

**Archaeological Survey at Hargy Oil Palms, Ltd.
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The panoramic view looking north over the Barema river from the Barema Mill Manager's House site (FADP) may be a key factor in the presence of stemmed tools at this location.

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**The project is affiliated with the National Museum of Papua New Guinea
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SUMMARY AND RECOMMENDATIONS

In November 2010 the research team accepted an invitation from Hargy Oil Palms, Ltd. to visit a location near the new Barema mill where a large, highly worked obsidian tool had recently been uncovered by a bulldozer while leveling the ground surface for a house site (FADP). Collections made by HOPL employees and the team while searching

the soil pushed off the terrace included fragments of at least 4 additional retouched artifacts that may be derived from stemmed tools together with a sample of small, non-cortical flakes.

A study of two adjacent sections in the slope located directly above the bulldozed terrace identified the probable stratigraphic context for the stemmed tool. This is within a well developed soil that had formed on top of a late Pleistocene volcanic deposit that, in turn, had been sealed by a subsequent volcanic layer. Radiocarbon analysis of a small charcoal sample removed from this layer within Section 2 may provide a date for the artifact and for a stemmed artifact made from volcanic stone that was also recovered from the section. An archaeological excavation located near the top of the hill in undisturbed contexts might also yield data about the cultural context in which the stemmed tool was used and discarded. PXRF analysis determined that the stemmed tool and fragments were made using obsidian from sources in West New Britain. Additional study of the data collected should determine the obsidian source more precisely. A microscopic study of the stemmed tools found no usewear. This result provides important support for the hypothesis that these artifacts had a social and/or ritual function.

A brief visit to the Barema mill site (FADQ) confirmed the presence of a light scatter of obsidian artifacts in the same stratigraphic context as the tools at the manager's house site (FADP). Study of a section below the Hargy Guest house identified a charcoal lens within a tephra level. Radiocarbon assay of this material may help date the stemmed tools and would contribute to a regional volcanic stratigraphy. A few obsidian flakes found on the surface near the section suggest the presence of ancient activity locally, probably on top of the hill (FADR). Future building activity should maintain a careful watching brief for archaeological finds.

Recommendations for further archaeological research include the following.

1. With its rich soils, the Hargy region is likely to have been occupied throughout the 40,000 years or so that people have lived in West New Britain. Archaeological research in the Barema region would certainly recover abundant evidence of ancient gardening and settlement, chiefly in the form of stone tools, but the homogeneity and shallowness of the soils will make it difficult to date these finds unless charcoal associated with the finds has been well preserved. In the meantime HOPL should be aware of the potential of archaeological material and maintain a watching brief for materials during all building activities, especially when there is large scale clearance at prominent features such as hilltops and level terraces.
2. As significant National Cultural Property is protected by PNG legislation, the artifacts collected at the Barema sites, including the large obsidian stemmed tool Barema 1, should be deposited with the National Museum and Art Gallery in Port Moresby. It is illegal for them to leave PNG.
3. Radiocarbon dating (at \$NZ800 per sample) of the charcoal sample from FADP, mill manager's house site, Section 1, Layer 4 should be a high priority. Dating of the carbon sample from within the upper (W-G?) tephra from FADR at the Hargy Guest House is a lower priority, but is still worthwhile and would provide useful data in terms of a regional volcanic stratigraphy.
4. A test excavation at FADP on the level area above the mill manager's house terrace would help determine the overall size and layout of the ancient site and perhaps help interpret the kinds of activities that took place there: i.e. whether garden, settlement or specialist ritual location. In general, the highest density of finds associated with a settlement is often just down slope from the top of a hill, since this is where rubbish is placed. If so, then the density of material on top of the hill may be less than in the sloping area that was destroyed by the construction of the terrace. However, archaeological material is probably still preserved within the less disturbed area within

the oil palm block. As this region is not under threat at the moment, there is no immediate urgency for further excavation and assessment.



Figure 1 Barema artifact 1 from site FADP.

BACKGROUND AND AIMS

Following the discovery of a large obsidian tool during the leveling of a terrace for the Barema mill manager's house (Figure 1), HOPL general manager, Graham King, contacted Dr. Torrence for professional advice. From the photograph provided, Torrence recognized that this highly retouched artifact belongs to a category called 'stemmed tools' (Araho *et al.* 2002). These have been dated by archaeological research in the Willaumez Peninsula, West New Britain as beginning some time prior to 7000 years ago and disappearing from use after a major eruption from Witori volcano (W-K2) at about 3300 years ago (Petrie and Torrence 2008).

The dating of stemmed tools is based on the stratigraphic contexts of broken or incomplete examples found in excavations made near the obsidian quarries at Bitokara Mission (FRL) or Malaiol Stream on Garua Island (FAP). No complete large stemmed tools have yet been recovered from a secure archaeological context. Most are known either from surface finds at obsidian quarries in West New Britain or from eroded and/or disturbed contexts (e.g., Araho 1996; Araho *et al.* 2002; Rath and Torrence 2004; Torrence 2004; Specht 2005; Swadling and Hide 2005). A few occur in museum or private collections, but the stratigraphic context of these is generally poorly described (see summaries in Araho *et al.* 2002; Specht 2005; Torrence and Swadling 2009; Torrence *et al.* 2009).

Since stemmed tools are relatively scarce and have rarely been found in their original setting, the Barema site find is extremely important. This new discovery provided an opportunity to learn more about the dating of this class of tools. In addition, the analysis of the particular location of the site and the associated finds could yield important information that would contribute to an understanding of the cultural contexts in which stemmed tools were used and discarded. For these reasons, the fieldwork at the Barema mill manager's house site aimed to recover as much information as possible about the original spatial and stratigraphic context of the Barema artifacts. Keeping in mind the limited time available, a second goal was to assess whether there was potential for further research at this specific location or elsewhere within the general region.

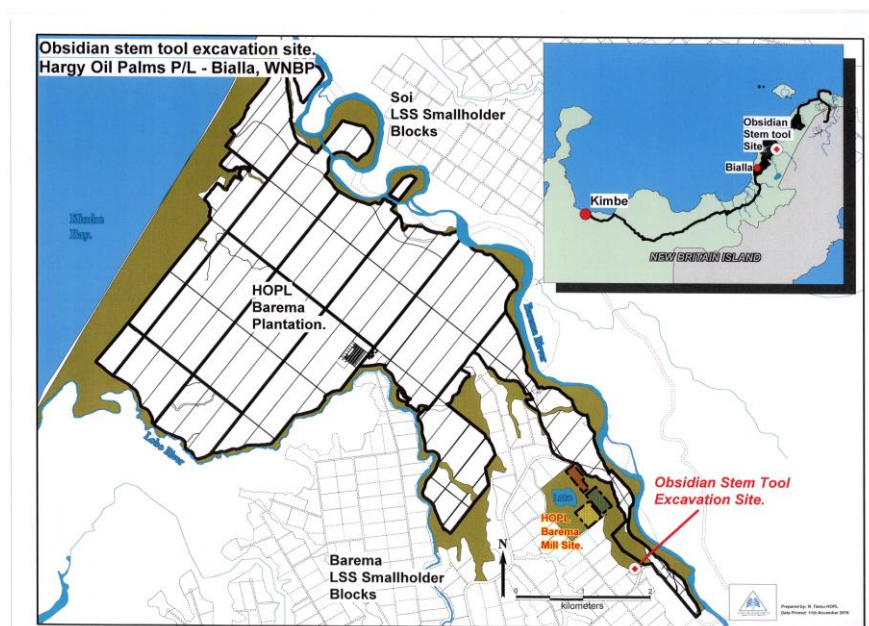


Figure 2 Location of the mill manager's house site (site FADP) where the obsidian stemmed tool was found and the general area of the Barema mill site (FADQ) which was briefly visited (Courtesy of HOPL and Richard Tiamu).



Figure 3 Looking east across the bulldozed terrace at the Barema mill manager's house site. Kanau Iobuna is pointing to the area where two sticks (labeled A and K in Figure 5) mark possible findspots for the Barema 1 artifact.

SITE SURVEYS

The team arrived just before sunset on November 9 in time to visit the site with Kanua Iobuna who showed us the general location where the stemmed tool was found. November 10 was spent in the field with another trip to the mill manager's house site on November 11 to brief Joyceline King. During this short trip to Hargy Oil Palms, Ltd., obsidian and other stone artifacts were observed at three locations. Official site codes have been assigned by the PNG National Museum to the places where obsidian artifacts were observed: FADP; FADQ; FADR.

We also briefly inspected the small Lake Samunsa, located about 1 kilometre to the west of FADP. This setting looks to have excellent potential for coring to obtain pollen and tephra sequences for the region. These data would be quite useful for reconstructing the environmental history of the region, particularly in terms of how vegetation responded to volcanic activity and to human disturbances and gardening practices.



Figure 4 Lake Samunsa located near the mill manager's house may be suitable for coring to obtain data for reconstructing the environmental history of the region.

Mill Manager's House Site (FADP)

Bulldozing to create a level terrace just below the top of a very steep hill uncovered an important archaeological context containing one intact and fragments of a possible 4 additional obsidian stemmed tools (described in detail below) along with a small assemblage of obsidian flakes.

There was some disagreement about the exact location of the complete stemmed tool. Two possible locations in close proximity to each other had been marked by posts. These are shown on Figure 5: A (Antonio, the workman who found the tool) and K (Kanau, foreman). Given the relatively pristine condition of Barema 1 (Figure 1), it is likely that it had not been moved very far from the place where it had been deposited in the past. The fragments of the other tools were found scattered across the site and within the soil that had been shoved over the cliff edge. Given the presence of many fresh breaks and cracks, these had been seriously impacted by the earthmoving.

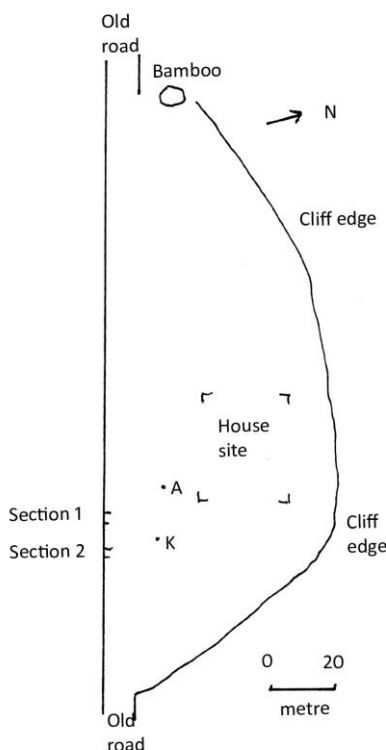


Figure 5 Sketch map of the Mill manager's house site (FADP) showing two possible locations where the Barema 1 artifact was found (A, K) and the two sections.

The original depth of the Barema 1 tool in the deposits could not be determined with absolute certainty. At the time of the study, the posts were within the upper part of the deep basal tephra shown in Section 1 (Figures 6, 7). The foreman, Kanau Iobuna, estimated that the tools had been found at about the current level of the posts. Three scrapes of c. 30 cm each had been removed

from the site when the tool was found. Parts of Barema 2 were found when the bulldozer was bringing soil back from the edge of the cut to dump it over the edge. It was not possible to estimate the depth of this find.

By estimating the original slope of the hill, Kanau guessed that the original depth of the tool was equivalent to the three scrapes of 30 cm each to the level which would be approximately the level of the old road shown in Section 1 (Figures 6, 7). Unfortunately, the contour map of the site prior to the bulldozing was not available during our visit to confirm this estimation. However, it is highly unlikely that cultural material was preserved within the massive volcanic deposit, because this probably formed during one relatively short volcanic eruption. It would make more sense for the original context to consist of a buried soil horizon: i.e., an old ground surface. To search for a more likely context, the team cleared off a vertical section along the bulldozed road on the southern end of the site. Since some charcoal and fragments of an artifact were observed nearby, Section 2 was cleared adjacent to the findspot to clarify their stratigraphic context.



Figure 6 FADP Section 1 after sampling. The two portions of the section are divided by a surface formed by the old bulldozed road.

Five stratigraphic layers were observed in Section 1. Moving up from the base (earliest to most recent in time) these are as follows.

1. A massive volcanic tephra with layers of coarse and fine material ranging in colour from white to yellow to light brown, probably the result of a single event. No artifacts observed.
2. A well developed brown soil with high clay content formed in situ within the upper part of the volcanic deposit of Layer 1 as the result of natural weathering processes.
3. A weathered volcanic tephra which varies in colour from yellow-orange to brown. As this layer is quite thin (c. 10cm) and has a high clay content, it is difficult to trace it along the section, but its texture is quite different from the layers above and below.
4. Current topsoil formed within the upper portion of the Layer 3 tephra.
5. Present only in Section 1 and not Section 2 is a discontinuous bright yellow-orange clay layer left behind by the bulldozer when the terrace was cut: i.e., a disturbed layer.

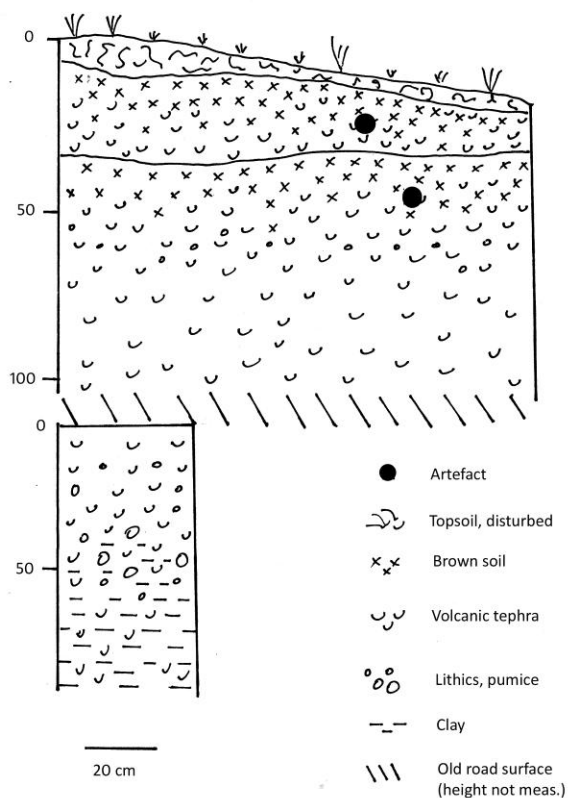


Figure 7 FADP Section 1 drawing showing the stratigraphic layers and locations of artifacts (cf. Figure 8)



Figure 8 Top portion of Section 1 at FADP showing the numbering of the layers and the location of an obsidian flake in Layer 2 and a volcanic stone flake just at the base of Layer 4.

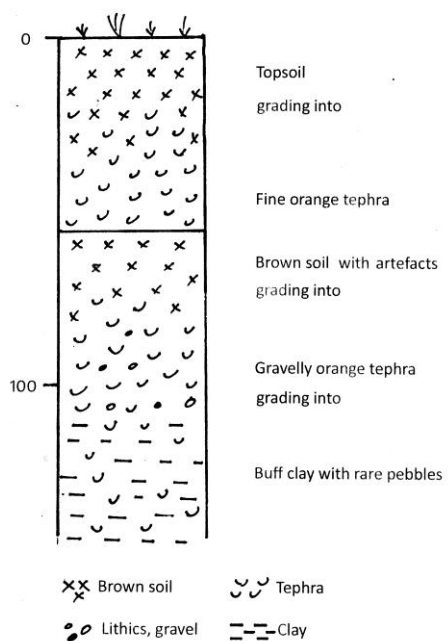


Figure 9 Drawing of Section 2 at FADP. Description of layers should be read from the top.

Two artifacts were found in Section 1 (Figures 7, 8). One, situated at the base of the current topsoil (Layer 4), is a small obsidian flake. At the base of Layer 2, another flake made from a volcanic stone was found. Given that artifacts were found in Layers 2 and 4, they are both potential candidates for the source of the stemmed tools. However, since the men working at the site think the tools were found at some depth and near to the yellow volcanic Layer 1, the buried soil formed at the top of this unit, i.e. Layer 2, seems the most likely depositional context, although it is possible that the tool was within a pit that had been dug into the Layer 1 tephra. There was, however, no trace of such a feature on the ground surface when the team visited the site. The importance of Layer 2 is given weight by the finds from Section 2.

While trying to trace the layers along the road section, about 6 metres to the west of Section 1 two more artifacts were observed (Figure 10). Section 2, part of which is visible on the far right of Figure 10 was made to clarify the stratigraphy of these artifacts. This showed that the artifacts are clearly within the buried soil labeled as Layer 2 in Section 1 (Figure 9). Nearby several small pieces of charcoal were also recovered. Radiocarbon dating of these might determine the age of Layer 2.



Figure 10 Two fragments of a retouched stemmed artifact made in a volcanic stone (Barema 6) found adjacent to Section 2 in brown soil Layer at FADP.

The artifacts fit together to form a tool with a stem made from a volcanic stone (Figure 11). The find is so very heavily weathered that a thick cream coloured cortex has formed over the grey-blue of the unweathered volcanic stone (see fresh break on right hand tool in Figure 10), suggesting the tool is very old. A few volcanic stone tools with similar stems have been found in the Talasea region, but always in surface contexts, so their relationship to the obsidian stemmed tools has never been determined. This find suggests that stemmed tools may have been made from a range of types of raw material. At this stage it is not possible to identify the source of the volcanic stone used in this tool.



Figure 11 Retouched stemmed artifact made in volcanic stone (Barema 6). Found adjacent to Section 2, FADP (cf. Figure 9).

Putting together all the threads of evidence, it seems most likely that the Barema obsidian stemmed tools were derived from the buried soil horizon that formed on top of the massive volcanic tephra. The age of this layer is uncertain, but it may be clarified by a radiocarbon analysis of associated charcoal, although there is a serious possibility that the charcoal is not in situ but was moved down from a higher level during the bulldozing of the road surface.

Samples of Layers 2 and 3, together with photographs of the site, were discussed with Chris McKee from the Geophysical Observatory, Port Moresby, who with David Lolok has done

extensive research on the volcanic history of Hargy volcano (McKee and Lolok 1998). In McKee's opinion Layer 1 is probably the Tiauru Pyroclastics derived from the late Pleistocene eruption of Hargy about 11,000 years ago. Although Layer 3 has very few diagnostic properties, in McKee's experience the W-G tephra from Witori volcano dated to about 1200 years ago (Machida *et al.* 1996) is the most common, highly visible Holocene age tephra in this region. If these tentative assignments to the Layers are correct, then the date range bracketing Layer 2 (i.e., 1200-11,000 years ago) overlaps, but is much broader than the known dates of stemmed tools from the Willaumez Peninsula and gives further support to Layer 2 as the most likely context for the obsidian stemmed tools at Barema.

Barema Mill Site (FADQ)

Following information from a workman that obsidian fragments had been observed near an area where a mumu pit had been dug, the team did a very cursory foot survey of the Barema mill site. Obsidian flakes were observed to be thinly scattered over the entire area surveyed, suggesting that, not surprisingly, this prominent flat hilltop was occupied in the past. The area cleared by bulldozer for the mill site, however, is highly disturbed to a depth of c. 20-30 cm as the soil is very soft and loose. Consequently, archaeological deposits are unlikely to be preserved in situ and it would be difficult to discriminate between finds in contexts matching Layers 2 and 4 at FADP, both of which would be expected to have archaeological material.

The team therefore concentrated on an area on the western edge of the mill site near the mumu pit where abundant obsidian flakes were present in the disturbed surface sediments. The first shovel pit was dug to a depth of 50 cm, but the topsoil was missing and the sediments were homogenous. A second shovel pit was dug further to the west in an area where trees still remain and the ground had been less disturbed. At the base of the pit, at c. 70cm, a gravelly tephra, probably equivalent to the late Pleistocene tephra at FADP, was encountered. Above this unit the stratigraphy was not as clear as at FADP. Underneath the very thin topsoil a red-brown homogenous clay similar to Layer 2 at FADP is present. Obsidian flakes were recovered within this unit at a depth of c. 30-40 cm., but the Layer 3 tephra present at FADP is either difficult to detect or absent at this location. The archaeological research potential of FADQ is fairly limited

due to recent disturbance, but further shovel testing might uncover some situ deposits with a higher density of finds, since this location would have been a desirable place for settlement.



Figure 12 Excavation of shovel test pits in the uncleared area adjacent to the Barema mill site (FADQ).

Hargy Guest House site (FADR)

A thin scatter of obsidian flakes was found below a steep, cut terrace situated down slope from the Hargy Guest House at HOPL. The original context of the flakes could not be discerned. These are likely to represent material from deposits disturbed through terracing and construction of the buildings on the top of the hill (e.g., Guest House and School). Their presence indicates ancient use of the area, perhaps as a settlement. Given the scale of building in this area, archaeological deposits may no longer be preserved, but when considering new building activities, especially if leveling/earth moving is involved, HOPL should consider the possibility that there was an ancient settlement nearby and be vigilant for the presence of stone artifacts. The absence of a clear buried soil horizon in the terrace section (Figure 13) indicates that the artifacts may be derived from the topsoil.

While surveying for artifacts, the team noted a line of burned twigs and charcoal within a tephra layer exposed in a section directly below the back door of the Hargy Guest House (Figures 13, 14). Although no artifacts were found within this terrace section, dating the tephra could prove useful for future work because it is likely to be good marker layer within a regional

tephra stratigraphy and it would help determine if the upper tephra at the Barema mill manager's house site (Layer 3 at FADP) is actually the W-G tephra.

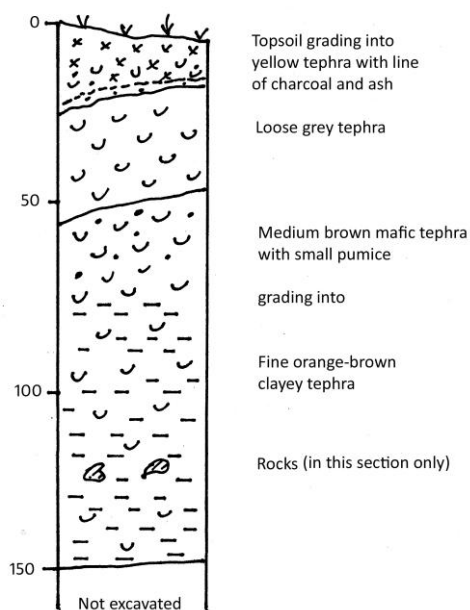


Figure 13 Drawing of section from Hargy Guest House (FADR)



Figure 14 Section at Hargy Guest House. A layer of grey-blue charcoal is visible within the upper yellow tephra.

STEMMED TOOLS

The most significant aspect of the new sites at HOPL is undoubtedly the presence of stemmed tools as these are very rare occurrences and provide important information about past social and cultural life in ancient communities. Since a great deal of care, skill and expertise was required in the manufacture of the shiny, fragile and highly distinctive stemmed tools, they may have been used to display the high status of the owner and/or to represent other meanings within a ceremonial or ritual context (Araho *et al.* 2002; Rath and Torrence 2003; Specht 2005; Torrence 2003; 2004). In addition, the existence of widespread social networks between high status individuals is suggested by the very widespread spatial distribution of the artifacts across the whole of Papua New Guinea and into West Papua (e.g. Torrence and Swadling 2008; Swadling 2005; Swadling and Hide 2005). Most recently, the discovery that stemmed tools with identical sophisticated forms were made from obsidian obtained from both West New Britain and Manus obsidian sources (Torrence *et al.* 2009) has provided additional evidence for complex social relations in the early history of Papua New Guinea. While visiting HOPL the team made preliminary studies of the typology, technology, function and source of the very important new finds of obsidian stemmed tools at the Barema FADP site.

Typology and Technology

Only the Barema 1 stemmed tool is complete; the remaining tools represent fragments of larger tools broken by the earth moving activity. The missing segments are probably still mixed up in the soil that has been pushed over the steep cliff at the north side of the site. Some additional artifacts may appear after rain washes the deposits so HOPL should keep a watching brief over the area. We have reconstructed the tools as far as possible on the basis of refits and consistency in the colour of the obsidian and the thickness of the flakes. This process yielded a maximum of 4 possible additional stemmed tools (Figures 15-18).



Figure 15 Barema 2. Five fragments were grouped together on the basis of the colouring of the obsidian and the thickness of the flakes. These include 2 parts of the tip that fit together (distal end at the bottom), a possible portion of the mid-section, and the base of the retouched stem (at the top).



Figure 16 Barema 3, broken in two pieces, may be a section of the retouched stem or butt of a tool with a similar shape to Barema 1.



Figure 17 Barema 4 is probably part of the stem or butt of a retouched tool. The right hand bifacially retouched edge is intact but there is a fresh break on the left hand edge and an old break along the top surface.



Figure 18 Barema 5 is a mid section of a kombewa flake with fresh breaks on all edges.

Barema 1 and Barema 2 were definitely made on a distinctive type of flake, called ‘kombewa,’ that is characteristic of one of the two major categories of stemmed tool defined by Araho *et al.* 2002 (Figures 1, 15). The blank form for all the remaining tools is also likely to be a kombewa flake. Experiments in replicating stemmed tools by Kononenko show that this particular kind of flake is difficult to make and together with the very careful retouch requires considerable knowledge and skill as well as practice. What distinguishes the Barema 1 and Barema 2 tools from other kombewa stemmed tools, however, are firstly, the presence of a deep hinge fracture at the distal end of the flake (Figure 15 bottom; Figure 19) and the large size and thin cross section of the stem. The production of a hinge fracture on the kombewa flake created a very thick and sturdy, but sharp, edge with a semi-circular shape in plan. Since this part of the tool was not retouched, the production of the distinctive shape created by the hinge was probably intentional.



Figure 19 Close up of the distal end of Barema 1 showing the hinge fracture on the left.

The second feature that differentiates Barema 1 and 2 from most other stemmed tools is the relative size of the stem and, most importantly, its very flat and thin cross-section. Like many other stemmed tools, the long axis of the retouched stem of Barema 1 is at an oblique angle to the direction of force that generated the kombewa flake. The re-orientation of the axis of the tool enables the maker to select a flat portion of the flake with a consistent thickness for making the large but uniformly thin stem. To achieve this aim, the thick and irregularly shaped bulb of percussion and the flake platform had to be completely removed (see Torrence 2004: 168, Figure 6 for the same technique but used on a stemmed tool with a different shape). To provide a large enough thin area for the stem (22 cm. long in the case of Barema 1), the original kombewa flake must have been extremely large and was probably nearly circular in shape. Fragments Barema 3 and 4 are probably also derived from tools with a thin, flat stem.

The stem of Barema 1 is directly joined to the base. If our reconstruction is correct, Barema 2 had a slightly different unretouched mid-section between the base and the stem. The reconstruction is difficult because the middle piece in Figure 15 is missing both lateral edges. Barema 5 is from a mid-section of kombewa flake but it is too damaged to link to a particular form of tool.

PXRF analysis

Measurements were made using a portable x-ray fluorescence spectrometer (PXRF) (Figure 20) in order to determine the chemical composition of the obsidian used in the manufacture of the obsidian artifacts found at the mill manager's house site (FADP). PXRF is a new technique in archaeology but a number of very successful PXRF studies of obsidian trade have already been made in other parts of the world (e.g. Jia *et al.* 2010; Philips and Speakman 2009) and the Papua New Guinea sources have been well characterized using this technique (Sheppard *et al.* 2010).

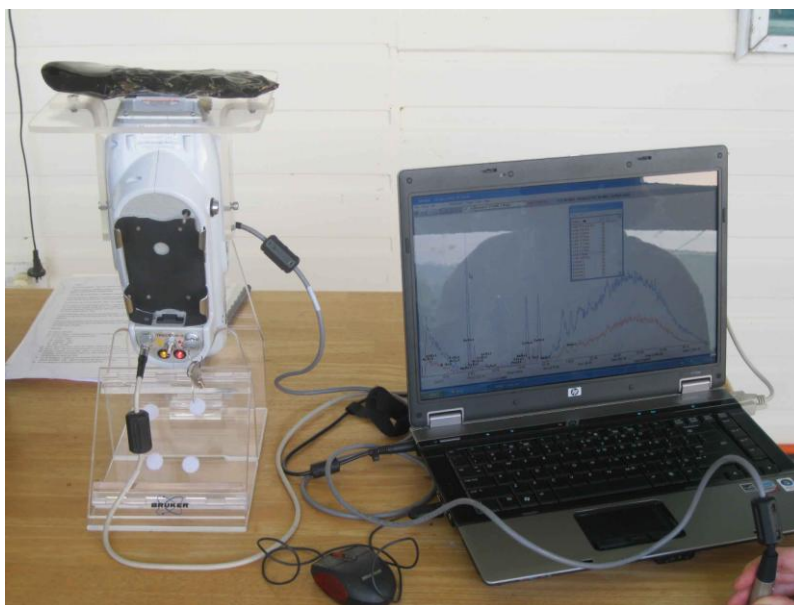


Figure 20 PXRF analysis of the Barema 1 stemmed tool in progress at the Hargy Guest House. The height of the spectra visible on the laptop indicates the relative amount of the measured elements, which are arranged along the horizontal axis.

When compared to the reference material from the geological sources, the PXRF measurements can be used to identify where the raw material for the tools was obtained. The movement of the stemmed tools from the obsidian sources to the Barema site required human agency. Given the relatively long distances involved, it is inferred that the transport of stemmed tools was part of an ancient trading system. At this stage of the research, we can discriminate among the major obsidian sources areas in PNG (West New Britain, Manus and Fergusson Is) by a visual comparison of the spectra obtained from the tools against spectra from our geological reference collections. Using this ‘eyeball’ method, it is clear that the Barema 1-5 artifacts were all derived from New Britain sources. Additional analyses involving the use of multivariate analysis will eventually be able to pinpoint the source area within New Britain to either Mopir (inland Hoskins) or the Willaumez Peninsula. These results will be reported as soon as they are available.

Usewear and Residue analysis

The study of usewear and residues was made to analyse if and how the Barema obsidian stemmed tools had been used in the past (cf. Kononenko 2007; Kononenko *et al.* 2010a; 2010b;

2010c). Usewear traces consist of microscopic damage to the edges of the tools sustained during use, e.g. for cutting, scraping, pounding, etc. In some cases residues from the material that was worked (e.g., taro, blood, wood fibres) has been preserved on the edges of the tools.

Dr. Nina Kononenko used a series of digital microscopes to examine the Barema stemmed tools for traces on ancient use. Kononenko has been developing the use of this innovative technology for archaeological research (Kononenko *et al.* 2010c), but this is the first time that this type of equipment has been used in field conditions in PNG.



Figure 21 Kononenko uses a digital microscope to examine Barema 1 for traces of ancient use.

Unfortunately, all the tools except Barema 1 have been heavily weathered through natural processes and the original surfaces that would preserve usewear traces have been removed (through hydration) or obscured as shown in Figure 22. Although the Barema 1 stem is also too weathered for analysis, the unretouched distal end of the flake is reasonably well preserved. All the microscopic flake scars and scratches on the distal end of the Barema 1 artifact are a result of recent damage from the bulldozing (e.g., Figure 23). Apart from these, there is no evidence for usewear traces (e.g., striations, polishes, edge rounding) on this part of the tool. The absence of wear is very important because it supports the hypothesis that stemmed tools were not utilitarian tools but functioned to signal an individual's high status and/or were displayed within a ceremonial or ritual context.



Figure 22 Highly weathered, irregular surface of Barema 2 (x50 magnification). The highly rounded edges are likely to be a product of weathering rather than use.

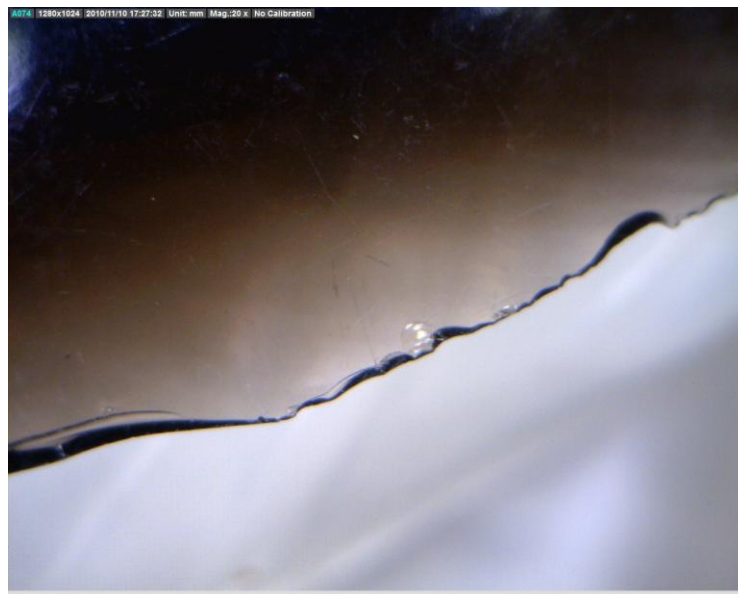


Figure 23 Recent edge damage on Barema 1 (x50 magnification). Note excellent preservation of obsidian surface and absence of usewear.

SIGNIFICANCE

The stemmed tools recovered from the Barema mill manager's site (FADP) make a highly significant contribution to the knowledge of the early history of West New Britain and to the

Pacific region as a whole. Although stemmed tools have been known for a long time, it is only recently that their potential use as symbols of status, as exchange objects, and/or as ritual items have only recognized (e.g., Torrence 2003; 2004; Specht 2005). Until now almost every stemmed tool has been unique in terms of shape and size, but Barema 1 is almost identical to an artifact from Apugi Island, near Kandrian in West New Britain (Figure 24), which is located on the opposite side of the island at a place that was most likely on a different route for travel or trade. The striking resemblance in the shape, size and the character of the flaking suggests that both tools were made by the same craft specialist. There can be little doubt that great skill and experience was required to create the hinge fracture at the base of these tools and to manufacture the highly retouched stem from such a thin flake.



Figure 24 Stemmed tool from Auwil, Apugi, West New Britain (Specht 2005: 376, fig. 28.2)
PNG Museum Reg. 79.27 FFQ (B)/1

If the other Barema artifacts are also fragments of similar tools, then we have to ask whether these tools (1) were made by the same maker; (2) were a widespread, popular type over a limited

time period; or (3) represent a particular form that was associated with a specific set of functions and/or meanings.

The finding of a group of stemmed tools at the same general location, on the gentle slope just below the top of a hill also raises questions about the context in which these artifacts were discarded or deposited. Were they part of a ritual cache, offering, or within a burial, or were they among the contents of a special building, such as a men's house, where important artifacts were stored and looked after? It is too soon to answer these questions, but it is notable that the only other place where multiple stemmed tools have been found is in a very similar setting, on a steep-sided prominent hill which provides a panoramic view over the surrounding landscape (see cover photo). Two large obsidian stemmed tools were found after bulldozing at the FABN site of Boku Hill on Garu Plantation, near Kimbe (Torrence 2004). Although it is possible that Barema and Boku hill were chosen for settlement because of their defensive properties, these distinctive settings may have been used for other particular functions as well.

The many questions raised by the Barema stemmed tools in themselves demonstrate the very high importance of these new discoveries since the new information obtained from the FADP site allows us to think much more broadly about the social and cultural meanings and functions of the poorly understood stemmed tools. The new information also opens up many new avenues for speculation and research that greatly enriches our knowledge of the history of West New Britain.

REPORTING

All the artifacts recovered during the research trip were put into plastic bags, labeled and left with Max Kuduk, the Environmental Sustainability Officer at HOPL. Barema 1 remained in the custody of Kanau Iobuna. It was stressed that all the finds should stay together. As National Cultural Property, they should be deposited with the National Museum in Port Moresby. HOPL might consider having models of the artifacts made for use locally. The Australian Museum could help find an appropriate model-maker, if permission was granted by the National Museum.

The team made a powerpoint presentation and discussed the significance of the new findings with staff at HOPL on the last morning of the research trip. The powerpoint file, which

contains extensive background on WNB archaeology and obsidian trade, was given to HOPL to use for reference and sharing the knowledge with a wider group and the local community. Similar presentations were made for staff at the WNB Cultural Centre in Kimbe and the National Museum in Port Moresby. Site recording forms were completed and filed at the National Museum and PNG codes were assigned to three locations. A preliminary account of the research trip was included in a report prepared for the National Museum, National Research Institute and various government bodies in West New Britain as part of the conditions of the research visa.

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REFERENCES

- Araho, N. 1996. *Obsidian Stemmed Tools from West New Britain, Papua New Guinea*. Unpublished MPhil. Thesis, University of Sydney.
- Araho, N. Torrence, R. and J. P. White 2002. Valuable and useful: Mid-Holocene stemmed obsidian artefacts from West New Britain, Papua New Guinea. *Proceedings of the Prehistoric Society* 68: 61-81.
- Jia, P., Doelman, T., Chen, Q., Hao, Z., Lin, S., Torrence, R., Glascock, M. 2010. 'Moving Sources: a preliminary study of volcanic glass artefact distributions in Northeast China using PXRF.' *Journal of Archaeological Science* 37:1610-1677.

- Kononenko, N. 2007. The contribution of use-wear/residue studies of obsidian for understanding changes in settlement and subsistence patterns in West New Britain, Papua New Guinea. *Bulletin of the Indo-Pacific Prehistory Association* 27:135-143.
- Kononenko, N., Bedford, S., and Reepmeyer, C. 2010a. Functional analysis of late Holocene flaked and pebble stone artifacts from Vanuatu, Southwest Pacific. *Archaeology in Oceania* 45: 13-20.
- Kononenko, N., Specht, J. and Torrence, R. 2010b. Persistent traditions in the face of natural disasters: Stemmed and Waisted Stone Tools in Late Holocene New Britain, Papua New Guinea. *Australian Archaeology* 70: 17-28.
- Kononenko, N., Torrence, R., Barton, H., Hennell, A. 2010c. Cross-cultural interaction on Wuvulu Island, Papua New Guinea: the perspective from use-wear and residue analyses of turtle bone artifacts. *Journal of Archaeological Science* 37: 2911-2919.
- Machida, H., Blong, R., Specht, J., Torrence, R., Moriwaki, H., Hayakawa, Y., Talai, B., Lolok, D., Pain, C. 1996. Holocene explosive eruptions of Witori and Dakataua caldera volcanoes in West New Britain, Papua New Guinea. *Quaternary International* 34-36, 65-78.
- McKee, C. and Lolok, D. 1998. *Witori, Hargy, Ulawun Volcanology. Volume I. Ulawun Decade Volcano Workshop Excursion Guides*. Rabaul Volcano Observatory.
- Petrie, C., Torrence, R. 2008. Assessing the effects of volcanic disasters on human settlement in the Willaumez Peninsula, Papua New Guinea: a Bayesian approach. *The Holocene* 18, 729-744.
- Phillips, S.C. and Speakman, R. J. 2009. Initial source evaluation of archaeological obsidian from the Kuril Islands of the Russian Far East using portable XRF. *Journal of Archaeological Science* 36: 1256-1263.
- Rath, R. and Torrence, R. 2003. Producing Value: Stemmed tools from Garua Island, Papua New Guinea. *Australian Archaeology* 57: 119-127.
- Sheppard, P., Trichereau, B. and Milicich, C. 2010. Pacific obsidian sourcing by portable XRF. *Archaeology in Oceania* 45: 21-30.
- Specht, J. 2005 Obsidian stemmed tools in New Britain: aspects of their role and value in mid-Holocene Papua New Guinea, in *Many Exchanges: Archaeology, History, Community and the Work of Isabel McBryde*, eds I. Macfarlane, R. Paton and M. Mountain. Aboriginal History Monograph 11: 357-72.
- Swadling, P. 2005. The Huon Gulf and its hinterlands: a long-term view of coastal-Highlands interaction, in C. Gross, H. Lyons and D. Counts (eds), *A Polymath Anthropologist: Essays in Honour of Ann Chowning*: 1-14. Research in Anthropology and Linguistics Monograph 6. Auckland: University of Auckland.

Swadling, P. and Hide, R. 2005. Changing landscape and social interaction: looking at agricultural history from a Sepik-Ramu perspective, in A. Pawley, R. Attenborough, J. Golson and R. Hide (eds), *Papuan Pasts: Cultural, Linguistic and Biological Histories of Papuan-speaking Peoples*, pp. 289-328. Canberra: Pacific Linguistics.

Torrence, R. 2003. 'Like everywhere you've never been': archaeological fables from Papua New Guinea. In R. J. Jeske and D. K. Charles (eds), *Theory, Method and Practice in Modern Archaeology*, pp. 287-300. Praeger: Westport, Connecticut

Torrence, R. 2004. Pre-Lapita valuables in Island Melanesia. In V. Attenbrow and R. Fullagar (eds), *A Pacific Odyssey: Archaeology and Anthropology in the Western Pacific. Papers in Honour of Jim Specht*, pp. 163-172. Records of the Australian Museum, Supplement 29. Sydney: Australian Museum.

Torrence, R. and Swadling, P. 2008. Social networks and the spread of Lapita. *Antiquity* 82: 600-616.

Torrence, R., Swadling, P., Ambrose, W., Kononenko, N., Rath, P. and Glascock, M. 2009. Obsidian stemmed tools and Mid-Holocene interaction. *Asian Perspectives* 48: 118-147.