The obsidian

Introduction[1]

The recovery of obsidian within the MM II archive at Petras provides further compelling evidence for the enhancement of its role and value in the Protopalatial period. Although the assemblage of 36 items is small, it nevertheless adds to a growing number of archaeological recoveries in Bronze Age Crete that propel the use of obsidian beyond the parameters imposed by mere functionality. Aside from funerary contexts, few other cases present unambiguous displays of association with specialised activities connected with ceremonial and political functions.

The overlapping role of obsidian between function and socio-political ideology is demonstrated locally at the LM IA House 1 at Petras.[2] Episodes of this kind are extremely rare, having been documented only at Knossos in the MM IB Vat Room deposit[3] and the LM IA Throne Room Area[4]; and the LM IB Building B2 at Mochlos.[5] Such direct associations between obsidian and power-centralised activity are conspicuous occurrences that clearly demonstrate privileged consumption patterns associated with this exotic material. It would appear that while there is a decrease in frequency throughout the site of Petras from purely domestic contexts, most of the vestigial connections maintained by obsidian are with those of political and ideological significance.

Obsidian procurement, production and consumption

Generally recognised trends associated with the obsidian industry suggest that its importation to Crete appears to be severely restricted both in terms of quantity and distribution, save for the truly exceptional anomaly presented by LM IB Mochlos and Poros-Katsambas.[6] In the case of Mochlos, Carter argues that the unparalleled finds show this site maintained a special relationship with Melos and possibly played a key role in the distribution of obsidian in eastern Crete. To date, Petras has not produced an extraordinary amount of

[1] The author wishes to gratefully acknowledge the ongoing support offered by Dr Metaxia Tsipopoulou to carry out obsidian analysis from sites in eastern Crete.
[2] D'Annibale 2004a.
[3] Panagiotaki 1998, 185–98.
[4] Carter 2004b.
[5] Carter 2004a.
[6] Carter 2004a; Dimopoulou 1997, 433–8.

obsidian to indicate that it competed for such dominance. Nevertheless there is a clear indication that obsidian was arriving in raw nodules and not in prepared cores from some other processing or distributor site.[7] All stages of obsidian production are present at Petras and surprisingly evident within the archive as well.

Several distinct varieties of obsidian were visually identified within the archive. Thirty specimens were pearl grey-black in colour and generally opaque. Translucency was only noticeable with the thinner examples. The majority of these were also distinguished by a lustrous colour tone. Some of the larger examples displayed tiny quartzitic vugs. This variety, which likely emanates from the Sta Nychia source on Melos, is widely regarded as the most common type of obsidian encountered on many assemblages from Crete. Markedly different were six other items representing two distinct varieties. The most common was characterised by an overall black glassy tone with clearly defined banding lines or veins visible in some of the more translucent examples. The third variety was represented by a single item. It shares similar characteristics to the previous variety however with markedly clearer translucent properties and a distinct brownish tone. The presence of these other varieties would indicate that at least one other source of obsidian was being utilised. In all probability these varieties were procured from other locations on Melos. Based on recent Neutron Activation Analysis, the Dhemenegaki quarry is the most likely source.[8] However, until these items from Petras are subjected to instrumental analysis, sourcing is still a matter of conjecture.

It could be argued that these visual distinctions are mere variations within the same source and that Melos still remains the primary source for obsidian in Crete. Nevertheless the varieties may also represent different procurement strategies associated with Petras. Preliminary grouping of the obsidian recovered from the Siteia Bay area sites indicates that the black banded translucent variety is well-represented. Provided that visual sorting is reflective of actual source variability, this points to a strong connection to the Dhemenegaki source throughout the Bronze Age. The Final Neolithic/EM I site of Kephala Petras had a content of black banded obsidian of 18%;[9] the EM II component at Aghia Photia had 32%; the MM IA component at Aghia Photia amounted to 37%; the LM IA House at Petras presented 22%. Similarly, the MM II archive at Petras maintains this contemporaneous utilisation of obsidian sources on Melos. Although the sample is small it represents 17% of the assemblage, suggesting that the use of this particular variety continued to form a substantial part of the obsidian procurement at Petras towards the Neopalatial period. These values offer quite a contrast to sites such as Mochlos and Malia, where the Dhemenegaki source is utilised to a far lesser extent.[10] The trends witnessed in the Siteia Bay area perhaps question the gateway status granted

[7] D'Annibale 2004a.
[8] Carter 2003, 75–82.
[9] D'Annibale 2004a.
[10] Carter 2003, 75–82.

Mochlos for the whole of eastern Crete. Obsidian importation may have operated on a more direct site-specific level of relationship with Melos. Much like the case offered for Mochlos, the differentiation in choice of obsidian exhibited by the Siteia Bay sites may hint at individual preferences and possibly separate connections with Melos.

The chipped artifacts

The excavation of the MM II archive at Petras produced 36 obsidian items, one metaquartzite flake, and a quartz crystal fragment. Blade products, 21 specimens, dominate the assemblage. The usable obsidian was exclusively represented by pressure flaked blade forms. Chipping detritus from the preparation of blade cores was restricted to 15 flakes.

Blade products

Twenty-one specimens represent the obsidian blade artefact class (Table 1). Trapezoidal blade types dominate the assemblage, these being the final or desired end product of blade manufacture. Two initial and two crested blade types indicate the manufacturing sequence of blade production is represented as well. Nearly all blades were found in a fragmented condition. Only one nearly complete trapezoidal blade and a complete initial blade were recovered (Fig 75.t, r). Blade metric data conforms to established patterns at Petras and the MM IA site of Aghia Photia. It has been observed from these sites that the majority of trapezoidal blades range between 5–12 mm in width, clustering around 8 mm. The normal thickness of these blades is in the 1–3 mm range. Judging from the nearly complete blade, blade length also falls within the conventional range. That is, no trapezoidal blade exceeds 55 mm at both Petras and Aghia Photia.

There is only one noticeable deviation from this standard at the archive (Fig. 75.s). This trapezoidal blade, if projected, would exceed the normal range of most blades. The width and thickness also exceeds the usual parameters. It represents a distinct anomaly in the usual bladelet-like repertoire of blade production typical of Middle Minoan assemblages in the Siteia Bay area. Its presence hints at a diverse production mechanism utilising a larger core from the usual small tabular type.

Blade utilisation

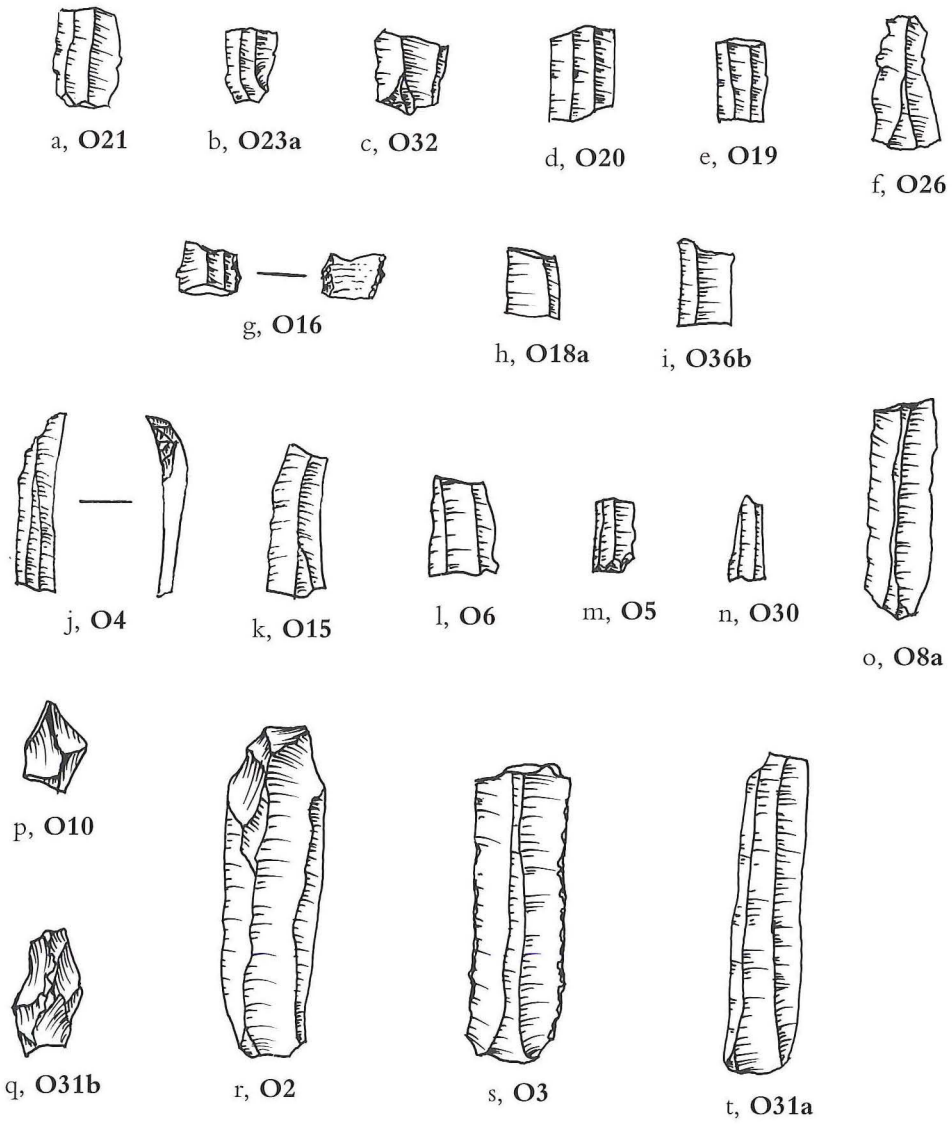
All blades can be regarded as actual tools or tool blanks. The only two exceptions are crested obsidian blades, which represent initial blade production and would not be intended for use (Fig. 75p, q). The rest of the blade assemblage were probably broken through use or intentionally snapped to create usable straight segments. Eleven of the blades showed definite sign of use-wear (Fig. 75a, d, e, f, g, j, m, o, r, s, t), defined as consistent edge wear over an uninterrupted section of the blade. The rest displayed sporadic edge damage,

Registry Number	Blade Type	Condition	L	W	Th	Wg	Utilisation	Comment	Figure
96–1144	Trapezoidal	Proximal	42	9	3	11	Dorsal Right Lateral	Near Complete	**O31a**
97–0129	Trapezoidal	Proximal	40	12	4	23	Dorsal – Ventral Bilateral	Scars	**O3**
97–0083	Trapezoidal	Proximal	28	9	3	9	Dorsal – Ventral Bilateral	Scars	**O8a**
97–0078	Trapezoidal	Proximal	13	8	2	3	Dorsal Laterals	Retouch; Scars	**O21**
97–0006	Trapezoidal	Proximal	11	9	2	2			**O32**
97–0068	Trapezoidal	Proximal	9	6	1	2			**O23a**
96–0745	Trapezoidal	Medial	20	8	2	4	Left Lateral		**O15**
96–1190	Trapezoidal	Medial	13	10	1	2			**O6**
97–0084	Trapezoidal	Medial	12	8	3	3	Dorsal Laterals		**O20**
96–0391	Trapezoidal	Medial	11	7	2	2	Dorsal Laterals		**O19**
96–1174	Trapezoidal	Medial	10	6	2	1	Dorsal Right Lateral + Proximal	Black banded glassy/ translucent Retouch	**O5**
96–1095	Trapezoidal	Medial	7	8	3	2	Dorsal – Ventral Bilateral		**O16**
96–1171	Trapezoidal	Distal	25	7	3	4	Dorsal Distal		**O4**
96–1107	Trapezoidal	Distal	12	5	1	1			**O30**
97–0109	Trapezoidal	Distal	18	9	3	4	Ventral Left Lateral + Ventral Distal	Tip : Retouch	**O26**
97–0126	Triangular	Medial	11	8	2	2			**O36b**
96–1202	Triangular	Distal	10	7	3	3			**O18a**
97–0128	Initial	Complete	44	12	4	24	Dorsal Left Lateral + Ventral Laterals	Scars	**O2**
97–0083	Initial	Medial	16	9	2	9			**O8b**
96–1144	Crested	Medial	15	8	5	5		Black Lustrous	**O31b**
96–1147	Crested	Medial	11	8	5	3		Black lustrous	**O10**
TOTAL	21					108			

Table 1: Blade products. Small letters refer to distribution map Fig. 77.

which could either be attributed to the result of inconsistent *in situ* use or could derive from trampling or from post-depositional effects. In addition some of the blades displayed scarring lines on the ventral surface. Both ventral and dorsal scarring was evident only on the larger trapezoidal blade (Fig.

Fig. 75. Blade products.



75s). The scars probably result from contact or use with some hard or in conjunction with some abrasive material.

Six blades were further reduced by micro retouch to produce a formalised working edge (Fig. 75a, e, f, g, j, m). Most would likely be used to perform fine scraping or shaving. In the case of Fig. 75j, retouch on the distal tip was used to create an engraving tip. Fig. 75f displays tip retouch and ventral retouch towards the tip that forms an incurving working edge, possibly to create a small spoke-shaving notched tool.

Although many blades function as usable cutting tools without modification, many were purposefully snapped to create small blade segments. In cases where the proximal ends (Fig 75b-c) or the hooked distal ends of the blade prevented its use as a straight edge, these two sections were deliberately removed. Depending on the size, blade segments could have been hand held,

Table 2: Obsidian detritus. Small letters refer to distribution map Fig. 77.

Registry Number	Artefact Type	L	W	Th	Cortex Wg	Cortex %	Comment	Fig.
97–0082	Secondary	26	14	8	24	45		
97–0072	Secondary	22	16	4	13	5		**O25**
97–0058	Secondary	20	17	4	11	30	Black lustrous	**O27**
97–0068	Secondary	15	17	3	7	50	Distal fragment	**O23b**
96–0437	Bipolar	15	10	3	4	30	Black lustrous;	**O12**
96–0440	Platf. Prep.	13	10	3	2	40		**O13**
96–0741	Platf. Prep.	10	10	3	3	55	Fragment	**O14**
96–1127	Platf. Prep.	7	6	3	1	5		**O9**
97–0066	Tertiary	21	13	3	9			**O22**
96–1096	Tertiary	17	11	3	4	20	Utilised	**O17**
97–0126	Platf. Prep.	13	12	2	2			**O36**
97–0125	Platf. Prep.	8	13	3	4		Failed blade?	**O35**
97–0124	Platf. Prep.	10	13	2	2			**O34**
96–1202	Bipolar	9	7	2	2		Wedge?	**O18b**
96–0436	Bipolar	14	11	5	9		Black lustrous	**O11**
TOTAL	15				97			

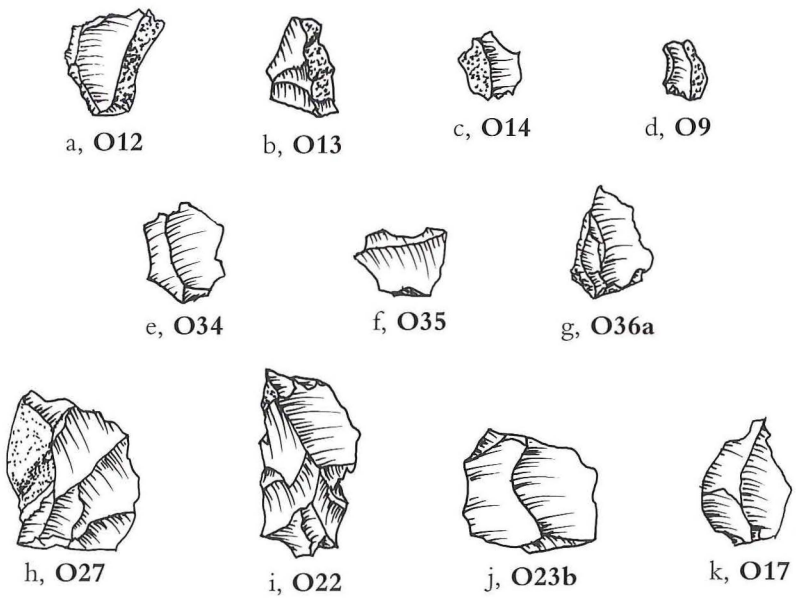
however some of the smaller specimens were probably meant to be inserted or hafted in either wood or bone handles. Although small blade segments may be the result of breakage during use, these were also intentionally produced. Evidence of intentional dorsal percussion to break blade segments off is visible on two specimens. Two of these medial blade segments (Fig. 75g, m), given their small size, would unlikely be utilised simply as hand-held tools but probably formed part of this category of hafted tools. The opposing pattern of bilateral micro-scarring and flaking on the Fig. 75g medial blade segment suggests a rotational use, perhaps from drilling.

Obsidian detritus

The recovery of 15 flakes provides good evidence that core preparation and core maintenance activities were being practiced in the archive (Table 2). Although no core fragments were recovered, the recovery of at least two obsidian varieties implies that the archive must have employed a minimum of two cores for the purpose of producing trapezoidal blades. The nature of production of obsidian blades results in few flakes. Yet, flakes account for a surprising 42% of the obsidian assemblage.

Most flakes are produced during the initial core shaping process. While no primary flakes were recovered, the high frequency of secondary flakes, four examples which retain remnants of the core's cortical surface (Fig. 76h, i), is a clear indication that blade core preparation was indeed occurring in the archive. The lack of any primary flakes would suggest that there may not have been a raw obsidian core in the room; however, at least one core arrived in

Fig. 76. Blade products



its initial stages of preparation. The relative abundance of a secondary obsidian flake type within such a specialised space is unexpected. Based on the norm from other assemblages at Petras and from replication experiments, tertiary or platform preparation flakes should outnumber these by a wide margin.[11]

Waste flakes from platform maintenance and the slight re-shaping or re-sizing of cores is evident from eight examples (Fig. 76a-g). The flake types also suggest that blade production did take place within this room. These flakes are indicative of the final stages of core preparation and represent utilisation of a prepared core. Since it has been demonstrated that cores were being reduced in the room, it is also clear that blade production was also occurring within the archive.

The presence of two crested blade segments is a definite indicator that initial blade production from a prepared core did occur (Fig. 75p, q). These blade types are usually associated with initial core preparation, whereby removing a series of adjacent flakes from an obsidian nodule creates a ridge. This ridge is then struck off. The resulting crested blade form is diagnostic of the initiation of blade production. It is possible that some of the platform preparation flakes and tertiary flakes, especially Fig. 76a-d, derive from the formation of one of these core crests. These finds, along with the two initial blades, the next blade types in the sequence of blade production, would indicate that both core preparation and blade production must have been functions associated with the operation of the archive.

In addition, the recovery of three bipolar flakes indicates that a core near an exhausted stage was also reduced in the room. This feature of splintering cores is a widespread practice occurring elsewhere at Petras, and Aghia

[11] D'Annibale & Long 2003, 425–9.

Photia.[12] The resulting slivers may have been used as wedge-like implements. Aside from this possibility, only one other flake displayed any sign of use. A tertiary flake (Fig. 76k) was retouched to form a notch to the distal tip, possibly to be utilised as a shaving tool or to reinforce the point as an engraving or perforating tip. Although sporadic and expedient utilisation of flakes is witnessed elsewhere at Petras, generally flakes were relegated to detritus items. The obsidian industry was focused on the production of blades as the desired end product. Flake forms as blanks for tools rank as a minor aspect of the industry.

Preconceived notions on the uses of obsidian may allow for the production of blades within the room but certainly core preparation as an integral function of an archive is somewhat surprising. All of these obsidian detritus artefacts point to several distinct episodes for the use of obsidian within the archive. A number of cores must have been at the disposal of the archivists or brought into the room at various times to perform the required activities connected to its operation. The group utilising the archive had access to a craftsperson or had the requisite skills or tool kit available on hand or on demand. Such a pattern for the use of obsidian and the functioning of the industry has been proposed elsewhere.[13] The economics of the industry must be considered on the basis of a highly standardised craft whereby access, production, and consumption, was strictly controlled by elite or specialised groups.

Artefact formation processes and obsidian distribution within the archive (Fig. 77)

Discrete artefact patterning reflects behavioural or anticipatory needs or operational considerations. Differentiating between disposal from operationally induced patterning and that resulting from coincidental or as an admixture within the matrix of construction material dropping or tossing, and can be extremely difficult to segregate. Inferring what is coincidental and intentional can be extremely difficult. The collapse of the archive on to the passageway below, as a result of an earthquake, effectively preserved the pattern of disposal of obsidian within the room. As a result, the archaeological deposit was not subject to the blurring effects of post-depositional occupation disturbance. The obsidian assemblage, therefore, represents the final episodes of activity produced within the archive.

Assuming that the distribution of artifacts reflects intentional discard resulting from an activity that was being carried out in that location, three distinct concentrations of obsidian are recognisable. These are localised in the archive as follows; along the western wall, centred on unit Y; adjacent to the east corner of the southern wall, primarily in Unit K with a few outliers located in

[12] D'Annibale 2004a.
[13] D'Annibale & Long 2003, 425–9.

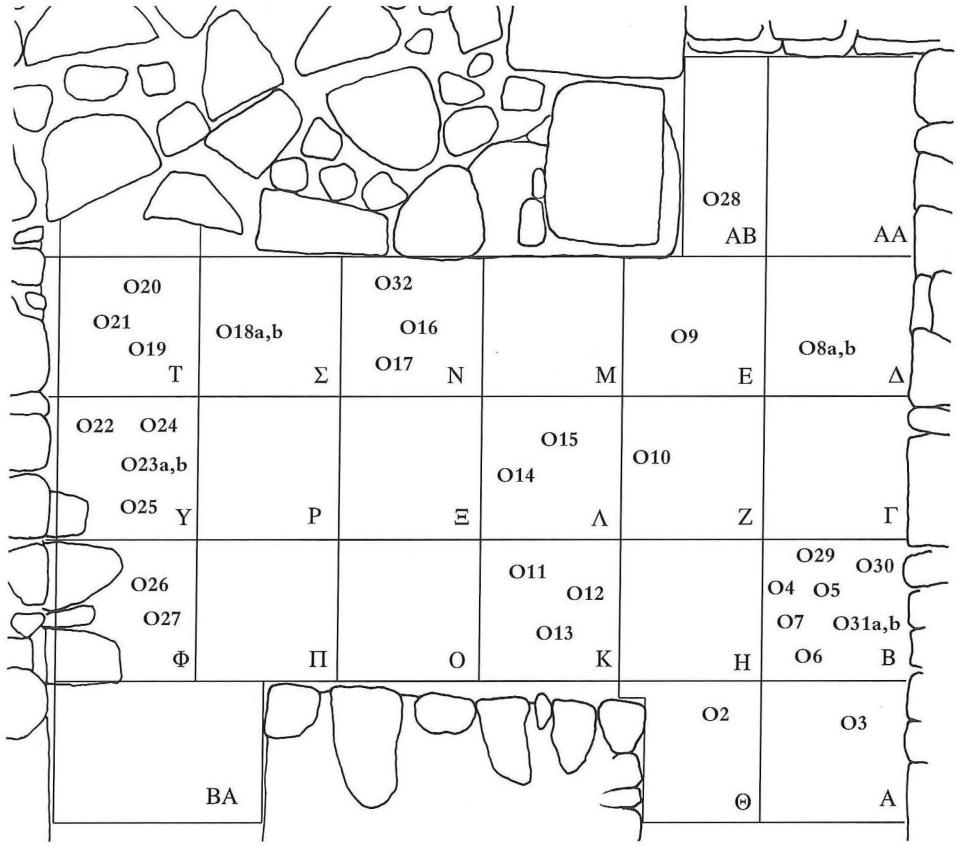


Fig. 77. Distribution of obsidian. From cleanings were collected **O33–36**.

the central part of the room; and along the south section of the eastern wall focused entirely in unit, B.

The nine pieces of obsidian found along the western wall indicate that several activities were being practiced here. The first grouping consists of three secondary and a large tertiary flake (Fig. 76h-j). As discussed above, these flakes are produced when reducing and shaping an obsidian core, indicating that this preliminary activity undoubtedly took place in the archive. In addition, five blades were also recovered along the wall (Fig. 75a,b,d-f). All are small segments, the longest being no more than 2.0. All share a common element; they were more than likely meant to be hafted onto some other material, such as bone or wood. What form these composite tools took cannot be determined. However, one in particular, the distal end of a trapezoidal blade (Fig. 75f), displays classic evidence for a rotating function. The western wall then appears to have held these small obsidian tipped tools forming perhaps a tool kit. Only one (Fig. 75b) shows no apparent sign of utilisation. It could be that it was discarded since a common practice would be to snap off the proximal end of a blade since the bulb of percussion would impede its use as a straight edge.

The second obsidian concentration found along the southern wall consists of five obsidian items. These unequivocally present the use of this area as a core-shaping activity zone. The flakes found here (Fig. 76a-c) are typical of core platform preparation and creating a crested core edge. Subsequent removal of such a crest is found in the neighbouring units Z and B. The pre-

sence of flakes in these areas is a definite indicator of blade production. Although the flake frequency is low, it conforms to recognised production detritus that results from maintenance of blade cores. What makes this area even more unusual is the clustering of the possible Dhemenegaki source obsidian. The only other possible Dhemenegaki obsidian artefact is found in unit B, demonstrating that these two contiguous areas were part of an operational sequence whereby some blades were produced in unit K and utilised in unit B.

Blade production, especially from a prepared core, could occur anywhere and leave little evidence but a few flakes. The fact that they are here indicates those who worked within the room were also making their own blades on the spot or had someone come in especially for that purpose. The last most obvious spatially distinct zone is located along the wall in Unit B. Aside from a splintered piece, all the obsidian here consists of six trapezoidal blade segments (Fig. 75j,l,m,n,p,t). This is also the largest concentration of blades in the archive. This is immediately adjacent to the receiving or dispatching area for the documents. Perhaps as part of the receiving or dispatching of documents, every transaction was opened by cutting the bindings with obsidian.

Obsidian in relation to the bronze point

A bronze point (Fig. 27) that was fortuitously recovered in the archive has been described in this report as a stylus for inscribing clay tablets. The following discussion will propose other possibilities and expand the uses of this artefact. If such an implement were to be found in other contexts, it would perhaps be identified as an awl or punch.

The difficulty of inferring formal use for such points is presented in other works such as Papasavvas[14] and Evely[15]. This is a just a matter of imposing our own semantic biases on an item that can just as easily be described with a variety of formal names which immediately classify the article and restrict both its possible uses and its adaptation. The bronze point can just as easily be described as an awl, a punch, stylus.

From a functional perspective, a tool can be used for any purpose one desires. It is an adaptable commodity in the hands of the user. It is possible that this instrument when hafted in wood, bone, or antler could also have functioned as a punch tool, perhaps associated with leatherworking. It could also have functioned as an awl to perforate clay seals, or as a punch used in the production of obsidian blades. A metal punch tool is what most researchers believe was used in the manufacture of blades.[16] The implement would have had a pointed end, which was placed on the prepared platform of a core. The platform on blade cores is typically characterised by small depressions on which the punch would rest. These depressions would prevent the punch

[14] Papasavvas 2003, 79–94.
[15] Evely 1993, 86–96.
[16] Evely 1993, 17,124; D'Annibale 2008, 197-8.

from slipping prior to being struck or pressure applied to flake off the blade. The characteristic impression left by this metal tool when used to strike or applied to remove an obsidian blade from a core is a circular point of impact on the blade or core platform. Since there is evidence for the manufacture of blades in the archive, this "stylus" may have served an obsidian manufacturing function just as well. In relative terms, knapping with metal punches has a longer history than writing with metal styli. It is more likely that the bronze point in general originated as a punch tool which was later adapted to a writing implement.

Although attempts have been made to replicate Minoan ceramic tablets, very little has been said about the method of inscribing.[17] The bronze stylus found in the Petras archive has been proposed elsewhere in this volume as the most likely candidate for the tool of choice for inscribing tablets and seals. Other just as adequate implements must be considered for the task. It can be postulated that any sharp instrument made from material such as bone, wood, and even obsidian could have produced the inscriptions. Tool hardness was not of importance compared to its sharpness, since the ceramic tablets and seals were inscribed when wet and soft. The use of a bronze stylus would appear a bit superfluous for the task. In addition, if the clay tablets were also temporary notes then the use of such a stylus would also appear to be an overstatement. This argument can be countered by the socio-political importance of the archiving tasks that would require an artefact with the appropriate commensurate value. Perhaps the act of inscribing was a function performed before the client for public display thereby requiring an article of some distinction. Metal tools may have served this purpose well.

Other media, specifically organic materials, such as leather and wood, for record keeping must be considered which did not leave any trace in the archive. In Minoan contexts the use of wooden tablets as records has been proposed by others. To inscribe on leather or wood, a round-tipped metal stylus would be a less effective implement compared to obsidian. Inscriptions on these materials would need to be cut or etched with a cutting tool. Although this is a speculative argument, the proposal is worth considering as highly probable. If such were the case, the presence of obsidian in the archive would then find a more compelling claim to its necessity.

Linear inscriptions: in fact, most appear to be cut or impressed into the clay. The use of a rounded stylus would tend to drag into the clay and leave softer, rounded lines or impressions. In addition, small tears from the displaced clay, appear on one side of the imprint, usually on the opposite side of the writer's dexterity. Instead some of the inscriptions have a characteristically "cut" appearance. The use of a sharper edge, like an obsidian blade, would leave a thin imprint at the point of entry into the clay and a thin dissipating exit at the end of the stroke. The inscriptions could have been produced by two basic methods. If the bronze point recovered in the archive is believed to be a sty-

[17] Sjöquist & Åström 1991, 24–5.

lus then the inscriptions were applied either by incising or trailing. That is, stabbing the point into the clay and dragging the stylus across the surface of the wet clay. The other possibility is by impressing. Using a blade segment edge stamped into the wet clay would create impressions from this technique. The implement is lifted entirely from the clay before being impressed again.

Two methods were tried to duplicate text with curvilinear inscriptions. Using a longer obsidian blade at an angle of 45 degrees, much like holding a stylus of any kind, proved to be awkward and left chunks of displaced material along the edges from the incising. The second method represents a somewhat unconventional way of writing. The act of writing is associated with manual dexterity by controlled wrist movements applied while holding a stylus between thumb and fingers. However, the reverse of this technique is worth considering. While holding the same obsidian blade steady in one hand and rotating the clay bar with the other hand proved to be far more efficient in producing curvilinear inscription lines.

Intra-site context

The frequency of obsidian found within the archive is not so exceedingly high to justify special merit on its own. However, what could be simply denoted as coincidental warrants re-evaluation. The contextual implications present an exceedingly rare occurrence that emphasises the privileged status of obsidian. Comparing the frequency of obsidian from the archive to other structures at Petras, there is a notable drop in consumption towards the Late Minoan period. Domestic structures, such as the LM IA House 1 at Petras, witness a drastic reduction in obsidian compared to earlier such spaces. The EM II House at Petras produced three times the amount of obsidian as that recovered from House 1: 373 to 106 items. This conforms to general patterns of obsidian utilisation recognised throughout the Minoan world.

At the LM IA House 1, no room within the building produced more than seven obsidian items.[18] However, the exceptions occur in special purpose areas, such as the north courtyard of the House. The northeast corner marked the location of a lapidary workshop and a household shrine. Here obsidian is found in strikingly contrasting quantity: 34 items. The duality of obsidian, blending the purely functional role as an implement in association with a specialised lapidary industry and, perhaps more importantly, its role as a ceremonial implement in the practice of ritual activities connected with the household shrine, is aptly demonstrated. Such occurrences evoke an importance that can be measured simply by obsidian's conspicuous association. The significant value assigned to obsidian is equally reflected in its presence with the political and economic functions assumed by the archive.

[18] D'Annibale 2004a.

Conclusion

Obsidian's ideological value and its function in socio-political constructs are difficult to detect archaeologically. The recovery of obsidian in the MMII archive at Petras increases our knowledge detailing the role of this material in highly centralised spaces. The presence of obsidian in association with such restricted functions related to centralised control over commodities is crucial for validating the still significant value assigned to a material that surely by this time was losing most of its functional importance as a domestic tool stone.