RESEARCH ARTICLES

Feminine Knowledge and Skill Reconsidered: Women and Flaked Stone Tools

Kathryn Weedman Arthur

ABSTRACT
Archaeologists continue to describe Stone Age women as homely bound and their lithic technologies as unskilled, expedient, and of low quality. However, today a group of Konso women make, use, and discard flaked stone tools to process hides, offering us an alternative to the man-the-toolmaker model and redefining Western “naturalized” gender roles. These Konso women are skilled knappers who develop their expertise through long-term practice and apprenticeship. Their lithic technology demonstrates that an individual’s level of skill and age are visible in stone assemblages. Most importantly, they illustrate that women procure high-quality stone from long distances, produce formal tools with skill, and use their tools efficiently. I suggest in this article that archaeologists should consider women the producers of Paleolithic stone scrapers, engaged in bipolar technology, and as such perhaps responsible for some of the earliest-known lithic technologies.

Keywords: women, stone tools, skill, gender, technologies

During the late-19th and early-20th centuries, ethnographers described women as skillful stone toolmakers (Bird 1993; Gasindie 1931:353; Holmes 1919:316; Lothrop 1928; Man 1883:380; Mason 1889; Murdoch 1892; Nelson 1899; Roth 1899:151; Sellars 1885:872). However, during this period, scientific racism and sexism were at their height (Harding 1998:78–80; Stepan 1986), and ethnographic accounts of women’s stone-tool technology served only to reinforce women’s low status. By the mid-20th century, ethnoarchaeological studies of stone-tool technology focused on men and mentioned women only in passing (Ainston 1929; Albright 1984:57; Binford 1986; Elkin 1948; Gallagher 1977; Gorman 1995; Gould 1980; Hayden 1979, 1992; Latta 1949:139–141; MacCalman and Grobbelaar 1965; Sillitoe and Hardy 2003; Stout 2002; Toth et al. 1992; White and Thomas 1972). It is not a coincidence that this change in interpretation coincided with the end of colonialism in most of the world, as well as the shunning of scientific racism and the recognition that we all share a common origin in Africa. Our common humanity served to heighten archaeological models of homogeneity and universalism, especially concerning the division of labor. In our Western-centric reconstructions of the past, women bear children while men hunt, butcher, explore, lead rituals, and produce technology—including stone tools.

Some archaeologists now identify Paleolithic women as small-game hunters, butchers, fishers, clothmakers, and ritual specialists (Jarvenpa and Brumbach 2006; Owen 2005; Soffer et al. 2001; Wadley 1998), but recognition of women as formal stone toolmakers is still rare (for an exception, see the description of a female flintknapper at Colha, Belize [Wilson and Meadows 1997]). Even when archaeologists identify (Hayden 1992) and illustrate (see, for critique, Gifford-Gonzalez 1993; Moser 1993) women as hideworkers, they still fail to associate them with the ubiquitous Paleolithic stone hide-scaper technology (Arthur...
Instead, archaeologists continue to reaffirm Western perceptions of women’s technology as low skilled and close to home by describing Stone Age women as producers of expedient stone tools made with low-quality local materials (see Gero 1991; see also Bruhns and Stothert 1999; Casey 1998; Fischman 1992; Kehoe 2005; Owen 2000; Sassaman 1992).

In this article, I present my interviews and observations with 16 stone-tool-producing Konso women living in southern Ethiopia (see Figure 1), which demonstrate that women are highly proficient and skillful in stone-tool technology. This community of Konso women depends on lithic (stone) technology for their livelihoods, but they are not passively stuck in the Stone Age. They intentionally shun glass and iron implements because their experience reveals that nonlithic materials tend to rip delicate hides and soften ineffectively. Most Konso people consider the skills and tasks used in stone-tool production and use as feminine, and therefore women are the primary knappers (craftpersons who make flaked stone tools). These women learn lithic technology within a restricted knowledge–based system, procure long-distance stone resources, produce intricate and complex tools, and efficiently use and rejuvenate stone tools to process animal hides. If there is great variation in gender ideology and technological knowledge in the present, then there is no reason to restrict our portrayal of women in the past as living in a Western industrial–style Stone Age. I propose that Stone Age women played a major role in developing and transforming stone-tool technology. Furthermore, I suggest that they spent years learning and practicing the art of knapping to become skilled, respected, and knowledgeable experts.

**XAUTA IDENTITY AND GENDER**

To enter the nucleated hilltop community of Gocha in the Konso district, I wove through stone terraces full of millet, maize, beans, and peas. On reaching the summit, a remarkable woman greeted me. She daily produced and used stone tools to create fine leather clothing, which earned her community distinction. The woman said that she was Xauta, one of the two Konso endogamous hereditary groups. Many Xauta told me that they identify themselves as artisans and traders who work for Ententa to gain access to land.
Historically, most Ententa define themselves as farmers, working land they acquire through agnicentric descent (persons related through the male line; see Watson 1997). Many of the Ententa men interviewed by Christopher Hallpike (1972:141) and several others I spoke to stated that, because Xauta do not own land, they can not serve as ancestors and ritual leaders. One Xauta man informed me he was a “true Xauta”: “I have married a Xauta girl. I have good behavior. I respect culture. In the old days elders said that Xauta are separate and we do not marry, eat, drink together [with Ententa], and we are not buried in the same place [as Ententa],” (conversation with author, June 26, 2002). As Hallpike reported, “The hauda [Xauta] live hauwe (alone or separate) . . . a separate class, not fully integrated into the religious and social life of the cultivators” (1972:139).

I interviewed several Xauta women married to Ententa men, and most of these women, although living productive lifestyles, did not practice any craft until after their husbands’ deaths. However, a union between an Ententa woman and a Xauta man is rarer, as many Konso consider it unproductive. Several Ententa men—including Marcos, a teacher who collects histories from Konso elders—said that when an Ententa woman marries a Xauta man people taunt her with a song.

Kathy: What happens if an Ententa marries a Xauta?
Marcos: If an Ententa woman marries a Xauta man, they sing a Xauta man will grind and smash you like a poisonous plant.
M: What is this poisonous plant?
K: It is a plant that is eaten only during famine period. Do you understand? The union is unfertile.
K: What about the man?
M: When a [Ententa] man marries a Xauta woman, they say he shook the bracelets; he has spoiled them and is no longer respected.
K: What bracelets?
M: The bracelets worn by the Poculla [lineage heads who are political and ritual leaders and distribute land]
K: What do the bracelets mean?
M: They mean power. They mean the land. [conversation with author, July 29, 2002]

Furthermore, in conversations with several Xauta, the use of the terms grind (yokeda) and smash (kekebisa) associated with a Xauta man reveals a deeper symbolic association between Xauta and gender roles. Most of the Xauta I interviewed repeatedly assigned separate gender tasks to men and women. They stated and I observed that for the most part men engage in hammering and penetrating activities exemplified in building houses, fences, and terraces and sowing fields. Furthermore, females commonly kneel (ghlsfata) to weed, harvest crops, collect water, grind (yokeda) grain, and smash (kekebisa) grain while cooking. Craftworks including pottery-making and ironworking require grinding, smashing and mixing, and cooking of clay and rock. Thus, the majority of Xauta men and women who create or reproduce the material world do so through activities that many Konso consider feminine tasks.

Stone-tool technology used in hideworking also requires kneeling to grind and shape the stone into tools, to grind and scrape the hide, and to cook or heat treat the stone. As stated above, most Konso associate these skills and tasks with femininity, and within Konso society there are several lineages of Xauta women (instead of men) who are the primary knappers and hideworkers. Although many women told me they cook the stone to make it break more easily, several also mentioned that the Ententa called the cooked stone and the hideworkers onayda, which means worthless and unproductive. All 16 of the stone-using Xauta women I interviewed were upset by the use of the term onayda because they see their work as meaningful, even if others do not. In his earlier work, Hallpike (1972:143) suggested that, in Konso ideology, to cook earth (iron and stone) is unnatural and goes against the social order and against reproduction. In my interviews, several of the Ententa and many of the Xauta insisted that Ententa despise Xauta tasks because Ententa consider these tasks unclean, unnatural, and beneath them.

Xauta hideworkers (Kollaya) engage in feminine tasks to process wild (only in the past) and domesticated hides, producing a variety of feminine goods including skirts, hats, belts, bags, and bedding. These products—clothing worn for birth and harvest fertility ceremonies, bags that hold crops and children, and bedding and burial sheets—symbolize fertility and the human life cycle. Although the male Xauta Kollaya I interviewed scrape hides to produce bags, most of these men emphasized their past work in producing male goods such as saddles, shields, ritual belts, and hats, which did not require scraping, stone tools, or knapping. I met several Xauta men who worked hides and others who refused to learn, and each of these men resented or feared that Ententa would refer to him as Sagkota—an effeminate man.

The identification of individuals into categories of Xauta and Ententa has not remained stagnant through time, nor have Xauta craft-production tasks. Within the last decade, I witnessed a decline in the number of Xauta stone-using hideworkers from 33 in 1995 (Brandt and Weedman 1997) to only 19 (16 women and three men) in 2002. This decline is attributable to changes in government policy and economics. In the 1970s, the Marxist–Leninist government (referred to as the Derg, who ruled 1974–91) banned the production of indigenous leather clothing and increased access to factory-produced goods such as clothing, blankets, rope and bags to replace hide products. An elderly hideworker lamented that the Derg government cut her income in half because they prohibited her from making clothing. Today only 30 percent of the practicing hideworkers are young or middle aged. Most stated that they use glass for hideworking instead of stone, and they have not learned how to make clothing or scrape wild animal hides because the current government prohibits the hunting of wild animals. In addition, economic reforms have led to a dramatically increased demand for exported leather (Hasen 1996), encouraging farmers to sell
their hides through local merchants to industrial tanning shops in Addis Ababa for export. Today, the stimulation of the economy through neoliberal economic reforms and growing wealth and organization of Xauta through trade (PoXauta Fulto Association) provides incentives for Ententa to take up historically identified Xauta occupations (Ellison 2008, 2009). This would seem to exhibit a significant modification of previous Ententa-held ideologies concerning the demeaning nature of hideworking tasks. However, although some Ententa have begun to engage in merchant trade of hides, to my knowledge, no Ententa have begun to scrape hides or to knap stone. Some hideworkers express that the Ententa may want to learn crafts but still fear the stigma associated with craft production and, thus, are unlikely to pursue it.

Kathy: Why do Xauta scrape, smith, and make pots?

Hideworker: Before only Xauta do these things, Ententa do not like to do this work. The government made everyone equal and now everyone wants in their hearts to learn! Before the Derg came, the Ententa hated this work and they do not want to learn. If the Xauta do not make iron, they [Ententa] cannot farm, if Xauta do not make pots they cannot eat, and if Xauta do not scrape hides they do not sleep [they make bedding from hides].

K: What then would they do without the Xauta?

H: They would have to learn! [There is laughter.] [conversation with author, July 12, 2002]

Other Xauta hideworkers commented that, since the change in government, the Ententa have been envious of their craft and want to learn, and so, in their envy, they wish for Xauta scraping stones to break and hides to rip. Although changes in the social context seem to provide an avenue for expanding the transmission of knapping knowledge with the inclusion of Ententa in the PoXauta Fulto Association, hideworking with knapping remains a craft restricted to Xauta participation, and even among the Xauta, the number of skilled, knowledgeable artisans continues to decline.

TRANSMISSION OF HIDE PRODUCTION AND LITHIC TECHNOLOGY

The 16 Xauta Kollaya stone-tool-using women I interviewed all selectively choose the individuals to whom they will teach the skills of hideworking and discourage others, creating a community of practicing expert knappers through scaffolding (learning with the assistance of experienced individuals; Lave and Wenger 1991; Wenger 1998). All 19 women and men who knap today learned the craft from a female relative such as their mother, father’s second wife, one of their grandmothers or aunts, or their husband’s mother. Thus, there seems to be little historical depth to males using stone for hideworking. Furthermore, all 16 Xauta Kollaya women restrict the transfer of knowledge to their second or third daughter, as the eldest daughter does not usually have the time to learn hideworking because of other household obligations. For instance, on the first day that I observed Sokati, an elder and highly respected hideworker living in Gocha, scraping hides, her young granddaughter was grinding ochre and castor oil seeds to add to the hide for color and softening. Sokati disclosed that her granddaughter had a “special heart” and that she would teach her the trade. Across the Konso district, people admire Sokati’s skill and many younger women claim that she taught them the craft; however, she is very particular concerning who she apprentices. I asked Sokati when she learned to shape the stones, and she responded:

When I was young, I did not want to scrape hides, it was hard work, but my mother kept encouraging me. Finally when I married I realized the economic stability it could bring to my family. [conversations with author, June 15 and 19, 2001]

In a later interview, Sokati emphasized:

It is important to teach hideworking to my children. I feel they should learn so that we can keep this history and not lose it. People will come and buy hides from them. It will keep the name of our family alive, so don’t stop working the hides. [Belkin et al. 2006]

All 16 of the stone-using hideworking practitioners stated that they begin to encourage the assistance of selected six- to eight-year-old daughters, granddaughters, and nieces (see Table 1). They also begin to teach them the technical vocabulary associated with the actions and materials of hideworking. As an example, Sokati’s granddaughter began the trade by discarding scraps of waste (lithic and hide), laying out a wet hide to dry before scraping, and softening a hide by stomping and rolling the hide with her feet.

Between the ages of 8 and 12 years old, selected Xauta Kollaya girls learn how to create mastic (from Balanites aegyptica, a tree resin used as adhesive) to secure stone scrapers into the single-socket haft (handle), to quarry stone, and to heat treat stone (see Table 1). The apprentices learn to use a metal-tipped tool to pry the stone tool loose from the mastic and to produce a new hole for inserting a tool in the mastic; this practice produces striations and scar damage on the stone tool that remain as visible indicators of hafting (Rots and Williamson 2004). I observed Turkana, a young hideworker living in Teshemelle, as she held a hafted scraper between her thumb and forefingers to show her young daughters the proper angle for hafting. Girls also start to accompany their mothers to the quarries to learn when, where, and how to procure the “right” type of stone. They observe the heat treatment of the raw material. Then they may practice kneeling on a cowhide, which is thick and more resistant to ripping, and scraping with a tool already made by an experienced practitioner.

When these same selected Xauta Kollaya girls are 14 to 16 years old, mothers, grandmothers, and aunts encourage them to observe and practice knapping for tool production (see Table 1). Practitioners usually examine the novices’ scrapers and edge rejuvenation and may make their own alterations. Apprentices may scrape parts of hides, particularly cowhides, for the household, but they are not responsible for the entire hide-production sequence and do not have their own clients. Most women stated that they did not regularly begin to make their own scrapers until they were married, were living in their husbands’ households, and recognized
TABLE 1. Summary of Hideworkers’ Ages, Skills, and Technologies

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Materials Used</th>
<th>Skills</th>
<th>Accomplished Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>6–8</td>
<td>scraps of fat lithic debitage</td>
<td>knowledge of discard locations in village trash heap or gardens</td>
<td>discard</td>
</tr>
<tr>
<td></td>
<td>enset leaves</td>
<td>wrap hide with leaves and bury for softening</td>
<td>softening hide</td>
</tr>
<tr>
<td></td>
<td>castor oil beans (<em>ricinus communis</em>)</td>
<td>identifying materials; learning location; collecting; grinding together trample into hide</td>
<td>softening hide</td>
</tr>
<tr>
<td></td>
<td>ochre</td>
<td>cut holes along edge insert pegs and lay on ground</td>
<td>drying hide</td>
</tr>
<tr>
<td></td>
<td>wet hide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8–12</td>
<td>soapberry tree resin (<em>balanites aegiptica</em>), soot-juniper wood, side of pot or household post</td>
<td>learning location; learning identification; mix and grind into small balls; store mastic until use; heat mastic; remove old scraper with metal-tipped tool; replace tool; proper positioning of stone in haft</td>
<td>hafting stone</td>
</tr>
<tr>
<td></td>
<td>stone</td>
<td>knowledge of location; selecting the right time of year for quarrying; selecting the right types of stone; reduce stone for transport</td>
<td>quarrying</td>
</tr>
<tr>
<td></td>
<td>stone sometimes cotton, hair, wool, leaves, ceramics</td>
<td>which stone needs heat treating; burying stones under hearth; selecting insulator; selecting length of heating; learn proper scraping position; learn proper angle of scraper; learn correct amount of pressure on hide;</td>
<td>heat treating stone</td>
</tr>
<tr>
<td></td>
<td>hafted scraper, hide</td>
<td></td>
<td>scraping hide</td>
</tr>
<tr>
<td>14–16</td>
<td>hafted scraper</td>
<td>using the proper amount of force with iron percussor; assessing where and when the working edge of tool needs altering</td>
<td>reshaping tools</td>
</tr>
<tr>
<td></td>
<td>raw stone material</td>
<td>identifying good striking platforms; strength and fine-tuned motor skills; angle to strike the raw material; size of tool for hafting creating a useful working edge on tool</td>
<td>knapping</td>
</tr>
</tbody>
</table>

the importance of the income that hideworking provided. In their husbands’ households, new hideworkers often discuss, practice, and receive assistance from their mothers-in-law or other female relatives of their husbands. Many hideworkers believe that an individual requires 10 to 15 years of practice before they produce good scrapers.

**KNOWLEDGE AND CONTROL OF RAW MATERIAL**

All 19 (men and women) of the stone-using Xauta Kollaya refer to hide-processing stone as *paltita* (singular: *palta*), which they collect from hillsides and seasonal riverbeds eroding from the Burji Gneiss and Awata Gneiss formations (Fischer 2003). They mostly prefer chalcedony (*lingeto*) and distinguish among darker chert, flint, and jasper (*tema*) and lighter agate (*aahata*), traveling up to 25 kilometers to acquire these precious resources (see Figure 1). Likay, an elderly female hideworker who lives in Gera and who has used stone for approximately the last 50 years to scrape hides, spoke to me about the names and types of stone she uses.

**Kathy:** Do you have a special name for this type of paltita? (I am pointing to a piece of chalcedony)

**Likay:** We call this paltita, *lingeto* [to kiss].

**K:** Why?

**L:** It is not easily broken like a kiss.

**K:** Why is it important that the paltita does not break easily? Don’t you need it to break to use?

**L:** Some paltita like we find here [milky quartz] it falls into too many pieces when you break it. [conversation with author, July 16, 2002]

The stone-using hideworkers consistently find the highly valued tema paltita at Kalklayta, Baida, and aahata paltita at Komola, Teshmelle; both are near Duro. Duro is where the largest number of stone-using hideworkers live today (see Figure 1) and where the first Konso hideworkers lived. As I listened to hideworkers (112 stone and nonstone users) recount their genealogical histories, I learned that most of the hideworkers’ female ancestors moved south from Duro, in accordance with their patrilocal postmarital-residence patterns. Several of the older stone-using hideworkers told me they either traveled to Duro and stayed with relatives while...
TABLE 2. The Raw Material Collected during Ten Quarrying Events and the Associated Volume, Type of Raw Material, and Average Number of Produced Scrapers

<table>
<thead>
<tr>
<th>Type of raw material</th>
<th>Average size in millimeters</th>
<th>Average volume of individual pieces of raw materials collected</th>
<th>Average number of scrapers produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>All raw material collected</td>
<td>39% 10 millimeters or less</td>
<td>196 cmm volume</td>
<td>4.863</td>
</tr>
<tr>
<td>( N = 616 )</td>
<td>58% 10–70 millimeters</td>
<td>( sd = 279.2 )</td>
<td>( sd = 5.46 )</td>
</tr>
<tr>
<td></td>
<td>3% 70–120 millimeters</td>
<td>( range 4.8–1,448 )</td>
<td>( range 0–22 )</td>
</tr>
<tr>
<td>Milky quartz ( n = 19 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quartz crystal ( n = 10 )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalcedony ( n = 37 )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the late 1970s when leather working became a part-time craft, many hideworkers began to use more locally available quartz crystal and milky quartz and traveled only up to about eight kilometers to collect their raw materials (see Figure 1). Today, all 19 hideworkers use stone and one-third of them also use glass because of the decreased demand for hide products and the easy access to glass in the market. Currently, even local resources of usable stone are dwindling. Some hideworkers collect lichics from plowed archaeological sites, recycling them for present-day use. In Kashelle, the hideworkers use quartz crystal and have begun to use glass because people are now selling quartz crystal as souvenirs for tourists.

Despite the fact that most hideworking communities consist of affines related through marriage, most women from a single community travel together, enjoying one another’s companionship, and sometimes stop at markets on their way to local quarry resources. When we went to the quarries, women often would compare, contrast, and comment on the raw material that each collected. The 16 stone-using hideworkers select small pieces of raw material or reduce them to small pieces at the quarry (see Table 2). Although milky quartz and quartz crystal naturally break into small pieces, I saw large boulders of chert at Kalklaya. Many stone-using women search on the surface and use their iron-tipped digging sticks to mine the ground and search for materials (see Figure 2). Kalle, an elder hide-worker who lives in Gellabo near the most reliable sources of hideworking stone, stated that, in particular, she looks for natural flakes in preference to large pieces of raw material and prefers clear, smooth material that is not grainy. None of the 16 stone-using women form the raw material into intentional cores (a piece of raw material with scars reflecting the detachment of one or more flakes for tool production) at the quarry. Instead, they break up the raw material to ensure quality and size before transporting it back to their homes and work spaces. As they move across the landscape, most place the pieces in their skirts and tuck the edges of their skirts into their waistbands to keep the stones safe.
SKILLED PRODUCTION AND MAINTENANCE OF STONE SCRAPERS

The majority of hideworkers using chalcedony and milky quartz begin production by heat treating the raw material to make it more brittle for reduction. The hideworker places the raw material on top of a broken piece of pottery with an insulator such as leaves, domesticated animal hair, wool, cotton, or additional pottery sherds in a pit under her hearth. There she leaves the stone for as little as 12 hours and up to three months. Once she “cooks” the stone, she then lets it cool for at least one day. Konso women knappers use different heat-treating methods based on the size, type, and quality of the raw material to increase the flakeability of the stone.

The women work stone in any shady place of their household compound. They usually knap alone, concentrating on their craft with the occasional exception of an apprenticing daughter or an older hideworker who advises the woman on the knapping process. I watched as all 16 used iron percussors (implements used for striking in stone-tool technology) to reduce the raw material with long, broad strokes and quick snaps of their wrists. I witnessed each woman reduce at least five pieces of raw material using a complex and skilled combination of direct percussion (see Figure 3) and bipolar techniques (see Figure 4). In direct percussion, an individual directly strikes a stone that she holds in her hand with a percussor held in the other hand. Using the bipolar technique, a knapper uses a percussor to strike directly a stone that rests on an anvil (a flat stationary hard object, in this case often a stone).

Knappers select from a combination of direct percussion and bipolar technique based on the type of raw material, the size of the raw material, and on the knapping tradition used in the community in which the hideworker lives. For example, Tita, a middle-aged hideworker who lives in Kashelle, reduced a hexagonal quartz crystal (volume of 256 mm$^3$), a natural pyramidal-shaped core, using only direct percussion in an alternating pattern. She also used direct percussion to shape the edges and reduce the dorsal thickness of the resulting 16 scrapers. All three individuals who reduced quartz crystal strictly used the direct-percussion technique in a radial or alternative-side style because they feared the impact on the anvil would shatter the stone.

Knappers using milky quartz and chalcedony often first used direct percussion and then implemented the bipolar technique. In addition, hideworkers intermittently used direct percussion for core trimming between uses of the bipolar technique. For instance, when Urmale, an elder hide- worker who lives in Teshmelle, struck the raw chalcedony (volume of 269 mm$^3$) with her large iron percussor, it broke into four large preformed cores (raw material that a knapper has broken into pieces but that are not yet formal cores), flakes, and shatter. She switched to the bipolar technique to create core platforms and then reduced these cores producing six scrapers. Some hideworkers set the flatter side of a piece of raw material or preformed core on the anvil and struck the protruding surface creating more platforms. In other circumstances, they set the core platform on the anvil and struck the protruding surface creating small flakes and shatter. From the raw material, the women produced a variety of core types including multidirectional, single- and two-platform (sometimes opposed), and pyramidal-shaped cores. They usually trimmed the edges of the scrapers with direct percussion using a smaller iron percussor before hafting the scrapers.

However, some hideworkers chose to use the bipolar technique exclusively, especially when the raw material was less than 40 cubic millimeters in volume. Others employed the bipolar technique to grind off the edges of a flake to form a scraper or to grind the edges of the raw material (esp. milky quartz that tends in its raw form to be shaped like a small flake). When Likay firmly struck the small milky quartz (volume of 13.67 mm$^3$), while it was resting on the anvil, only minute shatter fragments flew off the parent material. Likay rotated the flake on the anvil grinding the edges with the percussor until she had formed a single scraper.
Although there was little standardization in the production sequence, each woman exhibited a high degree of skill, producing, on average, five scrapers from relatively small pieces of raw material—with the exception of milky quartz (see Table 2). Each woman knapper, except those 65 and older, was able to produce between 10 and 22 scrapers from at least one of the five pieces of raw material. The only women who sometimes were unable to produce any scrapers from their raw material were those under the age of 20 or over 65. In addition, a study of five production events for each of the Konso Gellabo hideworkers suggested that there was a high degree of skill as indicated by the consistency in the size and weight of the flakes produced (Bridgeman 2003).

The Konso women I observed acquired knapping skill with practice and age, which was evident in the standardization of their unused and discarded scrapers. Conversely, there was a lack of standardization in scraper form with decreasing strength and elderhood. Konso women produced primarily unused informal scrapers (see Table 3 and Figures 5 and 6). However, archaeologists would classify all of the discarded scrapers as formal end and side scrapers (see Table 4). Furthermore, in an earlier publication (Weedman 2005), I noted that, in rare Konso communities where female hideworkers are consanguine kin, women produced a specific scraper style. As a further measure of standardization in scraper morphology and skill of the knapper, I calculated the coefficient of variance (CV), which archaeologists (Bettinger and Eerkens 1997:CV 6–55) and ethnoarchaeologists (Weedman 2002:CV 10–27; White and
TABLE 5. Coefficient of Variance (CV) for Unused Scrapers and Discarded Scrapers

<table>
<thead>
<tr>
<th>Hideworker’s Age</th>
<th>Mean Length (mm)</th>
<th>CV × 100</th>
<th>Mean Breadth (mm)</th>
<th>CV × 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75 (n = 44)</td>
<td>19.05</td>
<td>4.78</td>
<td>25.09</td>
<td>16.99</td>
</tr>
<tr>
<td>72 (n = 50)</td>
<td>19.44</td>
<td>5.5</td>
<td>28.29</td>
<td>14.35</td>
</tr>
<tr>
<td>16 (n = 42)</td>
<td>19.44</td>
<td>4.3</td>
<td>22.12</td>
<td>13.93</td>
</tr>
<tr>
<td>65 (n = 30)</td>
<td>16.01</td>
<td>2.31</td>
<td>14.43</td>
<td>14.28</td>
</tr>
<tr>
<td>62 (n = 33)</td>
<td>22.5</td>
<td>3.16</td>
<td>14.04</td>
<td>15.87</td>
</tr>
<tr>
<td>48 (n = 97)</td>
<td>17.25</td>
<td>3.7</td>
<td>21.45</td>
<td>11.28</td>
</tr>
<tr>
<td>35 (n = 95)</td>
<td>17.7</td>
<td>3.21</td>
<td>18.14</td>
<td>13.78</td>
</tr>
<tr>
<td>32 (n = 42)</td>
<td>19.44</td>
<td>3.7</td>
<td>19.03</td>
<td>13.62</td>
</tr>
<tr>
<td>27 (n = 35)</td>
<td>19.29</td>
<td>3.17</td>
<td>16.43</td>
<td>14.67</td>
</tr>
<tr>
<td>Discarded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>72 (n = 166)</td>
<td>12.52</td>
<td>2.7</td>
<td>21.56</td>
<td>12.2</td>
</tr>
<tr>
<td>70 (n = 24)</td>
<td>14.99</td>
<td>1.7</td>
<td>11.3</td>
<td>16.3</td>
</tr>
<tr>
<td>48 (n = 46)</td>
<td>11.04</td>
<td>22</td>
<td>11.49</td>
<td>2.72</td>
</tr>
<tr>
<td>28 (n = 24)</td>
<td>17.21</td>
<td>4.45</td>
<td>25.87</td>
<td>16.35</td>
</tr>
<tr>
<td>16 (n = 36)</td>
<td>14.19</td>
<td>4.13</td>
<td>29.1</td>
<td>12.27</td>
</tr>
</tbody>
</table>

Thomas 1972; CV 8–11) use to assess lithic standardization. The Konso knappers’ CV range (11–30) indicated a high rate of standardization for both unused and discarded scrapers—with the exception of results for women under 20 or over 70 years of age (see Table 5). Importantly, women achieve lithic standardization through practice and increasing skill. Correspondingly, with loss of strength as a knapper grows older, standardization begins to wane.

Age and skill also are evident in the ability of knappers to maintain a sharp working edge on their stone scrapers. During use on the hides, Konso women reduce the length of their scrapers through edge rejuvenation, which requires skill and strength. As a result of sharpening the scraper by removing small flakes off the working edge, there is a considerable difference in the length of the scrapers (5.65 mm) between their unused and discarded phase. In my earlier studies of male knapping and skill (Weedman 2002), I noted that, compared to middle-aged knappers, younger and elderly individuals tended to break their scrapers more frequently while resharping the edges of their tools because of their lack of skill or waning strength. In addition, younger and elder individuals often produced spurs (projections on the edge of the tool) not as a functional addition to the scraper (e.g., for puncturing or engraving) but, again, as a result of their lack of skill or strength.

While I observed Konso knappers, I also noticed that women under 20 or over 70 years of age produced the largest proportion of scrapers with spurs (83 percent) and were responsible for all of the scrapers broken during use. Subsequently, when a spur was present on the scraper, practitioners urged novices to scrape thicker cattle hides that were more difficult to rip. However, there are no strong associations between Konso unused scraper morphologies and type of hide scraped (Behrend 2003). I also observed several of the novices and elderly hideworkers cut their fingers during production and edge rejuvenation, which resulted in collagen and blood residues identified through microscopic studies of these scraper edges (Rots and Williamson 2004). Thus, the ability to use and maintain a scraper without breaking it or creating spurs requires practice, skill, and strength.

DISCUSSION

Diane Gifford-Gonzalez (1993) pointed out that when we reconstruct the past, we base it on our Western concepts of division of labor, ascribing women with the most labor-intensive, dull, and unskilled tasks, which certainly extends to our descriptions of women’s stone-tool assemblages. This review of women’s lithic technology demonstrates how material culture (stone) and an individual’s social position (Xauta), tasks (feminine), and experiences (age and skill) are transformed through learning and practice in a non-Western social context (Dietler and Herbich 1998; Dobres and Hoffman 1999; Gosselain 1998; Hodder 2003; Ingold 1993;436–439; Lechtman 1977; Pfaffenberger 1992; Weedman 2006). A majority of stone toolmakers among the Konso are women because most Konso people consider the associated tasks of cooking (heat treating), grinding (knapping and sharpening the edge), and kneeling (during cooking, knapping, and scraping) “feminine” activities. In other non-Western cultures, both male and female artisans are considered feminine because they transform materials (Sterner and David 1991), and in other cultures the art of hideworking is a feminine task because of its ideological association with rebirth or reviving the hide (Baillargeon 2005). Importantly, Konso stone-tool technology symbolically links fertility and women to lithic expertise, providing an alternative gender ideology to the “man-the-toolmaker” and “woman-the-gatherer” paradigm. Konso knappers reveal the growing recognition that gender tasks are fluid transformations across time and space (Jarvenpa and Brumbach 2006; Owen 2005). Viewing gender as symbolic and ambiguous does not destabilize archaeological reconstructions (Voss 2000); rather, it forces us to unearth a more nuanced understanding of the dynamic needs, desires, ideas, and practices of individuals buried in material culture.

Still, the enduring image of stone-tool enculturation is one of a prepubescent boy sitting adjacent to an experienced and skilled man, engaged in a time-consuming and sophisticated craft (Binford 1986; Crabtree 1982; Fischer 1990; Flenniken 1978; Gould 1980; Hayden 1979; Nelson 1977; Oakley 1949; Whittaker 1994; for critique, see Bamforth and Finlay 2008; Finlay 1997). Even well-intended articles
acknowledging women as toolmakers unknowingly devalue female knapping technology by labeling it “expedient” and “unskilled” to distinguish it from men’s technology (Bruhns and Stothert 1999; Casey 1998; Fischman 1992; Gero 1991; Kehoe 2005; Kohn and Mithen 1999; Sassaman 1992). Archaeologists commonly credit men with finely made tools such as projectile points (Whittaker 1994:294–298) and scrapers (Bordes 1961) because many researchers believe as Joanna Casey summarizes:

—men travel to hunt, but their tools have a life and mobility independent of the men to whom they belong. … they are lost … or break and are abandoned by their owners, are in a sense calling cards … exquisitely designed projectile points is the material expression of symbolic behavior for social or supernatural protection. [1998:99–100]

In another attempt to include women in Stone Age technology, Kenneth Sassaman (1992) suggests that women’s expedient technology may have contributed to the “degeneration” of lithic technology in the Ceramic periods in North America. His goal is to ensure that archaeologists consider the sexual division of labor as a source for technological change; however, in the process, he devalues women’s technology. Linda Owen’s (2005:38–39) criticisms of Marek Kohn and Steven Mithen (1999) highlight another instance of archaeologists associating women with less sophisticated and poorly made tools and crediting men with making finely made tools imbued with symbolic meaning and with creating new techniques.

Males tend towards display, so conspicuously impractical handaxes were most likely made by males, whilst females would make less refined, more practical handaxes. … They [females] were now concerned about their relationships with their mates, not just the quality of their mates’ genes, and their mate-choice criteria shifted accordingly; towards those males who were most reliable in the provision of resources. In response, males made their artefacts according to the demands of functional efficiency, developing varied toolkits as a result. Consequently, we see the development of Levallois technology for producing good-quality blanks, and the appearance of spears with stone points. [Kohn and Mithen 1999:523–524]

Konso female knappers demonstrate that women’s lithic technology, like men’s, is sophisticated and time consuming and takes place in a strict social context that provides selective apprenticeships. Knappers restrict the transmission of lithic technology within their endogamous-hereditary craft community of Xauta Kollaya (hideworkers). Transfer of hideworking and lithic technology usually involves explicit adult demonstration and explanation to young, “special,” second or third daughters, who are not as encumbered with housework as first daughters, to enhance skill and performance. Novices generally begin knapping with the guidance of practitioners starting at age 14. Most Konso women demand 10 to 15 years of knapping practice and instruction before they deem a novice proficient. Prior to this benchmark, young women tend to (1) produce fewer useable scrapers from a piece of raw material, (2) produce less standardized scrapers (Ferguson 2008), (3) more frequently break their scrapers during use, and (4) primarily scrape thicker cow hides that are more difficult to rip because scraper-edge rejuvenation is poor and produces spurs (Weedman 2002). However, I did not observe novices producing larger tools (Stout 2002), cores that lack platform preparation (Fischer 1990; Pigeot 1990), or poor blades (Bodu et al. 1990). Elder knappers who have lost strength also more frequently break their scrapers and experience difficulties with edge rejuvenation. Importantly, women’s technology and training parallels accounts of male knapping technology, which have been described as a time consuming and sophisticated skill that begins prior to puberty.

Like images of Stone Age life in The Flintstones (Hanna and Barbera 1960–66) cartoons, wherein women stay at home with the children and men work in the stone quarry, archaeologists continue to keep Stone Age women close to home where they use poor-quality local resources (Weedman 2005). But Konso women are not sadly stuck in the Stone Age. They have pride in their knapping skills and intentionally select, use, and prefer high-quality stone raw materials to ensure the superiority of their hide products. In raw-material selection, stone-tool using women reluctantly use local stone and spurn glass and iron resources in favor of long-distance resources. Konso women are not the only example of women who choose high-quality stone raw material or travel a long distance to acquire the material, as evidenced in worldwide ethnographic accounts (Allchin 1957:125; Beyries 2002; Dunn 1931:411; Gusinde 1931:353; Man 1883:380; Mason 1889:585; Nelson 1899:113; Roth 1899:151; Takase 2004; Webley 2005). Ethnographic evidence clearly illustrates that women are highly knowledgeable lithic practitioners who actively seek superior raw materials, thus dispelling myths that women are passive and careless in their selection of lithic resources.

In the film 2001: A Space Odyssey (Kubrick and Clarke 1968), a prehuman form violently smashes a large stick against rocks that are sitting on a stone surface, recounting our first attempt to make stone tools. It is no wonder that we believe bipolar technology to be simplistic—at all, how hard can it be to bash rocks together? Early archaeologists reinforced this image of bipolar technology as simple and associated it with a lack of skill (Patterson 1979), lack of good-quality raw material (Binford and Quimby 1963; Bleed and Meier 1980), small raw-material size (de la Torre 2004; Flenniken 1981), and economizing and recycling resources (Goodyear 1993; Jeske 1992). Ethnographers have primarily described women as engaged in bipolar reduction (Albright 1984:57; Dunn 1931:41; Gorman 1995; Holmes 1919:316; Man 1883:380; Roth 1923:278–280; Sellers 1885:872; Sillitoe and Hardy 2003). Likely because of the prevalence of the bipolar technique and the reluctance to associate stone-tool technology with women, most archaeologists have not associated this technique with women—neither from the earliest Stone Age assemblages nor through each subsequent historic period across the world (de la
More recently, archaeologists have revealed the complex nature of identifying and practicing bipolar technology by renaming fabricators, wedges, pièces esquillées (scalared or irregular and overlapping flake scares on pieces of stone), and outils écaillés (scalared cores) as bipolar cores (Flenniken 1981; Hayden 1980; Shott 1989; White 1968) and through archaeological and experimental assemblage studies (Barham 1987; Berman et al. 1999; Kuijt et al. 1995; Mercader and Brookes 2001; Orton 2002). Konso women’s lithic technology may look simple, but it supports growing evidence of the sophistication of bipolar reduction, as women tackle between various bipolar and direct-percussion techniques and produce a good number of usable scrapers from small pieces of raw material. Jill Pruett and Paco Bertolani (2007) recently suggested that when female primitives have limited access to preferred resources, they compensate by developing new tool technologies, such as spears made by chimpanzees for hunting. They conclude that females may have developed the earliest tool technology. Similarly, early ethnographers associate women with bipolar technologies, and archaeologists believe knappers use bipolar technology to economize resources. Thus, because bipolar technology is among the earliest-known stone-tool technologies, I suggest that perhaps female hominids were the first to produce stone tools.

The idea of women as skilled toolmakers and perhaps the very first toolmakers is inspirational, but it is likely that future literature will either opt for gender neutrality on issues of flintknapping or continue to ignore the evidence. For instance, Brian Hayden (1992:35) stated that ethnographers recognize women worldwide as toolmakers and that the presence of hide working tools then must indicate the presence of women. However, on the same page of his chapter in Exploring Gender through Archaeology, he noted that stone working, including hide working stone technology, is the exclusive task of males. How are we to make sense of this? One of the longest-standing debates in archaeology concerns the variation present in Paleolithic hide scrapers (Andrefsky 1994; Bamforth 1986; Bisson 2001; Bordes 1961; Dibble 1987; Kuhn 1992; Meltzer 1981; Wobst 2000), yet no one has suggested that perhaps differences in sex and gender may account for the stone-scaper variability. The latter once again reflects the idea that archaeologists perceive women’s technology as unskilled and expedient. In addition to the Konso, there are many ethnographic accounts indicating that women produce a variety of formal tool types including hide scrapers, arrow points, knives, and drills (Beyries 2002; Dunn 1931; Ewers 1930:10–13; Grey 1841:266; Hiller 1948; Holmes 1919:316; Lowie 1935:75–79; Mason 1889; Sellars 1885:872; Takase 2004; Turner 1894). Many Konso Xauta Kollaya women produce formal discarded end- and side-hide scrapers with a high degree of consistency and skill in overall size morphology that matches other studies of tool standardization as a measurement of skill (Bettinger and Eerkens 1997; Weedman 2002; White and Thomas 1972). I conclude that women can skillfully produce standardized formal tools, and archaeologists should consider sex and gender when analyzing Stone Age lithics.

In summary, Konso female stone-tool users are skilled knappers who develop their expertise through long-term practice and apprenticeship. They identify themselves with lithic technology in a socially embedded ideology that values their knapping skill as explicitly feminine. The small community of stone-using women has pride in their knapping skills and intentionally select, use, and prefer high-quality stone raw materials to ensure the quality of their hide products and in the process reject local stone and glass resources in favor of long-distance resources. Furthermore, women’s bipolar lithic technology may look simple, but it is complex and sophisticated, requiring continual decision making and intensive learning and practice.

Thus, there is overwhelming evidence for women’s sophisticated engagement with lithic technology to produce formal standardized tools. We must reevaluate our reconstructions of women’s roles in the Stone Age. Ethnohistoric and ethnographic evidence strongly associates women with bipolar and stone hide working technology. It is imperative that we reconsider the possibility that women are among—if not the first of—the earliest stone toolmakers, that women are responsible for Stone Age scraper tool kits, and that we cannot solely associate high-quality formal stone tools with men. In addition, the material visibility of an individual’s role as novice apprentice, practitioner, and elder practitioner emphasizes that a finer-grained understanding of the individual and social dynamics is possible through studying lithic technology in the archaeological record.

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NOTE

Acknowledgments. This project was generously funded by the National Science Foundation. For this, I am grateful to John Yellen, the program officer, and the proposal reviewers. I wish to thank A4 editor, Tom Boellstorff, all A4 anonymous reviewers, Thomas Hester, Jane Branham, and Mari Gillogly for their valuable detailed comments. I extend my deep gratitude to Ethiopia’s Authority for Research and Conservation of Cultural Heritage; the Southern Nations, Nationalities, and Peoples Regional Government’s Bureau of Culture and Information in Awasa, Arba Minch, and Konso; the National Museum of Ethiopia; and the Addis Ababa University Herbarium. In particular, I thank Jara Hailuemariam, Yonis Bayene, Mamitu Yilma, Hasen Said, Menisay Girma, Sagoya Robia, Abewab Ejigu, Denote Kusia Shinkara, Awake Amayze, and Kuse Kelto. Many other people contributed greatly to the success of this project, and I thank them for their collegiality, scholarship, and written and cinematic works including Steven Brandt (Co-PI), John W. Arthur, Matt Behrend,
Tara Belkin, Kara Bridgman, Harriet Clift, James Ellison, Erich Fischer, Birgitta Kimura, Rebecca Klein, Veerle Rots, Justin Shipley, and Bonny Williamson. Heartfelt thanks go toward many Konso people—but most especially to the hideworkers.

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