure technique exerted with long crutches in a standing position. Finally, another element which might indicate on-site production is a blade fragment showing a typical pop out-fracture (Fig. 6.3), which is usually associated with knapping mistakes occurring during the detachment of blades (Manclossi et al. 2019).

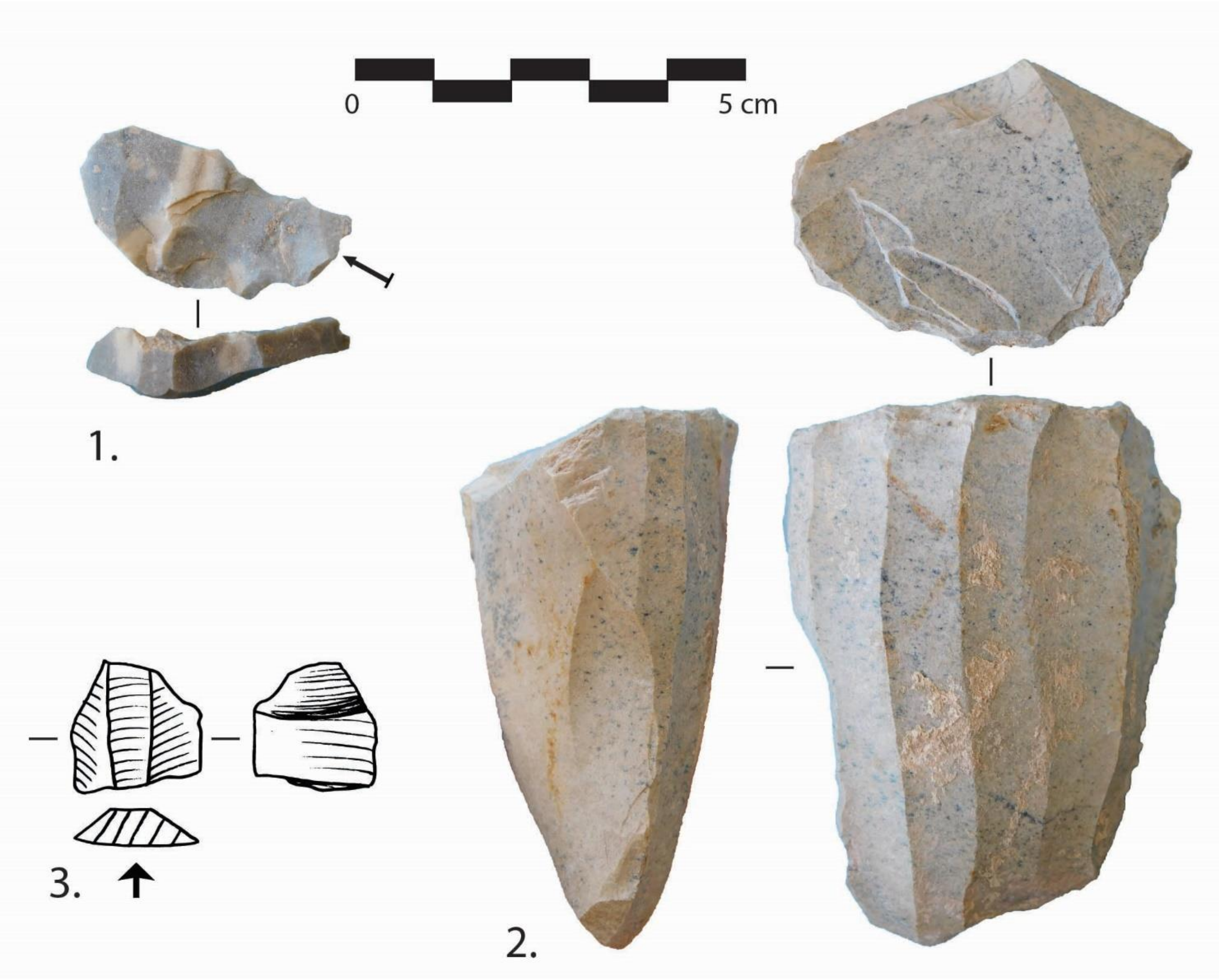

Fig. 6 – Diagnostic elements indicating the use of the pressure technique: 1. Core-tables removing a portion of the striking platform and knapping surface, 2. Pyramidal core with parallel and regular nervures, 3. Pop out-fracture visible on a broken blade.

Most of the blades of the assemblage (N= 28), however, present morphological traits which are not enough for recognize the use of the pressure technique. These blades show sometimes more irregular edges and dorsal arris. Moreover, their profile is not always perfectly rectilinear but slightly twisted. These features might indicate the use of indirect percussion. However, as shown by experimental replications, less regular blades can be detached also using the pressure technique (Pelegrin 2006, 2012).
A small group of blades (N=12) show more irregular profiles and delineations. They are the products of direct percussion and they can be considered as part of the ad hoc production that, sometimes, allows detachment of longer flakes (Pl. I: 4-5). The discovery of a few blade-cores (Fig. 7:1) on the surface of the site, however, seems to indicate that irregular blades might be the products of a specific reduction sequence specifically oriented to the production of long blanks (Pl. I: 6; Pl. III: 1-3). This hypothesis seems supported by the presence of a fragmented crested-blade (Fig. 7: 2).

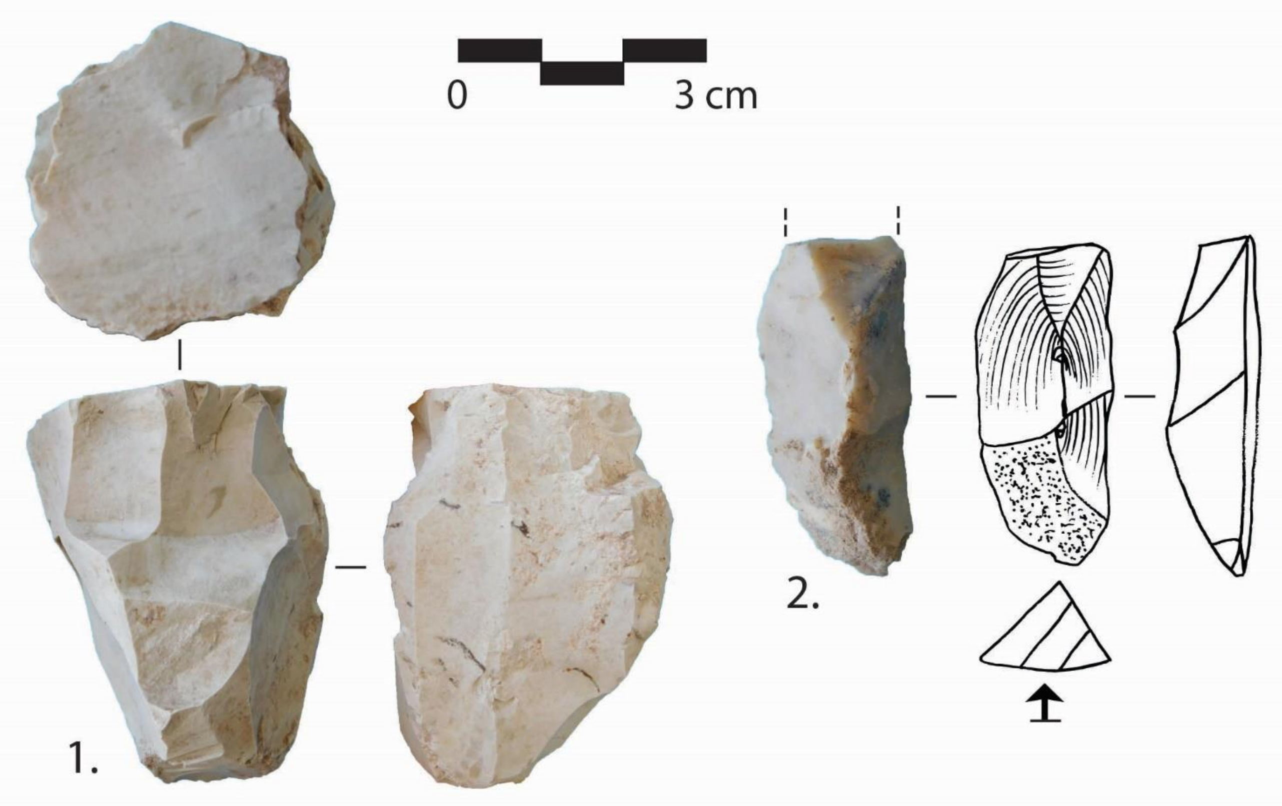

Fig. 7 – Irregular blade detached by direct percussion: 1. Blade-core, 2. Crested-blade.

Intention retouch and/or clear evidence of utilization are attested on 42.2 % of the blade assemblage (N=32). Typologically, these tools can be divided in two main groups: the glossy elements and the retouched blades. In the collection, there are nine glossy blades, identified by the presence of shiny luster on one or both the working edges (Pl. III: 4-6). Glossy pieces, manufactured on truncated or fragmented blades, have triangular or rectangular shapes. Their working edges are retouched and the retouch varies from nibble to serration. The intensity of gloss is usually low. Some of the blades preserve traces of adhesive, probably bitumen (Pl. III: 7-8), used for fixing the flint elements in the haft of composite tools. All other blade tools are simple retouched blades (N= 23). They are usually made on fractured or truncated blanks, and the edges present varying type of retouch which, usually straight, vary in extent (from marginal to long), position (direct or indirect), and distribution (from partial to total). In many cases, the edges show also marginal damages edge linked to their use.

The obsidian industry

In the assemblage there are 22 obsidian artifacts, for a total weight of 43.5 g. Excluding one retouched flake (Fig. 8:1) and nine small fragments, which might suggest the presence of on-site knapping activities, the collection is composed of 12 small blades/ bladelets (Fig. 8: 2-3), most of them with visible damaged edges. All bladelets/blades have parallel edges and rectilinear dorsal ridges, their profile is perfectly straight and their sections are thin. These characters are diagnostic of the pressure technique. All the obsidian blades/ bladelets are broken at least at one extremity, allowing no detailed metric analysis of the original size. The range of width (from 6 to 17 mm) fits within different pressure modes, from the hand-held baguette to the long crutch in a standing position. Nevertheless, at this stage of the research, it is not possible to determine if and which different modalities of pressure coexisted. We cannot either rule out the possibility that all the blades/bladelets were the products of the pressure technique exerted with a short crutch in a sitting position, the narrowest and the largest blades representing the limits of this system (Pelegrin 2012).

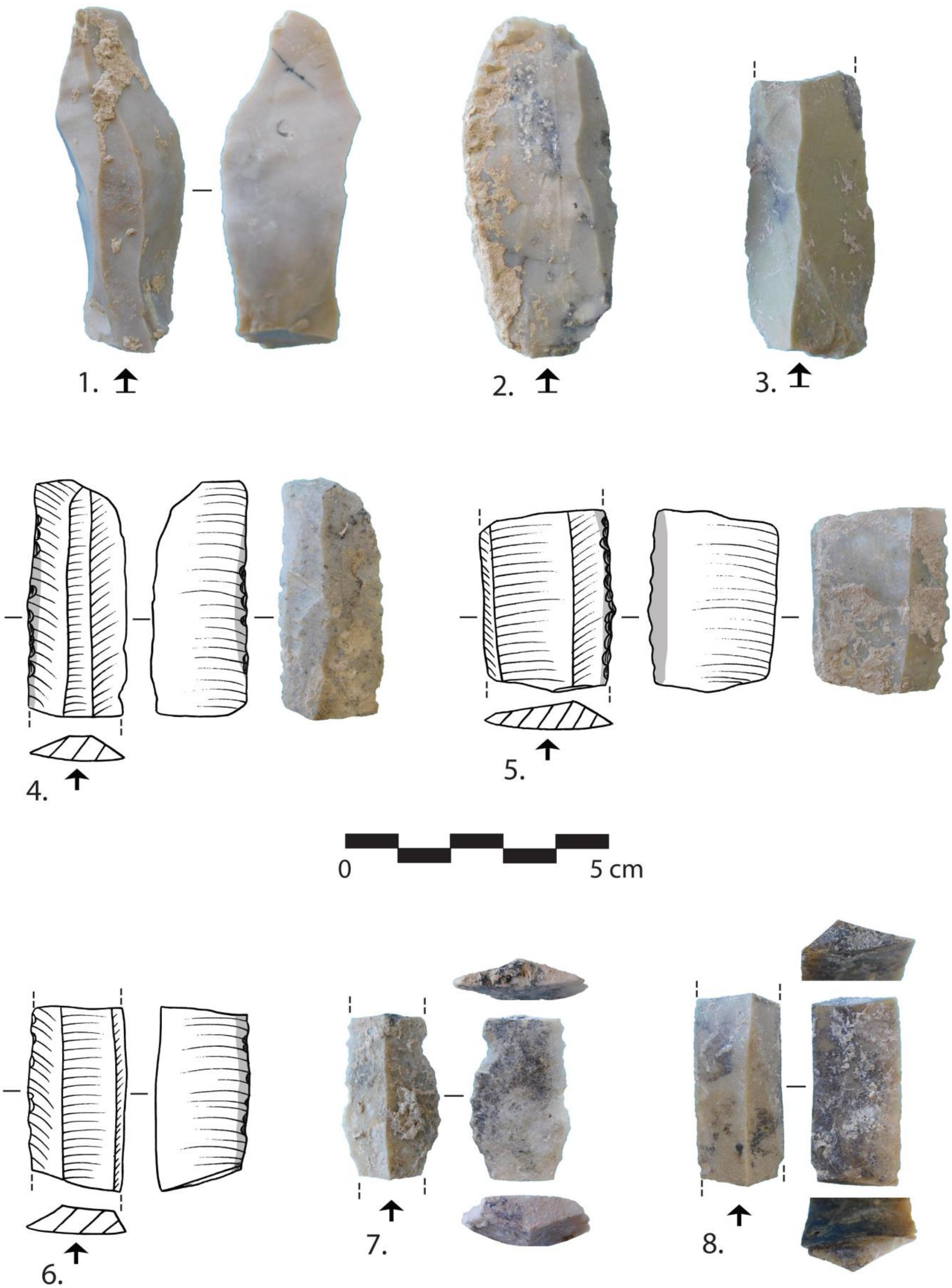

Plate III

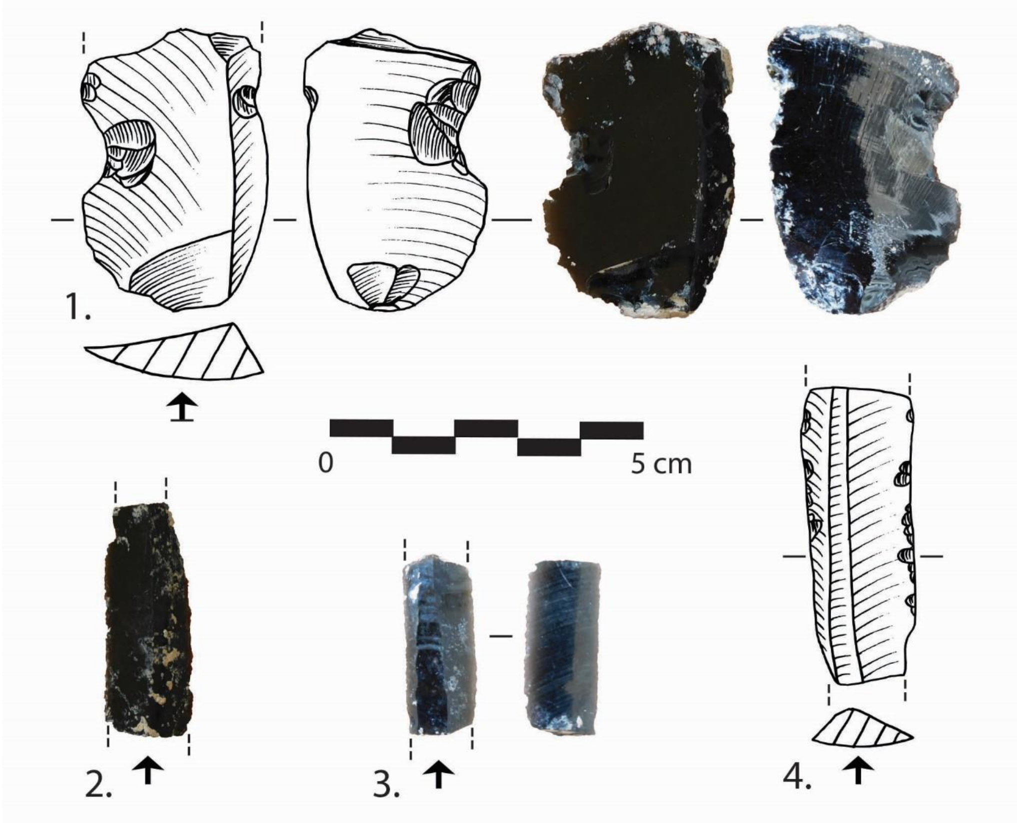

Fig. 8 – The obsidian industry at Girdi Qala.

LOGARDAN – TRENCH D

The chipped-stone collection from Logardan Trench D is quite small and consists of 168 artifacts. Following the stratigraphy of the site, the assemblage can be ascribed from the end of the Early Uruk to the Ur III Period. Quantitatively, the most conspicuous component (ca. 70%) derives from contexts dated to the Akkadian Period (phase 3A-B). At this stage of the research, it is not possible to recognize any chronological trends that characterized the development of 4th and 3rd millennium BCE lithic industries. However, several observations can be made observing the composition of the assemblage that can be divided in three main components: (1) a simple flake-oriented industry, (2) a production of flint blade/ bladelets, and (3) obsidian artifacts (Fig. 9).

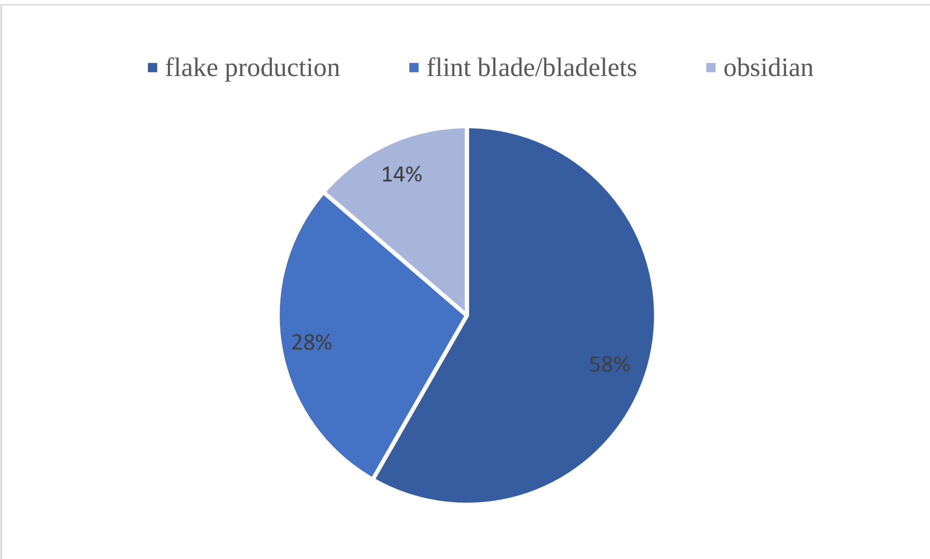

Fig. 9 – The composition of the lithic assemblage of Logardan Trench D.

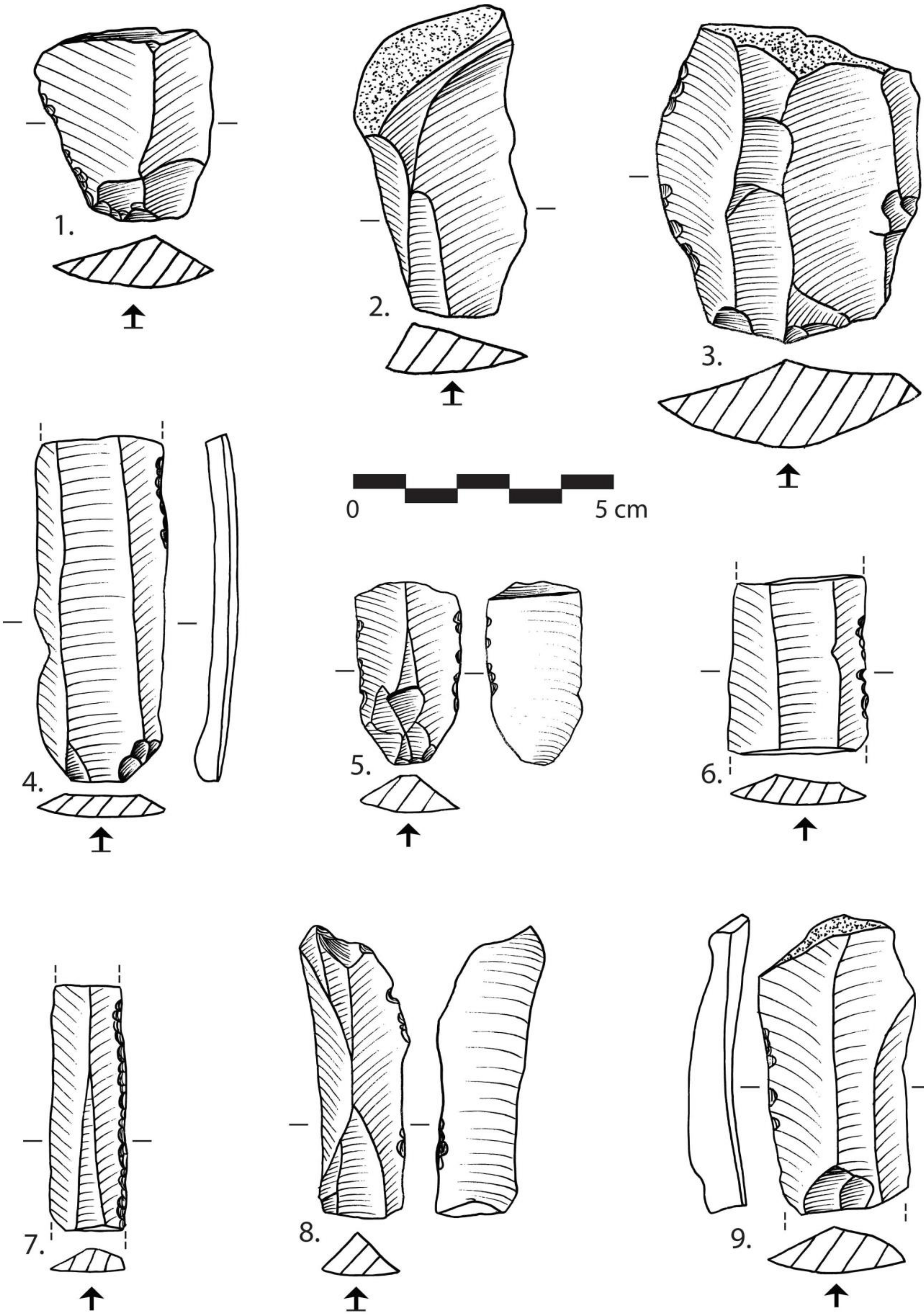

Plate IV

The flake industry
The dominant component of the lithic assemblage is characterized by non-diagnostic ad hoc tools (Pl. IV: 1-3) which exhibit all the stages of their chaîne opératoire (Table 2).

Table 2. Composition of the ad hoc industry

	N	*%*
core	3	3.1
waste	46	46.9
un-retouched flake	29	29.6
retuched flake	20	20.4
total	*98*	*100.0*

Local river cobbles of medium-small size, easily available in proximity of the site, were used for detaching irregular blanks. Fine/medium-grained flint was preferred (ca. 95 %), and coarse-grained flint is rare; only one artefact made on limestone have been identified.
Flakes were produced by using a simple technology requiring little investment. The utilization of hard stone hammers, often not well mastered, is indicated by large platforms and pronounced bulbs, and the presence of marked impact points inside the striking platform (Fig. 10).

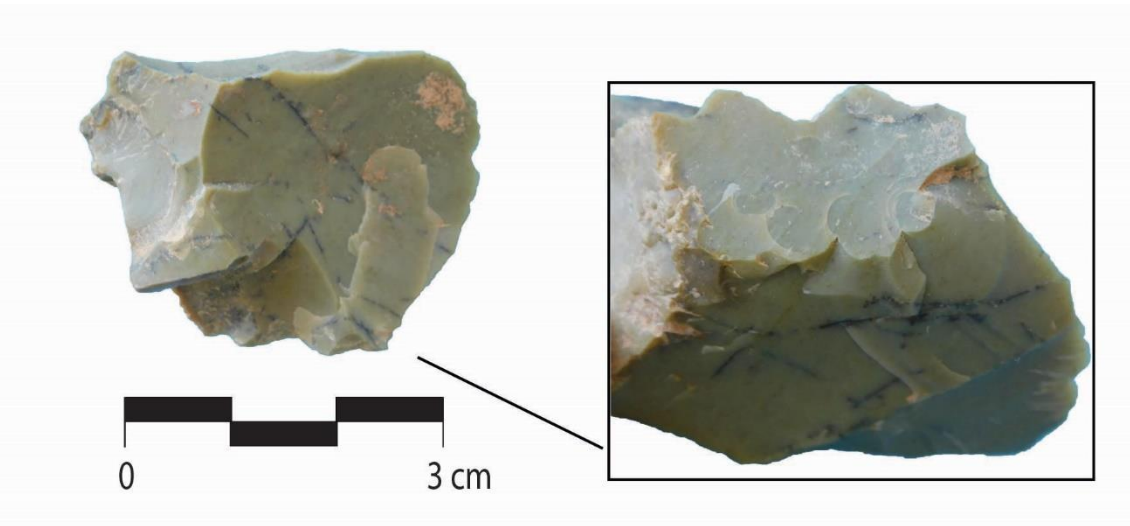

***Fig. 10** – Flake showing the marked impact point typical of poor control in knapping by using the direct percussion.*

Flakes are small/ medium size, and average dimensions are 4.2± 1.4 cm in length, 3.1± 0.9 cm in width, and 1.1± 0.5 cm in thickness. The examination of the dimensions of blanks and tools suggests that the size did not affected the selection of flakes subsequently retouched (Fig. 11).

Among the retouched flakes, there are scrapers (N=2), notches (N=1), and denticulates (N=1). Most of the tools, however cannot be classified following typological list, but are simple retouched flakes with retouch varying in delineation, extent, distribution and position

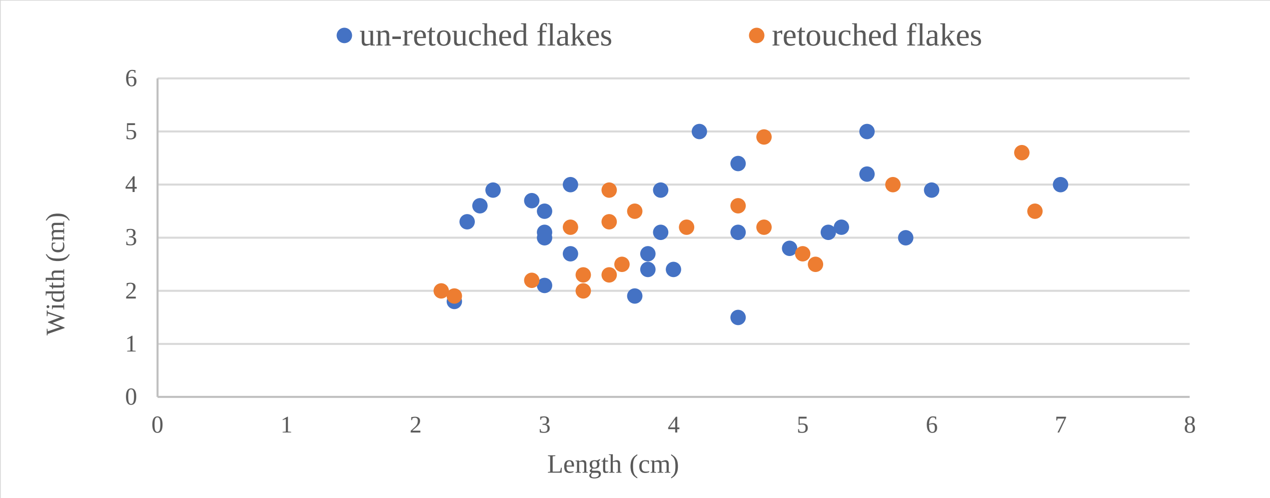

Fig. 11 – Ad hoc blank and tool size.

The blade/bladelet industry

The second component of the lithic assemblage is composed by blades/bladelets, which, according to their technological features can be divided in three main groups: (1) blades produced by pressure, (2) blade produced by indirect percussion, and (3) blades detached by using the direct percussion. The fragmentary nature of the collections, which counts many broken pieces, does not always permit to distinguish between the different groups (Fig. 12). With regard to the raw materials, blades/bladelets are usually made on fine-grained flint. Different varieties seem to have been used, but available data do permit any correlation between the type of flint and the knapping techniques.

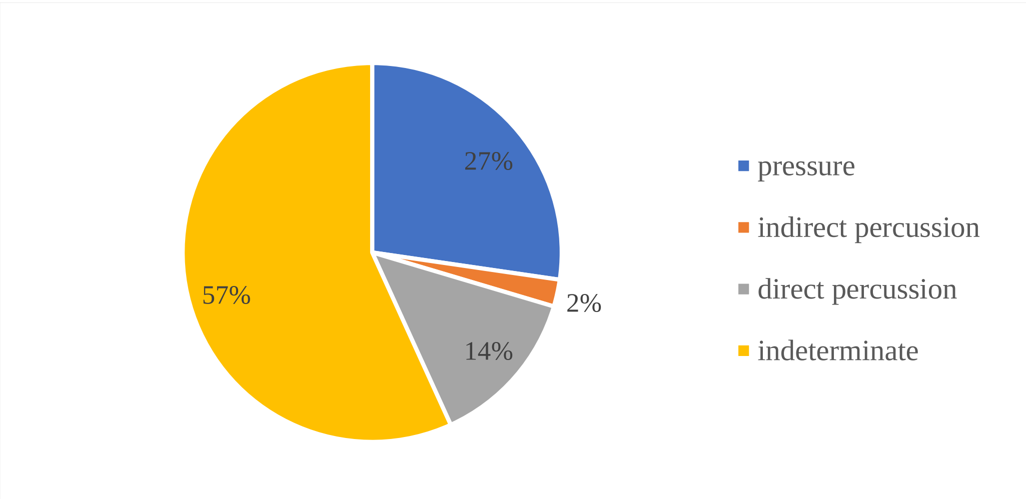

Fig. 12 – Technological composition of the blade/bladelet industry.

Blades/bladelets detached by pressure (N= 12) can be recognized by their parallel edges and regular dorsal ridges, which in many cases are perfectly rectilinear. Their profiles are almost straight, except for the curved distal end; and their sections are relatively thin (Pl. IV: 4-7, Pl. V: 1). These features are diagnostic for the pressure technique and both direct and indirect percussion can be ruled out. The bulbs are thick, high and short, the butts are smaller than the bodies (usually punctiform), and they are often prepared through small and delicate abrasion. The presence of lipped-butts (N= 2) suggests the use of antler pressure sticks. In one case, however, a marked crack on the bulb seems to indicate that copper points could be employed.

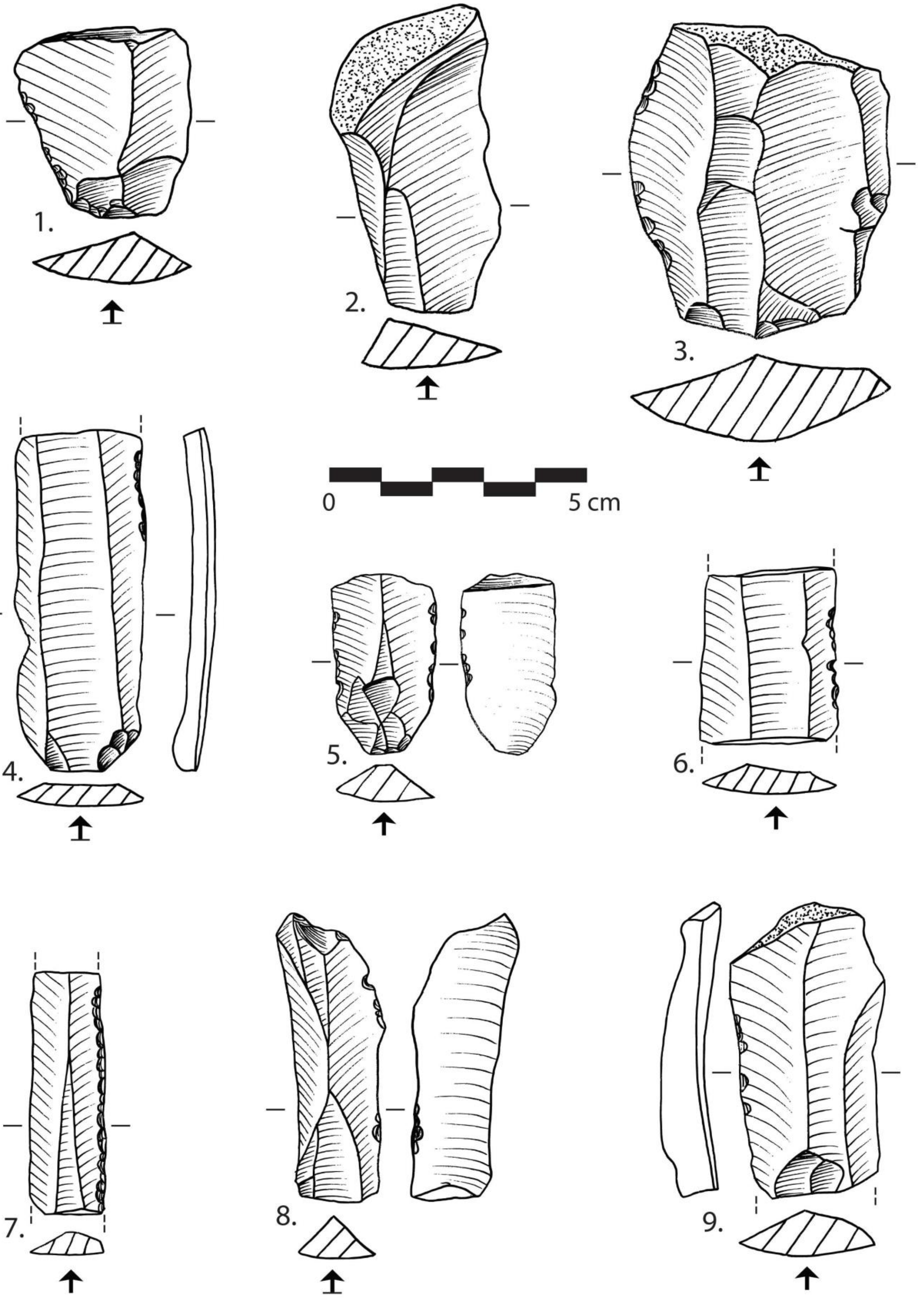

Plate IV

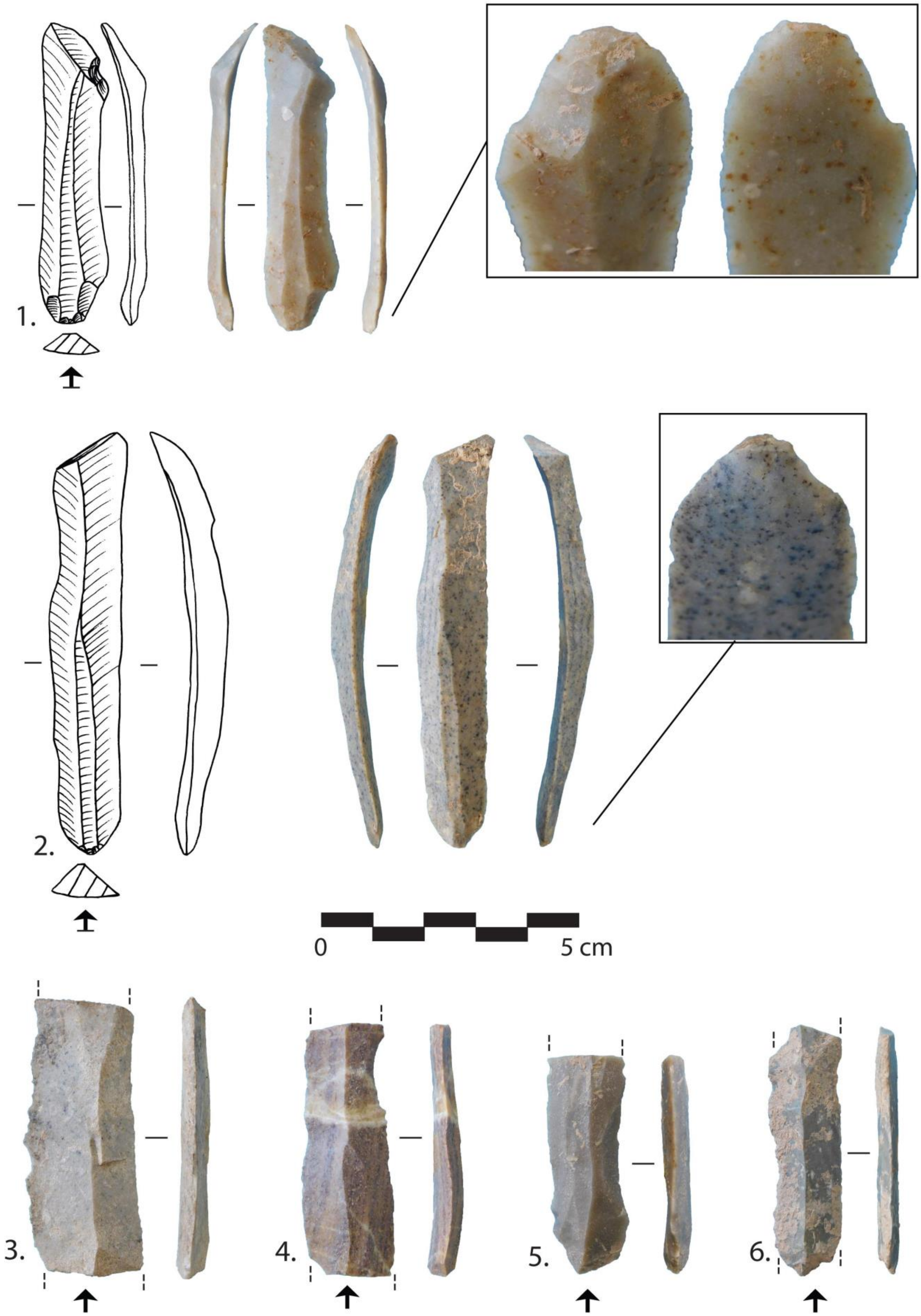

Plate V

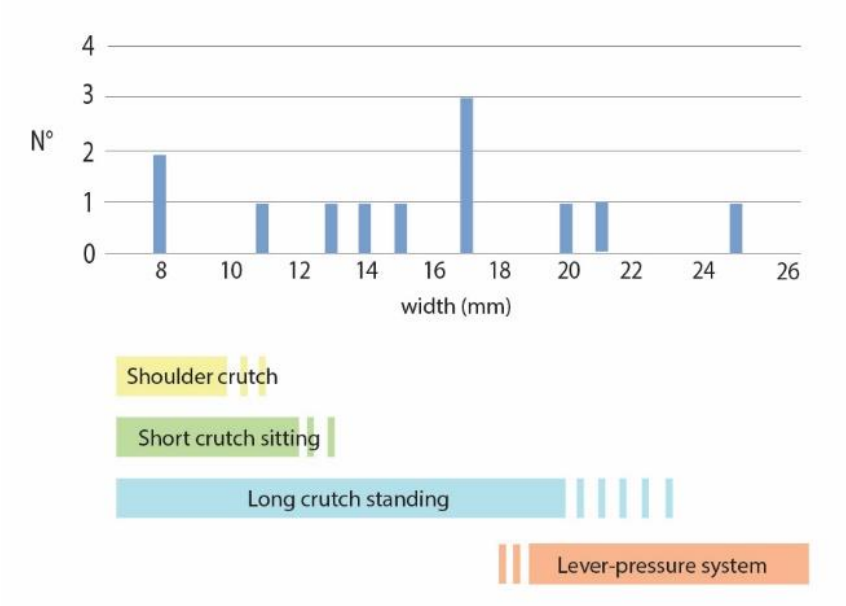

Fig. 13 – Pressure modalities for blade/bladelet production.

Metric analysis can be only partial because the high frequency of breakage (see below). Width frequency, however, informs us about the pressure modes employed for the detachment of blades (Fig. 13). Their width comprises between 8 and 25 mm suggests that at least two different modalities were used, the pressure with long crutch in a standing position and the lever-pressure system. The presence of narrow blades/bladelets (Pl. VI: 1-4), however, does not permit to exclude that simpler pressure modalities were also in use.

This possibility is supported by the discovery of an exhausted conical core exploited for the detachment of bladelets (Fig. 14). The size of the removals visible on the knapping surface indicate that pressure technique was exerted by using an abdominal short crutch, after the abrasion of the striking platform.

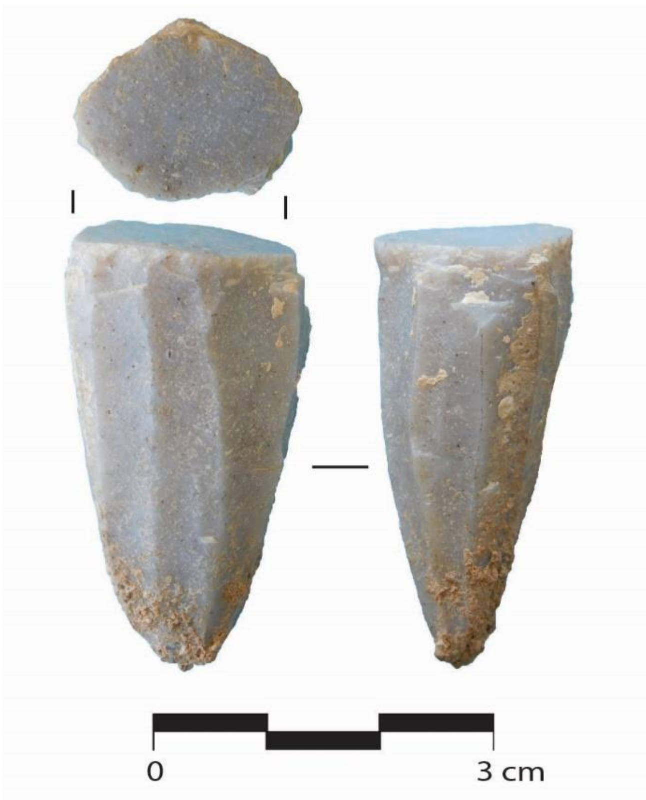

Fig. 14 – Bladelet-core indicating the use of the pressure technique.

The majority of the blades of the assemblage (N= 25), however, present morphological traits which are not enough for recognize the use of the pressure technique. These blades show sometimes more irregular edges and dorsal arris. Moreover, their profile is not rectilinear but slightly twisted. These features might indicate the use of indirect percussion (Pl. V: 3-6). In the assemblage there is only one blade showing morphological features that match with those characterizing the use of the indirect percussion. This blade, which is one of the few complete blanks, has a curved profile that is not compatible with the pressure technique. It has a small, plain lipped-butt which suggests the use of antler point (Pl. V: 2). Finally, a small group of blades (N=6) show more irregular profiles and delineations. They are the products of direct percussion and they can be considered as part of the ad hoc production (Pl. IV: 8-9).

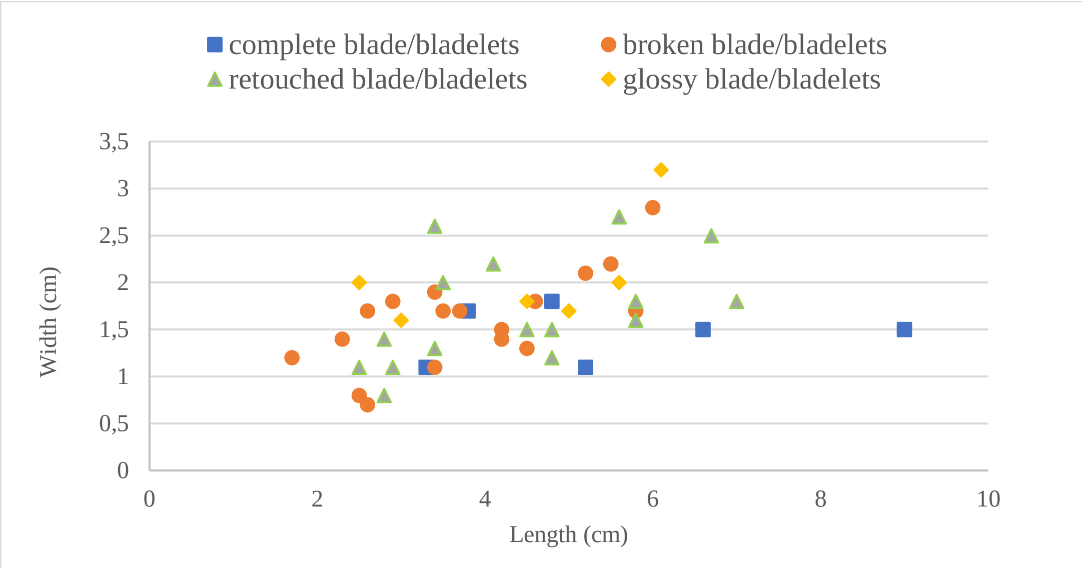

***Fig. 15** – Blade/bladelets size.*

With respect to the size of the blades, blanks and tools are characterized by a high incidence of fractures. Although the possibility of knapping mistakes cannot be ruled out (see Manclossi et al. 2019), not only the number of broken extremities suggests the intentional nature of the breakage, but also by the features of the fracture themselves. They are usually rectilinear with an orthogonal angle between both the faces and the fractured surface (see Manclossi et al. 2016). The few complete blade/bladelets, which preserve both their proximal and distal natural extremities (N= 6), indicate that the original size of the blanks could change, and it probably deepened on the knapping strategy adopted and on the core dimensions. The length of segmented blanks and tools is comprised between 2 and 7 cm, and there is a marked overlap between unretouched, retouched and glossy blade/bladelets (Fig. 15). The only recognizable trend is a selection of larger blanks for the manufacture of glossy tools.

Typologically, blades can be divided in two main groups: the glossy elements and the retouched blades. In the assemblage, there are six glossy blades (Pl. VI: 6-8). Usually defined as sickle inserts, their use cannot be confirmed without use-wear analysis. Given the functional context of Logardan Trench D characterized by the presence of many kilns, the possibility that they have been used in the manufacture of pottery cannot be ruled out, as it has been observed in other assemblages (e.g., Groman-Yaroslavski et al. 2013). Glossy pieces, manufactured on truncated or fragmented blades, have triangular or rectangular shapes. They have retouched working edges that vary from nibble to heavy serration, and the intensity of the gloss can change from one item to another.

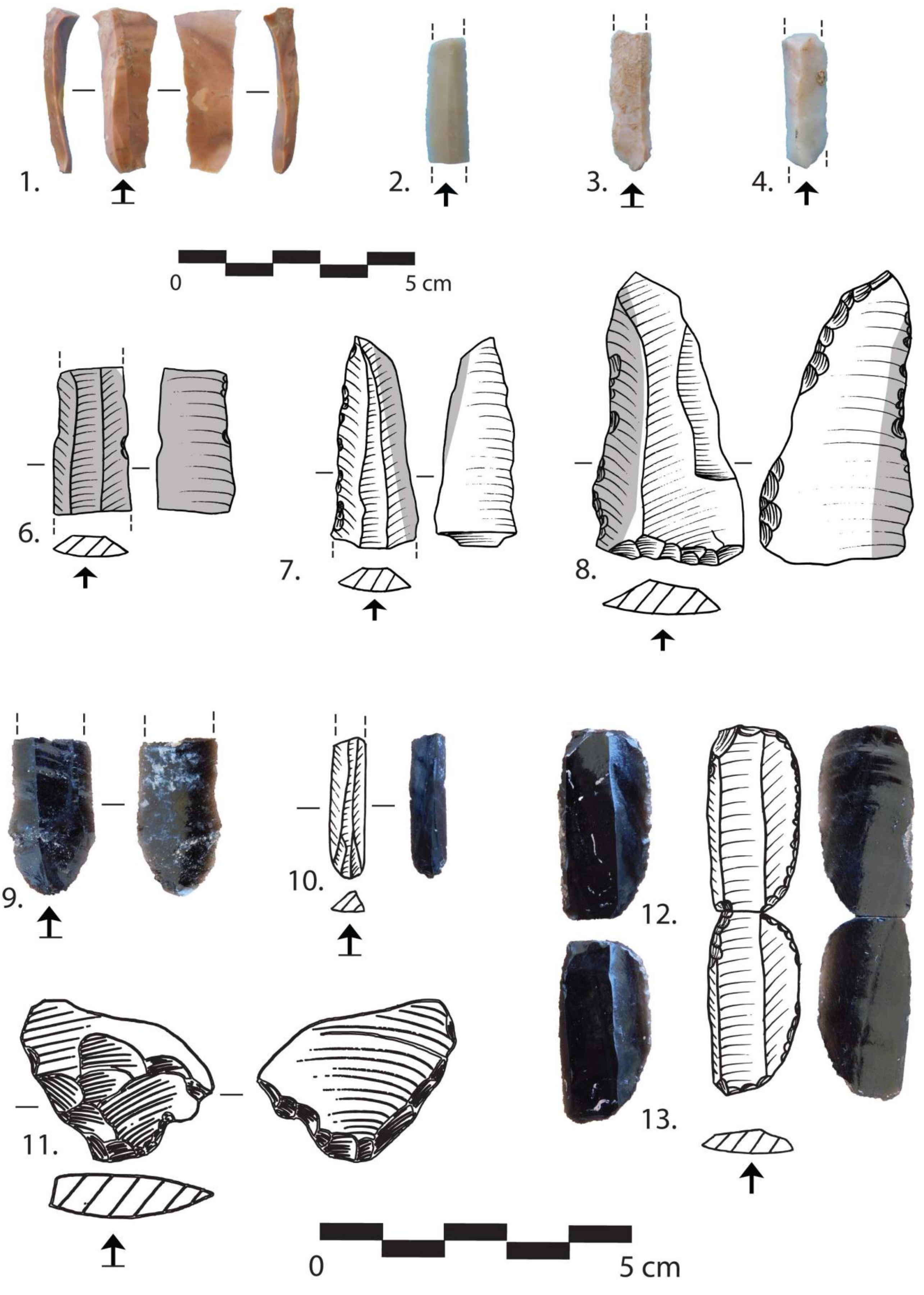

Plate VI

Fig. 16 – Blades with residues of adhesive facilitating the hafting of the tools.

All these differences might indicate various degree in the exploitation of the tools, which could be resharpened several times during their use. Although their function as sickles cannot be confirmed at this stage of the research, the existence of hafted tools is proved by the discovery of two fragments of blades that preserve traces of adhesive, probably bitumen (Fig. 16). These blades do not show visible gloss, but only marginal retouch on the edge opposite to the hafted one. These two items belong to the group of simple retouched blades, which count in total 16 tools. They are usually made on fractured or truncated blades, and the edges present varying type of retouch varying in extent (from marginal to long), position (direct or indirect), and distribution (from partial to total). In many cases, the edges show clear damaged edge linked to their use.

The obsidian industry

At Logardan, 23 obsidian artifacts were recorded, for a total weight of 31.6 g. Excluding five flakes (Pl. VI: 11) and three small unidentifiable fragments, the assemblage is composed of 15 small blades/bladelets (Pl. VI: 9-10), most of them with visible damaged edges. Only four items show clear intentional retouch.

All bladelets/blades are detached by pressure, as indicated by their parallel edges and rectilinear dorsal ridges, the straight profile, the thin section, and the thick, high and short bulbs. All preserve proximal segments (N=7) are characterized by delicate abrasion which was carried out for preparing the pressure surface of the core. All the obsidian blades/ bladelets are broken at least at one extremity, allowing no detailed metric analysis of the original size (the shortest bladelets is 1.4 cm long, while the longest is 3 cm; average length is 2.2 ± 0.5 cm). The range of width (from 5 to 15 mm) fits within different pressure modes, from the hand-held baguette to the long crutch in a standing position.

In absence of detailed use-wear analyses, the functions of the obsidian blades/bladelets cannot be identified. The lack of visible retouch on the majority of these items, however, seems to suggest that the blanks were employed without previous modifications. Of a particular interest there are two truncated and backed blades which were originally part of the same blade, subsequently fractured for creating two different tools, large 1.5 cm and long respectively 2.9 ad 3 cm (Pl. VI: 11-12). These two segments were found together within the fill of a pottery kiln in Locus 664, and they might be part of a composite tool.

Conclusion

The study of the lithic assemblages of Girdi Qala and Logardan allows some preliminary observations. Observing the raw materials exploited, it is possible recognize three different acquisition/production systems that were operating simultaneously.

Simple ad hoc tools compose the first one. Irregular flakes were produced on-site as indicated by the presence of cores and knapping waste. A simple knapping technology was used for detaching blanks from pebble available in the proximity of the sites. The flakes were either directly used or little modified through retouch in order to adapt them to different tasks. People knowing only the most basic knapping principles and rules produced flakes for a wide range of domestic activities that require sharp cutting tools (e.g., Mc Counaghy 1979, 1980). It is probably that the knappers, also likely the users, detached short series of flakes and used them selecting the most appropriate for the particular task at hand. The limited number of retouched flakes and their morphometric variability may indicate that the knappers were focused more on the particulars of the working edge then on the shape of the entire implement. They produced blanks with natural sharp edges and used them without important modification of their volume and morphology. Once produced and used, the ad hoc tools were quickly discarded without any investment in maintenance for later use. This non-diagnostic lithic industry characterizes all protohistoric Near Eastern chipped-stone tool assemblages. The uniformity and stability of this system indicates the maintenance and sharing of common technical behavior reflecting a stable technological substrate. The low technical investment and the elementary production/consumption system represent domestic contexts, widespread within the society that for millennia played a leading role in the daily life of ancient people. Within this system, we can also include the irregular blades found at Girdi Qala resulting from a simple reduction sequence specifically oriented to the production of long blanks.

The second component of the lithic assemblages is represented by regular blades/bladelets characterized by the use of a more complex knapping technology, the pressure technique exerted by long crutches and the lever-system. This industry reflects a specialized production, both from a technological and socioeconomic point of view (Manclossi et al. 2016). Available data are still incomplete, but the assemblages from the Qara Dagh are of particular interest and give us important insights about the emergence and adoption of the so-called "Canaanean blades" (e.g., Angevin 2018; Thomalski 2017; Manclossi and Rosen 2019b). In the analyzed assemblages, only a few items can be directly associated to this techno-type, notably the few blades wider than 23 mm and detached by using the lever-pressure system. The majority of blades/bladelets are narrower and result from the utilization of other simpler pressure-systems. Often ignored by the researchers more interested in the larger Canaanean blades, these "narrow" blades produced by pressure represent a fundamental link for understanding the processes of technological changes that occurred in late 5th-early 4th millennium lithic assemblages.

At this stage, only preliminary observations can be made, but if we compare data from Girdi Qala and Logardan with other contemporaneous sites, we can recognize different patterns whose meaning will be the subject of further investigations. The most significant comparisons can be made with the assemblages from Helawa in the Erbil Plain, and Gird-i-Shamlu in the Sharizor Plain. At Helawa, "narrow" flint blades characterize the lithic assemblages of LC1-LC2 contexts. From the LC3, however, the situation changes and larger blades produced by the pressure-system replace the "narrow" blades (Moscone, comm. pers.). At Shamlu, instead, the scenario is different because "narrow" and large blades, which appear in LC3 contexts in large quantity, coexisted until the following EBA Period (Manclossi, forthcoming b). In the Qara Dagh, differently from the other sites, not only there are clues indicating a local production of "narrow" blades, but large Canaanean blades attested in Middle Uruk contexts are extremely few. At this stage of the research, it is not possible to establish if each pressure-mode corresponded to a specific group of knappers. However, if we admit that the lever-pressure system was invented in Eastern Anatolia and Armenia and progressively spread through the movement of knappers toward east and south, data from Iraqi Kurdistan seems to suggest that the adoption of Canaanean blades was a complex phenomenon which took different trajectories. Especially during its initial stage, the adoption of the lever-pressure system was conditioned by the presence of preexisting lithic traditions and other transformations in the socioeconomic behaviors (Manclossi, forthcoming b).

The third component concerns the obsidian, a rock available only in volcanic areas, whose closest sources are several hundred kilometers away in eastern Anatolia and Armenia (e.g., Khalidi et al. 2009, 2016). Available data do not permit to establish how obsidian was imported into the sites, neither who were the people involved into this long-distance exchange network (e.g., Al Quntar et al. 2011). The presence of obsidian blade/bladelets in not unusual in the region (e.g., Renfrew et al. 1966), and this material is well attested in the previous periods (e.g., Cauvin and Chataigner 1998; Healey 2007). This persistence through time seems to indicate long-term relationships between distant areas (e.g., Bressy et al. 2005; Ortega et al. 2014; Ibáňez et al. 2016), with a privileged northwest-southeast axis. The small quantities of obsidian artifacts found at Girdi Qala and Logardan, however, suggests that this industry had only a marginal functional role within the chipped-stone tool assemblages.

The study of the lithic assemblage from Girdi Qala and Logardan offers interesting insights into the life of Late Chalcolithic/Early Bronze Age communities in the Qara Dagh. Chipped-stone tools were common objects used for various activities, notably in agriculture and other domestic tasks. However, the coexistence of different production-consumption systems, involving different raw materials and technologies, show that the sites were well integrated within a larger area. Available data are still too scarce to reconstruct the connections between Girdi Qala, Logardan and other sites, but further research might be able to offer other insights on socioeconomic and cultural dynamics acting during the 4th and 3rd millennium BCE, a crucial period for the development of complex societies.