POINTS OF DISCUSSION. OBSIDIAN BLADE TECHNOLOGY IN THE ADMIRALTY ISLANDS, 2100 BP TO 50 BP

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ABSTRACT

Variation in retouched obsidian blade (point) form on Lou Island is examined for the last 2100 years. A sequence of change is proposed, in which heavily modified points are replaced between approximately 1600 and 700 years ago by simplified forms resembling those recorded ethnographically. The suggestion is made that this technological change reflects a reorientation of the overarching system of production and distribution, which possibly saw the eventual emergence of the system of proprietary specialisation present in the nineteenth and early twentieth centuries. However, the limitations of our current archaeological data base for formulating hypotheses about socio-economic change are stressed. A warning is given over the uncritical use of the ethnographically-derived model of economic competition and integration as a template for interpreting prehistoric production and distribution.

The Admiralty Islands constitute the Manus Province of Papua New Guinea. The largest island in the group (Figure 1) shares the name of the province. The term "Manus" can also refer to one of the populations that were historically recorded as inhabiting the islands. Late nineteenth and early twentieth century commentators, most famously Mead (1956), identified three population groupings – Manus (speakers of the Titan language, a group also often known as Manus Tru), Matankor and Usiai. This tripartite division lacked any social foundation, as kin-based totemic clans were the primary unit of social affiliation (Mead 1934:206ff; Schwartz 1975:120). Instead it reflected the occupation of different ecological zones: Titan-speakers inhabited small islands and coastal margins; Matankor the larger islands and coastal Manus island; and Usiai the Manus island interior.

Villages in the interior and on coastal and offshore locations had access to a different range of resources and specialised in the production and distribution of sometimes village-specific consumables, raw materials and manufactured products. However, not all production in the nineteenth century was dictated by direct access to resources; much was based on a socially determined monopoly (Parkinson 1907:320, 323, 327; Vogel 1911:92; Nevermann 1934:236). Other communities were recognised as possessing a specialisation in conveying products. In the southern Admiralties these were the Titan-speaking villages.

This system of production and distribution, which continued to exist into the first decades of this century, served to link populations throughout the Admiralty Islands into localised and often impermanent economic and social relations. In this way communities producing different products were meshed into a fluid, archipelago-wide communication network. Schwartz (1963:75) saw these links as providing a means of "areal integration" in which economic and social integration hinged on: (1) maintaining exclusive rights over the natural resources of an area ("primary specialisation", based on land occupancy); and (2) the distribution of these resources or their transformation into manufactured products ("secondary specialisation", based on proprietary skills or technology). It is this second level of economic integration that has particularly intrigued archaeologists in their efforts to uncover the connection between ethnographic and prehistoric patterns of production and distribution.

HISTORIC BLADE PRODUCTION AND USE

It is possible to investigate production and distribution of lithic materials in an archaeological context by examining the importation of exotic materials into a locality, and the nature of production of a traded item. In Island Melanesian

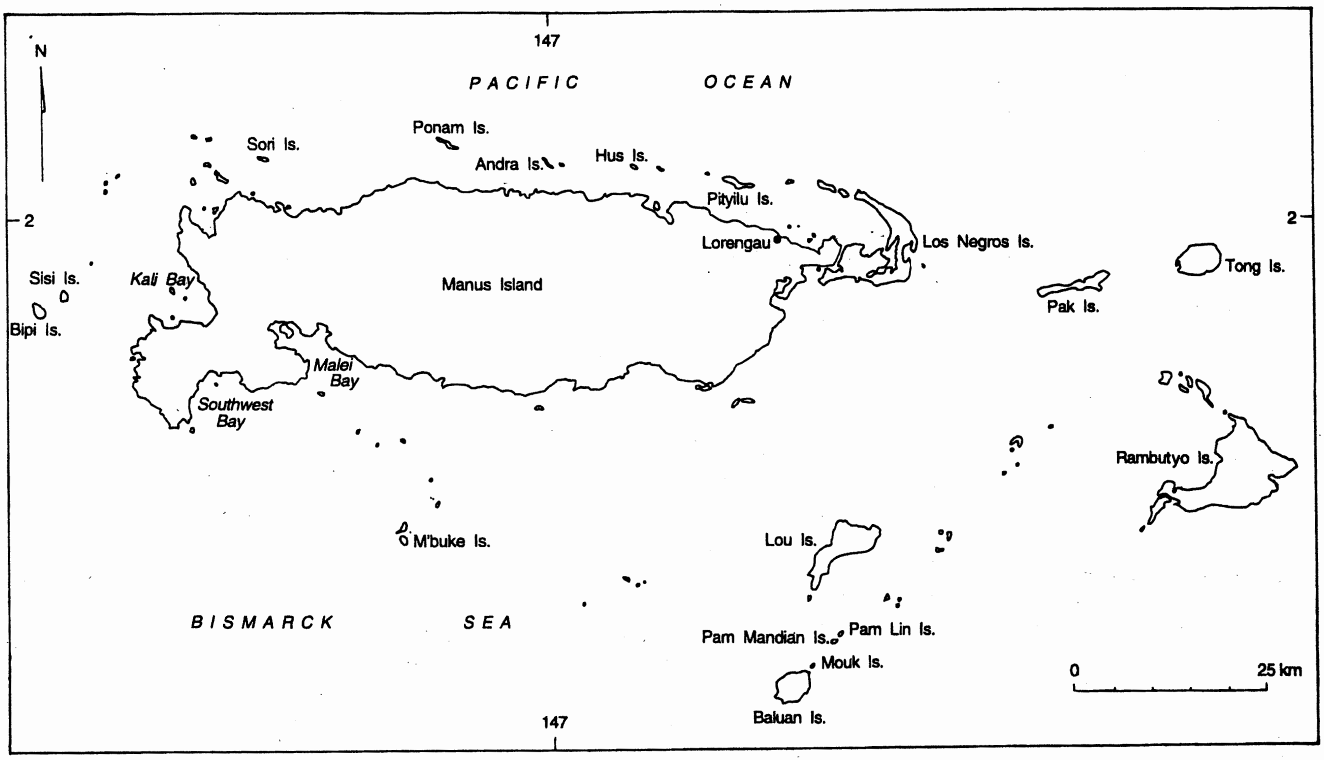

Figure 1: The Admiralty Islands.

archaeology little attention has been given to examining production for trade in stone tool assemblages, although this imbalance is now being rectified by a number of important studies (Torrence 1992; Allen *et al.* 1997). Analysis of production holds the prospect of answering questions on the relationship between historic economic specialisation and prehistoric patterns of distribution (Torrence 1986). Many items produced for trade would not survive in an archaeological context; of the products traded in the Admiralty Islands only items manufactured of bone, shell, stone, pottery and obsidian would retain an archaeological signature. In this paper I focus on obsidian, specifically on historically recorded obsidian blade flakes.

Obsidian-tipped Spears

By the time of Mead's first field season in 1928 obsidian had been replaced by iron, steel and glass and was no longer produced or traded. However, earlier ethnohistorical accounts frequently mention the widespread use of obsidian, particularly in spear and dagger points (Hawkesworth 1773; Labillardière 1800; Mikloucho-Maclay 1879; Parkinson 1907). Obsidian-tipped spears were first observed in 1545 by Ortiz de Retes, in reference to an attack upon his ship (Nevermann 1934:1). Over the subsequent 300 years European visitors and traders provided detailed accounts of the use of obsidian-tipped spears, not infrequently from the perspective of actual experience. One of the more graphic first-hand accounts is provided by Mikloucho-Maclay (1879:157) in describing a canoe-borne raid upon a trading vessel in the 1870s:

> The number [of spears thrown at the ship] was so great that when the battle was over nobody had the idea of making a count of them; there were so many and all were so broken (the end is made from slivers of obsidian, a very brittle material) that in order to clear the deck they were just swept into the sea. Many of the spears pierced the thick doors of the cabin and in spite of the heavy copper wire screen and thick glass two windows were pierced.

Obsidian-tipped spears were stored in bundles on platforms of multi-hulled canoes (Linklater 1972:185; Mikloucho-Maclay 1876:67; Moseley 1877:409) for use *en masse* as projectiles during maritime engagements. Spear shafts were thin, tapered, and up to two metres in length (Labillardière 1800:311). Most were armed with a large obsidian flake. Frequent mention also is made of imitation spears with wooden points coloured to appear like obsidian (Labillardière 1800:312; Linklater 1972:187; Moseley 1877:409). Obsidian spearpoints were either only minimally shaped by retouching or not modified at all (Figure 2). The lack of attention to shaping the spearpoint stands in contrast to the binding attachment, which was often ornately decorated (Figure 2). This suggests that at least some

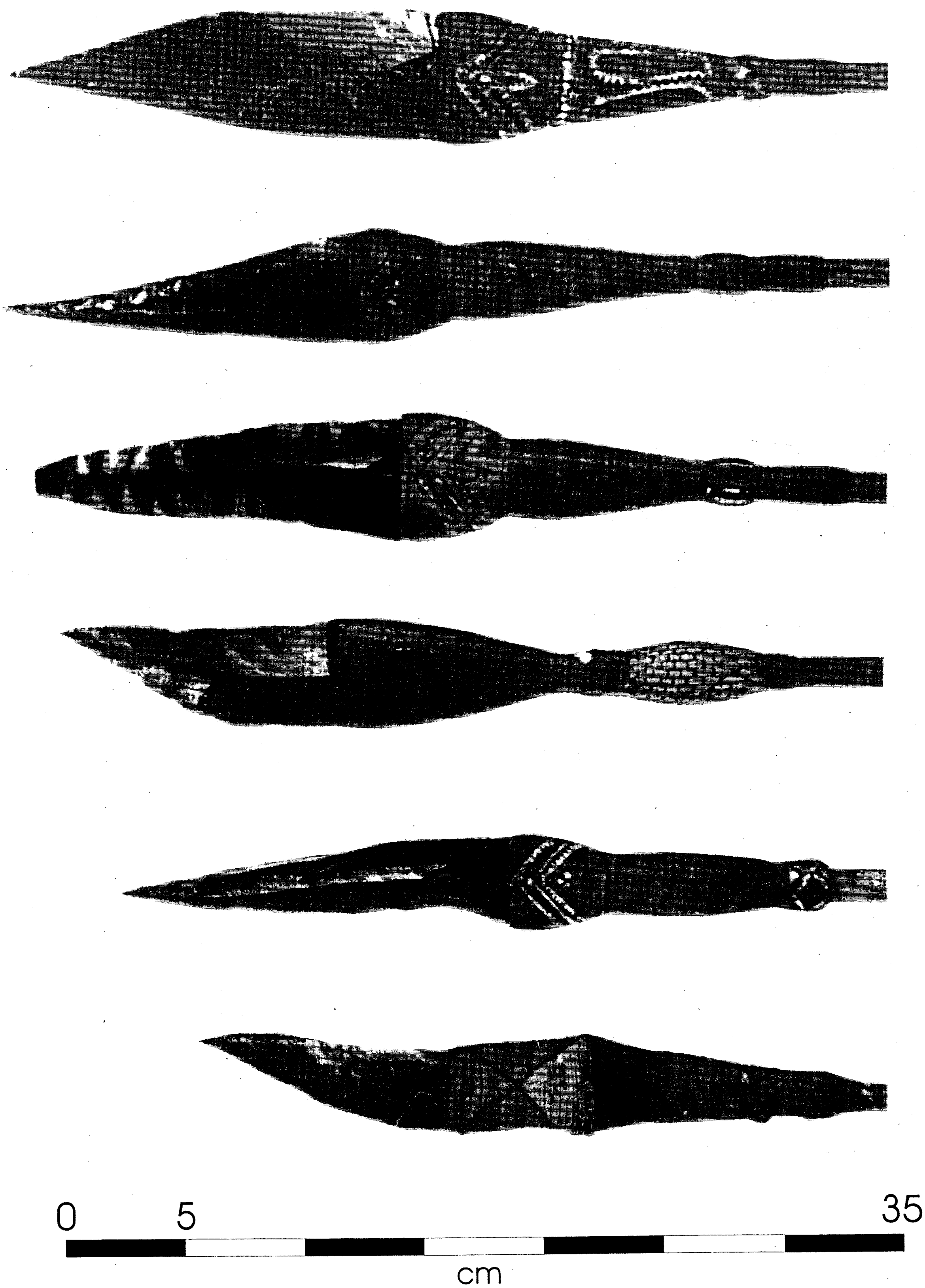

Figure 2: Obsidian-tipped spears in the Farrell Collection (reproduced by permission of the Australian Museum).

historically recorded spears were meant for more than expendable, utilitarian usage. Some appear to have been curated items. Parkinson (1907: 333) records how obsidian-tipped spears, along with land and canoes, were among the few items which were passed down as patrilineal heirlooms.

The use of obsidian-tipped weapons against European visitors, traders and administrators continued well into the 1890s. This discouraged commercial development, particularly the establishment of trading posts and plantations in the region. Consequently, in the latter part of the 1890s, German authorities forcibly imposed their rule by military means, and by the first decade of the 1900s peace had been enforced throughout most of the archipelago. During this time the status of obsidian-tipped spears changed from functional weapons to purely items for barter with European traders (Torrence 1993). Whether skilled point production actually continued into this late period, as suggested by Torrence (1993:476), is far from certain. Historical data are equivocal and most obsidian-tipped spears and daggers possessed amorphously shaped points, demonstrating that by the late nineteenth century waste flakes or poorly struck pieces were being commonly utilised in making weapons.

Obsidian Production on Lou

Three regions in the archipelago possess natural obsidian deposits: Lou Island; the nearby small Pam Islands (Pam Lin and Pam Mandian); and southwest Manus (Figure 1). In historical accounts Lou is invariably referred to as the main source of obsidian (Miklouchо-Maclay 1876:79; Parkinson 1907:329). Obsidian is recorded as having been traded from the island as both unworked blocks and finished spearpoints (Parkinson 1907:311, 327). Europeans in 1899 recorded disused obsidian mineshafts and extensive flaking areas during the first extended visit to Lou (Nevermann 1934). Island inhabitants recounted how obsidian deposits were under the control of specific villages in previous times, and the right to mine obsidian was the prerogative of individual "chiefs" and their sons. Actual spearpoint manufacture was said to have been the exclusive right of particular men or lineages (Nevermann 1934:236). These specialists made only points, not the complete spear or dagger (Nevermann 1934:335). Consequently, blades intended for use as weapon points were traded unhafted, and ornate decorations on spear and dagger shafts were applied by importing villages, as a form of "trade mark".

This sketchy historical picture suggests that by 1899 the regular production of obsidian spearpoints had ceased on Lou (Nevermann 1934:235). This is not to say that practical knowledge of manufacturing techniques had been completely forgotten. Both Parkinson (1907:311) and Nevermann (1934:236) record observations on individual knappers at work around the turn of the century. However, these obsidian reduction activities do not appear to have been part of a widespread, ongoing industry on the island in the 1900s, and occasional blade production and retouching was probably undertaken at the behest of German visitors. Certainly in 1909, the year a geological expedition made detailed observations on Lou, obsidian production was nowhere in evidence on the island (Wichmann 1911).

THE ARCHAEOLOGY OF BLADE PRODUCTION

Most prehistorical information on obsidian blade manufacture comes from three archaeological sites on Lou: Umleang (GBJ); Emsin (GEB); and Sasi (GEF, formerly GDY) (Figure 3). Manufacture has also been identified on southwest Manus, in the form of widespread but undated surface collections (Kennedy 1997). Ambrose and colleagues excavated the three Lou sites between 1977 and 1985. The investigations unearthed pottery, artefacts, domestic refuse and a range of features, such as hearths and postholes (for general descriptions refer to Ambrose 1988; Antcliff 1988; Fredericksen 1994). An extensive obsidian assemblage was uncovered at each site, totalling 70,588 gm in Umleang, 23,229 gm in Emsin and 64,194 gm in Sasi. In terms of weight of obsidian per cubic metre of excavated deposit, this calculates to 45,780 gm m^3 for Umleang (a figure derived for the unit with the maximum amount of obsidian), 17,193 gm m^3 for Emsin and 49,380 gm m^3 for the single-phase Sasi site.

The results of lithic analyses show that most obsidian working at these sites was devoted to the production of

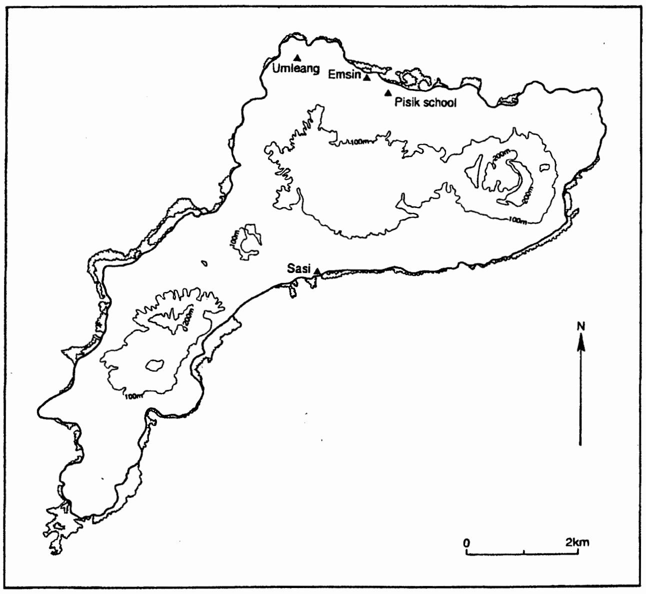

Figure 3: Lou Island showing archaeological sites.

obsidian blades of various sizes, including some too small to be effective points for spears of the kind recorded historically (see Antcliff 1988:33; Fullagar and Torrence 1991:133). The majority of blades were removed from a core using percussion, as evidenced by the presence of platform crushing, large bulbs and other characteristics of a hammer technique. However, a number of pieces resemble true parallel-sided prismatic blades (Crabtree 1968), and were probably produced using a pressure technique. These specimens were recovered in the Emsin and Sasi assemblages. A suggestion of greater effort to control blade removal is evident at these two sites. The proportion of blades with intact platforms which exhibit platform preparation is 50% in Sasi and 32% in Emsin. In contrast, only 25% of those blades in Umleang which have intact platforms show evidence of preparation. Blades in the Lou assemblages were retouched using percussion for primary shaping and a combination of percussion and pressure for final trimming. This is reconsideration of my earlier conclusion (Fredericksen 1994:123) that only percussion was used for trimming. Retouching in these assemblages was carried out bifacially from the margins, and in some cases dorsal ridges, of blades.

Retouched blades from the Admiralty Islands have come to be termed "points" in the archaeological literature (Antcliff 1988; Ambrose 1991; Fredericksen 1994; Kennedy 1997). This seems an appropriate label on morphological grounds, but it should not be seen to imply an identical function with historic spear/dagger points. However, their use as the tips of some form of weapon does seem likely. Given the brittleness of obsidian and the large size of many archaeological points, their use as awls, drillpoints or other ethnographically reported Melanesian piercing implements seems improbable.

Umleang (GBJ)

The Umleang excavation was carried out on a broad ridge distinguished by 23 vertical mineshafts dug at some time in the past to access subterranean obsidian. A major focus of the investigation was to date the use of the mineshafts. Excavation was therefore undertaken through a scree slope of obsidian and mine upcast which originated from one of the shafts. The excavation consisted of a 1 m wide trench encompassing an area of 5 m². Archaeologists identified 12 stratigraphic layers in the eastern part of the trench and 10 in the western. For clarification and simplification I have recombined these as topsoil overlying six stratigraphically-defined units (Figure 4). The uppermost unit (Unit 1) is represented only in the eastern area of the excavation and is

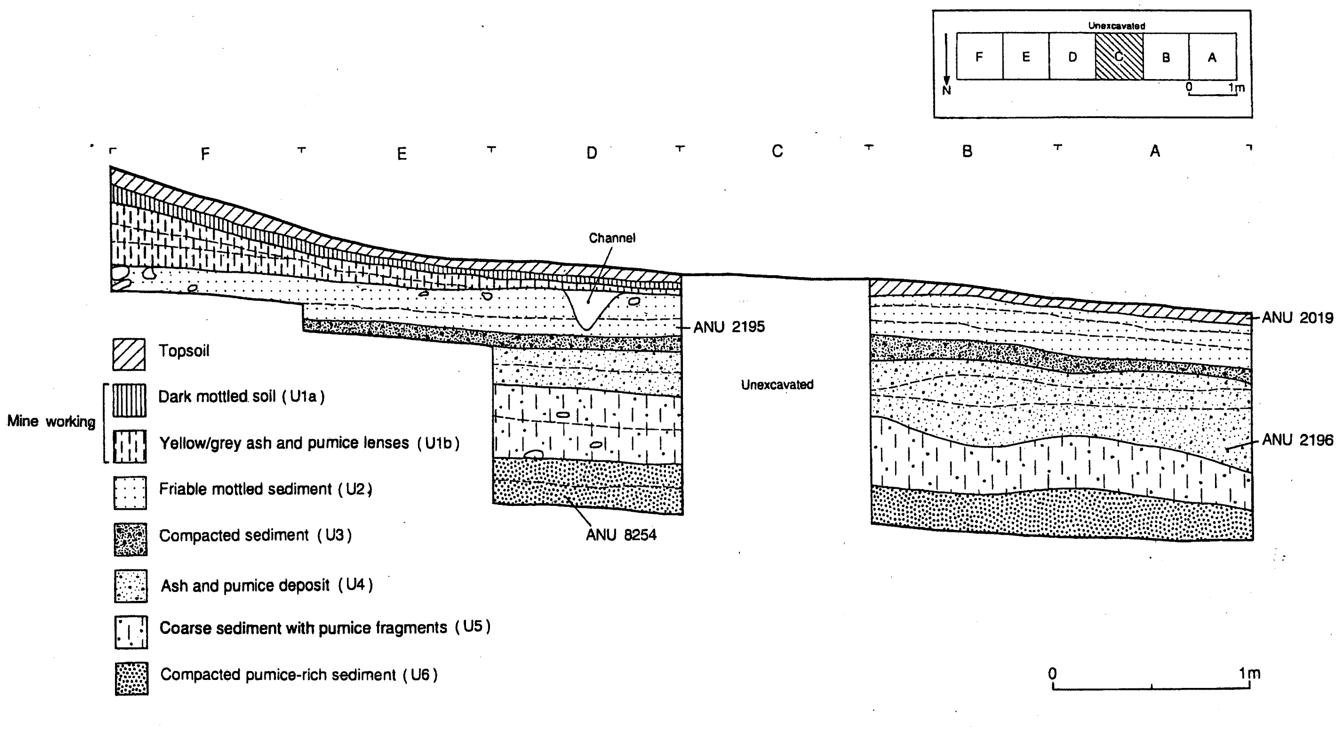

Figure 4: Umleang excavation trench section.

divided into two subunits (Units 1a and 1b), representing mine working upcast. A radiocarbon date of 220±80 bp (ANU 2019) is associated with the interface of the topsoil and Unit 1. Samples from Units 2 and 4 have returned "modern" ages, while the bottom unit (Unit 6) yielded a date of 860±200 bp (ANU 8254). Recently, an additional date of 1000±100 bp (ANU 9255) has been obtained for Unit 6 (Ambrose pers. comm.). The base of this unit probably represents pre-occupation deposit, so radiocarbon places occupation of the site within the last 1000 years or so. This has been confirmed by obsidian hydration dating by Ambrose (1998:217), which produced a date of 730±30 BP[1] for Unit 6. Interestingly Ambrose's study revealed a wide range of hydration dates for Unit 1. This probably reflects a very recent phase of mine working that resulted in older flakes becoming incorporated into late deposits.

Eightyfour points were recovered from the Umleang excavation (Figure 5). All have transverse snap fractures, probably incurred during manufacture. The vertical distribution of pieces is set out in Table 1. Particularly noticeable is the low number of points in Unit 1 (mine upcast). This may reflect either a situation in which most points were manufactured away from the mining site (Fullagar and Torrence 1991:136, 140), or alternatively the incorporation of points from earlier occupation phases with more recent debris not associated to *in situ* point production. The latter interpretation receives some support from the variable hydration dates for Unit 1 (above). Given the limitations of sample size, no great discrepancy is evident in point size among the excavation units, with the exception of length (Table 1). However, all points are broken so this may not have much bearing on the original size of the implements.

Some occupations at Umleang may overlap in time with the early historic period but two aspects stand out in comparison with early historic spearpoints. This first is the small size of points at Umleang. An examination of 100 spears in the Farrell Collection, an assemblage accessioned by the Australian Museum in 1887, revealed that spearpoints possess a mean maximum width of 47.3 mm (SD = 11.7 mm) and mean maximum thickness of 13.9 mm (SD = 3.2 mm) (Figure 2). The width statistic in particular is far in excess of the figures for Umleang (Table 1). The explanation of this difference almost certainly lies with the second aspect of discrepancy between Umleang and early historic points, variation in the amount of retouch application. As mentioned previously, historical spear and dagger points were either unretouched or had only minimal re-touching (i.e., less than 25% of the implement covered by retouch scars). Table 2 shows that the majority of Umleang points have more than 25% of their surface retouched. One piece (a distal fragment in Unit 2) is completely retouched. Additionally, seven point segments were bifacially retouched back toward the dorsal ridge to produce an implement of a triangular cross-sectional shape (Table 3). These pieces are associated with deposits perhaps only 200 years old. Another 47 triangular points have been retouched on one or two faces, their shape being largely determined by the form of the parent blade.

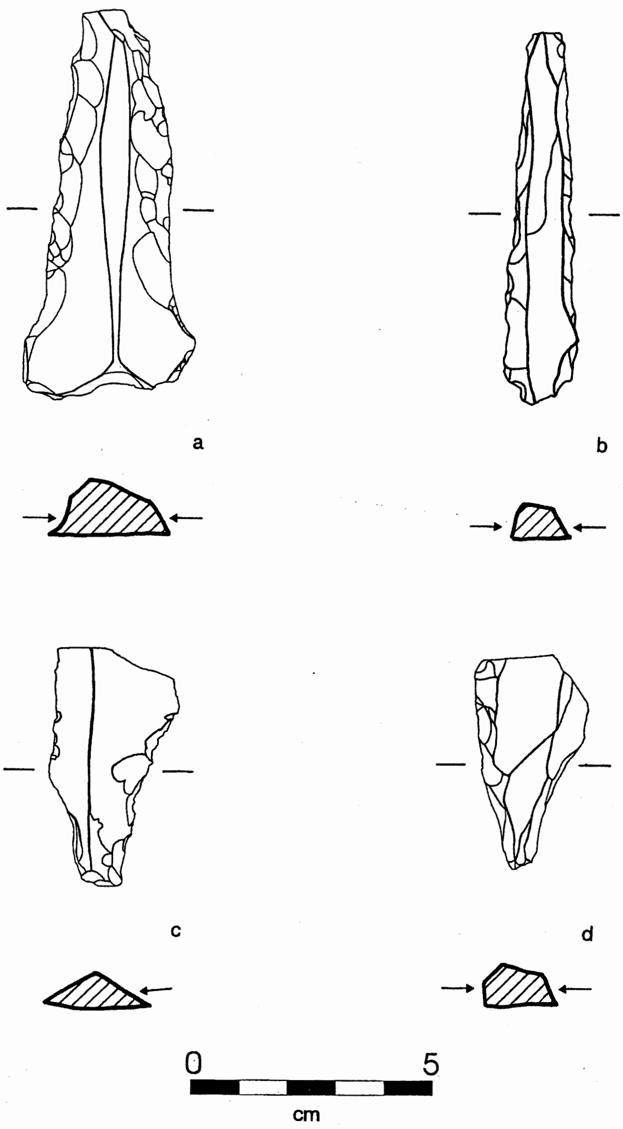

Figure 5: Points from Umleang, a and b from Unit 3. Arrows indicate retouched faces, scale in cm.

The Umleang assemblage is distinguished by the presence of 16 points which bear a distinctive tang or stem, probably to facilitate hafting (Figure 6). These are present in all units (Table 2). Most non-stemmed points were made by flaking a blade back to the dorsal ridge and then proceeding with reduction on the opposite face. In contrast,

Table 1: Umleang: count and mean dimensions (mm) of points by excavation unit (SD is standard deviation)

	UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5	UNIT 6
N	4	16	12	39	10	3
Length	46.6 *SD 20.3*	58.2 *SD 23.9*	50.2 *SD 18.3*	60.8 *SD 20.9*	51.6 *SD 22.7*	62.1 *SD 9.6*
Medial Width	30.9 *SD 18.7*	19.6 *SD 8.8*	19.5 *SD 9.1*	22.6 *SD 9.0*	20.6 *SD 3.7*	22.7 *SD 7.6*
Medial Thickness	12.3 *SD 6.6*	7.9 *SD 2.7*	10.4 *SD 3.7*	10.5 *SD 3.8*	9.9 *SD 3.4*	13.6 *SD 5.8*
Maximum Width	33.9 *SD 20.0*	20.8 *SD 8.4*	20.7 *SD 9.1*	24.7 *SD 9.2*	22.6 *SD 5.0*	24.4 *SD 7.9*
Maximum Thickness	14.2 *SD 5.5*	9.4 *SD 2.8*	11.6 *SD 3.3*	11.6 *SD 4.1*	10.7 *SD 3.0*	14.0 *SD 5.2*

Table 2: Umleang: extent of retouching on points by excavation unit

	UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5	UNIT 6
Stem Only	1	2	1	3		1
<25%	2	5	2	12	2	
25-50%	1	5	3	17	5	2
50-75%		2	5	5	3	
75-99%		1	1	2		
100%		1				

Table 3: Umleang: orientation of retouch on points by excavation unit

	UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5	UNIT 6
Stem Only	1	2	1	3		1
One Face	3	5	2	9	3	1
Two Faces		6	7	18	5	1
Three Faces		2	1	3	1	

stemmed points were manufactured by bifacially flaking one end of a blade. Comparatively little attention was given to the body of the point. Eight stemmed points have retouch restricted to the stem (Table 2). Only three of the remaining eight specimens possess retouch over more than 25% of their surface area.

Emsin (GEB)

The Emsin site is situated approximately 100 m inland from the north coast of Lou on a promontory above Rei village. The site was buried beneath a 3 m deep layer of culturally sterile volcanic tephra (Rei ash). The ash sealed a deposit rich in cultural material, most notably obsidian points. Excavation was carried out in arbitrary spits and stratigraphic layers in two contiguous squares: Square A (3 x 3 m) and Square B (1.5 x 2 m). The top three spits were excavated through a 20-40 cm deep mixed deposit, which I have termed Unit 1 (Figure 7). Beneath this was a fine silt, comprising Unit 2. Unit 3 was a friable deposit that possessed a particularly dense concentration of obsidian. The underlying Unit 4 of yellow fine clay probably represented the unmodified pre-occupation surface.

Two radiocarbon dates have been received for Unit 1 – 1640±90 bp (ANU 2193) for the top and 1860±140 bp (ANU 2194) for the base. This provides a minimum date for occupation of the site (as well as a date for deposition of the Rei ash). A maximum date can be inferred from the absence of Pisik ash, which is associated with an earlier phase of volcanic activity on Lou. Deposition of Pisik ash occurred approximately 1800 to 2000 years ago (Ambrose 1988:484), so occupation of Emsin occurred after this period but predated the episode of volcanism that produced the Rei ash which sealed the site. The vertical distribution of artefacts indicates possibly two major occupations, represented by Units 1 and 3. However, the intermediate 5-10 cm deep band of silt which forms Unit 2 also contains artefacts. Human activity at Emsin was therefore probably continuous, with no evidence for a hiatus in occupation. There is no reason to suppose that this occupation was overly extended in duration.

Excavation recovered 320 transversely fractured points. The majority (85%) were restricted to Units 1 and 3 (Table 4). Unit 3 represented a relatively undisturbed living surface with associated hearth, postholes and an obsidian knapping floor (Fredericksen 1994:125, Figure 6.26). Unit 1 was a mixed deposit possessing obsidian pieces mainly relating to point retouching, while all stages of point manufacture were evident in Unit 3 (Fredericksen 1994:126). No major differences in point size are present among units (Table 4). Table 5 presents data showing that 64% of points possess more than 50% retouch coverage, with 17.5% having retouch scars over all surfaces. This stands in contrast to Umleang where only 24% of points have greater than 50% of their surface area retouched. Examination of the orientation of retouch on the Emsin pieces (Table 6) demonstrates an emphasis on modification of three faces of the implement. The majority (140 of 162) of medial and distal point pieces which bear retouch scars on three faces exhibit a triangular cross-sectional shape (Figure 8). In Emsin the focus was therefore on the manufacture of triangular points from blade flakes. Points were manufactured from both triangular corner and trapezoidal blades, the latter requiring more flaking to achieve the desired product.

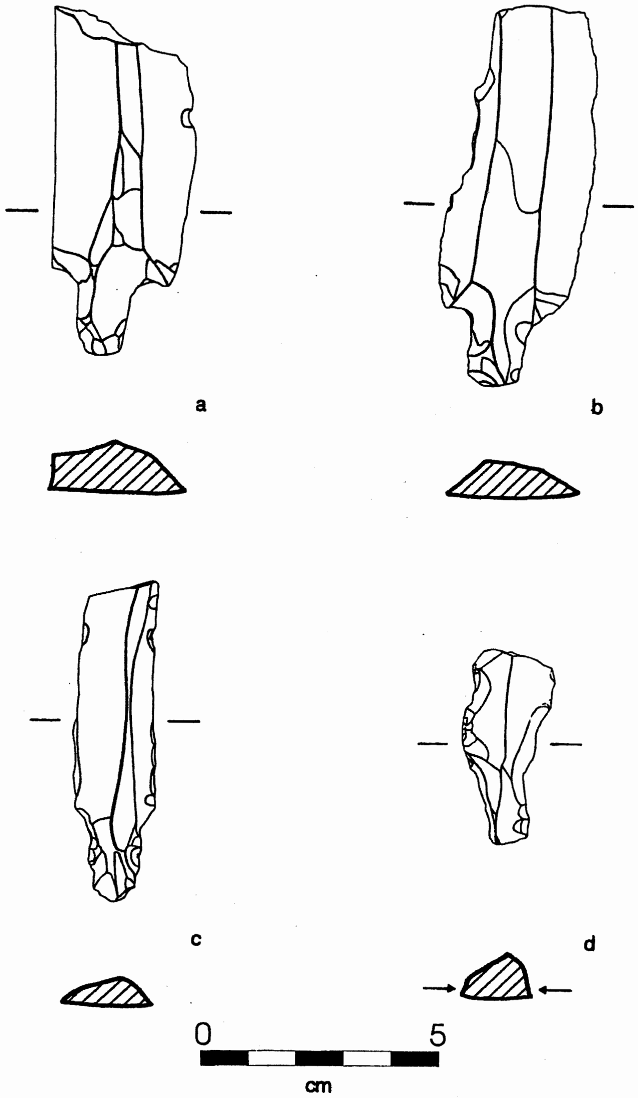

Figure 6: Stemmed points from Umleang, all Unit 4. Arrows indicate retouched faces, scale in cm.

Manufacture was carried out by the application of bidirectional flaking initiated from the margins and dorsal ridges of blades, in what appears to have been a routine production technique. In the majority of cases each blade face was systematically retouched in turn, to produce the desired angle of the implement face. This resulted in a characteristic point, distinguished by an almost equilateral, triangular section (Antcliff 1988). Significantly, the distinctive "Emsin type" is not found in the more recent Umleang assemblage, where the few triangular, extensively retouched pieces are distal segments, or tips, of points. At Emsin triangular modification was extended onto the body of the point.

Sasi (GEF)

The site of Sasi is situated on the southwest coast of Lou some 200 m east of present-day Baun village. The site was discovered after a 10-25 cm deep soil was exposed beneath 5 m of tephra in the face of an eroding coastal cliff. Large amounts of pottery, obsidian and other cultural materials were associated with the buried soil (Ambrose 1988). The cliff was cut back to expose the buried soil and seven excavation squares laid out, extending over an area of close to 6.0 m^2. Deliberately placed rhyolite slabs were found across the centre of the excavated area; these had evidently been laid down to form a pavement over obsidian knapping debris. In addition to obsidian, a large quantity of shell and bone (mainly fish) and pottery was recovered from the soil horizon. Sasi therefore represented a single-phase living site, at which a range of domestic activities as well as obsidian knapping was undertaken.

Ambrose (1988) has discussed the dating of Sasi in some detail. Only two of the six radiocarbon samples submitted for the buried soil produced reliable age estimates. The dates are 2070±80 bp (ANU 3014) and 2090±100 bp (ANU 5398). Occupation is considered to have taken place around 2100 years ago (Ambrose 1988:489).

Investigation uncovered 747 transversely snapped point segments distributed across the seven excavation squares. Quantitative analysis was carried out on 376 of these segments, comprising all pieces from Squares B (including composite collection from A/B), D and F (including F/G). The mean dimensions for this sample are presented in Table 7. These are close to the dimensions of points in Emsin but fewer pieces from Sasi exhibit extensive retouch (39% of points have greater than 50% retouch coverage). There was evidently also little emphasis on modifying the entire point; only two pieces (distal segments) have been entirely retouched (Table 8). Seventy seven points have retouch on three faces (Table 9) but only 27 exhibit a triangular cross-sectional shape. The impression obtained from examining the Sasi assemblage is that no preference was given to the manufacture of either triangular or trapezoidal points. Retouching was undertaken in a similar way to Emsin (i.e., bidirectionally from the margins of the parent blade) but this appears to have been carried out to reduce the overall width of the implement, and to form a sharp tip (Figure 9). All Sasi points are segments which were broken during various stages of the manufacturing process, so if production was directed to making triangular points this form should be far better represented than it is. Certainly, a much higher proportion of points exhibiting complete retouch scar coverage should be present. The conclusion drawn is that obsidian manufacture in Sasi and Emsin was directed to producing morphologically different implement types.

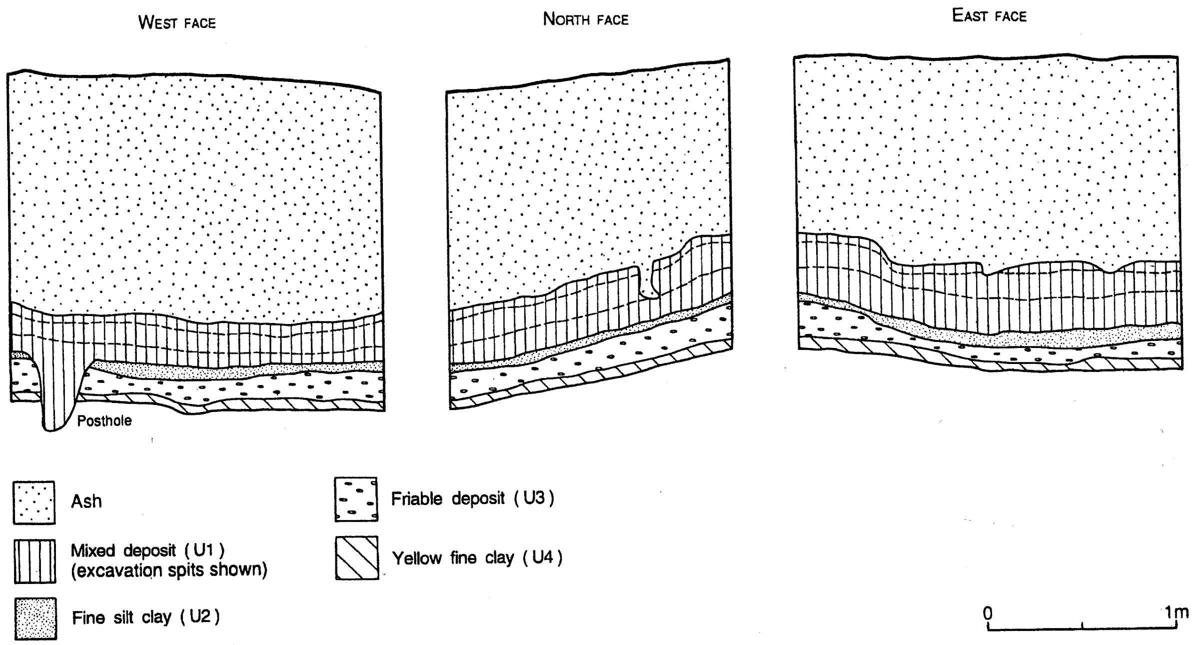

Figure 7: Emsin excavation section, Square B.

Table 4: Emsin: count and mean dimensions (mm) of points by excavation unit

	UNIT 1	UNIT 2	UNIT 3	UNIT 4
N	124	44	149	3
Length	56.5 *SD 26.6*	60.8 *SD 22.0*	64.1 *SD 23.0*	44.2 *SD 11.3*
Medial Width	15.6 *SD 7.1*	17.1 *SD 7.1*	17.3 *SD 6.6*	11.0 *SD 1.0*
Medial Thickness	12.2 *SD 6.1*	13.2 *SD 5.1*	13.1 *SD 4.5*	8.1 *SD 2.5*
Maximum Width	17.8 *SD 7.9*	19.0 *SD 7.9*	19.4 *SD 7.1*	11.5 *SD 1.0*
Maximum Thickness	14.0 *SD 6.6*	14.5 *SD 5.2*	14.6 *SD 4.8*	10.1 *SD 2.1*

Table 5: Emsin: extent of retouching on points by excavation unit

	UNIT 1	UNIT 2	UNIT 3	UNIT 4
<25%	5	1	11	
25-50%	35	24	37	1
50-75%	36	7	52	1
75-99%	20	6	28	
100%	28	6	21	1

Table 6: Emsin: orientation of retouch on points by excavation unit

	UNIT 1	UNIT 2	UNIT 3	UNIT 4
One Face	21	13	29	1
Two Faces	37	11	42	
Three Faces	64	20	76	2
Four Faces	2		2	

SUMMARY

The three Lou sites represent a period of obsidian point manufacture extending back more than 2000 years. The origins of this technology may lie further back in time than occupation of Sasi but on Lou such evidence is likely to be buried beneath many metres of volcanic tephra. Significant changes are evident among the three Lou sites. Perhaps 400 years after Sasi was buried by ashfall, Emsin witnessed the production of a more standardised triangular point form. Perhaps 900 years after the abandonment of Emsin the occupants of nearby Umleang were engaged in manufacturing less standardised points, as well as a distinctive stemmed type. This sequence of change is summarised in Table 10. The Emsin assemblage stands out for the application of extensive retouching to produce triangular points. Most points in both the Sasi and Umleang assemblages possess less modification and present no indication of a preference for manufacturing a particular cross-sectional shape.

The regularity of production at Emsin can be illustrated by comparing quantitative values of maximum width and maximum thickness. These variables are chosen as measurement based on technologically relevant attributes (such as implement length or medial measurements) are of limited use in comparative analysis when all points have been transversely broken. Table 11 sets out coefficient of

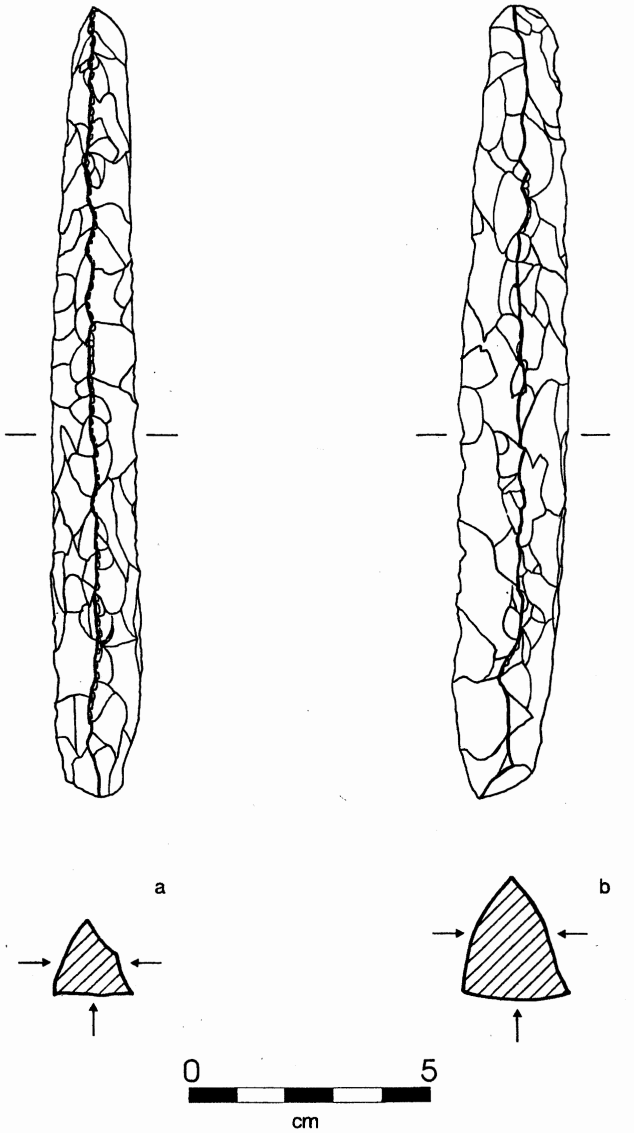

Figure 8: Points from Emsin a Unit 1; b Unit 3 (arrows indicate retouced faces, scale in cm).

Table 7: Sasi: count and mean dimensions (mm) of points

N	376
Length	64.9 *SD 27.0*
Medial Width	17.0 *SD 8.0*
Medial Thickness	9.6 *SD 3.4*
Maximum Width	19.2 *SD 9.2*
Maximum Thickness	11.0 *SD 3.8*

Table 8: Sasi: extent of retouching on points

<25%	77
25-50%	153
50-75%	126
75-99%	18
100%	2

Figure 9: Sasi: orientation of retouch on points

One Face	125
Two Faces	173
Three Faces	77
Four Faces	1

determination (r^2) values for the correlation between maximum width and maximum thickness on points grouped into retouch categories. The r^2 values demonstrate a strong correlation between maximum width and thickness on those Emsin points which possess more than 75% retouch. Clearly, in this site thickness and width decreased proportionally as points progressed through the stages of manufacture. This contrasts the picture for Sasi points, which exhibit a low correlation between maximum width and thickness for pieces exhibiting more than 75% retouch. The four Umleang points with extensive retouch exhibit a similar high correlation as Emsin, although this must be accepted with a degree of caution given the small sample size.

An argument could be advanced that differences among the assemblages reflect inter-assemblage variability in the stages of point manufacture. Spatial segregation of the various stages of stone implement manufacture can register as a temporally variable archaeological signature among sites. This can be misconstrued as demonstrating chronological variation in implement production. Some indication of a focus on various stages of production is exhibited in different occupation episodes at Umleang and Emsin (Fredericksen 1994:142). However, there is no evidence that manufacture was entirely restricted to a specific stage or stages of blade/point production. All production stages are represented in the Lou sites, from core preparation to blade retouching.

PROPOSITIONS ON VARIATION IN PRODUCTION

What factors might lie behind this picture of inter-site variation in point production? One possibility is that the diachronic pattern is in reality a manifestation of different aspects of unchanging but synchronically highly variable production. The issue of synchronic *versus* diachronic variability presents particular challenges for archaeology in the Admiralty Islands, where large-scale spatial excavation has yet to be carried out. Points of the Umleang, Emsin and Sasi "types" may have been manufactured in different places at the same time. However, there is some evidence to the

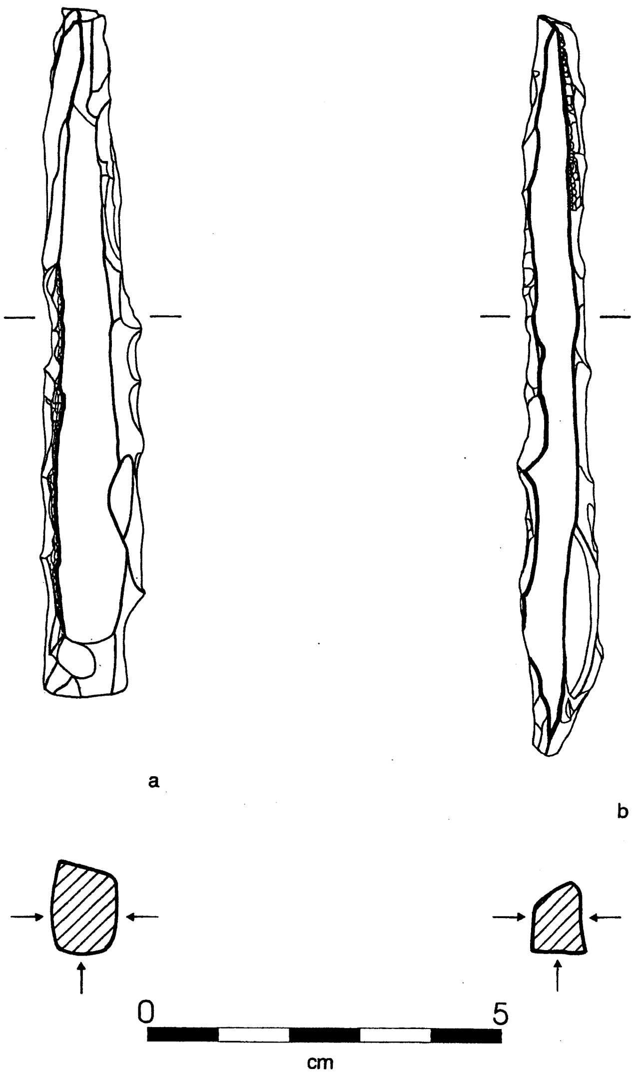

Figure 9: Points from Sasi (arrows indicate retouced faces, scale in cm).

contrary. Points in a small obsidian assemblage recovered from the Pisik School site (GBC) most closely resemble the Emsin form, with which they are associated in time and space (see Fredericksen 1994:128, 144). On current evidence, a case can be made that variations in the Umleang, Emsin and Sasi point assemblages represent an actual chronological change in production on Lou between *c.*2000 BP and recent prehistory/protohistory.

It seems clear that more time was invested in the production of each point at Emsin in comparison with Sasi. There is no obvious technological reason why this should be so. If Emsin points were intended as weapon tips there would be little functional advantage in producing a standardised, elaborately shaped form. Experiments by Pope (1923) have demonstrated the redundancy of retouching obsidian projectile points. The seemingly unnecessary elaboration of an artefact form brings us to an explanation based on "social" factors. I have previously suggested (Fredericksen 1994:167) that populations with control over obsidian deposits, or strong social or economic links with groups controlling deposits, may have produced distinctive obsidian implements to demarcate themselves from neighbouring groups. This may have been carried out within the context of production for trade as well as local use, although at neither Sasi nor Emsin is there strong evidence for the large-scale manufacture which might be expected for specialist production (Fredericksen 1994:165). Nevertheless, retouched point segments have been found outside Lou; points have been recovered from the island of Buka in a possible 2500-year old context (Wickler 1990:147), and from New Ireland in deposits approximately 1700 years old (White and Downie 1980:Figure 7). These distant occurrences demonstrate that this implement form was moved within a wide distribution system (or number of systems).

Closer to home, large numbers of Emsin type points have been identified in a production context at 25 undated surface sites on southwest Manus (Kennedy 1997). Kennedy has argued that the presence of Emsin type points in southwest Manus and on Lou would not be expected if point morphology was a social marker, especially if these two obsidian-bearing regions were "in competition" (1997:94). However, many would question whether we can project the ethnographic picture of specialisation of access and concomitant economic competition this far back into the past, especially when archaeology has yet to show whether southwest Manus obsidian was ever distributed more than a few kilometres from its source (Fredericksen 1997:68). The fact that all southwest Manus points thus far subjected to characterisation analysis have proven to have been manufactured from Lou obsidian (Kennedy 1997:85) instead lends support to the idea that at around 1600 years ago, (a date based on the presumed time of appearance of Emsin points on Lou), communities on Manus and Lou with direct access to obsidian were engaged in a form of socio-economic relationship which was quite distinct from the competition, specialisation and integration configuration reported for the Admiralties in the nineteenth and early twentieth centuries. The existence of similar obsidian point technology on both Lou and southwest Manus may have been an aspect of this alternative form of prehistoric engagement.

Somewhere over the millennium or so between abandonment of Emsin and occupation of Umleang a fundamental shift took place in the context of retouched point manufacture. This saw a simplification of technology, involving a reduction in the amount of retouching and the

Table 10: Relationship between point shape and extent of retouching (excludes 9 Umleang points on which retouch is restricted to stem)

		<25%	25-50%	50-75%	75-99%	100%
UMLEANG	Triangular	14	23	9	4	1
N=76	Trapezoidal	9	10	6		
EMSIN	Triangular	11	68	64	51	56
N=320	Trapezoidal	6	29	32	3	
SASI	Triangular	40	86	60	8	2
N=376	Trapezoidal	37	67	66	10	

Table 11: Values for r^2 calculated on maximum width and maximum thickness of points grouped according to extent of retouching

	<25%	25-50%	50-75%	75-99%	100%
UMLEANG	0.21	0.35	0.46	0.88	
EMSIN	0.26	0.48	0.60	0.88	0.91
SASI	0.30	0.58	0.66	0.31	

appearance of pieces on which modification was carried out for purely functional reasons, i.e., to facilitate hafting and to form a sharp tip. One possibility for this change, which I have previously canvassed (Fredericksen 1994), is that simplification was tied to a need to increase the volume of production, perhaps in relation to growing inter-group hostility. Pressure to increase production would see a reduction in the amount of time expended on each point, resulting in the loss of non-functional elaboration. Kennedy (1997:95) has proposed an alternative scenario, in which technological simplification and associated socio-economic fragmentation is considered to have promoted an increase in the number of forms based on superficial stylistic differences.

Discussion of the factors behind technological change will have relevance to the wider issue of the context of production and distribution. Obsidian spear and dagger points produced on Lou in the nineteenth century were partly, but not entirely, distributed within a network controlled by specialist maritime traders. Production may have been under the control of craft specialists, although this aspect of manufacture had disappeared by the last decade of the 1800s. Whether prehistoric or even protohistoric production and distribution was similarly organised remains unclear. If simplification of obsidian blade technology was a response to changing social and economic factors then the loss of a relatively complex technology between 1600 and 700 years ago could be interpreted as a reflection of wider socio-economic change, perhaps heralding the first moves toward group-specific control of production. However, explicating the links between technological change and reorientation of the overarching system of production and distribution will require much more research. Nevertheless it does seem clear that we cannot simply push the ethnographic picture back into the prehistoric or early historic past, and uncritically invoke late nineteenth and twentieth century notions of economic "competition" and "integration" when interpreting archaeological evidence of earlier production and distribution.

CONCLUSION

Nineteenth century visitors to the Admiralty Islands encountered an obsidian spear technology that was based on large, minimally shaped flakes and blades. This contrasts the early prehistoric blade technology which, from evidence from the archaeological sites of Sasi and Emsin, was characterised by an application of extensive retouching to produce well-defined point types. The link between these separate ethnographic and archaeological pictures comes in the Umleang site, a locality occupied into protohistoric times and possessing retouched blades with mainly relatively little modification. Here the evidence shows that extensively retouched points may have given way to simplified forms sometime between first occupation of the site and final occupation of Emsin, a time span encompassing the period between approximately 1600 and 700 years ago.

Whether this technological change was associated with a restructuring of the wider socio-economic system is a question that needs to be urgently addressed. The small number of assemblages on which our propositions are currently based limits how far we can explore ideas on variation and change. Hypotheses for the reasons for change in obsidian point form, and any association with change in production and distribution, must remain speculative until more information is available on the rate and nature of technological change across time and space. Obtaining this information must remain a major objective of any further archaeological research into obsidian blade technology on Lou and elsewhere in the Admiralty Islands.

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NOTE

1. Age determinations from obsidian hydration measurement are considered equivalent to calibrated radiocarbon dates, hence the use of BP. The radiocarbon dates given in this paper are uncalibrated.

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