

Living Lithics: ethnoarchaeology in Highland Papua New Guinea

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This paper represents the joint work of two very different specialists. The fieldwork was undertaken by Sillitoe as part of his ethnographic research in Papua New Guinea (PNG) and the interpretative work was done by an archaeologist, Hardy. The work described here represents some of the last direct evidence from users of stone tools. It shows how procurement, manufacture, use, storage and the relative roles of men and women in the process was dependant on what other materials were available – material often sadly elusive in the archaeological record. Discard did not reflect use, but was often guided by the thoughtful wish to avoid cut feet.

Keywords: Papua New Guinea, material culture, lithics, discard, gender.

Introduction

Worked stone is of paramount importance in much prehistoric archaeology as it is frequently the only cultural evidence to survive. For the same reason it often dominates interpretation, with lithics afforded a status that is unlikely to reflect their true place within the material culture of which they formed a part (Hardy & Sillitoe 2003). The examination of modern communities can often reflect the role played by stone tool-making in the broader material culture. The modern ethnographic study of stone tool traditions are concentrated in a few geographical areas, namely Australia (e.g. Allchin 1957; Elkin 1964; Gould 1980; Gould, Koster & Sontz 1971; Hayden 1977, 1979; Tacon 1991; Thomson 1964), Central America (e.g. Gaxiola & Clark 1989; Clark 1991; Hayden 1987) and the New Guinea Highlands (e.g. Blackwood 1950; Brass 1998; Cranstone 1971; Godelier & Garanger 1973; Hampton 1999; Petrequin & Petrequin 1988; Pospisil 1963; Sillitoe 1979, 1982; Strathern 1969; Watson 1995; White 1968, 1979; White & Thomas 1972; White & Modjeska 1978; White *et al.* 1977). While it was still possible until recently to find occasional stone tool-users in other regions (e.g. Burton 1984; Gallagher 1977; Miller 1979; Runnels 1975, 1976), it is arguably now impossible anywhere to find people using stone for most everyday tasks in preference to metal tools.

Until the early 1980s the Wola horticulturists of highland Papua New Guinea (PNG), were still routinely using flake stone tools, and during anthropological study a lithic assemblage was gathered on request (Sillitoe 1988). It consists of nodules, used flakes and waste material

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and represents probably the last example of its kind of a lithic tradition once found throughout the highland region up to the ethnographic present. However, the majority of Wola material culture, including all clothing and decoration, all musical instruments, all evidence for hunting and food processing, axe hafts, agricultural tools, fire lighters, bags and containers would be unlikely to survive archaeologically. Flaked stone was an integral but secondary part of their material culture: such stone tools played no direct part in food production and stone working was afforded no status. The Wola only viewed their flaked lithic artefacts in relation to their use, while storage and discard behaviour followed no regular pattern and did not conform to widely used archaeological categories such as 'curated' and 'expedient' (Binford 1977, 1989; Hayden 1987; Parry & Kelly 1987). Men were the main makers and users of stone tools, but women sometimes made and used them too. Much of this has been noted before in other areas of the New Guinea highlands (Strathern 1969; Watson 1995; White 1967; White & Thomas 1972). The new data summarised here represent some of the last that might be gathered, and by analogy, raise fresh questions about the relative importance of stone in prehistoric contexts, how it was procured, used and stored and how far it can be used to reflect gender roles.

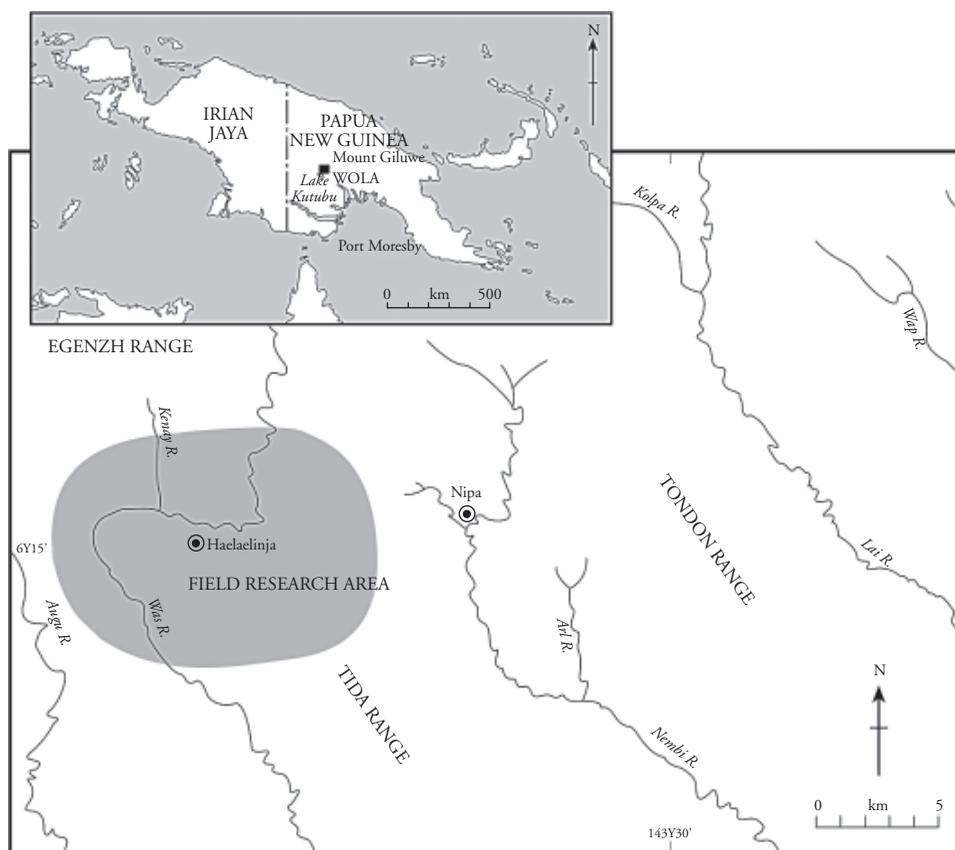


Figure 1. Map of Wola region.

Background

New Guinea has been occupied for at least 40 000 years (Groube *et al.* 1986) with the highland region probably populated by 30 000 BP (Smith & Sharp 1993; Mountain 1993). The Wola occupy five valleys, in the Southern Highlands Province (Figure 1). They live between 1600–2000 metres above sea level, along valley sides, in areas of secondary regrowth. The geology comprises mostly sedimentary rocks, mainly limestone. Geomorphological processes are active, erosion is constant, and the occasional large-scale earth movement can dramatically alter the local landscape (Löffler 1977). Lower montane rainforest occurs on mountains and in unpopulated parts of river valleys. Where cultivation has taken place, areas of dense cane grass are interspersed with the grassy clearings of fallow or recently abandoned gardens, and with the brown soil and green crops of currently cultivated plots. Sweet potato is the staple food (Sillitoe 1983) and pigs are kept. Hunting plays a minor role in subsistence. Wooden digging sticks are the predominant agricultural tools for women while men use steel axes and machetes (replacing polished stone axes) for garden preparation work (Golson 1977). Unretouched, utilised flakes are the most common artefact type in prehistoric (pre-1930) lithic assemblages with a decrease in retouch and a reduction in artefact size occurring over time (White & Thomas 1972; Holdaway 1995). The present assemblage is in line with this tradition.

Procurement of raw material

The raw material for lithic production is chert that occurs in nodules, up to 50cm long throughout the local limestone. The Wola distinguish between two types: *aeray* (lit: chert) and *aeraytol* (lit: chert-dirt). Only *aeray* was used for tools, *aeraytol* does not take a sharp edge when knapped. *Aeray* varies from dark to light grey and has a shiny glass-like lustre. Colour is used as an indicator of quality; darker *bombray* (lit: black) was preferred but people often settled for the first *aeray* they found, even if it was the lighter *hundbiy* (lit: any colour from grey to khaki).

Although *aeray* nodules are not abundant, it takes only about ten minutes to find one if one knows where to look.

The best places are stream beds where nodules weather out of the limestone. Alternatively nodules occur in heaps in some current and abandoned gardens, having been cleared from stony soil during garden preparation. Hammerstones were of basalt (*huwbiyp*), the only local stone strong enough to knap chert without shattering. This occurs along and near watercourses and in a soil type called *tiyptiyp*



Figure 2. Testing raw material.

where the Wola say it “grows”. Alternatively hammerstones can be taken from a *mumu*, a type of earth oven located inside house yards. Such hammerstones were usually returned to the ovens when no longer needed. Hammerstones weigh about 1-1.5kg.

Everyone had free access to nodules, not only in their neighbourhoods, but also in those of other communities. *Aeray* is easily found, there was no restriction of access nor had it any transactable value. When a man needed chert, he collected it himself or sent someone, maybe a child. He first had to determine whether or not a nodule was suitable; both *aeray* and *aeray tol* have the same white powdery cortex, or *shongol* (lit: skin). *Aeray* is the heavier, and its weight might be tested before being broken open. Recently the nodule was given a sharp tap with the heel of a steel axe; previously it would have been hurled against a nearby rock or hit with another stone (Figure 2). The shattered fragments were inspected and, if suitable for tools, were collected and used without further modification while other large flakes and the remaining nodule might be collected and knapped later. Women rarely collected nodules directly from source; if a woman needed a tool she most likely approached a male relative or knapped a flake off a core or nodule stashed near her homestead.

Knapping methods

Further knapping was often done at home, adjacent to the house or to one side of the house yard. Knapping did not take place where people usually walk, because of the danger of people cutting themselves on waste fragments. Sometimes a single flake was knapped carefully indoors, if for example it was raining outside. There is a Wola superstition which signals that it was unwise to work indoors; “*aendon aeray pokay sin mowmaek saen pop bukao*” (lit: “inside chert flake if pearl-shell debt repay make”) or “if you flake chert indoors someone from whom you have borrowed a pearl shell will come along and demand repayment in strong terms” (to your embarrassment). If a nodule was too heavy to hold comfortably in one hand it was placed on the ground. Men said the best way to flake chert was to hold the nodule in one hand with the striking edge nearest the body. On the few occasions women knapped they used the bipolar technique. Wola men did not use bipolar knapping saying it caused the nodule to fracture uncontrollably. No standard reduction method was used; cores were not prepared before knapping and men

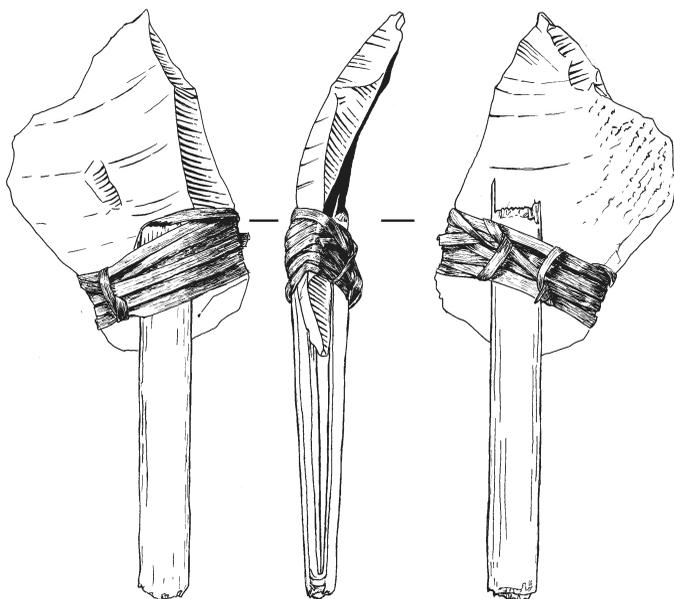


Figure 3. Hafted tool.

just looked for irregularities and kept striking until a piece the required size and shape was produced, usually in a few seconds. The usual practice was to strike off one or two flakes for the job in hand and then stash the core for possible future use.

Tool selection and use

The only criterion for tool selection was suitability for the proposed task. The edge, size and to a lesser extent shape were important considerations when selecting a flake. For some jobs, large pieces that could be held firmly were preferred (e.g. for scraping a bow or digging stick) while small pieces mounted in a handle were selected for other jobs (e.g. engraving, paring rattan strands) (Figure 3). For boring holes, pieces with points or *wil* (lit. ‘nose’) were used (Figure 4). Tools had a variety of uses (Figure 5) but a short lifespan. Flakes were normally used for one purpose only and indeed a number of flakes were sometimes needed to complete one job. Blunt edges were never resharpened, but if a flake was big enough, it was sometimes reused as a core. Flakes were not modified to facilitate easier hand-grip or hafting.

Tool use was carried out either in the house yard, garden or more rarely inside the house. Sometimes tools were used when walking, particularly for laborious tasks such as smoothing an axe handle. While stone tools did not feature highly in an extractive capacity, they did feature widely in a maintenance or secondary capacity. Of the 150 artefacts that made up the portable Wola material culture, 86 were still sometimes made with flake stone tools in the 1980s (Sillitoe 1988). These included most tools, weapons, consumption



Figure 4. Carving design on bamboo tobacco pipe.



Figure 5. Cutting off bamboo internode to make a cane headband.

utensils, musical instruments and around half of all clothing and finery. Only body ornaments, bags and cosmetics rarely demanded stone tools in their manufacture.

Storage and discard

Tools were not maintained or modified in any way, nor were any specific tools considered individually important, but nodules and flakes were regularly stored, both used and unused. Sometimes stored artefacts were big enough to be reworked but small, unused pieces were also stored. The Wola often kept unused flakes and cores for years; they had no identifiable pattern of storage and discard and it would be impossible for the outsider to distinguish which tools were stored and which discarded; even tools with blunt edges may be stored for later use as cores. Small flakes were sometimes stored; they could also be carried in a man's string bag, along with tobacco, and other small objects. This blurring of the divide between storage and discard has been noted in other regions of the world (Deal & Hayden 1987; Gallagher 1977; Torrence 1986). When tools were finished with, permanently or maybe for later reuse, they were disposed of carefully in places where people were unlikely to step on them, such as at the base of trees or under house eaves; it was considered irresponsible not to do so. Reasons given included the danger of people cutting their feet and the possible wish to find the tool again.

Archaeologists sometimes seek to determine activity areas on the basis of the distribution of stone artefacts (e.g. Flannery 1986; Grace 1992). The Wola evidence suggests that it is unlikely that tools would have been discarded within a working area. Most tools found on archaeological sites may likely represent those (probably a tiny sample) that have been inadvertently lost, broken or put aside. Further afield, Gould (1980) estimates that stone tools occurring at habitation base camps in western Australia represent 0.05 per cent of used tools with the remainder discarded outside habitation zones, while Hayden (1979) notes that open-air ethnographic sites do not include areas set aside for specific activities. Accidental loss certainly occurs (Deal & Hayden 1987), and in New Guinea people often find polished axe heads and caches of flakes when clearing gardens, building houses, etc. Brody (1981) notes that in north-east British Columbia, the jumbled scatter of paraphernalia lying in front of houses, and apparently discarded in a random and messy fashion, is in reality a store of spare parts, objects left purposefully nearby to be found, modified and reused at some later date. The hazy parameters of Wola attitudes to the storage and discard of stone tools suggests a similar attitude to their objects.

Did hunter-gatherers treat their tools in the same way? Hunter-gatherers normally lived and moved within a territory, returning habitually to the same sites (e.g. Brody 2000). It is possible that objects left behind included both discarded and lost tools, as well as material that was stored or put aside, and there may be no clear distinction between these. Hayden (1979) points out that in Australia, artefacts were frequently placed around campsites in an apparently random fashion, to facilitate retrieval.

Wola attitudes towards their tools are similar to those observed ethnographically in many other parts of the world and can be compared to today's parent who will not discard a broken lawnmower in case it proves useful for the go-cart they plan for their child. This suggests that artefact-based spatial analysis is complex and needs to take into account the possibility that artefact distributions are not necessarily what they seem; an apparently exhausted piece may

well have a different meaning within another use context. Hardy (in press), examining use-wear traces on artefacts distributed over the Mesolithic site of Camas Daraich, Scotland, found that many appeared to have been used in a minor way. These artefacts may well represent an archaeological example of informal storage. Possibly the only way one can be sure that an artefact has reached the final end of its useful life is when a large number of similar and obviously well-used artefacts are found, such as the tiny nubs of American projectile points though even these may have had a different meaning or use, in a different context (Flenniken & Wilke 1989).

Social aspects and terminology

Among the Wola knapping was not a social activity. Individuals most often knapped alone, though men occasionally recited a refrain followed by a whistle made by drawing in breath, called *uwt kay*, as they knapped. In this, men were expressing their wish that the chert they were knapping would fracture cleanly to give good sharp flakes. It was not a ritual spell (called *namonk* – Sillitoe 2002), more an expression of desire. The lack of social interaction was probably related to the speed and *ad hoc* nature of knapping. Even though flaked tools appeared to be considered low value items by the Wola, their presence in at least two mythical stories (Hardy & Sillitoe 2003) suggests lithics had a certain cultural significance. Few terminological distinctions were made between tools; all were called *aeray*, after the raw material. In contrast, the Wola had a wide functional vocabulary. There were, for example, six different phrases for cutting related to raw material worked on, the objective of the cutting and the method of using the flake. This suggests that it was the tool's use, rather than the tool itself, which was important, as has been noted before (Strathern 1969; White 1967; White & Thomas 1972).

Gender

Flint knapping has sometimes been considered exclusively male (e.g. Flannery 1986) though this was clearly not the case (Gero 1991). Among the Wola, when a woman needed a stone flake, she might have knapped it herself or obtained it from a male relative. Although stone tool use was more common among men, Wola division of labour is complex. Within their material culture, some objects are made and used exclusively by one sex, some made by one sex and used by the other, while others can be made and/or used by both sexes. Although the Wola themselves do not remark on it, the manufacture of objects can be divided into five categories, with lithics falling into the 'men mainly made' category (Sillitoe 1988). The Wola explain their sexual division of labour by referring to 'strong' and 'soft' tasks; men generally carry out the 'strong' tasks, e.g. making and using stone tools, bows and arrows and musical instruments. The use of 'strong' and 'soft' is not only physical, both women and men say women are 'softer' thinking and are unable to cope with many tasks. In reality, women carry out many vital tasks while men do a wider range of non-subsistence related tasks, such as making items of personal decoration. Women made all string, which took up almost 50 per cent of their manufacturing time, clothing and consumption utensils. Although the list of women's objects is shorter, the amount of time they spend on manufacture is 75 per cent greater.

The objects made by men are more likely to survive archaeologically, being of ‘strong’ materials, particularly stone and bone. This occurs in other cultures too. For example, among the !Kung San, women’s daily equipment included ostrich eggs, antelope stomach sacs, wooden digging sticks, carrying bags, nets, cracking stones and grinding tools (Lee 1979) few of which might survive archaeologically. More widely, and within a hunting and gathering context, women spend more time gathering, preparing food and until recently, manufacturing string and clothing (Blaffer Hrdy 2000; Owen 2000; Wayland Barber 1994). Wola women use mainly wooden tools for agriculture and their traditional clothes are all made of organic materials. The string they spent so much time making was used both by men and women to make a wide range of objects, none of which would survive archaeologically.

If Wola sites were excavated after millennia of decay, the finds are likely to represent a tiny, almost entirely male, proportion of their material culture with the under-representation of women in the archaeological record concerning not only the things they made, but their work too. This bears on the visibility of women in the archaeological record, a subject of long-standing debate (e.g. Dahlberg 1981; Gero & Conkey 1991; Owen 2000; Dobres 2000).

Discussion

Torrence suggests (1989) that stone tools do not contribute as much as they could to our understanding of human behaviour. One way of addressing this is to examine them within the contexts that inform human behaviour and the varying requirements people had of their stone tools. The simplicity of New Guinea lithic technology is not recent. Others have suggested reasons for this (e.g. White 1977), though focusing on stone tools alone. Lithics were integral to, but a secondary part of, Wola material culture. This, plus abundant local raw material, may account for their low status. Binford observes “*where an instrumental technology is primarily manufactured from non-lithic raw materials ... the lithics may in comparison appear impoverished and crude*” (1989:466). Where this is true, the question remains, why? A wider examination of Wola life suggests three points that may, when taken together, account for the evolution of the Wola lithic tradition.

- 1 *Local resources.* People were not dependant on stone as a primary raw material (Hutterer 1977; Strathern 1969). The local region offers ready access to several different environments. Wola country has two major ecological zones, man-made cane grassland and montane forest. From them, the Wola can obtain all but 34 of their 255 individually named raw materials (not including food) (Sillitoe 1988). These include many good substitutes for lithics such as bamboo, tropical hardwood, and animal products (tusks, bone, teeth and claws). Bamboo, which can be quickly made into very efficient implements, was a useful alternative to stone for cutting.
- 2 *Food.* Highlanders were able to meet their food requirements easily and with scarcely any direct use of flaked lithics. Garden vegetables are available all year and the domestic pig is the main source of meat. Some animals are hunted, but hunting is not important

to subsistence (Pospisil 1963; Salisbury 1962; Sillitoe 2001). Wild pig is the largest and most dangerous animal hunted and people use their most effective weapons to hunt it, or employ other techniques such as trapping. Though hunting is relatively danger-free, the same equipment is used for warfare, thus relating it to danger. Hunting equipment comprises bows and arrows hafted with slivers of bamboo and palm. Stone arrowheads were not made. There is no connection between perilous activities and stone which might enhance its status. The all-important agricultural tools are made predominantly of wood. Not only is more care taken with these extractive tools, they also take considerably longer to make (e.g. digging sticks took on average four hours using stone tools) (Sillitoe 1988).

- 3 *Other tools.* Polished stone axes/adzes were used in a wide range of extractive and maintenance tasks (Bulmer 1977; Bulmer & Bulmer 1964; Strathern 1969; Sillitoe 1988); they reduced the need for a varied repertoire of task-specific stone tools and had long life spans, often lasting a person's whole life. Torrence (1989) notes a worldwide simplification in lithic technology correlating with the onset of Neolithic economies and the introduction of polished stone axe traditions. One reason for this could be that a wide range of functionally specialised flaked stone tools is replaced with the highly versatile polished stone axe eliminating the need to rely on many specialised tools.

Wola lithics have much to teach archaeologists regarding the place of stone tools within society and material culture. While lithics form a unique resource for studying prehistory, among the Wola chert is only one among 255 types of raw material. Stone may not necessarily have been as significant to the user as it is to archaeologists. The use of bamboo as an alternative to stone, combined with the versatility of the polished stone axe, reduced the need for a wide range of functionally specialised flake tools. Even at the high latitude of Scotland, with its relatively impoverished resource base, alternative materials for cutting included seashell fragments and bone (Hardy & Wickham-Jones 2002). Clues to the relative importance of stone lie in a detailed understanding of the local resource base, evidence for subsistence strategies and the types of tools found. Although the lithic technology of the Wola appears simple, it was not unsophisticated. On the contrary it met demands adequately when examined within its social, economic and environmental context. Lithics were only a small, indeed secondary part of Wola material culture, and this material culture reflected a sound and balanced relationship between people and environment, based upon a profound knowledge.

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