A HISTORY OF FOOD WITHOUT HISTORY: FOOD, TRADE, AND ENVIRONMENT IN WEST-CENTRAL GHANA IN THE SECOND MILLENNIUM AD

by

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Our knowledge of African cuisines, past and present, is particularly dependent upon archaeology and ethnography. Even today, the vast majority of recipes are not written down but are passed on from mother to daughter. As different foods and tastes are increasingly imported, and as large-scale disasters such as famine and civil war destroy local patterns of life, these fundamental elements of cultural identity are changing at an increasing rate. Archaeology may prove important in Africa, not only when considering long abandoned cuisines, but also in reconstructing cuisines of the recent past.

-Rachel Maclean and Timothy Insoll (1999: 79)

To the Bemba, millet porridge is not only necessary, but it is the only constituent of his diet which actually ranks as food…I have watched natives eating the roasted grain off of four or five maize cobs under my very eyes, only to hear them shouting to their fellows later, "Alas, we are dying of hunger…We have not had a bite to eat all day."

-Audrey Richards (1939: 46-47)

To my father, for having faith in me from the beginning and ever since

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This dissertation has roots in all of my archaeological experiences, and particularly those since I have been involved the study of people and plants. In every project that I have taken part in—from Ecuador and Bolivia to Sudan, Ethiopia, Senegal, Togo, and Ghana—I observed what people were growing and eating nearby, and for most of them was struck by the 'global' nature of what was being produced and consumed. Archaeologists are often taught not to appreciate the complexity of the present, for it complicates our imaginings of the past. Whether maize in Africa or barley in South America, cuisines of today are profoundly altered by the Columbian Exchange and what came afterwards—but this too is not a new process. For a time I just attempted to ignore or subtract alien crops from my observations. I eventually came to realize that understanding how those crops and technologies spread is integral to getting a handle on what came before, understanding how culture is made and remade, and demonstrating the relevance of the past for the present and the present for the past.

I must first acknowledge the women and men of Banda for their willingness to talk with me, and Mr. Enoch Mensah for allowing me to understand. Their openness to a foreign researcher and to the objectives of the research was reassuring, and I learned a lot on the art of negotiating a living in an ever changing world. In particular I would like to acknowledge the women, men, and chiefs of the villages in which I worked: Banda-Ahenkro, Bui, Dumpofie (Kuulo), Ngre (Nyire), Makala, and Dorbour. The Banda paramount chief, Tolɛɛ Okokyeredom Kwadwo Sito, and the Banda Traditional Council permitted me to conduct this research and were supportive of my time in Banda. I also acknowledge the assistance of Lɛlɛɛ Akosua Kepefu, the Queen Mother of Banda, who shared her knowledge, contacts, and life story. Kwesi Millah and Afua Nimena's vibrant recollections of the past significantly colored my visions of it. Enoch Mensah was my research assistant and friend throughout my fieldwork; his astute observations and wisdom inform much of the present dissertation. The hospitality of Mr. Sampson Attah, Afriye, and family helped make me feel at home in Banda.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ABSTRACT

African foodways are often portrayed as unchanging traditions plagued by chronic food insecurity and forever subject to the vagaries of environmental change. These assumptions are based mostly on the present and obscure our ability to determine why and under what circumstances these problems arose. I provide a long-term perspective on continuity and change in food practices over the last millennium in Banda, west-central Ghana, as the area was drawn into increasingly global networks. Using archaeological, archaeobotanical, environmental, ethnographic, and documentary evidence, I trace how new crops were adopted, how people responded to environmental, economic, and political shifts, and the development of food insecurity.

People in Banda relied on pearl millet for much of the last millennium supplemented by sorghum in wetter periods, along with cowpea, okra, and shea butter. The area first became involved in long-distance trade during a wet phase (1210-1450) while much of the subcontinent was experiencing dry conditions, making Banda an ideal location for iron smelting. From 1450-1650, Banda was heavily involved in northern-focused trade networks and produced ceramic, iron, copper, and ivory objects locally. Some of these goods—most notably ivory—may have provided access to emerging Atlantic trade networks. The American crops maize and tobacco were adopted by c. 1600-1660, in the middle of a centuries-long drought. Maize remained a little used crop even as the Asante state took control of the area (c. 1773-1825), suggesting that the role of maize in the development of the forest-based Asante has been overemphasized. The most significant break in food practices occurred during the mid to late 19th century, a time of upheaval associated with the internal slave trade and shifts in political and economic control over much of the subcontinent. Banda peoples were forced from their homes, and when they resettled, chose to rely on the fastest yielding and low labor crops they could—maize and cassava. These results suggest that the food insecurity problems

of modern times arose only recently. The Banda that existed beforehand was able to withstand a severe, centuries-long drought with little impact on food practices and daily life.

Chapter 1

Constructing a History of Food without History in West Africa

"Obama Eats Kenkey!" declared Ghanaian newspapers in mid-July 2009. It was considered a national honor that Barack Obama, America's first black president, was to visit Ghana, Africa's first nation to gain independence, before any other sub-Saharan African country.[1] Perhaps this was part of the intended message in serving the U.S. President local foods as breakfast rather than the British-style fare usually proffered to foreign dignitaries (coffee, tea, toast, and baked beans).[2] Offering *kenkey*, a traditional Ghanaian staple, may have also been an extension of pan-African identity and friendship to the first African-American president of the U.S., and perhaps a gesture of reestablishing ties between these two countries. These ties were rooted in deep history indeed. The Obamas paid sober homage to this connection by visiting the Cape Coast Castle, once central in the Atlantic slave trade, and now a major tourist destination. But these historical links were also expressed in the choice of *kenkey* as the quintessential Ghanaian food offered to the Obamas. *Kenkey* is today a staple, especially in coastal areas, and is made of ground cornmeal that is fermented, made into a thick porridge, wrapped in corn or banana leaves, steamed, and eaten with a sauce. It is prepared and sold by women in urban areas of West Africa, and has the advantage of being relatively inexpensive to prepare and purchase (Osseo-Asare 2005; Robertson 1984).

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[1] Obama visited Egypt the previous month.
[2] This issue is discussed in numerous online Ghanaian new sources of 13 July 2009, including http://news.myjoyonline.com/news/200907/32612.asp, which raises the possibility that serving local foods may have been a cost reducing effort by the government.

Of the diverse local foods offered to the Obamas—tilapia, red pepper, *shito*, *abolo*[3], and porridge—it was mundane *kenkey* that the media and public emphasized. In part, this relates to its popularity among all social classes and to Ghanaian concepts of what constitutes food for the elite. Unlike North Americans, who value novel foods and variety, many elite West Africans often simply eat more of (or better quality versions of) the dishes they know (De Garine 1997; Goody 1982)—at least today. So *kenkey*, though a food of the masses, so long as supplied in large quantity and high quality, was an appropriate choice to be served to the Obamas.

Kenkey was also offered because it is thought of as 'traditional' Ghanaian food. However, from a long-term perspective, *kenkey* is a relative newcomer on the culinary scene—it embodies a history of global goods interacting with local routines and concepts of taste. The primary ingredient in *kenkey* is maize, a crop domesticated in highland Mexico and introduced into Ghana sometime in the 16th century through coastal European traders (Ch. 5; Alpern 1992; McCann 2005; Miracle 1965). This maize dough is wrapped in either maize or banana leaves. Bananas were an earlier exotic introduction, being one of the earliest crops from Asia to be introduced and adopted across the African continent (Mbida et al. 2000; Neumann and Hildebrand 2009). While of exotic origin, both crops, as well as many others from Asia and the Americas, had transformative effects on African foodways and agriculture and today are the foodstuffs of the multitudes and elites alike.

As one blogger and restaurant owner in Accra puts it "[o]ne can't help but wonder why Kenkey, an incredibly "simple" corn meal has become as Ghanaian as apple pie is to America."[4] In many respects this dissertation looks at the same question. How is it that maize and other American crops like cassava, sweet potatoes, and chili peppers, have become staples that are at least as important, if not more so, than their African counterparts yams, millet, and sorghum? How were they modified and incorporated into culturally acceptable cuisine? And what were the social, political, economic, and

[3] *Shito* is hot black pepper sauce used widely in Ghana; *Abolo* is a lighter, pancake-like version of *kenkey*, also made of maize.
[4] Nii Thompson, http://www.myweku.com/2010/02/a-look-at-ghanas-famous-staple-kenkey/

environmental circumstances under which they were adopted and ultimately came to dominate West African subsistence?

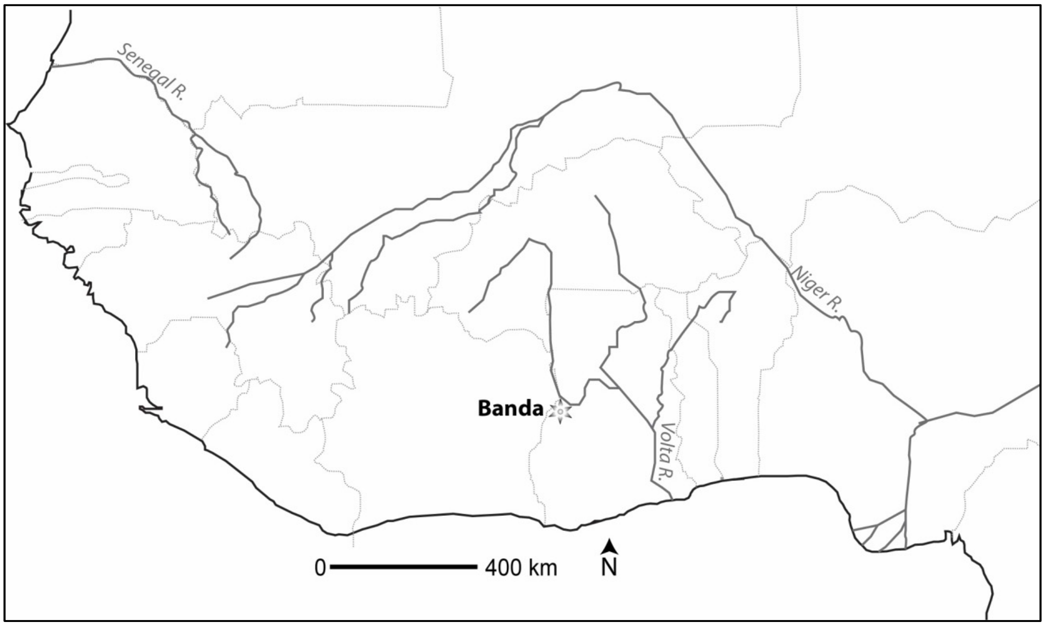

FIGURE 1.1: Location of the Banda region in West Africa

My aim in this dissertation is to address these issues by examining introduced foods alongside continuities and changes in food practices in Banda, a small region in the interior of west-central Ghana, over 400 km from where President Obama sampled *kenkey* (Fig. 1.1; Stahl 2001). On a primary level, I will examine food and daily life and how they changed over time in concert with political, economic, and environmental conditions. The direction and message of the story is one familiar to much of the world—one of incorporation into the global food economy. But the pathways through which this happened in Africa remain poorly understood for most of the continent. Scholarly attention to African foodways has mostly concentrated on modern famines and food security, with little attention devoted to the historical roots of those problems (Mandala 2005) or the development of modern African cuisines. The few admirable attempts at writing African food history (Carney and Rosomoff 2009; Goody 1982; Mandala 2005; McCann 2005, 2009; Rich 2007) are constrained by the limits of thin documentary source material and oral histories, both of which have restricted time depths. Moreover, they emphasize urban areas and political events and structures rather than everyday culinary habits. While these pieces admirably address a significant gap in the literature and are particularly instructive in considering the interactions between food and colonialism, they are unable to address the periods when most of the American food crops were introduced to the continent.

By combining archaeology, archaeobotany, historical, and ethnographic sources, I trace the introduction of American crops including maize from their early adoption four centuries ago (Ch. 5) to more recent times when they became staples in African diets (Ch. 7). These crop introductions, however, did not enter a vacuum, but rather met rich agricultural and food traditions that had been developed in the millennia before their arrival. Thus my investigation of food continuity and change begins much earlier, around AD 1000,[5] when vast trade networks stretched across much of West Africa to the Arab and European worlds. During this time people developed tastes for things from afar and goods, including foods, moved across the subcontinent (Ch. 4). It was into this dynamic world system that European explorers and new crops from the Americas and Asia arrived in the 15th and 16th centuries. The version of Africa they encountered was much different than what we observe today, and food adoptions at the time were likewise done under very different circumstances. These new foods—like the many other new objects circulating through trade networks—were initially adopted not as a means to quell food insecurity, but as curiosities accessed by only a few (Ch. 5). It was not until several centuries later, under the pressures of violence and dislocation associated with the internal slave trade and the new challenges posed by colonialism, that people switched to American staple crops (Ch.7).

By injecting history into our understanding of the 'food without history' (cf. Wolf 1982), I challenge the notion that Africa has always been food insecure and Africans thus unable to 'choose' what is eaten. In recent years, historians and archaeologists alike have coaxed out a more historically nuanced image of Africa, particularly during the heyday of trans-Saharan and Atlantic trade (e.g., McIntosh and McIntosh 1981, 1984; McIntosh 1999; Mitchell 2005; Northrup 2009; Stahl 1999a,b, 2001, 2007a; Thornton 2009); however, these insights have yet to be substantively applied to the study of Africa's

[5] All dates in this dissertation refer to AD, unless otherwise noted.

foodways. Theoretically, explanations of continuity and change in African food and agriculture remain dominated by the assumption that food shortage is just around the corner; that the hungry season gap has plagued the continent from time immemorial; and that mitigating the risks of an uncertain environment has always been difficult and the primary concern (Chs. 5, 6, 8). These explanations are, however, derived from present understandings, and whether intentional or not, "deny coevalness" (Fabian 1983: 31) or contemporaneity to African food and agriculture. Such collapsing of time and change not only reinforces outdated notions of African 'backwardness', but denies agency to rural farmers and cooks. It obscures a complex, sometimes turbulent and tragic history of how Africans became consumed by and consumers of the global world, one that very much underwrites the continent's present food security concerns. My study aims to provide a window into this history as experienced in one small place in west central Ghana over the last thousand years.

The central question that concerns this introductory chapter is: how do we go about constructing the history of food without history? I outline my theoretical orientation in three parts. The first defines what it is I am studying—food—and the analytical and theoretical frames I use to think about it. Next, I step back to consider the place, time, and objects of inquiry—Africa, global connections, and the foods and objects that travelled through them. Finally, I consider the interplay of environmental change and foodways in an African context. To conclude the chapter, I outline my approach and the structure of the dissertation.

Continuity and Change in Food Practices

My central questions concern how we model and understand change and continuity in everyday practices, especially in relation to food. Food includes not just the species eaten, but how they are defined, produced, prepared, processed, preserved, and consumed. In other words, cultural practices transform plants and animals into food. There is no one explanation for why people change what they eat or how they prepare it. Instead, the pathways by which people choose to adopt new foods or new techniques are culturally and historically situated, if bound within broad nutritional requirements (Holtzman 2009; Macbeth and Lawry 1997; Wilk 2006b; Sutton 2001). This diversity is grounded in the complex interplay of factors that determine food practices. What people eat is mediated by biological necessity, environmental capabilities, preference, religious and cultural proscriptions, and economic realities and, consequently, there is variability between rates and scales of change (cf. Wilk 2006a, b). Sutton (2001) suggests that highly structured meal systems trend towards conservatism, though certain elements, like ingredients, are still subject to considerable change. Food change is also closely linked with socioeconomic class (Goody 1982). In contemporary Africa this is particularly true of the emerging middle and urban classes, who tend to eat processed foods that surmount seasonal availability and supply issues and reduce women's labor (Andræ and Beckman 1985; Koenig 2006). Despite this trend, studies in Mali have shown that a variety of local ingredients and cooking techniques are still used by middle class urban dwellers, and many of the long-standing social networks involved in food consumption, production, and distribution still hold (Koenig 2006).

Still other scholars see food as fashion (Macbeth and Lawry 1997)—a matter of culturally defined and embodied taste (Bourdieu 1984). Redefinitions of food preferences may occur as part of colonial encounters, as new foods are introduced and recontextualized according to local (re)definitions of taste (Smith 2006; Stahl 2002). Conditions of necessity brought on by financial insecurity, environmental degradation, supply issues, and political instability may also exert pressure to change production and consumption of foods. Macbeth and Lawry (1997:4) conceptualize food change as occurring on a U-shaped curve, with the most potential for change at two ends of the spectrum: one representing conditions of luxury where individuals seek stimulation and novelty, and the other conditions of necessity, where people consume what they must to fulfill biological needs. However, we must remember that food preference (or taste) is culturally situated—in many parts of West Africa, increased quantity of foods, rather than trying new foods, is desirable (De Garine 1997; Goody 1982). Clearly the motivations behind food change are complex, and often due to more than one of these reasons.

How then can we productively view and study foodways in the past? As a starting point, foodways must be studied as actions or practices, how people 'do things,' not just species lists. To reconstruct food history, we must look at sequences or genealogies of food practices over time. In other words, we need to focus on what people did with those species, and what they did before that. Was maize first ground and then made into porridge? Or was it made into *kenkey* at the outset? Were other crops made into a *kenkey*-like dish before maize arrived on the scene?

'Doing things' is of course informed by what one did before, hopes to do afterwards, and what other people are doing. I am particularly interested in the role of techniques of the body (Mauss 1973) in both the adoption of new foods and technology as well as 'bodily memory'. By techniques of the body, Mauss (1973 [1934]: 75) refers to an action which is both effective and traditional, or in more modern terms, a bodily logic that is socially transmitted. The body is both our "first and most natural technical object, and at the same time [our] technical means" (Mauss 1973: 75). For Mauss, techniques of the body could be studied through four angles: 1) the sexual division of bodily techniques; 2) variations of bodily techniques with age, 3) the apparent efficiency of bodily techniques (i.e., skill), and 4) transmission of the form of the techniques. These four dimensions are key to any study of continuity and change in foodways and daily practice. For archaeologists, a focus on techniques of the body is all the more compelling because daily actions, norms, and knowledge are materialized in bodily performances and interactions with both food and the tools of food preparation (i.e., pots, fires, etc.). This allows comparison between the techniques of the body that predominate today, how they change over time as knowledge is transmitted (or not), and the practices and technologies through which continuity is reproduced.

The role of 'bodily memories' in cultural memory is also important. Recent work on food and memory has stressed the importance of bodily actions and the senses in how people remember food and events associated with it (Counihan 2004; Holtzmann 2006, 2009; Sutton 2001). I add a longer diachronic dimension to such studies by investigating the physical remains of food preparation in the deeper past; as I move towards the present, I link them with food memories of today. Archaeologists focusing on memory have highlighted the role of repetition in bodily action in creating and maintaining identity (Hamilakis 1999; Mills and Walker 2008a; Van Dyke and Alcock 2003), but the focus has been almost exclusively on ritual practice; there has been little application to the practices of everyday domestic life (Mills and Walker 2008b: 5-7). This is in part because practices associated with *inscribing* or commemorative memories are more easily examined archaeologically than are *incorporating* or bodily forms of memory (Connerton 1989). An important point that arises from the memory literature is that bodily practices tend to be resistant to change because they are often subconscious and routinized—subject to a different kind of memory (Connerton 1989; Mauss 1973). This suggests a tendency towards reproducing continuity, which has important implications for understanding both how embodied knowledge is transmitted and for the rate and form of change in food practices.

Attention to 'archives of the body' enables us to reconstruct and speak to past actions or practices and concepts of value and taste. This focus allows not just figuring out what activities were performed in the past, but a critical examination of the way in which the performance of those tasks reaffirmed the *status quo*, challenged it, or was modified to fit daily routines. Here I pull specific insight from practice theory (Bourdieu 1977; Ortner 1984), which analysts are beginning draw on in examining foodways in the archaeological record (Atalay and Hastorf 2006; Bruno 2009; Gifford-Gonzalez 2007; Twiss 2007). Such approaches emphasize the constitutive role of practice in assimilating and reproducing daily life, but also in generating change (Dietler and Herbich 1998; Joyce and Lopiparo 2005; Pauketat 2001). What people do and the techniques they use are simultaneously historical products and agents (Dietler and Herbich 1998). At a most basic level, the structures of the material world impose limits that influence the development of 'dispositions' (Bourdieu 1977). Techniques are formed in reference to dispositions, but are also culturally situated—the development of 'tendencies' and cultural perceptions of what constitutes possible alternatives are present at all stages of *chaînes opératoires* (Lemmonier 1986), and closely bound to the social realm (Dietler and Herbich 1998: 246; Dobres 2000). These techniques are routinized and embodied, forming what Bourdieu (1977) and Mauss (1973) have called *habitus*. It is precisely the embodied nature and interrelatedness of habitus across technical and social realms that makes it dynamic—"a generative principle of improvisations" (Bourdieu 1977: 78). Practice may change only gradually, so long as the objective conditions and the subjective way that dispositions are organized correspond. This correspondence or 'fit' makes them seem 'natural'. However, if demands merit a response that calls this correspondence into question, what seemed natural before becomes problematic (Dietler and Herbich 1998:246-7; Silliman 2001). This may result in deviating from existing practice (orthodoxy), working to maintain it, or adopting or developing new solutions (heterodoxy) (Bourdieu 1977; Silliman 2001).

To illustrate how perspectives of memory and practice are related, I borrow the example of Thanksgiving, a distinctively American festival, as described by Roddick and Hastorf (2010: 163-164). Thanksgiving is on one hand a commemorative feast, initially a way of inscribing the value of a harvest, later the unity of a nation (during the Civil War era), and, after the subjugation of Native American populations, an idealized and invented American past of friendly relations with them. Today, Thanksgiving commemorates these different and compatible visions of the past, but also codifies more subtle kinds of 'traditions.' Family recipes are maintained and a limited and predefined set of dishes are prepared. A family community is recreated and remembered through these conscious and unconscious actions, at the same time these ideals are transmitted to members of the younger generation through participation. These proscriptions are followed until a new member from a different set of traditions joins the group; at that point 'age-old' traditions are questioned and in some cases modified to expand community boundaries. This process of passing down, reifying, and questioning bodily techniques and community ideals happens not just at special feasts like Thanksgiving, but as new foods, techniques, and people are introduced into a household. It is this process I seek to understand.

How can these insights inform the study of food continuity and change in the archaeological record? Practice can be operationalized to understand long-term process through documenting practical variation, reconstructing genealogies of practice, and tacking back and forth (cf. Stahl 2001; Wylie 1989) between multiples scales and lines of inquiry. Recent work on genealogies of practice attempts to reconstruct change and continuity in technological attributes and forms (of artifacts, features, etc.) over time as a means to understand human agency in long-term processes of change (Gosden 2005; Joyce and Lopiparo 2005; Pauketat and Alt 2005; Stahl 2010). Like technology, the practices of food production, processing, and consumption are routinized, embodied, and centrally situated in the everyday, but food is rarely recovered in its final intended form (i.e., in contrast to pots). Instead, the archaeobotanical and faunal remains most commonly encountered result from a variety of different stages of production and processing (e.g. Hillman 1973, 1981), consumption and decay. In order to reconstruct genealogies of food practice, we must be attuned to the techniques and *chaînes opératoires* (Dobres 2000; Dobres and Robb 2005; Lemmonier 1986, 1993) of food processing, and the processes by which new plants and animals are incorporated into, rejected from, or modify existing practices. What is accessible to archaeologists is how new foods and processing techniques become incorporated into cuisine, habituated into preference over time (cf. Appadurai 1996), and how this varies over time and space. Below I consider the link between food practices and technological practices more explicitly. But first I visit the time and place on which my inquiries focus.

Africa, Globalization, and Global Things

At first mention, globalization and archaeology seem an odd pairing. One could say the same about Africa, an 'inconvenient' continent most often left out of discourse about globalization (Ferguson 2006) or condemned to forever play the role of victim instead of active participant. Still others deny the usefulness of 'globalization' for its presentist and evolutionary implications (Cooper 2001), treated as if it is the next 'step' in 'our' universal cultural evolutionary trajectory (Tsing 2000, 2005). These critiques point to the need to unpack the constellations of different processes that come together but defy bundling into a neat package of globalization. Tsing's (2005) corrective for studying something so diffuse and slippery is to focus on the articulation of global connections in a specific place and investigate the networks and frictions between them. Likewise, Cooper (2001) has called for historicization of the many different strands of change and connection that are housed beneath the globalization umbrella. My intent here is to show how an archaeology of global connections accomplishes both, and does important analytical work for the study of the past as practiced in Africa.

A focus on globalization, or more accurately global connections, is alluring for the important analytical boundaries it crosses for archaeologists. The first boundary is a temporal one: the imaginary line between supposedly premodern and modern, prehistory and history, usually incised at 1400 or 1500 (Wolf 1982). This is considered the 'start date' for the development of many processes and linkages glossed under the rubric of globalization, particularly the Columbian Exchange (Crosby 2003; Ch. 5). The linkage opened at this crucial juncture was between the western and eastern hemispheres, worlds 'Old' and 'New'. While exchange had long been going on within these two halves, the movement of goods, people, and organisms between them after this occurred on a much larger and unprecedented scale. These networks of trade oftentimes built on previously established ones: trans-Saharan routes that connected North and West Africa to each other as well as Arab and European worlds (Mitchell 2005). The difference then, was not in kind, but in the scale—in terms of both size and distance—of global bonds.

Despite the fact that archaeologists possess the means to connect these two 'halves' of world history through material remains of past activities, the vast majority of studies stumble at the premodern/modern divide rather than straddle it (for example, both Leone 1995 and Orser 1996 define historical archaeology in Western terms and chronologies; cf. Silliman 2005; Stahl 2009). The division of archaeology into 'prehistoric' and 'historical' practitioners, each with their own separate conferences and theoretical objectives, underscores these disciplinary realities. This artificial separation seeps into archaeological thinking of past peoples and their idealized worlds, condemning 'premoderns' to the 'savage slot' (Cobb 2005). Those scholars who straddle the divide tend to do so by back tracing processes considered modern (such as colonialism or globalization) back to premodernity (e.g., colonialism in deep history, Stein 2005). The idea is not to deny that differences existed between premodern and modern lifeways, but instead to treat this potential for differences as an empirical problem, and render them visible through tracing continuities and changes across the premodern/modern divide.

Africanists have an arguably greater stake in challenging the modernity issue, for Africa was a central place in which evolutionary ideas of premodernity were conceptualized (Stocking 1987; Trigger 1989). Much anthropological and archaeological scholarship in the postcolonial period has been devoted to eroding and challenging those stereotypes (e.g., Andah 1979; McIntosh and McIntosh 1980, 1984, 1988; Robertshaw

1990; Schmidt and Avery 1983; Stahl 1986), yet they retain an uncomfortable tenacity in popular thought (Stahl 2005). Scholarly insistence on the exclusivity of modernity, which has been defined in Western terms, only exacerbates this misconception (Chakrabarty 2000). So too does the practice of selective harvesting of 'traditional' African lifeways for sources of ethnographic analogy, which whether intentional or not tends to "deny coevalness" (Fabian 1983: 31) and history alike (Wolf 1982) to what are very modern strategies and circumstances (cf. Stahl 1993a).

Globalizing African pasts, then, crosses a second analytical boundary by reinjecting history and coevalness back into modern practices. It does so by rejecting the concept of the fixity and isolation of African village life, and instead acknowledging shared global historical trajectories and local agency (Piot 1999; Stahl 1999a, 2001; Wright 2004). A global focus tells an alternative story by showing that Africa has not always occupied the lowest rung of the global development ladder, lest we forget what fueled Europe's hunger for global expansion—Malian Mansa Musa's ostentatious parade of gold all the way to Mecca in 1324. A long-term view with an eye to the global allows archaeologists to tease apart the different processes and linkages that contributed to the making of the modern world (cf. Hall 2000).

Archaeology, with its focus on local trajectories of culture change, can act as a corrective to the homogenizing discourse of globalization by disentangling how different processes and linkages converge on a single place and its history, and thus can begin to address the concerns of Cooper (2001). Effects of global pressures at the local level can include: the disembedding of local relations from their context (Giddens 1990), the creation of hybrid or creole cultural forms (Bhabha 1994; Hannerz 1996), the development of various 'glocal' forms (Robertson 1992), and even the reinvigoration (or creation) of 'tradition' (Inglis and Gilman 2009: 6-8). Material evidence provides a direct means of tracing how local people reconfigure global items and influences according to local circumstances, history, and identity. Studies have shown how goods are recontextualized (e.g., cowrie shells: Ogundiran 2007) and tastes refashioned in colonial contexts (Bourdieu 1984; Stahl 2002). On a basic level, the recovery of global goods attests to contact with external forces, directly or indirectly, but also allows for an investigation of culture-making that highlights how local people resisted, transformed, and negotiated global objects and influences in their daily lives (Ogundiran 2002, 2007; Stahl 2002, 2009, 2010).

I draw specific insight from Nicholas Thomas's work on entanglements, as well as the social life of things (Appadurai 1986; Kopytoff 1986), which informs much of the work just described and recent directions in the study of material histories (Stahl 2010). These studies view the adoption of novel goods, which may or may not involve direct culture contact, as a social process. Namely, any new object is introduced into an already functional social and material world, and is acquires function and value based on that world (Kopytoff 1986). New objects may be used to enable major social transformations (Thomas 1999), or fit into preexisting systems of value (Thomas 1991). In other words, "[t]o say that black bottles were given does not tell us what was received. This is so partly because the uses to which things were put were not inscribed in them by their metropolitan producers" (Thomas 1991: 108). In these ways, 'entangling' foods begins to move us past simplistic assumptions that Africans only adopted new foods to solve perennial food insecurity issues (many of which are modern constructions, Ch. 5-7), placing foods back in the realm where cultural values and tastes assume saliency.

I also make an explicit comparison between objects, as produced and made things, and foods, which are also made. Objects are produced through a series of techniques that transform raw material(s) into a desired finished project. The nature of the materials being worked with constrain how they can be worked, thus are, in some ways, agents of their own making (Dietler and Herbich 1998; Gosden 2005; Latour 2005; Martin 2005). The material properties (made and innate) of objects dictate how they can be used; people decide in what ways to use them. Often the material or aesthetic properties of unknown, new objects affect whether or not they are adopted and how they are used (Thomas 1991).

Foods, too, are used and produced. They may be collected growing wild in the bush; people choose to use them based on their material and taste characteristics, toxicity, perceived health benefits, and many other factors. More often, foods are *made*, through a series of techniques that transform raw animal and plant material into cuisine.[6] Certain characteristics or properties of particular foodstuffs may constrain or beg being used in various ways, and affect how they are adopted and spread. Despite these obvious similarities, food is more often than not left out of this sphere of 'produced' things. Historically, archaeologists have tended to marry foodways to environmental systems, though recent literature has emphasized social factors (e.g., Graff and Rodriguez-Elia 2012; Twiss 2007). But in order for plants and animals to become food, they must be transformed into culturally acceptable cuisine. This transformation is accomplished through a series of food preparation techniques. What really defines the separation of foods and objects? For archaeologists, one may argue that differential preservation and material realities of plant remains versus more durable materials (say, pots), and the increasing polarization of specialists has demarcated them into separate analytical and theoretical domains, rather than any real difference in their actual production or consumption (see Logan and Gokee in prep.).

Analyzing the introduction of new foods helps create material archives of food history—it is an alternate way of constructing the past, well-suited to the dearth of textual data available for the African continent. Tracing the spread and adoption of new crops over space and time has been an important contribution of archaeobotany to understanding culture change and contact. For instance, significant attention has been devoted to both pre-European shifts such as the spread of maize throughout North America (Fritz 1990; Scarry and Steponaitis 1997; cf. Fritz 1995; Kidder 1992; Schoeninger 2009), and African crops to India (e.g., Fuller 2005), as well as the more recent exchange of Old World crops to the Americas (Gremillion 1993). Some view the adoption of these crops in terms of optimizing agricultural production or minimizing agricultural risk (e.g., Gremillion 1997) while others see them as indications of changing taste preferences or social relations (Fuller 2005; Logan et al. in press; Smith 2006). Investigation of why new crops were adopted must be examined on a case by case basis,

[6] I use cuisine here to refer to a collection of different dishes often associated with specific cooking styles or cultural traditions. I avoid the use of the term in when referring to the deeper past, because I am not yet convinced that in most cases archaeology and history are up to the task of recreating entire 'cuisines'. Instead, we are able to get at 'food practices' or 'foodways' which are specific components of cuisines—hence the focus on practice theory.

taking both environmental and social situations into account. Such a focus provides a window on the intersection of cultural and environmental change, where the adoption of and local reinterpretation of foods, like other kinds of objects, makes visible processes of culture-making.

Why the focus on new crops and technologies? First, 'new' things can be reliably traced in the archaeological record, in people's memories, and in archival documents, and even more so when all three are combined. This is not to say that food did not change in other ways – through local processes, changes in agricultural strategies, ritual prohibitions, etc.—it did, and much of my data speak to these types of change. Second, tracing how new things are adopted is complementary to understanding gradual change in local crops and technologies. Third, these new things allow a window on how local societies change in the face of external contacts, associated opportunities, and pressures (but see Silliman 2009). For some, this may be an over-reliance on 'external' things or pressures as the source of change—but how new objects are adopted or rejected is a local process, one that illuminates how people became part of local, regional, and global networks.

Africa, Food Insecurity, and the Environment

One cannot write about African subsistence[7] without reference to the opportunities that the diversity of environments on the continent provide (Ch. 2) as well as the role of environmental change in subsistence shifts. Climate change, especially drought, is among the most popular explanations of subsistence change in Africa, one that is painfully close to the news story versions of present day tragedies of African food systems. To be sure, drought can and often does have an impact the quantity of food people produce, but it must also be kept in mind that African farmers long ago developed methods of dealing with environmental risk (i.e., Marshall and Hildebrand 2002; Redding

[7] Subsistence can refer broadly to meeting the minimum requirements to support life or to the means of supporting such life, according to the Merriam-Webster definition. In archaeological usage, it is most often used to refer to foodways in the deeper past (i.e. millennia ago) or to situations where farmers just barely make it (i.e., subsistence farming). I avoid the word in my dissertation—except when speaking of it in the literal sense—as it tends to imply that food insecurity is lurking nearby, which in all cases needs to be tested rather than assumed. For example, we would never use the word 'subsistence' to talk about modern American food (even if we should in some instances).

1988). Environmental change is, in many ways, a constant. Development anthropologists have moved away from the notion that a decline in production alone is to blame for famine. Instead, following the influential work of Amartya Sen (1981), it is household and individual command over or access to food (i.e., entitlements) that defines who suffers and who does not in times of shortage. In other words, famine is not entirely a natural disaster, but an economic and political one (e.g., Baro and Deubel 2006: 524; Berry 1993; Bigman 1993; Davis 2001; Watts 1983: 17). For archaeologists, this implies that drought does not necessarily mean famine or engender significant changes in subsistence (particularly when conditions are unstable and unpredictable, cf. Park 1992; McIntosh 1998, 2005), but that when drought and food shortage *do* coincide, it is necessary to ask what other economic or political conditions allowed shortage to happen.

While famine can result in significant changes to subsistence and even social and political structure, it is by no means the most common kind of shortage. In the course of my interviews in Banda, I became aware that people discriminate between two kinds of food shortage: famine and seasonal shortage. In Banda today, famine is fortunately virtually unknown, though at least two past occurrences are recalled when prompted. Instead, it is cycles of seasonal food shortage that are both rampant and easily recalled. Mandala (2005) found the same distinction in Malawi. He suggests that Africanist literature on foodways has focused too narrowly on severe crises, rather than addressing the day to day shortages that define people's daily lives and routines (Mandala 2005: 15). This observation parallels anthropologists' calls to move away from a focus on emergency relief to investigate the underlying conditions that make food shortage endemic (Baro and Deubel 2006).

The conditions that make famine and endemic shortage possible are closely tied to historical and social processes as well as environment. However, economic and environmental factors tend to be emphasized at the expense of social historical ones. But understanding the historical conditions that led to the Africa of the present, where food shortage is common and famine occurs all too often, is also critical for situating both present day food security policy and archaeological and historical visions of Africa's past. The very vulnerability and lack of resilience in households that makes shortage commonplace is just as contingent on history as it is on environment. Yet the historical roots of these problems remain all but ignored (Bigman 1993; Mandala 2005).

My objective in the pages to follow is to critically evaluate some of these taken-for-granteds, particularly the role of environmental, political, and economic factors in food security, household resilience, and vulnerability, from the vantage of an archaeologist's long-term gaze. The indicators used to measure resilience and vulnerability, even in modern populations, are debated (Baro and Deubel 2006), and archaeologically we are even more limited in our ability to see intangible strategies, such as simply eating less. However, significant shifts in foods utilized, preparation practices, and hunting and gathering strategies *are* visible. Interviews with modern communities are used to help define possible motivations for both the adoption of new foods and coping strategies for dealing with shortage (this study; also many others, e.g., Dei 1988; Hildebrand 2003), though they are not necessarily the same as those in the past.

The adoption of new foods may provide a marker of unstable conditions, one side of the U-shaped curve that MacBeth and Lawry (1997) conjure to explain food change. The American crops maize and cassava are today incredibly important in minimizing the seasonal hungry gap as well as increasing overall food security in Africa. Consequently, most scholars assume that they were immediately accepted by Africans upon their first introduction (Crosby 2003; McCann 2005), but as I show in Chapter 5, motivations of African farmers and cooks in the 16th century seem to have differed from those of today. The conditions that have created chronic food insecurity in today's Africa do not seem to have been so pronounced at that time. Instead, I investigate *when* stop-gap crops like maize became staples to pinpoint when food insecurity problems arose. What conditions led people to change their foodways so dramatically? Was it environmental change, political or economic instability, or something else? This approach allows for an empirical examination of how and when the food insecurity problems of the present arose, but also allows us to contemplate a very different past.

My point in this brief foray into African foodways and environmental change is to show that environmental change does not always or even often occasion a response in foodways. This is a lesson I learned from interviewing Banda farmers, who are cognizant of and respond differently or not at all to climatic shifts of varying intensity and severity, but always with the market in mind. In the analysis that follows, I do my best to evaluate the interplay of environmental, social, political, and economic factors and their impact on food and daily life. Archaeology, with its long-term perspective, is ideally positioned to address these long-term sustainability and food security issues, a point I return to in the Epilogue (Ch. 9).

My Approach

I approach the study of the history of foodways in Africa by focusing primarily on the plants used over the last millennium in central Ghana and further afield. Drawing on Stahl's (2001: 27-40) version of upstreaming, I comparatively analyze multiple sources in the periods when they are available, including ethnographic interviews, archives, oral history, and archaeology. This allows for critical evaluation of the sources against each other (Ch. 6 & 7). The ethnographic information I rely on derives primarily from two periods of fieldwork in the wet and early dry seasons in 2009 and wet season in 2011 in six villages in the Banda region. The ethnographic work was guided by questions concerning continuities and changes in food, agriculture, and women's work in living memory. In particular, I focused on how new foods and food technologies were adopted while others were abandoned, as well as farmer responses to environmental change. My aim was not to establish an ethnographic baseline (for the present itself is a moving target), but to get a handle on changing food dynamics in the period between the most recent archaeological evidence generated to date (extending to c. 1930) and the present. General agricultural strategies and foodways are reported in Chapters 2, 7, 8, and the Epilogue. Further description and analysis of these interviews will be reported in future publications.

Moving back in time, colonial archives as well as people's memories connect me to the archaeological data which ends at around c. 1930. In Chapter 7, I draw on ethnographic, archival and archaeological sources to disentangle the turmoil that characterized the late 19th century and subsequent changes to daily life as the British took control of Ghana. Use of these sources helps me fill in some, but not all, of the gaps and critically evaluate each kind of source. Archival sources are limited for Banda, particularly as related to food and agriculture. Oral histories are difficult to translate into calendar years as the passage of time is marked differently. They also tend to commemorate events and chiefs rather than daily food practices. Archival sources as well as oral histories begin to drop off as we move backwards in time, so that in Chapter 6, which covers the period of Asante rule (c. 1725-1825), we are reliant on archaeology as well as the accounts of a few Europeans who made it as far inland as Kumasi. This spatial unevenness in documentary coverage is even more pronounced in earlier periods, when Europeans adhered closely to the coast. These European travelogues are helpful in documenting the initial spread of American and Asian crops along the coast after c. 1550 (Ch. 5). But archaeology still does the important work of covering areas and populations not visited by Europeans, including the hearths of everyday people on the coast and elsewhere. This view 'from the hearth up' is essential to figuring out the motivations behind crop adoption. Accounts of Arab merchants and scholars in the dry interior of West Africa extend observations backwards in time to c. 900-1600. However, a wide band comprising the northern forest, forest-savanna mosaic, and much of the savanna is left out of both Arab and European sources. Yet this area was heavily impacted by American crops, and was a source of many trade goods in the past, as well as a crossroads for trade caravans running north and south. It is within this dynamic zone that we find Banda (Ch. 2).

In addition to their limited spatial and temporal distribution, documentary sources are also biased in that they were usually written by foreign individuals who were almost exclusively male. This is a major bias in reconstructing a history of cuisines that are cooked up by women's daily decisions and activities. The 'from the hearth up' focus of archaeology provides a perfect complement to these limitations, and it is on this small-scale data that I rely. Though I experimented with newer techniques like phytolith and starch grain analyses (Ch. 3), my primary analytical focus is on charred botanical material. Examinations of African plant remains has grown substantially over the last two decades, though much of it has focused on the Late Stone Age when we see the emergence of domesticated plants and animals for the first time (e.g., D'Andrea et al. 2001, 2007; Eggert et al. 2006; Kahlheber et al. 2009; Marshall and Hildebrand 2002; Neumann 2003, 2005; Neumann et al. 2012). Far fewer studies have examined subsistence over the last two thousand years in the so-called Early and Late Iron Ages, though there are some excellent examples (e.g., D'Andrea et al. 2008; Haaland 2007; McIntosh 1995a; MacLean and Insoll 1999; Murray 2005; Nixon et al. 2011; Walshaw 2010). A very small handful of studies try to connect the more distant past to the present, but rarely examine more than a sample or two from recent, historic periods post-dating 1500 (e.g., Bigga and Kahlheber 2011).

Despite these advancements in our knowledge of past subsistence, none of these studies address the introduction of American crops to Africa, or the effects of the slave trade or colonialism on African foodways. These topics have simply been outside of the temporal and topical reach of most African archaeobotanical studies. This is despite the move towards studying the recent past by Africanist historical archaeologists, particularly over the last two decades (e.g., for West Africa: DeCorse 1992, 2001a,b; Insoll 2008; Monroe 2007, 2011; Monroe and Ogundiran 2012; Ogundiran 2007, 2009; Reid and Lane 2003; Richard 2009, 2010; Stahl 1999a, 2001; Swanepoel 2005). Instead documentary sources have dominated discussion of foodways during the last 500 years, coupled with assumptions of continuity in food preparation techniques and agriculture (e.g., DeCorse 2001: 115; McCann 2005).

Most Africanist archaeobotanical studies have understandably focused on ecological interrelationships or risk avoidance as the primary means to explain subsistence change (e.g., Marshall and Hildebrand 2002; see review in Neumann 2005). I questioned this focus above, when considering the role of environmental change in modern food shifts. This is not to say that environmental change did not have an impact on human settlement and agriculture, but that it should be treated as an empirical problem—one of several possible explanatory factors in subsistence change. In order to determine how shifts in climate may or may not have impacted local agricultural strategies, I reconstruct their impact in Banda based on two sources. The first is a high-resolution record of rainfall at Lake Bosumtwi, some 200 km south of Banda in the forest zone of central Ghana (Russell 2003; Shanahan et al. 2008, 2009; Talbot et al. 1983). Second, I evaluate whether or not the shifts recorded in this sequence impacted Banda through wood charcoal identified by Dr. Alexa Höhn. I also consider the shifts in how wood was used on site, from cooking daily meals to supplying craft producers.

While charcoal and baseline environmental data from Lake Bosumtwi help evaluate the climatic contexts in which African agricultural systems were managed, I move beyond ecological interpretations and address the role of political economic changes on Banda food and agriculture as well. This is accomplished primarily through what I gloss as contextual analysis. Drawing inspiration from the work of Christine Hastorf (Atalay and Hastorf 2006; Hastorf 1991, 1993; Hastorf and Johannessen 1993), I focus on discussion of archaeobotanical remains in their historical and archaeological contexts as a way of moving beyond ecological interpretations. These detailed contextual readings are only possible because of the excavation data and interpretations generated by the long-term Banda Research Project directed by Ann Stahl, on whose work I piggyback. Archaeobotanical samples were systematically collected from excavations over the last two decades, when few others on the continent sampled for plant remains. I joined the project in the 2008 and 2009 seasons, when I developed much of my understanding of Banda archaeology. The specifics and chronology of this project and the Banda region are reviewed in Chapter 3.

For readability I have succumbed to the allure of time's arrow and begin with the earliest evidence (11^{th}-15^{th} centuries) and move towards the present. This approach eschews the modern/premodern divide and allows us to tell the story of people living at the so-called 'margins' and on marginal incomes whose stories and perspectives are not otherwise recorded, yet are at the center of much economic development policy and debates, as well as how we think about the past. As such, this study aims to address a particular silence (Trouillot 1995) in the historical record—one that pertains particularly to women and their daily activities.

Dissertation Outline

In the chapters to follow, I expand upon the themes and questions that I have raised above. I do this through consideration of continuity and change in food and daily life in Banda over the last millennium. This provides a long-term and local view of global-level shifts that is meant to combat stereotypes of African foodways and Africa's place on the edge of all things modern. Two goals unite my approach: 1) reconstructing of African experiences of global connections through their foodways, and 2) tracing when, and under what conditions, its present food security concerns arose. I accomplish this through tacking back and forth between various scales of inquiry (Stahl 2001; Wylie 1989) to reconstruct 'cartographies' of change over space and time (Richard 2009: 31; Stahl 2002: 835). The structure of each chapter mirrors this approach. I begin by reviewing broader political economic contexts, particularly concerning trade networks. I then narrow my observations to Ghana and finally to Banda, and describe continuity and change in foodways and environment. At the conclusion of each chapter, I tack between Banda and the wider West African contexts in order to "interrogate the historical forces framing social trends" (Richard 2009: 31).

In Chapter 2 I give the reader background needed to understand Banda's position at environmental and cultural crossroads that underlay its role in long-distance connections. Chapter 3 considers the way in which I collected and analyzed archaeological, ethnographic, archival, paleoenvironmental, and botanical data, and in particular how phytolith analysis is used in the subsequent chapters. These two chapters foreground my exposition of Banda's lived and cooked past, which begins with the earliest period investigated (in Ch. 4), beginning around 1000, and moves forward in time, ending with the early colonial period, c. 1930 (Ch. 7). In Chapter 4, I examine how West Africa and Banda became enmeshed in wider spheres of circulation across the subcontinent and to Arab and European worlds, and how new foods moved through those networks in the first half of the second millennium AD. Chapter 5 examines the Banda area of the 15^{th} to 17^{th} centuries, which was a much more central, active, and resilient node in long-distance trade networks, a place that thrived and prospered during a centuries-long drought, and imported new crops like maize and tobacco. In Chapter 6, I relate how the Asante invaded and took control of the Banda area, and placed different demands on labor, production, and trade. In Chapter 7, I describe the exodus of people out of Banda, as its inhabitants were involved in a series of traumatic upheavals that fundamentally altered the routines of daily life, and what (if anything) people ate. When people begin to leave material traces once again, Banda was under the control of a new colonial power—the British—and there was a new ‘normal’. I consider the ways in which colonialism further affected agricultural production and redefinitions of taste as Banda became increasingly marginalized during the first half of the 20th century. Chapter 8 attempts to retie the threads of Banda’s food history back to the theoretical issues raised in this chapter. Finally, I use this long-term gaze to speculate on the future in the Epilogue.

Chapter 2

Situating Banda at a Crossroads: Food, Culture, and Environment

This chapter situates Banda at the intersection of environmental, agricultural, and cultural spaces as a prequel to understanding the nature of its involvement in long-distance networks and culture contacts, past and present. Banda lies at the boundary of two major ecological zones and at the intersection of many different ethnic groups. Its position on the border between forest and savanna and proximity to the entrepôt of Begho helped spur involvement in major long-distance trade networks that moved resources between the north and south. Another axis of intersection is attested to by the diverse ethnic makeup of the region today, which suggests the region's past position as a frontier zone (Kopytoff 1987; Stahl 1991, 2001). Viewed from the vantage of the present, where Banda can be defined relative to a series of boundaries drawn on maps, it is evident that Banda is located at many different kinds of crossroads. None of these boundaries are frozen in time; rather they have been formed by and helped form Banda's environmental and cultural history. The movement and interplay of those boundaries is something I explore in subsequent chapters; here, I introduce the characters involved and broad plot lines from the vantage of the present looking back in time.

Today the Banda region is defined by the extent of the Banda paramount chieftaincy, located in an area of wooded savanna in west central Ghana (Figure 2.1). It is bounded by the Black Volta River to the north, the Tain River to the east, and more open boundaries to the west (between the Banda hills and the border with Cote d'Ivoire), and the south (south of the Chen River; Figure 2.2; Stahl 2001: 45-46). These boundaries are shaped by natural features on the landscape, and also by historical interactions with neighboring polities and the colonial and national governments (Chs. 6 & 7; Stahl 2001). In particular, the Banda hills run northeast-southwest and present a barrier to east-west movement, just as the Black Volta prevents easy access from the north; both would have made Banda an attractive refuge in times of trouble (Stahl 2001: 45), a geographical attribute which shapes its present day heterogeneity. In this chapter, I review the ecological, physical, and cultural characteristics of this space, the agricultural and food practices of today, and provide an introduction to the archaeological work undertaken in the region to date.

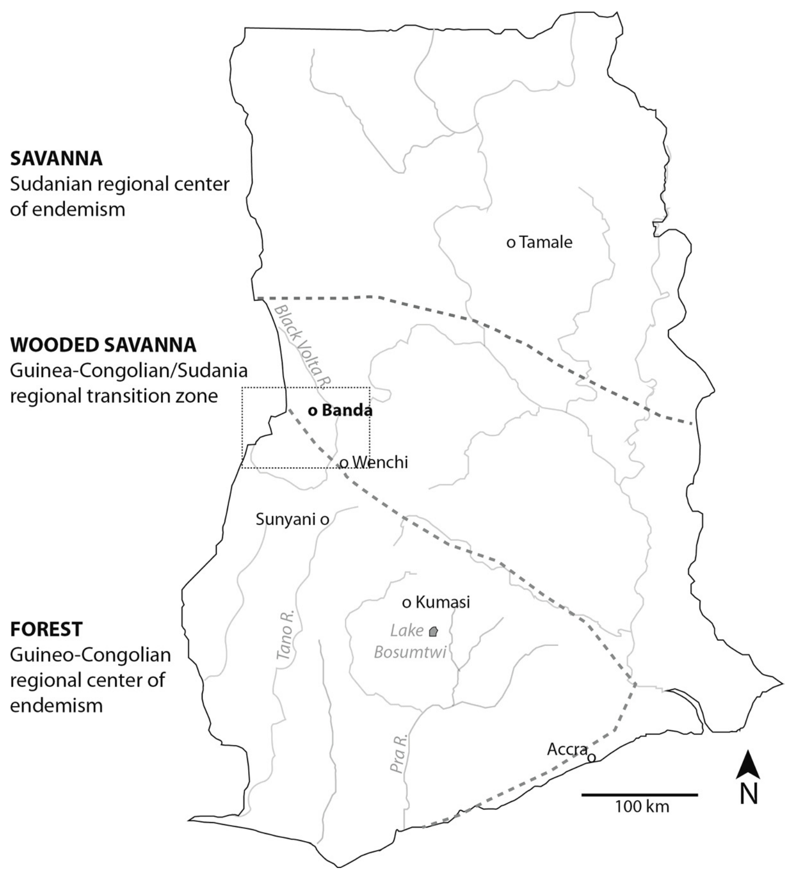

FIGURE 2.1: Map of Ecological Zones in Ghana (after White 1983: 177)

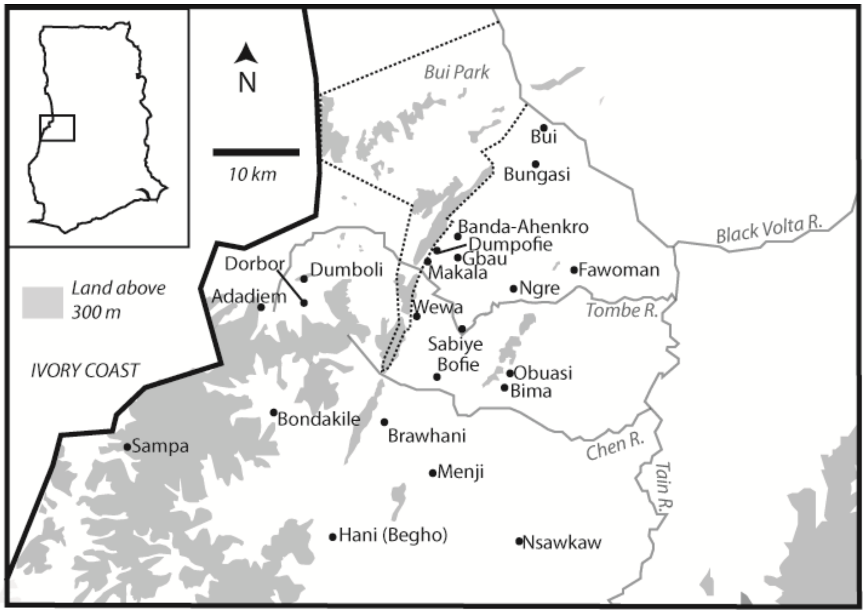

FIGURE 2.2: Map of Banda Area with Modern Towns (after Stahl 2001: 46)

Ecological Boundaries

Modern day West Africa is divided into five vegetation zones (Figure 2.3) which are distinguished on the basis of annual precipitation and its seasonal distribution as well as plant physiology (White 1983). These zones run east-west, with precipitation generally decreasing as one moves north. The Sahara or Sahara regional transition zone is the most northerly zone, and is classified as a desert based on very low rainfall, high temperatures, and sparse vegetation. The Sahel transition zone lies directly south of the desert, receiving more precipitation and allowing the growth of grasses and acacia trees. The Sudanian regional center of endemism[1] is characterized by savanna that is mostly grassland and wooded grassland, which receives moderate amounts of rainfall and supports large populations of plants, animals, and people predominantly through cereal agriculture. The Guinea-Congolia/Sudania regional transition zone is dominated by savanna woodland that contains patches of both savanna and moister forest. Finally, the Guinea-Congolian regional center of endemism runs in a band across the southern edge of West Africa, and is dominated by rainforest with high annual precipitation (White

[1] "[A] Regional Centre of Endemism is a phytochorion which has both more than 50 per cent of its species confined to it and a total of more than 1000 endemic species." (White 1983: 42)

1983). Tubers and tree crops are the main food plants. While there are several localized microenvironments between and within these zones, the above divisions allow a generalized discussion of how climate change and human activities have impacted the distribution of these different vegetation zones.

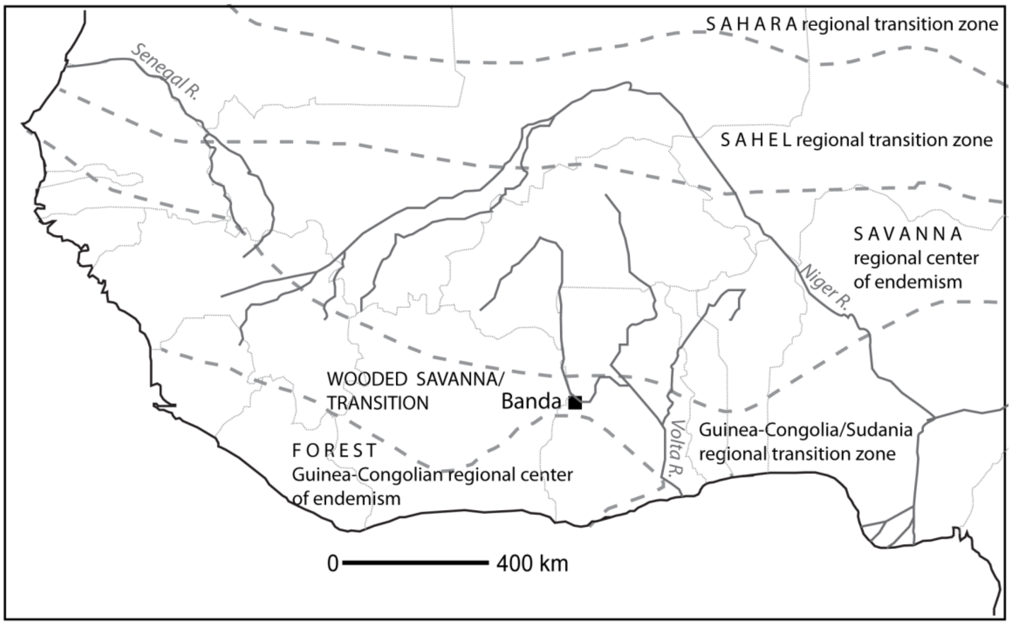

FIGURE 2.3: Ecological zones in West Africa after White (1983: 38,177)

The boundaries of modern day Ghana straddle three of these zones—wet forests are concentrated in the southwest third of the country, with semi-deciduous forest dominating a thin band in the center (Keay 1959) and savanna environments dominating in the northern half of the country (Figure 2.1; Hopkins 1974; White 1983). Today, Banda lies at the northern edge of the forest savanna mosaic in wooded savanna, a highly productive agricultural zone where tubers (yams, cassava), grains (maize, pearl millet, and sorghum), legumes (cowpea or black eyed peas, soybeans) as well as a wealth of vegetable crops (garden eggs or small eggplants, chili peppers, tomatoes) and industrial crops (calabashes) are cultivated (see below). In this section, I review the ecological setting of the savanna woodland and the variation in precipitation and seasons to help situate agriculture and land use in Banda.

Forest and savanna environments

Forests and savannas can be neatly separated by the relative amount of woody species and grasses. Forests have a much higher percentage of woody species, and savannas are dominated by grasses (Hopkins 1974). The boundary between the two should be patchy and gradual, though today is sharply delimited by the extent of burning. Human agricultural activities like burning and clearing transform forest edges into transitional savanna. But even without the impact of human activities, the boundaries of forest and savanna have shifted over time; changing climatic conditions, especially precipitation, have shifted zone boundaries—sometimes considerably—northward (wetter) or southward (drier) (Figure 2.4; Brooks 1993, 1998). Since the Banda region lies in a transitional zone between forest and savanna today, it is important not to treat the present boundaries of each zone as hard and fast; instead, these are modern phenomena based on millennia of human, environment, and climatic interactions. These interactions are examined more fully in subsequent chapters using wood charcoal data to reconstruct human use of the landscape. Here I review the range of environmental configurations in central Ghana.

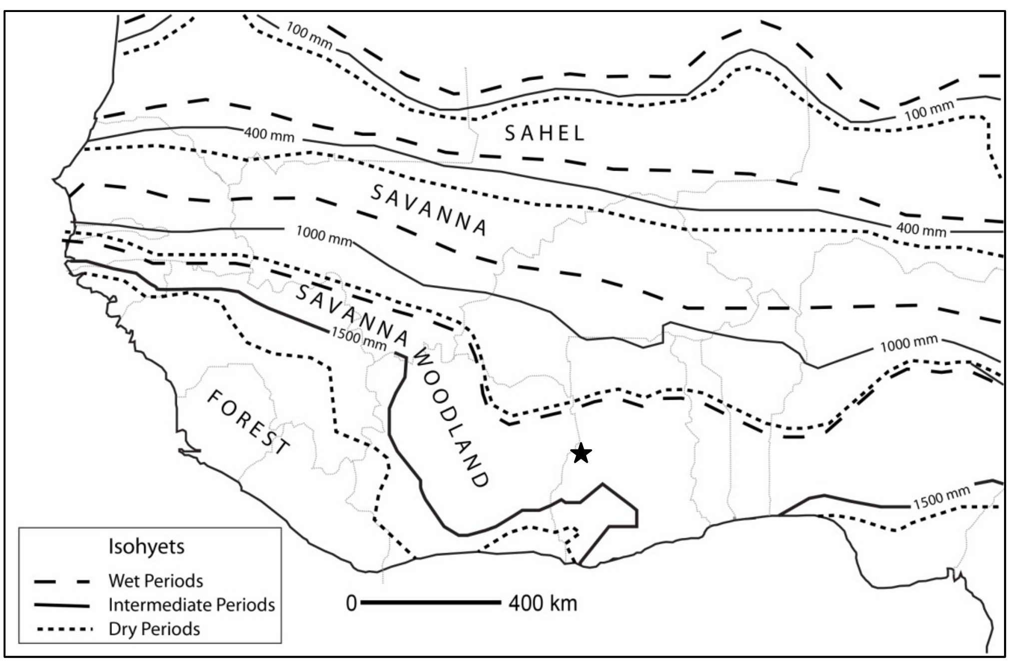

FIGURE 2.4: Potential variability in distribution of ecological zones with shifts in rainfall patterns (Banda is starred; redrawn from Brooks 1993: 10)

Both Keay (1959) and White (1983) categorize the Banda environment as moist savanna woodland. In Keay's (1959) rendering, Banda is characterized by undifferentiated savanna woodland just north of a thin band of forest savanna mosaic, a transition that can still be seen today as one drives south to Sunyani or Techiman. In a more recent synthesis, White (1983) places Banda in the transition between two zones of endemism: the Guineo-Congolian to the south and the Guinea-Sudanian to the north (Figure 2.1 above). Working from south to the north, the Guineo-Congolian regional center of endemism in southern Ghana was formerly covered mostly by rainforest and swamp forest. Today little undisturbed forest remains and forest vegetation is instead in various stages of regrowth. African rainforests are not as diverse as those on other continents, but are floristically diverse by African standards. Rainforest in this context grows to at least 30 m in height, and sometimes much taller—in Ghana reaching heights of 55-60 m (Figure 2.5). In contrast to true savannas, most rainforest plants are woody with a large percentage of climbers. Most species in the forests are evergreen or semi-evergreen, with the rare occurrence of deciduous species (White 1983: 75). The character of the rainforest varies over space and under different conditions, leading White (1983: 76) to define four main variants: coastal evergreen forest; mixed moist semi-evergreen forest; single-dominant moist evergreen and semi-evergreen forest; and drier peripheral semi-evergreen forest. Most areas in the Guineo-Congolian regional center of endemism are covered (or were formerly covered) with mixed moist evergreen and semi-evergreen forest, which occurs on most well-drained soils, and areas of mean annual rainfall generally between 1600-2000 mm. Patches of single dominant moist evergreen and semi-evergreen forest are scattered throughout the zone, but are, in general, rare in West Africa (White 1983: 77-78). Drier peripheral semi-evergreen forests flank the northern and southern margins of the Guineo-Congolian center of endemism. Formerly this vegetation type was much more widespread in the transition zone, and still can be found along river banks (White 1983: 79).

Most relevant for the present day is the vegetation that characterizes the Guinea-Congolia/Sudania regional transition zone where Banda is currently located. Most of the approximately 2000 species that characterize this zone come from the neighboring Guineo-Congolian and Guinea-Sudania endemic areas. Much of the zone is covered in secondary grassland and secondary wooded grassland (Figure 2.6). Different types of forest were (presumably) widespread in the past, but have been destroyed by fire and cultivation (but see below). Only rarely are patches of drier peripheral semi-evergreen rainforest found; shorter (in height) and less diverse forest patches are more common (White 1983: 176).

FIGURE 2.5: Rainforest viewed from canopy walk in Kakum National Park (Ghana), typical of the Guineo-Congolian regional center of endemism (photo by author)

FIGURE 2.6: Savanna woodland in various stages of fallow/regrowth with Banda hills, Bui, Banda, Ghana (photo by author)

The Sudanian regional center of endemism runs in a band north of Banda and is characterized by savanna woodland vegetation. Wooded savannas differ from forests in that they have a higher percentage of grasses (with forests having almost none), and in forming an irregular canopy that lacks extensive stratification. The canopy in the wooded savanna is equivalent to the lower tree stratum in the forest, with an occasional emergent from the middle stratum (Hopkins 1974: 55). This zone has about 2750 species, roughly a third of which are endemic. There are three endemic genera, one of which, shea butter (below), is of economic import to humans. Today the vast majority of the area is characterized as bush fallow, or woodland in different stages of regrowth after cultivation. Areas with short fallow have far fewer tree species than areas under long fallow, and are instead composed of mostly economic or fire-resistant species. Woodland varies in its composition, which in transitional zones can include more species associated with forest. Species characteristic of drier and wetter Sudanian region can be found in White (1983: 105-106). In brief, wetter southern parts of this zone tend to be dominated by *Isoberlinia doka*, although in Ghana it is not as abundant, and instead *Burkea africana, Daniella oliveri*, and *Erythrophleum africanum* are more common. The drier northern parts of the zone lack *Isoberlinia*. The area may have previously supported rich woodland, but agriculture is so extensive that almost everywhere is in a stage of bush fallow (White 1983: 103-106).

Savanna grasslands are dominated by high (over 80 cm tall) grasses that are typically burnt annually. Herbs, trees, and other woody plants are also present (Hopkins 1974: 55). Depending on the availability of water and extent of cultivation there are greater or lesser numbers of trees. *Terminalia macroptera*, and to a lesser extent, *Bracharia jubata* and *Hyperthelia dissoluta* are found in the wetter portions of this zone. The dominant grasses in these wetter zones are *Hyparrhenia cyanescens*, *Pennisetum unisetum*, and *P. polystachion*. Seasonally flooded grasslands are dominated by grass species like *Setaria sphacelata* and *Andropogon gayanus*. Drier areas of the Sudanian region tend to be dominated by *Acacia* species. The shallow soils that overlie deposits of ironstone that cover much of the interior savanna zone of Ghana support grassland communities of *Isoberlinia*, and grasses that are dominated by *Rhytachne rottboellioides*, associated with *Lycopodium affine*, and species of *Xyris*, *Utricularia* and *Drosera.* When

Isoberlinia dies out due to extensive cultivation, *Terminalia avicennioides*, *T. laxiflora*, and *Butyrospermum paradoxa* tend to grow instead (White 1983: 107-108).

Earlier authors, usually operating under the auspices of colonial governments and their biases, portrayed African shifting cultivation practices as responsible for destroying much of the forest, turning it into 'derived' savanna (Fairhead and Leach 1996; Hopkins 1974; Wills 1962). In part, this was based on the observation that under a long enough fallow, fields in the wooded savanna turn first into secondary grassland, which are usually burnt once per year, encouraging the growth of grasses and fire-resistant tree species. However, if left for long enough without the use of fire, fallow lands revert to secondary forest. There is considerable local variation in the density of tree cover and species composition according to the history of land use in individual regions (White 1983: 84-85). Essentially this means that pockets of forest survive amid grasslands, which colonial officials saw as remnants of a more forested past. This misinterpretation of the African landscape has dictated environmental policy in the modern era (Fairhead and Leach 1996). By 1983, White concluded that the transition area was probably never covered in forest, but instead was a true, gradual transition that one would expect to see between different centers of endemism (also Hopkins 1974). Fairhead and Leach (1996) argue that human practices actually encourage the growth of forest trees around settlements and in fields. They instead interpret islands of forest in the savanna not as remnants of a long-lost forest cover, but as the result of active human encouragement and stewardship. In their eyes, people have extended and altered the distribution of the forest, rather than systematically destroying it.

In the case of Ghana, two generalizations are plausible. First, people have for millennia engaged in practices that encourage the growth of useful trees in savanna and forest environments, transforming the 'natural' landscape into a productive one for human collectors (e.g., Logan and D'Andrea 2012). These kinds of practices act to increase the density and number of useful trees on the landscape. Rather than attempting to reconstruct what is 'natural', Fairhead and Leach (1996) suggest that we view the present day landscape as a record of the activities of previous generations. It is the case that the rainforests of southern Ghana have been severely deforested in recent decades for logging and cocoa and oil palm plantations. Second, these practices are not new; cocoa plantations were carved out of the forest beginning in the 1890s and were the major economic focus of the British colonial government (Ch. 7). One estimate suggests that at the start of the 20th century, about one-third of Ghana's land mass was covered in tropical forest; by 1989, it is estimated that 78% of that humid forest had already disappeared. The most recent estimates suggest an annual deforestation rate of 3% (Appiah et al. 2009: 472). Clearly any discussion of environmental degradation must take into account the changing nature of human activities over the long-term.

The Banda landscape today is divided into two major zones. The first includes the Banda hills along with a segment of land to the west, both of which have been protected as part of Bui National Park. The second contains all areas to the west and east of the park that have been transformed into agricultural and useful lands (Figures 2.2 & 2.6). About 50 km south of Banda-Ahenkro, the savanna woodland vegetation grades into what used to be a more complex stratified forest just three decades ago (Stahl 2001: 48). Bui National Park was designated in 1972 to protect the rich flora and fauna of the area (and perhaps to help facilitate construction of a long-planned hydroelectric dam, see Epilogue). The changing composition of fauna in the area speaks to ongoing environmental change over the last century, despite reportedly low human populations for at least the first half of the 20th century (Ch. 7). In 1931, the area was visited by elephants and buffalo, and supported small numbers of lions and large numbers of roan antelope, hartebeest, hyena, and leopard (KA 168 in Stahl 2001: 48). In 1982, Stahl noted that elephants were gone, but that Bui Park contained hippos, artiodactyls (bushbuck, kob, oribi, duiker, hartebeest, waterbuck, buffalo, and warthog) as well as primates (colobus monkey, patas and green monkeys, and baboons) and carnivores (leopard, spotted hyena, lion; Stahl 1985: 76-77, 2001: 48). By the time I interviewed local residents in 2009, a common complaint was that hunting was not what it used to be. Far fewer animal species were seen, and in much smaller numbers than the elderly recalled from their youth. People mostly blamed this on two causes: the overhunting of some of these species in order to sell the meat, and the demarcation of Bui National Park, which provided a safe haven for animals as hunting—now called 'poaching'—is forbidden. In terms of food, the major decrease in availability of bush game has major dietary and economic impacts, and illustrates one negative impact of top-down conservation measures on local livelihoods (but see Appiah et al. 2009; Shetler 2007).

Vegetational change in Banda is less clear, and will be investigated to the degree possible in the next several chapters. Because Banda is too far north to produce cocoa or oil palm on any scale, plantations have not been established in the area, sparing Banda the attendant deforestation found in southern Ghana. However burning trees for charcoal is a very common practice (bags ready for sale can be seen in Figure 2.6), and most of the land is farmed for subsistence or cash crops like introduced cashew and teak trees. Tobacco used to be among the cash crops grown; large-scale production began in the mid-1980s thanks to incentives offered by Pioneer Tobacco Company (Stahl and Cruz 1998: 223). However, by the late 1990s and early 2000s farmers and elders realized that large-scale tobacco cultivation resulted in serious long-term effects on land fertility, and requested that the community cease production. Consequently, large-scale tobacco production is virtually nonexistent today. This suggests that people in Banda have a view towards preserving land fertility and livelihoods in the long-term. Unfortunately, declining land fertility is a common complaint, as is increasing pressure on prime farmlands. Both are likely to get worse as the reservoir for the newly constructed Bui Dam fills, flooding 25% of Bui National Park and creating more pressure for farmland, especially for resettled communities (see Epilogue).

Precipitation and Seasonality

Variability in precipitation and the changing of the seasons have dramatic effects on the landscape. To the casual observer, savanna landscapes in Africa in the wet and dry seasons look completely different; the land transforms from a picturesque, fertile, lush green woodland scene (Figure 2.6) to a dusty, parched landscape almost devoid of life (Figure 2.7). These seasonal contrasts structure much of daily life in West African villages, especially agriculture and diet.

The wet and dry seasons in West Africa are defined by the interaction between the Harmattan or north-east trade winds and the monsoon or south-west winds (Figure 2.8). The Harmattan brings dry, dusty, hot air across the Sahara, and the monsoon brings moist, cool air from the Atlantic Ocean. The meeting of these two winds results in rainfall, an area known as the Intertropical Convergence Zone (ITCZ) (Boateng 1970: 31). The ITCZ is characterized by low pressure, rising motion, clouds and precipitation (Nicholson 2009: 1156) and frequently shifts in position (Shanahan et al. 2009).

FIGURE 2.7: Dry season field prior to burning in Banda, 1982 (photo courtesy of Ann Stahl)

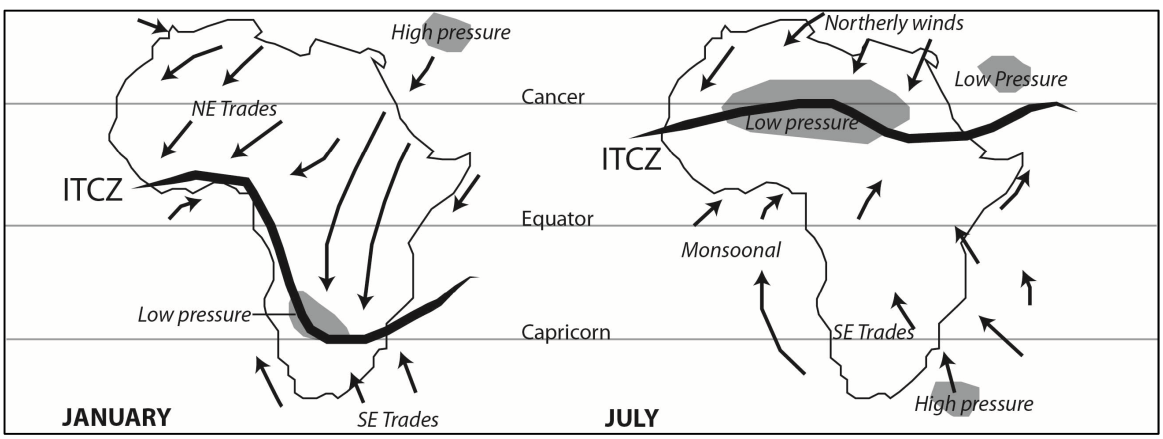

FIGURE 2.8: ITCZ position in dry and wet seasons in Africa

The timing, duration, and intensity of precipitation determine periods of plant dormancy and growth, and is critical for structuring the agricultural cycle. Ghana is in a transitional zone, where an equatorial (two-peak) rainfall pattern in the forests of the south transitions into a tropical (one-peak) pattern in the savanna north. Forested areas generally receive two peaks of rainfall in May-June and September-October or October-November, while northern Ghana has only a short rainy season in August-September, and a long dry season thereafter. Banda falls in a zone of transition between the two, thus the rainfall pattern retains some of the equatorial periodicity. The wet season generally lasts from late March to October, but rain falls in two peaks: a minor one in May-June and a major one in August or September-October (Baker 1962: 204-207). The intervening month of July is thus a 'little dry season' (Nafaanra: *kowam*; below). The main dry season occurs between November and April, though sporadic rains may start in February/March. Peak temperatures are usually reached in February or March, just before the onset of the rainy season (Boateng 1970: 27, 30). This rainfall pattern puts Banda within a very productive subsistence farming zone since in good years two crops of maize can be grown.

In absolute amount of rain per annum, savanna woodlands are characterized by areas with lower annual rainfall than rainforest zones, usually less than 1000 mm. Rainfall estimates for the Banda area in 1959 were 40-45 inches (1016-1143 mm) per year (Walker 1962: 13). In 2010, the average for the Brong-Ahafo region was 1088-1197 mm a year, and estimates for the more northerly reaches of the province (which includes Banda) are lower (Ghana Ministry of Food and Agriculture: http://mofa.gov.gh/site/). Both estimates underscore Banda's position on the southern moister margins of the savanna woodland. There can also be significant annual variation in rainfall. Farmers in Banda frequently express concern over diminishing rainfall in the last few decades. About 200 km south of Banda, climatic data from the Kumasi weather station and oxygen 18 isotope records from nearby Lake Bosumtwi (6°30.3′N 1°24.5′W) confirm this observation; higher rainfall occurred before 1965, with a dramatic drop off in precipitation after 1970 that is characterized as the Sahel drought in more northern latitudes (Shanahan et al. 2009).

According to Banda farmers, in recent decades the onset of the rainy season in particular has been quite unpredictable. This is supported by recent environmental research that suggest the ITCZ, which dictates rainfall timing and duration, has exhibited frequent shifts in location (e.g., Shanahan et al. 2009). Crops can be heavily impacted by either late onset of the rains or a change in the normal two-peaked rainfall pattern. Late onset of the rainy season can delay planting of crops, making it impossible to plant a second crop, and can alter at what point in a crop's lifecycle rains stop or start. Some crops like pearl millet are particularly sensitive to receiving too much rain during their flowering stages, or in the case of maize, not enough rain at critical growth stages (below). The results of such shifts can be dramatic; for instance, in just 30 years' time, people have stopped cultivating pearl millet which had been the staple crop for nearly a millennium. Unfortunately, our ability to see changes in the timing of rainfall in the archaeological and paleoenvironmental records is limited, though historical sources may provide information on these sorts of changes in the last century.

Anthropogenic influences combined with changing rainfall patterns suggest that the local ecology has long been in constant flux, and use of modern vegetation zone boundaries for application to the past should be treated with caution (e.g., Figure 2.3). Instead, paleoenvironmental and archaeological data should be used to reconstruct past local microenvironments. Several sources address environmental change over the last millennium AD in Ghana and the transitional zone. Of greatest import for the present study are paleoenvironmental studies from Lake Bosumtwi (Russell 2003; Shanahan et al. 2008, 2009, Talbot et al. 1984), which lies south of Kumasi, approximately 200 km south/southeast of Banda as the crow flies (Figure 2.1). Annual precipitation records spanning the last two millennia have been reconstructed from Bosumtwi, providing a high resolution picture of environmental change in the wider area. These shifts will be discussed for each period in the chapters to follow. A general diagram of these changes over time can be found in Chapter 4 (Figure 4.7).

Agriculture in Banda Today

Agriculture and land use in Banda have changed over the last millennium, especially with the incorporation of American crops like maize, cassava, and peanuts (Ch. 5-7) and the development of a cash crop economy (Ch. 7). Here I limit the discussion to crops and general patterns of agriculture and land use today as a jumping off point for understanding continuity and change in the past. Wild plant use is discussed briefly in Chapter 7, and will be reported fully in subsequent publications.

Crops of the Banda area

In this section I provide brief descriptions of the animals and crops that are currently grown in Banda. Crops and their place of origin or domestication are listed in Table 2.1.

TABLE 2.1: Main crops grown in Banda (2009) and their places of origin. Parentheses denote crops that are no longer grown but were in recent memory.

English Name	Scientific Name	Origin
<u>Grains</u>		
(Pearl millet)	*Pennisetum glaucum*	West Africa
Sorghum or guinea corn	*Sorghum bicolor*	African Sahel
Maize or corn	*Zea mays*	Mexico
African rice	*Oryza glabberima*	West Africa
<u>Tubers</u>		
True or white yams	*Dioscorea rotundata*	West Africa
Water or Asian yams	*Dioscorea alata*	Asia
Cassava or manioc	*Manihot esculenta*	South America
<u>Legumes</u>		
Cowpea or black-eyed pea	*Vigna unguiculata*	Northeast or West Africa
Bambara bean/groundnut	*Voandzeia subterranea*	West Africa
Peanut or groundnut	*Arachis hypogaea*	South America
<u>Vegetables and squashes</u>		
Okra or okro	*Abelmoschus esculentus*	Africa
Garden eggs or eggplant	*Solanum* spp.	Africa
Egusi or agushi	*Cucurbitaceae* (various species)	Africa and South America
Hot pepper	*Capsicum* spp.	South America
<u>Tree crops</u>		
Shea butter	*Butyrospermum parkii*	Africa
Baobab	*Adansonia digitata*	Africa
Dawadawa or locust bean	*Parkia* spp.	Africa
<u>Cash crops</u>		
Calabash	*Lagenaria siceraria*	Africa/Asia/Americas
Cashew	*Anacardium occidentale*	South America
Teak	*Tectona grandis*	South and Southeast Asia
(Tiger nuts)	*Cyperus esculentus*	Egypt
(Cotton)	*Gossypium* spp.	Old World/New World
(Tobacco)	*Nicotiana tabacum*	Americas

Domestic animals

The extent of livestock rearing in West Africa, especially of cattle, is defined by the limits of the tsetse fly, which generally becomes more common in wetter areas. Tsetse fly is a vector for trypanosomiasis (sleeping sickness) in large domestic animals and humans (Knight 1971). Tsetse fly is for the most part absent in Banda today, though it does appear with heavy rains. Individually owned cattle are tended in the area by immigrant Fulani; most other families own sheep, goats, and sometimes chickens and guinea fowls that are free-ranging. Pigs are also kept on occasion. Fish are a particularly important source of protein, and are readily available in the nearby Black Volta River (Stahl 2001: 50).

Grains

Pearl millet (*Pennisetum glaucum* (L.) R.Br.) has been cultivated in Ghana since Kintampo times (3600-3200 bp: D'Andrea et al. 2001), and it remains an important staple in the northern half of the country. It is the sixth most important crop on a worldwide scale, and the third most important in the African continent (National Research Council 1996: 77, 80). Pearl millet is a well-known drought tolerant crop that is grown in depauperate conditions across Africa and India, though it is losing ground to maize, in part because it is low-yielding and has not received research support, despite being a risk-averse choice for farmers (National Research Council 1996: 79, 97). It is nutritious, containing a fair amount of protein for a grain crop (9-21%) and more oil than maize. Pearl millet is also versatile; it can be used to: make porridges (including T.Z., below), steamed, made into beer (National Research Council 1996: 81), or even consumed as uncooked flour. Two distinct varieties grown in Ghana today: early and late maturing. The late maturing variety is widely grown throughout the interior savanna; early maturing millet is found in the far northern reaches of the country where it is the first crop of the season (rather than maize as in the south). Early millet matures in 80-90 days and is usually planted in April-May; its harvest marks end of the hungry season gap for northern regions. Late millet matures in 140-190 days and is planted from May to July and harvested from October to December. The late variety is very tolerant of weed competition and may not be weeded until the early cereals are harvested. In land rotation it is often planted with yams at the start of the rotation or is interplanted with cassava at the end of the rotation—in other words, at the least fertile periods in the rotation (Staff Division of Agriculture 1962: 369).

Pearl millets in Ghana can vary from those grown elsewhere in West Africa, as in Ghana they are grown in higher rainfall areas than most neighboring countries. Pearl millet generally grows in areas with 250-800 mm/yr (Brunken et al. 1977: 163), but where cultivated in Ghana, the average rainfall per year is 1000 mm. Pearl millet in Ghana tends towards early maturity and larger grains, though it is still classified in the race *globosum* (Appa Rao et al. 1984). Pearl millet exhibits a high degree of diversity, especially in seed morphology, and can interbreed with both its wild progenitor and mimetic weeds, which are called *shibras* (Brunken et al. 1977; D'Andrea and Casey 2002). *Shibras* are difficult to distinguish from millet prior to maturity, but they disperse their seeds naturally. Seed morphology tends to be quite variable but is intermediary between wild and domesticated millet (Brunken et al. 1977: 166). *Shibras* are much less common in areas outside the natural habitat of pearl millet, in other words, the more moist zones to the south, including Ghana (Appa Rao et al. 1984; Brunken et al. 1977: 166); however they have been found in archaeological crop assemblages from sites in northeastern Ghana where it is and was much drier (D'Andrea et al. 2001).

Brunken et al. (1977: 168-170) distinguish four races of pearl millet: 1) *typhoides*, which occurs over a large area in West Africa (and India), exhibits extreme variability in seed size, and is likely a primitive race; 2) *nigritarum,* the seeds of which are obovate like the other races, but very angular and infrequently cultivated west of Nigeria; 3) *globosum* which are more spherical with a depth always exceeding 2.4 mm (in modern accessions), and extends over much of West Africa in what is probably a modern migration; and 4) *leonis*, a narrow, long grain, which is a morphology adapted to wet conditions, though it is confined mostly to Sierra Leone. These four races represent a classification of the existing unimproved landraces as of the 1970s; it is likely that millets grown in Banda in the past differed from these, perhaps resembling an intermediate between the very small grains recovered in Late Stone Age contexts (D'Andrea et al. 2001; D'Andrea and Casey 2002) and modern *typhoides* or *globosum* races. It is also possible that multiple landraces existed in the past that did not survive to the present; for the Banda area a wet-adapted millet such as the modern race *leonis* would have been advantageous.

As noted above, though important in the past (Ch. 4-7), pearl millet is no longer grown in the Banda area. Farmers cite different reasons for this, but the most common is that it is very sensitive to rain at certain times in its growth cycle, particularly at flowering, when rain can cause a total crop failure (National Research Council 1996: 91; Staff Division of Agriculture 1962: 369). Recent shifts in the timing of the rains has been blamed for abandoning its cultivation, though it is likely that economic factors are also at play, as millet is very time consuming to process.

Sorghum or guinea corn (*Sorghum bicolor* (L.) Moench) is an African domesticate that is a principal cereal in the interior savanna where, like millet, it is produced primarily for domestic use and local sale. In Banda, it is most often sold to *pito* (beer) brewers from the north, and is rarely eaten as food. Sorghum is usually planted on more fertile land, being interplanted as the late crop with maize (or early millet in the north), though yields on poor land are moderate. There are a few quick maturing varieties (110 days), but most are longer maturing at 140-190 days. Planting usually starts after the first rains, in May or June, after the maize has been planted. Flowering occurs towards the end of the rainy season and the grains ripen after the rains have finished (Curtis 1965: 147). Harvest occurs from October to January, as after the crop is mature it is left to dry in the fields for some time. Compared to pearl millet and even maize, sorghum is much more tolerant of wet conditions (Staff Division of Agriculture 1962: 370), and even waterlogging (House 1995). It is not surprising that in recent years, as rainfall has been unpredictable and thus damaging to both maize and pearl millet, sorghum has emerged as the most dependable yielder.

The cultivated sorghums all belong to *Sorghum bicolor* subsp. *bicolor* (DeWet and Harlan 1971: 129). There are five main races of cultivated sorghum (guinea, kafir, caudatum, durra, bicolor), but in Ghana the main type is guinea (or guinea corn), which dominates most of tropical West Africa (DeWet 1978; DeWet and Harlan 1971; DeWet and Huckabay 1966: 797). There are at least three different cultivated groups and many more hybridized varieties. Of interest for this study are two cultivated varieties that correspond to different moisture regimes: one race grown in high rainfall areas has smallish grains (3-5 mm long) with grains shorter than the glumes; another race with longer grains (5-9 mm) that are equal in length to the glumes is widely grown in wide leaf savanna (DeWet 1978: 480-481). Guinea corn is widely grown in areas that receive 1000 mm or more of annual rain, and is best suited to areas reaching 80-1400 mm of rain a year, but can grow with as little as 254 mm (10 in) or as much as 3050 mm per annum (DeWet and Harlan 1971: 130-131). The guinea race may have been selected for in West Africa from wild members of the variety *arundinaceum* (DeWet and Huckabay 1966: 797).

Although it closely resembles sorghum, **maize** (*Zea mays* L.) was domesticated in Mexico. It did not reach West Africa until after Columbus (Ch. 5; Alpern 1992; McCann 2005; Miracle 1965), but by the 1950s had become Ghana's "most important staple cereal" (Staff Division of Agriculture 1962: 371). Today it is grown throughout the country and is in high demand for food and animal feed. One advantage to maize in interior savanna and forest regions is that two crops can be grown per year as there are quicker maturing varieties: 80-140 days, depending on variety, compared to 140-190 days for late sorghum or millet (Staff Division of Agriculture 1962: 372). This also means that maize matures before any of the other grains or tubers, during what has been called the hungry season gap before the other crops are ready to consume (McCann 2005: 28). Under the right conditions, maize produces much higher yields than indigenous African grains (McCann 2005: 6). Both advantages may have been instrumental in its widespread adoption throughout the continent. White dents are usually grown in southern Ghana and white or yellow flints in the interior savanna zone. Maize normally occupies the most fertile part of the rotation; in the interior savanna it occupies the second rotation, after yams. The first planting is carried out during the first rains and, when there are two peaks in rainfall, it is planted both during the main rains from March to July and during minor rains in September. In more northerly locales that are characterized by a short late wet season only one crop is grown per year (Staff Division of Agriculture 1962: 372). However, unlike the indigenous cereal grains, maize is very sensitive to drought, especially early in the growing season, during tasseling and as the kernels mature (McCann 2005: 19). Farmers in Banda have noted that maize has become increasingly hard to grow as the rainfall patterns have shifted. Instead, as noted above, they tend to produce the more reliable sorghum which is sold and the profits used to buy maize for food.

African rice (*Oryza glabberrima* Steudel) was domesticated in an area to the west/northwest of Ghana from Senegal to the Inner Delta of the Niger and northern Ivory Coast, where it was an important staple of medieval African states (Ch. 4; Carney 2001; Murray 2005; Portères 1976). It is grown in small quantity in some regions of Banda today (particularly near Brawhani) and is highly desired by consumers there.[2] African rice is usually grown in river valleys, wetlands, and in dry lands that receive enough rainfall. It used to span both the forest and the moist savanna woodlands, though it has almost entirely disappeared from the forest zones as Asian rice has replaced it. This process of replacement may have begun several centuries ago as Asian rice reached West Africa through trans-Saharan and Atlantic trade networks (Richards 1996: 211-212). Today African rice lingers on in some areas simply because it has become weedy in fields of Asian rice (Harlan et al. 1976: 10).

Tubers

The cultural, economic, and dietary importance of the **yam** (*Dioscorea* spp., Dioscoreaceae) in West Africa cannot be overstated; in areas where it can be grown, it is king among the preferred foodstuffs and structures the agricultural system. On a global scale, West Africa produces the vast majority of *Dioscorea* yams. Three species of yam are grown in Ghana: white guinea, yellow, and water yams. Both white and yellow yams were domesticated in West Africa, while water yams are of Asian origin. There are many varieties of each distinguished by shape and size of tuber, skin characteristics, palatability, keeping-quality, and period required for maturity. A wide diversity of yam varieties is grown in Ghana, where every district has its special types which may be adapted to local conditions. Yams require high rainfall regimes and thus cannot be cultivated much farther north than Wa in Ghana (Ayensu and Coursey 1972). White guinea yam (*D. rotundata* Poir) is generally held to be of the best quality and is the principal cash crop variety; yellow or forest yams (*D. cayenensis* Lam.) are similar to white yams in many respects but the flesh is yellow and of slightly poorer quality and it

[2] This desire for African or 'red' rice may or may not be linked to the high demand for the Asian variety, which is a common but expensive convenience food.

does not keep as well, so is produced in smaller quantities. Asian yams (*D. alata* Roxb.) are more fibrous and thus considered poorer quality then white yams (Staff Division of Agriculture 1962: 377) and are considered a second-rate foodstuff. Both white and water yams are grown extensively in Banda, though white yams are very much preferred for eating and selling. Yams are planted in the first rotation of a field before any other crops as they yield more nutrients than most crops and are also the most valuable (Coursey 1967: 69). They prefer high rainfall (1200 mm/year) though can grow in areas receiving as little as 600 mm or as much as 3000 mm a year. The development of the yam tuber is an adaptation to a long dry season, when the leafy parts die away and the plant becomes dormant. Yam tubers essentially develop with the rains and usually take six to eight months to mature; thus they thrive best in areas with a long wet season (Coursey 1967: 71, 74). The amount of rainfall dictates the size of the tubers; if rainfall is low for the year, the yam plant bears only small tubers. By August or September, yams are ready to consume in Banda, a time celebrated by the New Yam festival (below; Coursey and Coursey 1971). Approximately nine different varieties of white yams are grown in Banda (Figure 2.9), though many more were grown in recent memory.

FIGURE 2.9: Main yam varieties grown in Banda today (clockwise from top left: *nyungbo, asobayere, muchumuduu, tela, lelee, akwa, labreko, afi betua, pona*; for scale, white labels are about 4 inches long)

Cassava or manioc (*Manihot esculenta* Crantz., Euphorbiaceae) is a tuber crop from tropical South America that has become ubiquitous throughout Ghana. As of the early 1960s, it was only very occasionally grown in the interior savanna zone where yam was the principal root crop, mainly in land rendered unproductive by frequent cropping (Staff Division of Agriculture 1962: 374). Today cassava can be found in nearly every farm and cooking pot in the Banda area. This is because it is a heavy yielding crop that can be planted on poor lands, requires little tending, and is drought-tolerant. It is also easily convertible into cash surplus as the tubers may be sold fresh or processed into *gari*.[3] Depending on the variety and desired tuber size, cassava requires six to 24 months to mature, but most varieties can remain in ground for up to a year as a form of storage (Staff Division of Agriculture 1962: 375). Cassava can be harvested and replanted at any time of the year unlike yams and grains which require a specific rainfall regime for good yields. Despite being easy to grow, the bitter varieties of manioc that predominate in West Africa must be detoxified prior to use (van Oppen 1999). The tubers are considered to be less nutritious than yams (e.g., Ayensu and Coursey 1971) or millet, but the leaves are very nutritious and a common ingredient in soups, making cassava an essential part of daily diet (van Oppen 1999).

Legumes

Legumes are valuable in West Africa as an important source of amino acids and as nitrogen-fixers in the soil, making them the perfect complement to high carbohydrate diets and fields based on grains and tubers. **Cowpea or black-eyed pea** (*Vigna unguiculata* (L.) Walp., Fabaceae) is the major legume crop of the wider region and the Banda area. An African domesticate that was cultivated very early on in Ghana (about 3500 bp; D'Andrea et al. 2007), it is widely cultivated throughout Ghana and is one of the more famous botanical travelers to North America (Carney and Rosomoff 2009). The plant fares well on poor soils and in drought conditions and is a good source of protein and digestible carbohydrate (National Research Council 2006: 105-107). Cowpeas are eaten in many forms, often in boiled or ground form, and the leaves are widely used in the Banda area for soup.

[3] A "coarse flour made from dried grated fermented cassava" (Osseo-Asare 2005: 161) often sprinkled on liquidy dishes such as beans to add starch and a different texture.

Though associated with a number of West African soups and stews, **groundnuts or peanuts** (*Arachis hypogaea* L., Fabaceae) are indigenous to South America. In West Africa they are widely grown in drier interior regions as a cash and subsistence crop (Brooks 1975: 31-32). Groundnuts are widely cultivated both as a cash crop and for local use in Banda. They are most commonly consumed boiled as a snack or ground and added to soup.

Bambara beans (or Bambara groundnut) (*Voandzea subterranea* (L.) Thouars ex DC. or *Vigna subterranea* (L.) Verdc., Fabacaeae) are essentially a local African version of a peanut, being similar in botanical, agronomic, nutritional, and culinary aspects. Bambara beans are low growing, with one large black and white eyed bean to a pod. They are boiled in the pod as a snack (Figure 2.10), roasted, pounded into flour, and made into porridge. Bambara beans are a good source of carbohydrates and protein, and contain many oils, vitamins, and minerals. They are a dependable crop that is able to tolerate harsh conditions like poor soils and drought, and more resistant to pests as the pods grow within the soil (Doku and Karikari 1971; National Research Council 2006: 53-55). Maturity time ranges from 90-170 days, depending on whether an early or late variety is planted (Doku and Karikari 1971: 259). In Banda today, Bambara beans are not as common as cowpeas or peanuts, but they are greatly desired as a snack.

Vegetables and Squashes

The most important vegetable crops are okra and garden eggs (small eggplants) which are valuable sources of vitamins and minerals. Along with tomato and onions (which are usually brought in and purchased in Banda), they are so central to daily cuisine that they are simply referred to as 'the ingredients' in Ghana (Osseo-Asare 2005). **Okra** (*Abelmoschus esculentus* Moench, Malvaceae), or okro in Ghanaian English, bears long green fruits full of white seeds and a sticky, mucilaginous juice that endears it to African palates but offends some Western ones. It is common component of soups and stews throughout Ghana because of the 'slippery' texture it imparts to those dishes. An African domesticate that is also popular in the southern United States and South Asia, okra is easy to grow, adaptable, and a good yielder (National Research Council 2006: 288). In Banda two crops can be grown per year. It is the most common vegetable in much of West Africa, where it is eaten fresh or dried and also used as a thickener. Okra is also very nutritious; high in fiber, it contains moderate amounts of Vitamins A and C as well as calcium, magnesium, and potassium (National Research Council 2006: 289).

Garden eggs (*Solanum* spp., Solanaceae), also called eggplants or Guinea squash in the Western world,[4] are closely related to the larger purple variety familiar in the West from Asia, but are African in origin and much smaller—about the size of a chicken egg. There are endless varieties that come in shades of virtually every color, though most are eaten while still immature and white in color (National Research Council 2006: 137-139). Though they are relatively easy to cultivate, in Banda they occupy the full range of wild to domesticated; birds spread the wild varieties which are tolerated by farmers in their fields and later harvested for their very small bitter fruits (called *bruni saan saan*). There are several varieties used in Banda, separated by the bitterness of taste, which is desired for certain dishes.

Another important soup ingredient and valuable agricultural product is **cucurbit seeds** or *agushi*. *Egusi*, *agushi*, or *fnumu* (Cucurbitaceae) are squashes or melons cultivated for their white, melon-like seeds which are a prized ingredient in soups throughout Ghana and West Africa. The cracking of the outer shell of *agushi* seeds to extract the soft inner seed is a task that never seems to end in the villages. Indeed, *agushi* is valued for use at home and is in high demand in urban markets. It is very high in edible oils and protein, a perfect complement to grain based diets that lack extensive supplies of milk. *Agushi* is easy to cultivate, generally produces high yields, and suppresses weed growth. Seeds from multiple varieties are used as *agushi*, and may derive from several different taxa (*Citrillus lanatus*, *Cucumeropsis mannii* or *C. edulis*, and even *Lagenaria siceraria* and *Telfairia occidentalis*) (National Research Council 2006: 155-158); in this sense *agushi* is best thought of as a food category rather than a botanical designation. **Calabash** or bottle gourd (*Lagenaria siceraria*) seeds may also be consumed but are mainly grown for containers, which are an important cash crop in the Banda area. *Lagenaria*, though native to Africa, was probably among the world's earliest domesticates (possibly in Asia), where it was then carried to tropical South America and

[4] Both eggplants are closely related. The large dark purple variety with which most people in the West are familiar was domesticated in Asia. West African garden eggs were introduced to Britain and Europe before their Asian counterparts, though they fell out of favor soon after their large purple cousins were introduced (National Research Council 2006: 138).

FIGURE 2.10: Some common crop plants of the Banda area: clockwise from top left: peanut, okra, chili pepper, sorghum, yams, cassava, calabash and agushi, bambara beans still in pod (photos by author)

was subsequently returned to Africa in post-Columbian times (Erickson et al. 2005). However since there are a large number of cucurbits native to Africa, it is possible that one served the same purpose in pre-Columbian times.

Hot peppers (*Capsicum* spp., Solanaceae), today a central part of West African cuisines, were introduced from tropical South America in post-Columbian times. Several different 'peppers' are native to Africa, including *Aframomum melegueta*, *Piper clusii*, and *Xylopia aethiopica*; none were as hot as Capsicum peppers (Alpern 1992: 27).

Tree crops and wild plant foods

Banda lies just north of cocoa producing areas and just to the south of the denser areas of shea butter tree stands (Boateng 1970: 65); for this reason it was often left out of colonial development projects (Ch. 7). Still, there are several trees of economic and dietary importance in the region. Generally speaking, these trees are not cultivated, but their growth is encouraged near settlements and in agricultural fields, where they are left standing when other trees are cleared. First among them is **shea butter tree** (*Butyrospermum parkii* Kotschy, Sapotaceae), a valuable source of oil for cooking and soap making, and today an important source of income for women. It is Ghana's third ranking cash crop, yet it is collected, not cultivated (National Research Council 2006: 305). The trees are left standing when fields are cleared, and encouraged to grow near compounds. The tree begins to bear fruit at 12-15 years, but does not reach its full bearing capacity until it is 20 years old. Fruits mature in the early wet season and are usually harvested after they fall to the ground (Staff Division of Agriculture 1962: 364-365). The fruits are boiled or fermented to loosen the nuts from the pulp. The nuts are then sun dried and pounded to remove the shell from the kernel. The kernels are pounded into a paste and heated, producing a brown, oily mass. This is churned, strained, and kneaded for hours until the light yellow fat emerges (National Research Council 2006: 307; Staff Division of Agriculture 1962: 364).

Baobab trees (*Adansonia digitata* L., Malvaceae/Bombacaceae) serve an important function in both subsistence and in local belief systems. The fruits are eaten and the leaves cooked as soup in Banda and throughout the drier reaches of West Africa. The leaves appear just before the rains start, and continue until after the rains have ceased. They are dried for use during the rest of the year. Besides providing an ideal combination of amino acids, Vitamins A and C and several minerals, the leaves give sauces and soups a slippery texture that is so desired across West Africa (National Research Council 2006: 75-79). The presence of baobab trees, which can grow to be quite old (up to 1000 years: National Research Council 2006: 76), often marks the location of former villages, such as the case with Makala Kataa (Ch. 6 & 7). Chief among the baobabs in the Banda area is a very old tree with a split trunk that runs along the ground near modern day Dumpofie (or Kuulo; see below). Oral tradition records this as the spot where the Kuulo ancestress Wurache ('grandmother') sank into the ground at her death, and people came back from the farm to find a baobab seedling growing there. Offerings of food and spirits are still made at the base of the tree (Stahl 2001: 107-108, Plate 6).

African locust bean or Dawadawa (*Parkia filicoidea* Welw., *P. biglobosa* Jacq. R. Br. ex G. Don. f.) is an important leguminous tree that is harvested for its beans which grow in large pods. The tree is common in open savanna, bush fallow, and wooded farmland, but can also grow on rocky slopes (Orwa et al. 2009). In Banda the pods are used to make a drink, valued for its sugary taste, and the seeds are fermented and used as a soup flavoring. The seeds are very nutritious and, because they mature in the dry season, can be an important food source in lean times (National Research Council 2006: 207-208).

Another category of extensively used wild plants is **leafy greens**, mainly as an important soup ingredient that adds nutrients and a desirable texture. These are collected from the bush, from crop fields, and are on occasion purposefully cultivated. Most are low growing herbs. In Banda, there are over 30 named plants used for their leaves. Leaves of crop plants, especially cowpea and cassava, also fall in this use category and may today be replacing the use of a diversity of wild greens.

Agricultural practices

Agricultural practices are dictated by the changing of the seasons and are highly dependent on when the rains fall. Generally the growth cycle of each crop is during the rainy season, which usually starts in April and continues until October. However, the intensity and distribution of rains varies throughout the rainy season. Thus Banda farmers recognize seven seasons instead of just two. The farm calendar begins with the first rains, which can start as early as late December or January. This is the planting period. Nowadays, the onset of the rains is highly variable; they may not come until May, but typically planting of yams begins before the rainy season is in full swing, usually in April. In June, the weather is cloudy, with little sun and little rain; it is called *zukutuu*. By July, it is *kowam*, or literally, "rainy season with no rain." This coincides with the dry dip between the two rainy peaks that are typical of an equatorial rain pattern. August is called *kokrom*, which means "go to your town," in other words, strangers should have left, and people should stay home, as it will rain heavily and the rivers will flood, making travel difficult. September is called *ko*—the peak of the late rainy season when it downpours. By the end of September and into October *nyanyini* (literally "dry grass") begins; rains occur infrequently and dry winds signal the beginning of the harmattan. From then until the planting period is the dry season or *tlo* (literally "cloud") when the dry harmattan winds bring heat and dust, with little relief of the rains. Farmers know what signs to look for to sign that each of these new seasons is coming; most are signaled by the maturation of certain tree fruits. Each of these seasons signal new tasks to a farmer and correspond with the growing cycles of each crop (Figure 2.11).

Land use in Banda, as in much of Ghana, is defined by a system of land rotation and intercropping. Interviews with farmers confirmed the general pattern previously described for the southern savanna, when land is cultivated for a few years (usually two), followed by a period of fallow, when speargrass (*Imperata cylindrica* (L.) Beauv.) first dominates, and is replaced in a few years by tall perennial grasses, mainly Andropogonae, as well as small trees and shrubs, which are burnt and cleared before the land is re-cultivated (Nye and Stephens 1962: 135-136; Wills 1962: 201). In fallow, part of the soil nutrients are taken up and stored by the natural vegetation and are released back to the soil in the form of leaf, branch, and stem litter, rainfall, and eventually burning prior to cultivation. All act to increase the organic matter content of the topsoil, which is one of the primary sources of nitrogen, and a significant source of phosphorous and sulphur (Nye and Stephens 1962:136).

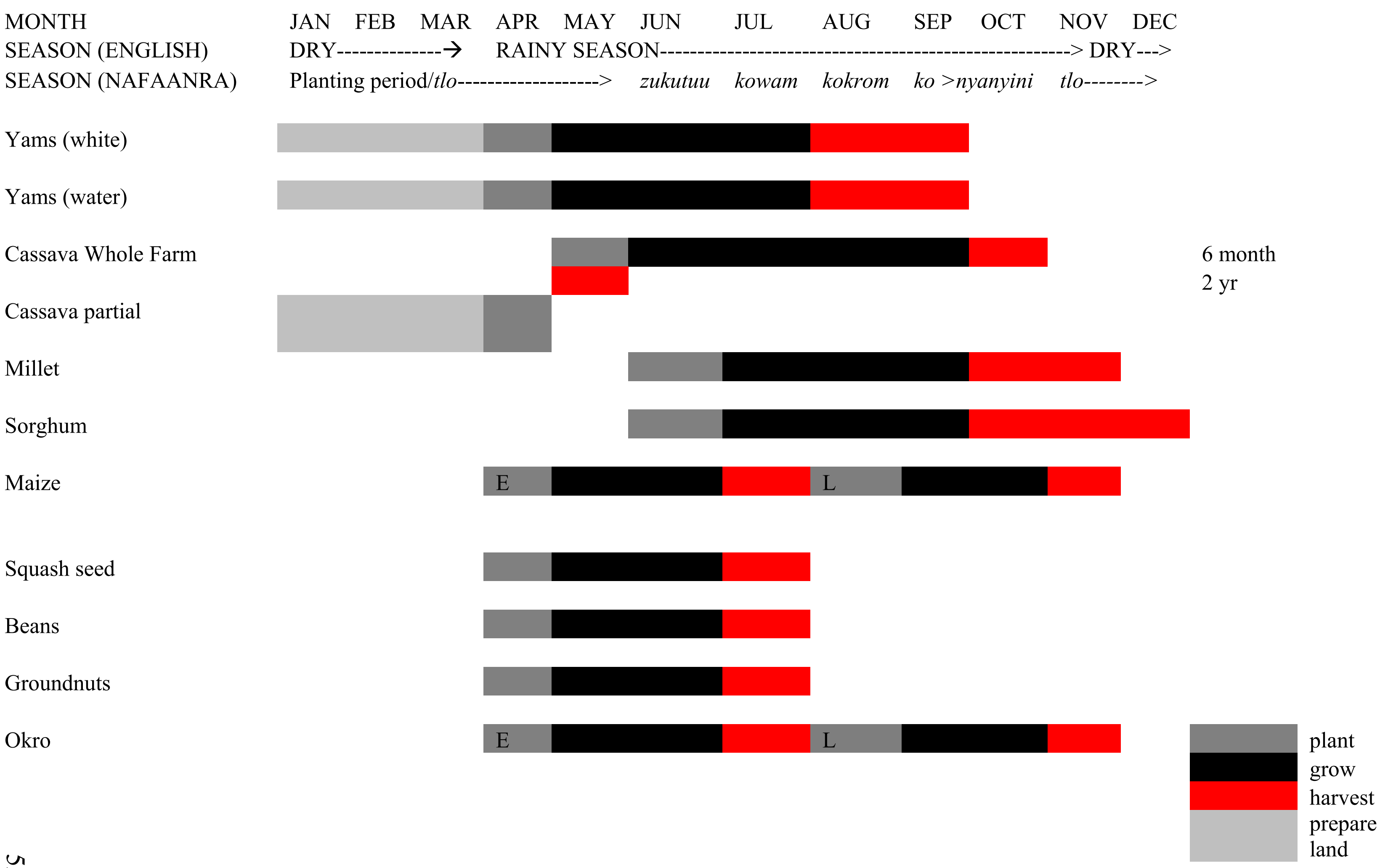

Figure 2.11: Typical Agricultural Cycle in Banda (in 2009)

Fallow time depends on land availability and population pressure (Nye and Stephens 1962: 137). Intensive land fallow systems in which the land is left to rest for a short duration characterize areas that lack unfarmed 'natural' vegetation. In regions where there is more unfarmed than farmed land, less intensive fallow systems prevail. As of 1959, Banda fell into a system of "less intensive land rotation with sparsely grazed tree savanna regrowth fallow and scattered patches of…little-cultivated ungrazed tree savanna, including forest reserves" (Wills 1962: 203). This observation fits colonial observations (Ch. 7) that portrayed the area as sparsely populated. This was very likely a time when population was recovering from major losses and dispersal that occurred during the tumultuous raids and wars of the 19th century. Fifty years later, population has increased and is starting to create competition for land, especially prime plots close to villages. As of 2011, anyone who wanted land to farm was given access, though a farmer might have to travel some distance from the villages to reach his or her fields. Some farmers describe declining fertility and shorter fallows as a problem in recent times, though this was not a widespread complaint. In any case, pressure on land is a problem that will surely escalate as the Bui dam comes online and the region attracts new residents.

Today, with the exception of plots with cashew or teak trees, parcels of land are generally farmed for two years before being left to fallow. Typically in the first year yams and other crops are planted on mounds and in the second year, grains, squashes, and beans are planted on mounds or rows. If two-year cassava is planted instead of yams in the first rotation, it may be allowed to remain in the field alone for the second year (Figures 2.12 & 2.13).

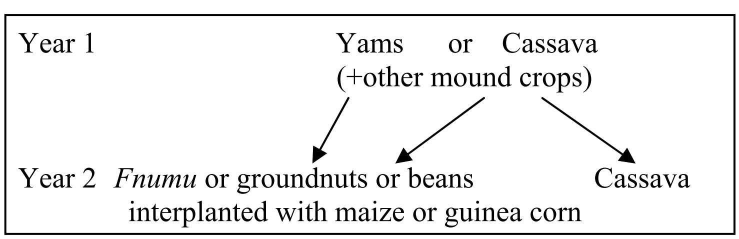

FIGURE 2.12: Land rotation in Banda

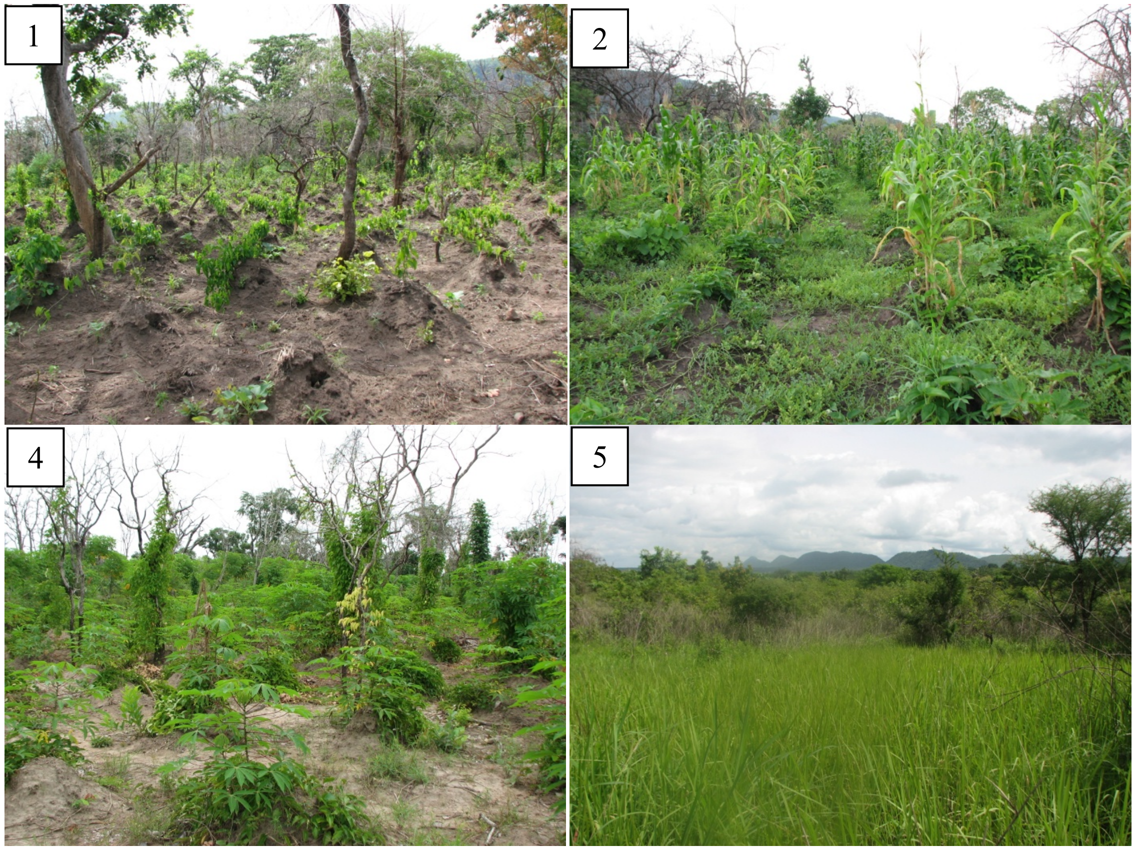

FIGURE 2.13: Stages in the rotation of a field: 1) Mounds planted with yams, in early stages of growth, 2)Yams, with maize and calabashes planted in mounds; 3) Maize with groundnuts (not pictured), and 4) Cassava, at end of the cultivation cycle, and 5) fallow field in early stages of regrowth (all photos by author)

To prepare a field for planting, grasses are burned and non-useful trees are removed. Fruit and other useful trees are left in the fields. Other small trees or branches are often left in place or added to help stake the growing yam vines. Mounds are raised after a little rain when it is easier to dig. Field preparation typically occurs in the very end of the previous wet season or beginning of the dry season. In a first rotation field, yams are the first crop planted in the mounds, sometimes as early as November, but generally between January and April. Freshly planted yam tubers are often covered with spare vegetation and dirt to protect them from the dry season sun until the rains start. As soon as yam planting is finished, other creeping crops like calabash, *fnumu*, or cowpeas can be planted in the mounds, taking care not to plant those that will quickly grow and overshadow the fledgling yam vine. Okra can also be planted in the mound at this time, but is not usually planted in quantity as it is produced primarily for local consumption. Later, maize is often also planted in the sides of the mounds. Cassava may be planted along the edges of the fields in rows; being deep rooted, cassava is not planted in the same mounds as yam so as to avoid competition for the same soil nutrients. After these crops are planted, the farmer weeds or waits for the crops to sprout and then weeds the field. This portion of the agricultural cycle usually occurs in the late dry season and early wet season, so that by the time planting is finished there has been adequate rainfall for both.

In this first rotation, staple crops are grown on mounds that function as microenvironments to provide a niche for each crop. This ingenious system takes advantage of the different depth and soil requirements of each crop (Fig. 2.14). Yam and cassava require deep, loose, well-drained soil, which the mound provides. This leaves the top layers of soil free for shallow rooted crops like beans and okra. Timing is also critical; all of the crops grown in the top layer of the mounds mature in four months, compared to six months for yams and 6-24 months for cassava. This insures that the crops in the top layer do not interfere with yam growth, and the yam plant is not yet very large at the time they are harvested. Yams or cassava are then left in the field to mature; yams are generally ready in August or September. Cassava can be harvested at the same time in the case of six month varieties; others remain in the field for another 6-12 months to reach optimal yield. In this case the crop may occupy the field for the duration of the second rotation.

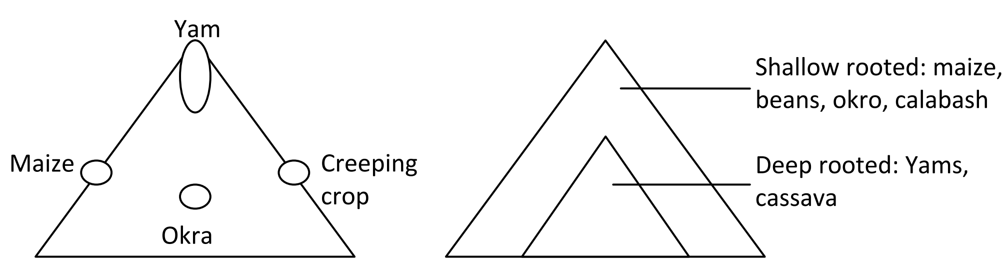

FIGURE 2.14: Schematic Cross-Section of Mixed Farming on Mounds

In the second year of cultivation, as soon as the yams are harvested, the land is cleared. After the rains begin, ridges are raised to plant *fnumu* or groundnuts. Sorghum (or millet in the past) is planted in June when the rains are most predictable. They are ready to harvest six months later. Maize can also be planted at this time, but this can be a costly option if it was planted in the previous rotation because of the need for chemical fertilizers. Instead sorghum is preferred in the second year. It requires only phosphorous, generally produces good yields, and can easily be sold. Weeding must be regular to ensure that speargrass does not compete with grain crops for nutrients. By year three, speargrass begins to dominate and most farmers do not find it worth their time and energy to cultivate another year in light of declining soil fertility.

Monocrops of maize are also planted, though are not as common as mound plantings. The reasoning is that because yams are highly valued for eating and for sale, it is a waste to use newly cleared fields just for maize. Maize can be ready in as little as three months, though it has not yet dried, making harvest more difficult. To ensure planting of two maize crops in one growing season, farmers can plant the first crop in April, anticipating a June yield; it can be left to dry for a few weeks to a month, which is preferable. Another maize crop is then planted in August, ready in November, before the other grain crops, at a time when yam stocks run low.

Both men and women do farm work, though in recent times there has been a shift to women having their own farms. This allows women a steady supply of income that is under their control, and also evens out risk of crop failure for the family. Traditionally, men did the heavy work such as clearing, weeding, planting, and initial harvesting (removing plants from the ground). Women assisted by weeding and tending, peeling and drying, and in final harvest practices such as gathering grain heads and processing them into clean grain. Yams were associated with men, who were responsible for growing them; women assisted by carrying seed yams to a new farm for planting and grown yams from fields to kitchens. These gender roles have changed as more and more women run their own farms and often produce lucrative yam crops. The most labor consuming tasks are clearing of the fields, building mounds, and weeding. In recent times, both men and women have started to hire Dagaarti laborers from northern Ghana to perform these tasks.

Modern Food Practices

Continuity and change in food practices was studied as part of an ethnoarchaeological project in 2009. Here I sketch only the basics; these data will be more fully explored in subsequent publications. In a nutshell, what people eat changes throughout the year with the seasons. There are two main staples. Yam fufu (*gbosro* or simply *sro*[literally 'food] in Nafaanra) is the primary food from the beginning of the yam harvest sometime in August and September until around the time the wet season begins, when they run short. T.Z. (in Ghanaian English, originally abbreviated from *tuo zaafe*, Hausa for 'hot porridge'), or *kambɔ* (Nafaanra), is a thick polenta-like porridge made from grain and cassava flour (Fig. 2.15). It dominates when yams run out and is eaten throughout the wet season.

T.Z. and fufu are essentially methods of preparing starchy staples, but in practice there is a fair amount of flexibility in the ingredients used to make them. For example, fufu made of white or African yams is preferred in Banda, but it can also be made of water or Asian yams, or a mix of plantains and cassava. T.Z. is made using a mixture of a grain of choice (maize, sorghum, or millet) and cassava flour; though it can be made just with grain, this is rarely done these days. Elderly women remark that this was more common in the past. Other starchy staples such as rice may be eaten in the place of T.Z. or fufu, especially for a midday snack.

In local cuisine these staple foods are accompanied by a 'soup' (thin sauce) of some sort. People use a dazzling array of wild and domesticated resources to add variety, nutrients, and desired taste to their soups, including wild and domesticated animals, peanuts, palm oil, tomatoes, eggplants, tree fruits, and a wide variety of leafy greens. T.Z. must be eaten with a 'slippery'[5] soup because of its texture. Soups fulfilling this criterion are made from okra or specific leaves which are commonly consumed throughout the wet season and may be dried for later use. The product is a high quality and digestable starch, complimented by soups that are nutrient- and, when meat is available, protein-rich.

[5] Many Westerners might call this texture 'slimy', but I resist that description both because it imparts a gross factor to Western readers, and because in Ghanaian English 'slippery' is the term used. Richards (1939) also used this terminology. Slippery is also lends a functional description to this texture; it helps food slide down the throat. This slippery quality derives from mucilaginous qualities found in certain plants, particularly okra.

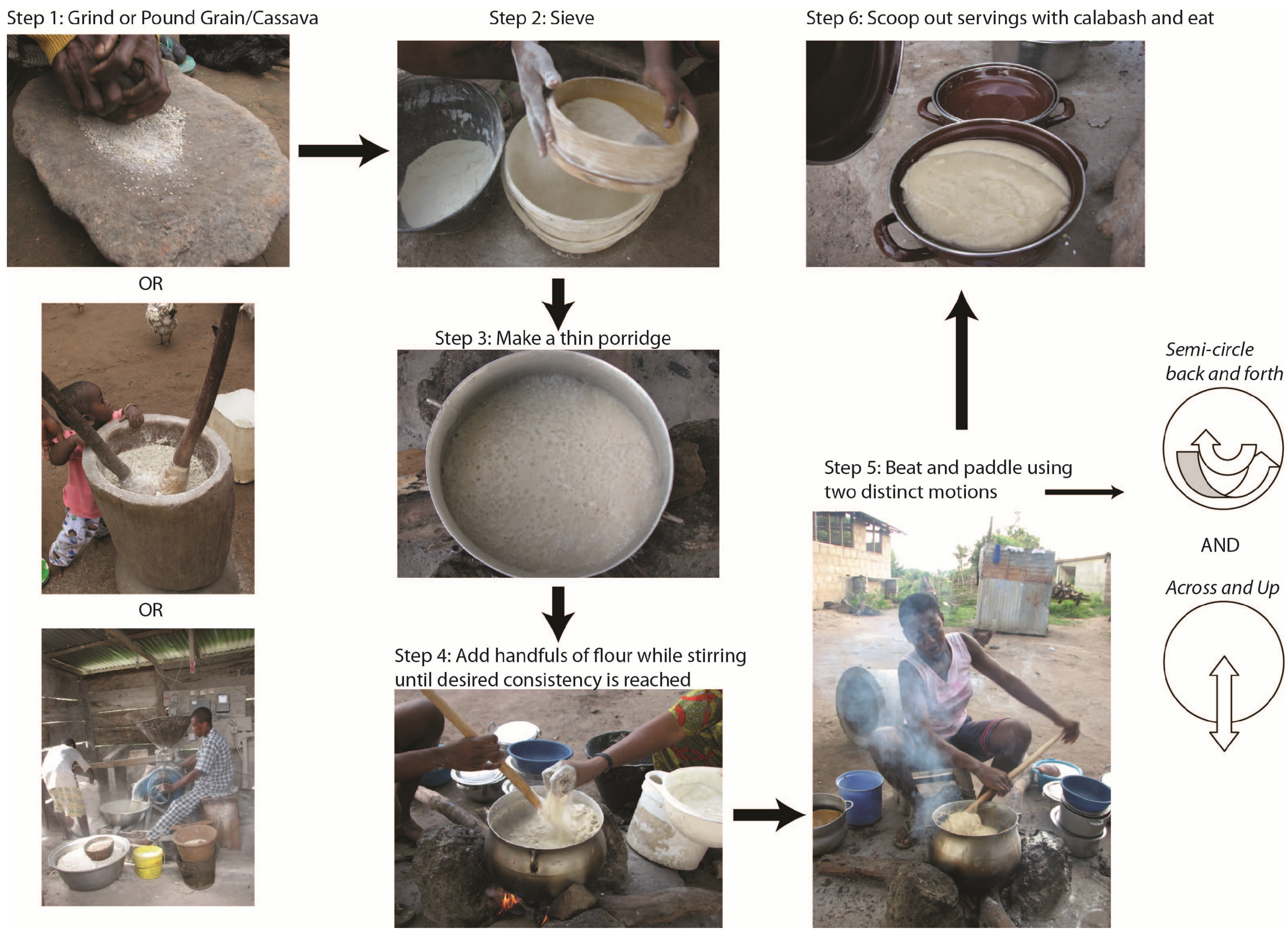

FIGURE 2.15: Steps in making T.Z. (*tuo zaafe*) (photos by author)

Preparation of both the starchy staples and the soups is quite time consuming and requires specialized skills. People in Banda—and Ghana more broadly—are connoisseurs of texture as well as taste. Smoothness seems to be particularly important—for both fufu and T.Z. to be acceptable they should be firm, without chunks, and very smooth and sticky. Both staples are swallowed without chewing because the mortar has 'done the chewing for you.' The longer a woman spends making T.Z., the smoother and better it is. The preparation steps for making T.Z. are illustrated in Figure 2.15. It requires considerable time investment for women and often involves more than one person in food preparation. Far from being a 'simple porridge', preparing T.Z. and fufu is time consuming and profoundly physical—in a real sense taste is embodied in food preparation.

Several imported foodstuffs have been adopted in Banda over the last three decades. Chief among them is Asian rice: quick to prepare and the food of urban dwellers in Ghana. It is, however, much more expensive than other starchy staples since much of it is imported. Canned tomato paste is also commonly used as a way to quickly produce a soup, and as way to subvert the seasonal availability of fresh tomatoes. Some of these canned products are made within Ghana itself, but many are imported. Maggi cubes—a Nestlé bouillon product most often found in shrimp flavor—are ubiquitous and have replaced local spice alternatives such as fermented *dawadawa* or cotton seeds, herbs, and wild mushrooms. Maggi cubes are also important as they provide a taste of meat even if meat itself is beyond the financial reach of the family. Meat is highly sought after and is considered the ingredient that makes a soup 'strong' or healthy. Bread is not made in Banda, but can be found in Wenchi (the nearest large market town), along with canned milk, tinned coffee, and tea. These foods are uncommon among all but the most well off individuals in Banda.

Along with the addition of imported foods, several other shifts have occurred in living memory. The first is increased emphasis on cassava over other crops. Old ladies remark on how T.Z. never used to be made with cassava, the taste of which many dislike. Instead, T.Z. was made of millet and maize. As mentioned above, shifts in rainfall have made the cultivation of millet and maize difficult in recent years. Millet has been abandoned altogether, both because of the unpredictability in rainfall and the difficulty in processing it. Along with the growing of the crop, the preparation of several millet dishes has been abandoned. Maize cultivation is on the decline due to unpredictable rainfall and high nutrient requirements of the crop, besides which yam is the staple of choice. Maize is often purchased with funds acquired through the production and sale of sorghum. There is a strong aversion among the Nafanas (below) to sorghum as a food, though it is the primary grain made into beer. Water yams are becoming more and more common as people are forced to sell the preferred white yams as a cash crop since they fetch a much higher price.

There have also been important shifts in food preparation technology. The most significant is the introduction of the diesel-powered grinding mills beginning in the 1970s, but not reaching most places until the 1990s or even later. Though grinding mills have eased labor requirements on women considerably, cash is required to access them. Mills are also not available in many of the smaller villages (e.g., Makala and Bui), but most women choose to walk to the closest mill in a nearby town. However mills also further entrench women and household food security into a cash economy, which has important impacts on labor. Together with increased emphasis on women farming, there have been major changes in female labor requirements and gender dynamics even just over the last few decades. For example, use of the mills and market competition has also eroded the bonds between age mates who formerly accomplished tasks such as pounding the family grain together. Cash crop farming among men and women has also led to the demise of age groups.

Cultural Intersections

Today, Banda is located in the Tain District in Brong-Ahafo province.[6] Tain District has a relatively low population density at 22 persons per square kilometer compared with the Ghanaian national average of 49 persons per square kilometer. The major occupation is agriculture (80.2%) and most people live in houses built with mud and thatch roofs, though this is rapidly changing (Tain District online: http://tain.ghanadistricts.gov.gh/). Hydrology and access to arable land shape present-day

[6] Banda is slated to become its own district in 2012, a development not unrelated to its new position as the home of Bui Dam.

village location (Stahl 2001: 47-48). While there is currently no shortage of arable land in the Banda region, some farmers have to go quite a distance to reach their farms. In accordance with traditional land use in Ghana, all land belongs to the paramount chief who allocates farm land (Stahl 2001: 48).

Mobility has changed in the last decade in large part due to the construction of a hydroelectric dam near Bui. In the late 20th century Banda was linked to the closest market town, Wenchi, by a 75 km track that took from two to six hours to traverse (Stahl 2001: 45); by 2011, the road had been significantly widened and paved in order for large trucks to pass to the Bui Dam site easily, reducing the trip to under two hours (see Epilogue, Fig. 9.1). Several lorries leave Banda and now Bui City (a resettlement community) daily.

Banda-Ahenkro is the largest town in the Banda traditional territory, seat of the paramount chief, and home to several thousand inhabitants. Following Stahl (2001: 43-45), the Banda region is defined by the limits of the traditional territory of the chieftaincy, though these have changed over time, especially along the western and northern margins. Five ethnolinguistic groups are present in modern day Banda, which includes 24 villages as part of the paramount chieftaincy (Stahl 1991: 251-257, 2001: 51-52). Ethnic diversity in the Banda region today is very much a product of its past position as a frontier between several more homogeneous neighboring polities (see Ch. 6-7; Stahl 1991, 2001: 82-106). Linguistic groups surrounding Banda include Brong-speakers to the east and south, Guang-speaking peoples in Gonja to the north, and Mo-speakers along the Black Volta River. The entire area has also long been influenced by Akan-speaking peoples as the Asantes sought to increase their territory from the 18th century onwards. Similar to Banda is Gyaman (Jaman), which surrounds Bonduku to the west, and incorporates several ethno-linguistic groups (Akan-, Senufo-, and Mande-speakers) (Goody 1965; Stahl 2001: 51; Terray 1980).

Ethnic-linguistic groups in Banda include the Nafana, Kuulo, Ligby, Mo, Ewe (Stahl 1991: 252), and more recently the Dagaarti. The Nafanas are numerically and politically dominant, and speak Nafaanra, a Senufo-related language that is classified in the Gur or Voltaic group of Niger-Congo languages (Stahl 1991: 252). Nafana ancestors migrated from Kakala in present-day Côte d'Ivoire sometime in the early 18th century, and are today the easternmost group of Nafaanra speakers (Stahl 1991: 252; also Ch. 6-7). The Kuulo (also referred to as Dumpo or Ndmpo) speak a language called Kuulo or Dumpo, a Guang language related to Gonja (Goody 1963; Stahl 1991: 254). Kuulo has been described as a remnant language that is currently being replaced by Nafaanra (Blench 1999; Goody 1963); indeed, few speakers remain. The Kuulo are acknowledged as the original, ancestral inhabitants of the region; in Nafaanra, the word *kuulo* means "the dead." Ligby-speakers are thought to be related to Mande-speakers who derived ultimately from the Niger Bend area, and today are predominantly Muslim and occupy different villages or spaces within villages. Small numbers of people in the Banda area speak Mo, a Grusi-related Gur language that is centered to the north and east along the Black Volta. Ewe-speakers are more recent migrants (c. 1930s) and are likely Tongu peoples from the banks of the Volta. They provide much of the fish consumed in the Banda area (Goody 1965; Stahl 2001: 60). All groups except for the Kuulo claim immigrant status (Stahl 1991: 254). Dagaarti immigrants from northern Ghana have arrived in Banda over the last several decades, and today are the main farm laborers and *pito* (sorghum beer) brewers. Today, this process is ongoing, as migrant workers flood into the area from all over Ghana and as far afield as China as part of the construction of the Bui hydroelectric dam. The dam has also resulted in the migration of others, especially Mo- and Ewe-speakers, out of the immediate area in advance of flooding.

The Nafana are by convention matrilineal, with descent groups organized into *katoos* or houses. These matrilineages are associated with a house compound where the male head of family resides, though not all members of the matrikin are necessarily co-residential. The male and female elders of a *katoo* are approached to solve disputes, often teach traditions to younger members, and are responsible for sacrifices to the ancestors and shrines of a *katoo* (Stahl 2001: 57).[7] Use of the Nafaanra language helps define Nafana identity. In the recent past, female puberty and marriage rites were a quintessential part of becoming a proper Nafana (and passing this on through maternal ties). Nubility rites involved clitoridectomy, which was followed by a month of restrictions for the young initiate. A year must pass between completion of these rites and

[7] This matrilineal organization seems to be eroding in recent times, but this observation requires further substantiation.

marriage. If no suitable husband was found within that year, a girl was free to marry at any point in the future (Stahl 1991: 254). These puberty and marriage rites were central to becoming a Nafana women—if not successfully completed, a women's status was undermined; she was not able to become female head of family, and her children would not be considered 'proper' Nafanas (Stahl 1991: 255).[8] Older women remarked that if a girl was found not to be a virgin during nubility rites, she was humiliated by not being allowed to wear the appropriate beads and necklaces with others when they were paraded through town following performance of the rites (Figure 2.16).

FIGURE 2.16: Female head of family in Ngre with curated beads from nubility rites (photo by author)

In recent years there has been less emphasis on performance of such rites due to the growing number of Nafanas adopting Christianity (cf. Stahl 2001: 55), and the

[8] It is said that the grandmother of the current paramount chief—Okokyeredom Kwadwo Sito—was banished from Banda because she did not go through the female nubility rites. Such 'witchcraft' could pass to her daughter, but not to her grandchildren, so they were no longer banished. Though Sito was allowed to return and become chief, because of her transgression he is not allowed to perform many of the royal family rituals, such as giving offerings to the black stool or going into the stool room. In other words, despite the fact that female nubility rites are no longer performed, they still play a role in political and social authority and ceremony.

passage of a national law in 1994 which forbids female circumcision in any form. According to local elderly women, female rites continued to be performed after the passing of this law; however, after several women were caught in the act and punished, these practices stopped completely. Most women interviewed say that this is one of the biggest (negative) changes they have witnessed in their lifetimes. Elderly women blame this for what they see as general depravity of the youth and fragmentation of family and other social units. Similar observations on changing activities of youth after the 1994 law have been documented in northern Ghana (Mensch et al. 1999).

The political history of the Nafanas has been reviewed extensively by Stahl (2001, especially pp. 63-76), and will not be reiterated in depth here. In short, like the rest of Ghana, political organization follows a dual authority model that accords both traditional chieftaincy and national bureaucracy a role in governance. Chiefs are selected according to local custom, and are representatives in the Regional and National Houses of Chiefs. Like much of the area that was under Asante control in the 18th and 19th centuries, the Banda chieftaincy incorporates many Akan influences (Bravmann 1972), even though the Banda peoples are not Akan (Kropp-Dakubu 1988; see Ch. 6).[9] Chiefly positions are referred to as "stools," which also are real physical objects that embody and symbolize the position. Like Asante royal practice, upon the death of a paramount chief, his stool is blackened and placed in a special stool room (Stahl 1991: 255, 2001: 63). In Banda, only Nafana men may possess chiefly stools (Stahl 2001: 63); women, especially those who are females heads of family, also may have stools that signify their position (Figure 2.16). Heads of family often occupy the same rooms in a family house, in other words a certain room passes from one family head to another. The heads are selected differently in each family; in some families, the eldest male or female automatically assumes the position but in others it is rotated to ensure even participation. There are twenty positions in the Banda Traditional Council, including the paramount chief or *Omanhene*, and queen mother or *Ohemaa*. Most of these stools are inherited within a *katoo* or matrikin group. The Traditional Council also includes village heads (Stahl 2001: 65). The council meets when needed, such as when foreign archaeologists come to ask permission to conduct

[9] "Akan" refers to Brong- and Twi-speaking peoples, including the Asante, who dominate central Ghana. In addition to inheriting many aspects of Asante political organization, Twi is the most widely spoken language in Ghana, often as a second language of the markets.

research. All research in the area is done with the approval of the council. It is customary for outsiders to offer a bottle of Schnapps, which is used to pour libations to the ancestors.

According to Nafana oral tradition, it was they who brought chieftaincy to Banda as they were chiefs from their origin place (Kakala) (Stahl 2001: 149). While the precise date of Nafana in-migration is uncertain, the chieftaincy appears to have been established by the 1720s before Banda was incorporated into Asante (Stahl 2001: 150-151; see Ch. 6 for more historical detail). One non-Akan feature of the chieftaincy is succession through a rotational principle, which appears to be a long-standing element of Nafana chieftaincy. The paramount chieftaincy used to rotate between several families, including immigrant ones (Stahl 2001: 152-153), but today rotates between only two: Sielɔngɔ Katoo of Banda-Ahenkro and the Kabruno family (who are reportedly of Mo ancestry; Stahl 2001: 65, 67). This rotation was not observed at the death of the paramount chief Kofi Dwuru II of Sielɔngɔ Katoo in 1977, resulting in a chieftaincy dispute that lasted nearly two decades (detailed in Stahl 2001). During this period, Kofi Dwuru III of Sielɔngɔ Katoo acted initially as regent from 1977-1985, and was eventually installed as paramount chief after a national tribunal decided in his favor. This met with resistance in Banda, resulting in at least two violent outbursts—one in 1986 on the eve of the New Yam festival and one in 1994 in the week preceding the festival (Stahl 2001: 74-76). Subsequently the New Yam festival was not practiced publicly for many years. In 1996, Kofi Dwuru III was destooled as men entered the palace, removed his sandals, and placed his bare feet on the ground (Stahl 2001: xv). The rotational principle was thus reinstated though the traumatic destoolment event, but the chieftaincy dispute has left a noticeable mark on the memories of Banda people.[10]

Despite not being authochonous to the region, the Nafana dominate the Banda area politically, linguistically, and numerically. Their language—Nafaanra—is the *lingua franca* of the area (Stahl 1991: 256). However, membership in the ethnic group is not determined by either language or ancestry (Stahl 1991). Several families or houses were

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[10] The chieftaincy dispute still very much affects politics. In Dorbour, a village on the west side of the Banda hills, a dispute arose over who was to become chief of the village, with the two factions supporting the Kabruno vs. Sielɔngɔ Katoos. It resulted in the shooting and death of one of the candidates by the other faction, who was sent to jail. Now, about 10 years later, Dorbour still does not have a chief.

founded by peoples belonging to other ethnic groups and from other regions (e.g., Gonja) who fled for various reasons and sought refuge in Banda (Ch.7). Upon settling, the newcomers adopted the Nafana language and its customs (Stahl 1991: 264-265). A similar process is in action today with the Dagaarti, who are recent immigrants from the north. The Dagaarti speak Nafaanra and work on Nafana farms, but they are usually segregated on the edges of villages where their houses differ somewhat in construction. They are also segregated in terms of labor; most are either *pito* (sorghum beer) brewers or agricultural laborers. Likewise, the Ligby are separated by their Muslim identity, which means a whole host of distinctive customary practices (such as marriage rites), and a patrilineal descent system. The Ligby maintain this separate identity by speaking the Ligby language (along with Nafaanra), living for the most part in separate villages, and working as traders and transport owners rather than farmers.[11]

Despite these differences, after many months of interviewing, I gained an appreciation for the tremendous homogenizing force that is Nafana identity—a characteristic that may have led Stahl (1991) to criticize notions of what ethnicity is and is not, especially when viewed over the long-term. People of diverse ethnic groups buy into or choose to express their "Nafana-ness" to varying degrees; some may choose to only adopt the language, for instance, but many adopt far more than this, especially in terms of the habits that structure daily life. In particular, a common cuisine creates solidarity among the many ethnic groups, as do other kinds of technological practices that signal Nafana identity in a visible material way. In this way material culture does not necessarily correspond with ethnic identity but binds groups across different lines (Stahl 1991; Cruz 2011). For instance, despite repeated attempts to distinguish between what is "Nafana" food and what is not, the individuals I interviewed all insisted that everyone ate the same things and prepared them in exactly the same ways throughout the Banda area.[12] Only after extensive interviews was I able to see any variation; almost all differences in foodways were based on location or distance from the 'core' Banda area (i.e., the area east of the Banda hills), history, urban experience, and wealth (Ch.8).

[11] However, one informant claimed that the Nafana were not originally agriculturalists either, but instead came as traders. This was given as a reason for why the Dagaarti were used as agricultural laborers.

[12] I did not spend much time interviewing Ligby individuals, whom I would expect have some differences in foodways, especially if they elect to follow Muslim food taboos (no pork, no alcohol) which often receive muted expression this far south.

An exception to this ethnic melting pot are the Kuulo (or Dumpo, Ndmpo) who, despite adopting many Nafana customs as well as the language, actively curate elements of Kuulo identity. They dominate in only one town in the Banda region called Kuulo or Dumpofie (Stahl 1991: 256). Though Goody (1965) characterized the Kuulo as a remnant ethnolinguistic group, the few Kuulo-speakers that exist display "a remarkable tenacity" (Stahl 2001: 58). My many visits to the head of the Kuulo family were marked by requests that I record their customs and language and deposit paper copies of the interviews with them. Their identity is distinct from the dominant Nafana in several ways. Kuulo identity is based in ancestry: to be Kuulo is to be descended from the ancestress Wurache, who descended from the sky (Stahl 2001: 58, 107-109). The Kuulo are considered a house or family or *katoo* within the Nafana system. They hold a separate yam festival though also participate in the Nafana version (Stahl 1991: 256). Unlike the Nafana, female circumcision has never been part of their female fertility rites, though there are coming of age performances, which require specific foods. Marriage customs also differ.

In the past, the Kuulo held the position of *trafun* (Nafaanra; *kahole wura* in Kuulo) or "owner of the land," by virtue of being descended from the ancestress Wurache and original inhabitants of the land (Stahl and Anane 1989; Stahl 1991: 256). Though they never held positions of power in the paramountcy, the Kuulo claim to have performed several special rites during the installation of the paramount chief by virtue of their priority on the land. As a result of a land dispute during colonial times, British officials ruled that no one owned the land, but that the paramount chief should be responsible for controlling it since he ruled over both peoples. The Kuulo no longer have an official role in installation ceremonies (Stahl 1991:256). However their authochthonous ancestry is ceremonially commemorated via by special food offerings to the ancestress Wurache, now enshrined by a baobab tree (above; Stahl 2001:107-108). These foods are almost always made of pearl millet, which is also the case in many Nafana rites. This relationship to the land and ancestors is also suggested by taboos that prohibited Stahl and students from accessing certain areas of the nearby archaeological site of Kuulo Kataa (*kataa* means old place) that contained additional shrines (detailed in Stahl 2001: 110-113).

Upstreaming and the Banda Research Project

In order to trace the emergence and development of these identities and agricultural and culinary practices, my research 'upstreams' (following Stahl 2001: 27-31; Vansina 1990) by moving backwards in time and explores Banda's past through oral and written histories and material culture. The history and archaeology of the Banda region has been the subject of a long-term archaeological and oral historical project directed by Ann Stahl since the 1980s. Building on an initial survey in 1982 (Fig. 2.17; Stahl 1985, 1986), and beginning with the collection of oral histories in 1986 (Stahl and Anane 1989; Stahl 1991), the project has moved progressively back in time. Initial excavations (1989, 1990, and 1994) focused on Makala Kataa, a multi-component site occupied from the late 1700s to the early 20th century (Stahl 1994, 1999a). The nearby site of Kuulo Kataa dates to the period straddling the beginning of the Atlantic trade (cal AD 1350-1650) and later Makala times, and was excavated in 1995 and 2000. In 1996-1997, 1999, and 2001, Leith Smith conducted an expanded regional survey and testing program to document occupation on a regional scale in areas west of the Banda hills and south of the Tombe River (Banda Research Project [henceforth 'BRP'] 2002; Smith 2008; Stahl 2007a) to augment Stahl's (1985a) earlier survey that was focused east of the hills and north of the Tombe (Fig. 2.17).[13] Subsequent investigations (2008, 2009) expanded chronological depth through extensive excavations at two earlier sites: Ngre Kataa, a multi-component site occupied during the height of the trans-Saharan trade (cal AD 1210-1450) and subsequent phases (cal AD 1350-19th century); and Banda 13, occupied ca. cal AD 1000-1280. Bui Kataa, a late 19th -century site sampled previously by York (1965) was also tested in 2008 as it was threatened by construction of Bui Dam.

Stahl has divided the chronology of the Banda area into five working phases which are defined on the basis of ceramic attribute analysis anchored in absolute dates and named after 'type' sites (Table 2.2; Stahl 2007a,b, 2012 pers. comm.). In the chapters to follow, I provide background on each chronological phase both within a wider West African context as well as in reference to cultural history specific to the Banda area. This information provides the background for understanding the data on foodways that are my

[13] The coverage of Stahl's 1982 dissertation survey was constrained by accessibility and gasoline shortages and is not even (Stahl 1985a: 72-74).

focus. In order to facilitate comparison of archaeological contexts to environmental records, I divide Stahl's overlapping phases into discrete temporal units when possible; for example, all contexts dating between 1210-1450 are discussed as part of the Ngre Phase (Ch. 4), while all contexts dating between 1450-1650 are considered part of the Kuulo Phase (Ch. 5).

TABLE 2.2: Occupation phases and sites in the Banda region (from Stahl 2007a: 56-57; phase dates modified by Stahl 2011, pers. comm.)

Phase	Date Range (cal AD)	Sites
Volta	1000-1280	***Banda 13,*** *Banda 27**
Ngre	1210-1450	***Ngre Kataa****, Banda 41,* A-94, B-123, B-143, Kuulo Kataa
Kuulo	1350-1650	***Kuulo Kataa*****,** *Ngre Kataa, A-212,* A-216, A-235
Early Makala	1720s-1820s	***Makala Kataa,*** *A-212, B-112, Ngre Kataa* Banda 12, A-233, A-236, B-145
Late Makala	1820s-1920s	***Makala Kataa***, *B-2, Bui Kataa,*A-9, Ngre Kataa, Banda 12, Banda 44, B-145

***** Site naming conventions are as follows (refer to Fig. 2.17): sites within Stahl's (1985a) original survey area were identified as "Banda 1, 2, etc"; sites found as part of Smith's (2008) survey were named according to his survey units, A-1, 2, etc., and B-1, 2, etc.; type sites were subsequently renamed according to the local village that claimed them, followed by the Nafaanra designation '*kataa*'
Bold indicates 'type' site for phase that has been extensively excavated
Italics indicate sites analyzed for this dissertation

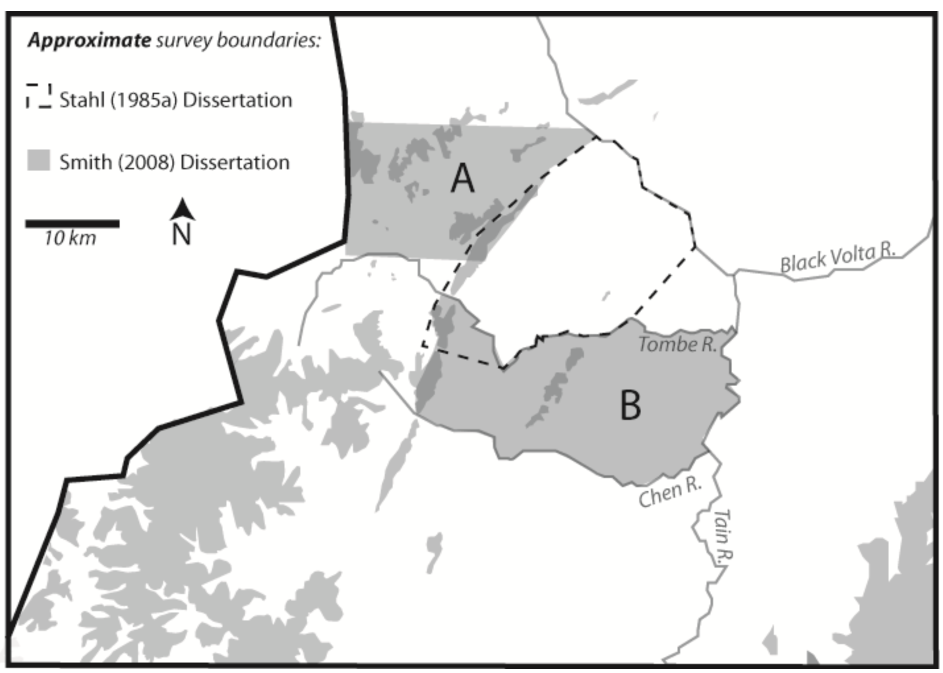

FIGURE 2.17: Approximate survey boundaries in the Banda area

TABLE 2.3: Distribution of flotation samples analyzed by site and phase (phase designation based on Stahl 2007a: 55-57, Stahl pers. comm. 2008, 2009, 2011)

Phases	**Banda 13**	**Banda 27**	**NK**	**Banda 41**	**KK**	**A212**	**B112**	**MK**	**Banda 2**	**BK**	**Total**
Pre-Volta						3	1				**4**
VOLTA	22	6									**28**
NGRE/Early KUULO			16-37*	3	10						**29-50**
Mid-Late KUULO			57		79	2					**138**
Early MAKALA			5			4	3	64			**76**
Late MAKALA								16	9	6	**31**
Total	**22**	**6**	**99**	**3**	**89**	**9**	**4**	**80**	**9**	**6**	**327**

* M6 (n=21) samples may or may not fall within this phase; will be sorted out as more dates are available

My main analytical focus is on analysis of botanical material from light fractions. Banda Research Project protocols since 1986 have been to collect soil samples for flotation from every excavation context, resulting in over 1600 light fractions. Given the time-consuming nature of archaeobotanical analysis it was not possible to investigate every sample. Instead, my selection of archaeobotanical samples for analysis was judgmental, focusing on the contexts that were most relevant for the research questions. Only contexts that were secure and could be reasonably linked with a phase through absolute dates or ceramic chronologies were analyzed. Samples were selected based on excavator descriptions in field notes, and where available, Stahl's later descriptions of them, as well as my own experience as a partipant in the 2008 and 2009 excavations. A small number of samples (around 30) for each phase was attempted, but I generally stopped looking at more samples when I felt redundancy was reached (e.g., Banda 13). Fewer samples were analyzed for sites where no apparent domestic architecture was uncovered. Others succumbed to poor preservation (i.e., Late Makala Station 10) with little to no food remains present. Many more samples were completed for phases of interest, particularly when Atlantic trade networks may have been active. Exceptionally well-preserved contexts, such as the Early Makala kitchen discussed in Chapter 6, were also a focus as they allow a unique window into domestic life. Generally, I sampled the extensively excavated sites (Banda 13, Ngre Kataa, Kuulo Kataa, and Makala Kataa) more intensively, but also analyzed samples from at least one of the regional testing sites for each phase in an attempt to establish regional scale patterns (Table 2.3).

My decisions on which samples to select for phytolith analysis were informed by what was found in the flotation samples, the contextual associations, and what had been sampled in previous phases of the project. I focused mostly on domestic contexts and the tools used in those locations. I sampled each of the four major phases, but focused on Kuulo and Early Makala phase contexts to better understand the introduction of American crops and impact of Asante hegemony on local foodways. More details on sampling, excavation, and laboratory methods can be found in Chapter 3.

Chapter Summary

Banda's location on the boundary of different ecological zones and cultural frontiers has shaped and been shaped by its history, which I explore in subsequent chapters. Today located in the modern nation state of Ghana, Banda sits just north of the forest boundary in savanna woodland. This environment provides ample rainfall in two peaks, allowing Banda farmers to produce a variety of crops. Most people in Banda today are farmers who use mixed cropping techniques that take advantage of the different needs of each crop. Environmental change and human activities have affected the composition of the local ecosystems and agricultural fields, but what is observed today is the result of long-term relationships between people and their landscapes. Banda cuisine is shaped by seasonality, one in which T.Z. made of grains and/or cassava dominates along with soups made of fresh leaves and vegetables, and another during which yam fufu is the primary staple alongside soups of cucurbit seeds, peanuts, and tomato and eggplant. Today Banda is made up of six ethnic groups with distinctive yet interwoven histories in the Banda region. This diversity is managed through the unifying language and customs of the dominant Nafanas, including a remarkable homogeneity in foodways throughout the region. Banda's position on the edges of the modern Ghana state is rapidly changing with the influx of global influences and development, particularly with the construction of the Bui Dam. In the remainder of this dissertation I examine how Banda's past unfolded from the vantage of continuity and change in agriculture and foodways in relation to wider temporal and regional developments.

Chapter 3

Integrating Methodologies Old and New

> Food has more than one past, which obliges the researcher to rely on more than one kind of source. -Mandala (2005:21)

The central aim of my research is to reconstruct food practices to the greatest level of detail possible from several vantage points. This requires use of multiple sources—archaeological, ethnographic, and historical. In this chapter, I describe the methods used to gather and analyze each of these types of data. There are two main parts: the first focuses on ethnoarchaeological, archaeological, and macrobotanical methodologies. The second focuses on phytoliths, and includes results of my comparative phytolith work on West African material and outlines my analytical approach to phytoliths in the Banda samples. I end with a brief discussion of what these data can address and how, through combination, they inform on the history of culinary practice in Banda.

Ethnoarchaeological methods

Ethnoarchaeological methods were built around my central research questions of continuity and change in food practices, which involved documenting the variability in specific foods, materials, and techniques over space and between generations. I attempted, so far as possible, to avoid asking questions that would introduce assumptions of timelessness into the data. In other words, the objective of this research was not to collect baseline quantitative data such as crop yields, because such measures are not comparable or obtainable from the archaeological record, and they do not take into account the impact of changing governmental and economic inputs into agriculture (such as fertilizer). This is not to belittle the many excellent case studies of this type that have already been accomplished; but this is not one of them. Although I have spent a total of about 10 months in Banda, this comprised several non-consecutive visits between 2008-2011, some of which were spent engaged in archaeological research. My time was concentrated in the wet season (April-October) and early dry season (October-November). Ideally, I would have stayed over the dry season, where I would have seen fields prepared for planting, and eaten the leaves and vegetables dried in the wet season for later use. However, I feel that I have an adequate idea of these activities from interviews and from previous fieldwork during the dry season in neighboring Togo (January-March) and more distant Senegal. Further, I observed and have interview data about the two primary food seasons (Ch. 2).

My ethnoarchaeological research design was shaped by David and Kramer (2001), and was based on my experience in Sudan with Catherine D'Andrea in 2005. Prior to fieldwork, methodology and sample questionnaires were approved by the University of Michigan's IRB, who issued an exemption (Appendix A), because the information to be collected was not sensitive. As part of the interview process, name, age, and area of origin information were collected to aid in possible future longitudinal studies, but information was coded and/or all identifiers are removed for reporting purposes.

My initial ethnoarchaeological study focused on food change, and took place from July-November 2009 in the period as the wet season transitioned to the dry one and food shifted from T.Z. to yam fufu (a hard, pounded mass). I interviewed over 120 women spread across six villages in the Banda region, including one on the west side of the hills (Dorbour) also studied by Cruz (2003). Much of these data will be reported on in subsequent publications, and I reserve a detailed reporting of methods for those contexts. In this dissertation, I sketch a basic outline of modern food practices and environmental change in Chapter 2, and in Chapters 7 and 8 I report on oral histories and memories of food insecurity, wild plant use, and the adoption of new foods and technologies. Farmer responses to environmental and economic shifts are also reported.

Interviews on food change were semi-structured, using a questionnaire to guide the interview, but were tailored to highlight the knowledge of each interviewee. All interviews were translated by Mr. Enoch Mensah, a long-time Banda Research Project

Assistant who is fluent in the local language (Nafaanra) as well as Twi and English and is well-known in the community. Generally, interviews focused on one person at a time, but some group interviews were also conducted. Men were often interviewed in groups, as they wished to give me the 'official' story. The other kinds of group interviews were composed of 1) women and men, usually members of the same household, and 2) multiple generations of men and/or women, either in the same household or summoned by an elder because of their knowledge. Middle aged and elderly women (40 years or older) were the focus group for most interviews, but in each village a small number of men and younger women were also interviewed. Informants were generally interviewed at their home, and selected mostly at random or on occasion based on recommendations from other informants. Interviews generally lasted around one hour. All photographs were taken with consent of the informant.

Six villages were selected based primarily on their proximity to archaeological sites, not so that a direct analogy could be constructed per se, but because these towns were already familiar with the work of the long-term project. Villages interviewed included Bui (near Bui Kataa), Dumpofie/Kuulo (near Kuulo Kataa), Ngre (near Ngre Kataa), Makala (near Makala Kataa), Banda-Ahenkro (where recent middens and a house were sampled for plant remains), and Dorbour, the latter so I could compare ethnoarchaeological observations of food to Cruz's (2003) mid-1990s examination of pottery. The good relations that the principal investigator Ann Stahl has established in the region over the last 30 years, and in these villages in particular, made it possible for me to visit several villages and quickly obtain blessings and cooperation. As is custom in this part of Ghana, before any research began, the paramount chief and elders in Banda-Ahenkro proper were consulted. Their permission secured, I then met with the chief and elders of the individual villages in which I worked to obtain appropriate permissions as well as advice on who best to talk to. Only after this did I visit individual informants and begin interviews. At all steps in this process, the good working relationships and long-term relationship that Stahl had with these communities aided my acceptance. In return, I discussed how the archaeological work connects to the present and is relevant to the many individuals with whom I spoke.

Interviews generally began with an introduction as to why we were there and what information we were seeking. If the informant consented (which they almost unanimously did), we began the interviews with a simple question: how have foodways changed in your lifetime or since that of your parents? The initial responses usually followed one of several patterns: 1) that no change had occurred, everything was the same, but there were different foods for different seasons; 2) that there were several dishes that were no longer made, and crops no longer grown; or 3) that there are a lot of wild leaves that were used (which often were still used). Generally I continued my questions based on this first response, and let the mood and interest of the subject guide my next questions. Every interview ended with two queries: what was the biggest change (besides those already talked about) that you have seen in your lifetime or since that of your parents; and whether the interviewee had any questions for me. These open-ended questions often involved the subject asking more about the research and its value to the community, adding information they thought relevant but we had not covered, or describing changes that had had big impacts on their lives (such as the cessation of nubility rites, Ch. 2). The 'biggest changes' question helped me to understand the broader social and economic changes people had seen in their lifetimes; food intersects with most of them in interesting ways.

Intensive participant observation focused primarily on three households, one in Banda, one in Bui, and one in Ngre, each of which represented different socioeconomic strata. Repeated visits were made to each household for several hours in duration to observe food preparation practices from start to finish. In addition, observation occurred during afternoon interviews , when women were busy processing various products (calabashes, kapok fibers, shea butter, etc.), and preparing food. Shorter observations occurred at random as we were passed by someone cooking or processing plants, which often led to interviews. Because interviews and observation occurred primarily during the wet season, several dry season plant processing activities, such as sorghum processing, were not observed directly; however, several informants from different villages were questioned regarding these in an attempt to capture the variability present.

Ethnobotanical plant collection was also a focus of my 2009 ethnoarchaeological season. I focused on collecting useful wild and domesticated plants. Whenever possible I collected duplicates of the entire plant (leaves, inflorescence, seed, and roots) in order to facilitate identification and ensure appropriate material for building a phytolith comparative collection. Plant collection took place with help of community experts on wild plants; men generally knew of fruits and women of wild leaves. Both were knowledgeable about plants with other uses (for ash, soap, etc.). All plants were pressed when possible, though in practice drying presented some difficulties as it was the wet season. Consequently there was more loss than I had anticipated. I donated a duplicate set of voucher specimens to the Ghana Herbarium, Department of Botany, University of Ghana, where Dr. Patrick Ekpe kindly identified them.

I also attempted to the best of my abilities to record words for plants, tools, and dishes in Nafaanra and Kuulo/Dumpo. Transcription was phonetic, where possible, based on the spellings used by the Nafaanra Literacy Project and the knowledge of my research assistant, Mr. Enoch Mensah. These spellings are imperfect, but where possible I have cross referenced them with the Nafaanra dictionary available online as well as with linguistic work by Blench among the Dumpo/Kuulo (Blench 1999, 2007).

Archival methods

Archival work was essential for augmenting understanding of the colonial period. Building on the detailed archival work of both Stahl (2001) and Cruz (2003; also Stahl and Cruz 1998), I conducted research in the Ghana National Archives in Accra, Kumasi, and Sunyani, which provided insight into colonial perceptions of Banda in the first half of the 20th century, and also anchors many of my informants' memories in calendar years. Though information is sparse, it provides tantalizing glimpses of Banda life as viewed through the eyes of others.

In 2009 I visited the Brong-Ahafo Regional Archives in Sunyani which houses information from approximately the late colonial to independence eras (around 1925 to 1970s), and the Kumasi branch, which focuses primarily on the period of Asante rule (1900-1920s). The Sunyani archives were examined in 2009 with the help of Enoch Mensah; all Banda regional material was examined, as well as documents on agricultural policy affecting Brong-Ahafo.

In 2011 I returned for a more intensive look at the Accra and Kumasi Archives. Accra contained a mix of material from all periods. There I examined material relating to food and agriculture in the colonial era, excepting that of cocoa and oil palm, which was the majority. I also re-examined archival sources cited in Stahl (2001) and Cruz (2003), which led me to several lists of foods, trade, and taxations, as well as colonial descriptions of Banda. Another important source of data were trade records from Wenchi and Kintampo, where Banda inhabitants came to ply their wares. The brief period when Banda was placed in the Ashanti region, from about 1907-1920s, was accessed in records stored in Kumasi. All material relating to the Banda region was examined. Additional archival material from the colonial era is available at the National Archives (UK), which have been surveyed previously by Stahl (2001), and were not consulted further for this study.

Archaeological methods

The bulk of data considered in this dissertation is archaeological, since for the majority of the period covered this is the primary source of information about food. Archaeological data are derived from excavations in the Banda region that have been ongoing since 1989 (see Ch. 2). Domestic structures, kitchen contexts, midden deposits, and craft working areas were extensively sampled at four sites spanning the period 1000-1920s (Banda 13, Ngre Kataa, Kuulo Kataa, and Makala Kataa), with limited test excavations at many more sites as part of a regional testing program (Smith 2008; Smith and Stahl 2002; Stahl 2007a,b). Botanical, faunal, ceramic, and metal samples were systematically collected from all deposits, and most have been analyzed, save those from the most recent research on the earlier part of the sequence (c.1000-1400), which is still in progress.

All methods used in excavation of archaeological sites and processing of material culture have been previously summarized by Stahl (1999a; 2007b). Middens were usually sampled by isolated 1x2 or 2x2m units (Stahl 1999a: 11), which was appropriate given the large quantity of materials that resulted. For domestic and craft working contexts, adjacent, mostly 2x2m units were excavated to achieve broader areal exposure of deposits. Excavation units were identified by the coordinates of their northeastern corner on an arbitrary site grid. Excavation commenced in arbitrary 10 cm levels unless there were natural or cultural boundaries present; in the case of multiple deposits or features in a single level, individual deposits were removed separately and designated differently (Area A, Zone A, etc.). Identifiable features such as pits or floors were excavated separately. All soil was sieved through a 5 mm (1/4 inch) screen (Stahl 1999a:11-12). Pottery, bone, slag, and small finds (beads, metal, etc.) were collected and recorded separately.

Macrobotanical analysis

Macrobotanical analysis—the identification of charred plant parts, especially seeds and nutshells—was my primary analytical technique. Paleoethnobotanical collection and analysis methods followed published protocols (Pearsall 2000, Piperno 2005), with modifications made for field conditions. Five or ten liter scatter samples were collected from almost every level, feature, and depositional unit over the two decades of Banda Resesarch Project excavations (1989-2009); point samples, usually of smaller volume, were collected from features of interest (i.e., burnt areas) (Stahl 1999a: 12), together yielding well over 1600 samples. Interior contents of pottery vessels were also routinely collected and floated. Generally, 10 liter samples were collected in earlier phases of the project (Makala Kataa: Stahl 1989, 1990), but sample sizes were reduced due to practical considerations in the mid-1990s (Makala Kataa: BRP 1994; Kuulo Kataa: BRP 1995, 2000, Stahl n.d.; Banda 13, Ngre Kataa, and Bui Kataa, BRP 2008, 2009). Five or ten liter samples were the maximum feasible size given that samples at the end of an excavation day must be head-loaded to vehicles and manual flotation was the only method possible without running water (or electricity until 2007) in Banda (all flotation water was drawn from boreholes and head-loaded by women). Given these constraints, the number and size of samples collected is exceptional in West Africa. Nonetheless, differential sample size may present some challenges for quantification.

An IDOT-style flotation method was utilized (Pearsall 2000; Streuver 1968: 354-355), using an approximately 0.5 mm mesh tea strainer for skimming, and a 1 mm mesh to collect the heavy fraction. The light fraction was collected in cheesecloth or chiffon for drying, and the heavy fraction dried on a piece of 1 mm screen. Water was changed and all tools and buckets cleaned in between samples. This method was practiced with little variation in all excavation years (1989-2009), and for the most part, few changes were made after I joined the project in order to preserve comparability as much as possible between years. The one change that was made in 2008 was use of chiffon or other small pore size fabric instead of cheesecloth for light fraction drying, which may account for the slight increase in small wild seeds at Ngre Kataa. In 2009, following a suggestion by Stahl, I ran side by side tests of the method with a bucket flotation method that utilizes 1 mm and 0.25 mm screens.[1] For this test, the entire sample sequence from 12N 24E was floated using bucket flotation and compared to surrounding units. More pearl millet and wild/weedy seeds (n=17) were recovered from this unit, but more samples were also analyzed (n=18) than any other unit. It is hard to determine whether or not this represents a real spatial pattern or a recovery issue.

The routine recovery of seeds in a very small size range (0.25-0.75 mm), such as tobacco, suggests that recovery of small seeds with the IDOT-type flotation method was generally good. The differences observed in small seed recovery were usually between sites (i.e., Banda 13 and NK), suggesting that there is variability in preservation rather than recovery. Another issue is recovery of heavier, larger materials, many of which end up in the heavy fraction. Heavy fractions were sorted by project members and/or local women at all project phases and charred vegetal material collected; however, little of this material was available for later examination by me (which is not surprising, given that in many cases over two decades had elapsed!). This may account in part for the low representation of nutshell, particularly of shea butter shell, which was only encountered in low amounts. However, heavy fractions from the flotation samples analyzed from the 2008 and 2009 years were available and examined, and serve as a good recovery test. Results of the first 30 samples from NK yielded no seeds or nutshell, only small pieces of charcoal. Given that charcoal recovery was excellent in light fractions, the remainder of the heavy fractions were not examined due to time constraints.

Sampling of light fractions was necessary as excavations resulted in well over 1600 floated soil samples. Judgmental sampling was chosen over random sampling given

[1] This bucket method and small screen size would have been impracticable to process flotation samples at the rate they were generated by excavation. Banda soils are sandy loams and tend to clog 0.25 mesh rapidly. Ideally if running water were available, a mechanized system would be used.

the hit-and-miss nature of macrobotanical preservation (e.g., requiring fire); the diversity of excavated contexts (i.e., domestic, ritual, ironworking); and their appropriateness for answering the research questions. All samples were selected based on a detailed reading of the contexts available in field notes from each site. An attempt was made to complete a similar number of samples from each site and time period, but samples at some sites (Banda 13 and Kuulo Kataa) were remarkably homogeneous, leading to diminishing returns. Once diversity had leveled off at these sites (i.e., more samples resulting in data redundancy), I opted to sample sites with better preservation, better contexts, and more diverse assemblages. At all sites, midden and domestic contexts were sampled when available. Middens were selected since they are typically richer and more diverse and allow for chronological reconstruction. Domestic contexts, though considerably more sparse, were selected in order to reconstruct daily practice over space. A limited number of samples were completed from craft and ritual areas to compare with daily household activities.

All light fractions were weighed, separated through nested sieves (2 mm, 1 mm, 500 µm, 250 µm), and examined under 7-40x magnification. All components (charcoal, seeds, other) were separated and recorded for the 2 mm and above fraction; the remaining size fractions were scanned for seeds only. Samples weighing more than 25 g were split using a riffle splitter; weights reported in the data tables (Appendix B) are of the material analyzed only (i.e., does not include unanalyzed portion).

Several categories used in this study need explication. 'Unidentified Charred Plant Remains' refers to material that is clearly not wood charcoal, and may include materials of interest that could be further identified in the future. 'Parenchyma' is loosely defined as a porous or bubbly material that often results from the burning of seed endosperm and underground storage organs (Hather 2000), though in practice this ended up being much harder to keep track of, especially when I had the help of another analyst. Much of the parenchyma ended up in the Unidentified Charred Plant Remains. 'Unidentifiable seed fragments' refers to seeds and seed fragments that are unlikely to be identified in the future due to extreme distortion and/or fragmentation.

Reference collections for seed identification initially included: 1) specimens that I collected from various parts of West Africa (Ghana, Senegal, Togo), including Banda; 2)

West Africa specimens collected by Daphne Gallagher and in the Ethnobotany Laboratory collections at University of Michigan; 3) extensive North American and some South American, Near Eastern, and European specimens that form the University of Michigan Ethnobotany collections; 4) and published and online sources, especially the well-illustrated material presented in Kahlheber (2004 (part 2): 1-225). The remaining unknown specimens were identified further in 2011 based on extensive reference collections of the African Archaeobotany Laboratory at Goethe University, Frankfurt, Germany.

Based on the generally low seed counts as well as unevenness in the data (i.e., several thousand grains in MK 6 samples versus a few dozen in NK Mound 7), I opted not to use statistical techniques for quantifying my results. Instead, I use simple presence/absence and count data. The idea was that phytolith and starch analysis would help confirm the spatial distribution of important crop and wild plants, though, as I now describe, this is still a few years off.

Phytolith and Starch Grain Sampling and Processing

Sampling for both phytoliths and starch grains differed at various stages of the project. There are no soil samples available for the earliest excavations (in 1989 and 1990), though some grinding stones were archived unwashed—indeed, at this point in time, phytolith studies were only just emerging. Soil samples were taken more regularly in 1994 and 1995 at Makala Kataa Station 6 and Kuulo Kataa, often in the form of column samples from select walls. Soil and unwashed grinding stones were also collected from Makala Kataa Station 6 in 1994. After I joined the project in 2008, more extensive sampling for microbotanical remains was undertaken (i.e., at Bui Kataa, Ngre Kataa, and Banda 13). A small soil sample was collected from each 5 liter flotation sample in an attempt to get a ‘scatter’ sample of each excavation unit. This was supplemented by point samples of interesting features (floors, hearths). In addition, 64 artifacts were sampled for phytoliths and starch using the methods outlined in Pearsall et al. (2004), with modifications made for field conditions. These included the creation of a ‘clean zone’ in the laboratory, use of new disposable materials for each artifact (toothbrushes, plastic bags, etc.), and use of bottled water for sampling (distilled water was not available).

Sampling involved collection of three sediments from unwashed artifacts. Sediment 1 was collected by dry brushing an artifact inside a plastic bag. Sediment 2 involved adding a small amount of bottled water and wet brushing the artifact, also inside a plastic bag. Sediment 3 included the addition of more water and subsequent sonication for 5 minutes inside a bag. Sediment 1 remained inside a plastic bag; Sediments 2 and 3 were washed into bottles for transport. For previously washed artifacts, only Sediment 3 was collected, and the sonication time was increased to 10 minutes. All artifacts sampled were photographed. This kind of intensive sampling was undertaken for the sites of Ngre Kataa, Bui Kataa, and Banda 13. Due to differential sampling, I focused analysis on the two excavation areas with the most comparable samples: Makala Kataa Station 6 and Ngre Kataa Mound 7.

Phytolith extraction methods follow those used in the University of Missouri Paleoethnobotany Laboratory (Pearsall 2000; Chandler-Ezell and Pearsall 2003), modified for extraction of calcium compounds, such as faunal spherulites, which are found in animal dung and composed of calcium carbonate (Coil et al. 2003; see Logan 2006: 30-38 for procedure detail). I was also interested in extracting calcium oxalate bodies (raphides, druses, etc.), which while they do not appear to be diagnostic of specific taxa (i.e. there is a level of redundancy across plant taxa), may serve as a supporting line of evidence in identifications, especially of yams. Yams (*Dioscorea* spp.) contain large amounts of calcium oxalate raphides, so their presence may help confirm an identification based on other types of remains (i.e., starch grains).

Briefly, extraction of phytoliths from soil samples involves homogenizing the sediment through grinding in a mortar and pestle, followed by sieving through a size 16-mesh. Ten grams of the sediment is weighed out and pH values taken. Oxides and some carbonates are removed with glacial acetic acid (which replaces hydrocholoric and nitric acid in most procedures) in a hot water bath for one to two hours. After rinsing (3 times at 2000 rpm for two minutes unless noted), organic removal commences with the addition of 27-35% hydrogen peroxide in a hot water bath or hot plate; this step takes anywhere from one to eight hours. Samples are rinsed again, and full strength bleach added for five minutes only (longer can damage the phytoliths). After rinsing, dispersion is necessary to remove clays; samples are mixed with 0.1% EDTA, a detergent, and put in a shaker overnight. The samples are repeatedly centrifuged and decanted until clear. The final step separates the phytoliths from the remaining non-silica material through heavy liquid flotation. Zinc iodide is mixed to a specific gravity of 2.3 g. A small amount is added to each sample, which is centrifuged at 3000 rpm for five minutes. The floating material, which includes the phytoliths, is decanted into a clean extract tube. Extract is then rinsed by adding water and centrifuging for 10 minutes at 3000 rpm. Flotation is repeated two times, i.e., for three runs total. Remaining sediment is also rinsed. Both are dried in a low temperature oven to facilitate mounting and drive off any remaining iodide. Samples are generally processed in sets of 8-12 samples; the entire procedure takes 18-24 hours or more of active lab time.

Artifact residues are processed using a slightly modified version of this procedure, with smaller amounts of chemical used and generally smaller amounts of time required to complete each step. A few extra steps are taken at the beginning of the procedure to recover the starch grains before phytolith extraction commences, which uses acids harmful to starch grains (Chandler-Ezell and Pearsall 2003). Samples are transferred from the bottles or bags and centrifuged at a low speed (1000-1500 rpm). Dispersion then proceeds as above, but samples are in the shaker for only two hours. After rinsing, samples are visually checked via pouring a small amount into a vial; if this unprocessed starch sample is clear, no additional steps are used. If it is opaque or murky (i.e., muddy), dilute hydrogen peroxide (5.75%) is added cold and left to stand for 10 minutes (any more could risk damaging the starch). The starch grains are separated from the other matrix using cesium chloride (specific gravity 1.6 g/mL), adding a small amount to each sample, centrifuging at 2000 rpm for 5 minutes, and decanting into a clean extract tube (repeated once for 2x total flotation). The sample is then easily divided into starch extract, and residue remaining for phytolith extraction. Generally, I processed samples in sets of 12-16, which took slightly less time per sample then for phytolith extraction from soils, above. The major bottleneck was centrifuging; the Michigan lab contains one centrifuge capable of holding only four samples. Initially, I used this piggyback procedure on both artifact and soil samples in the hopes of extracting starch from soil samples. The only difference with soil samples was that after starch extraction, I returned to the full soil processing procedure, i.e., with full amounts of chemical and longer processing steps, to ensure maximal recovery. Unfortunately, starch results were not positive (below), at which point I abandoned the piggyback extraction.

Starch and phytolith slides were scanned separately (i.e., each artifact sample yields two or more slides). Starch slides were made using a 50:50 mixture of glycerol and extract in water. Alternate rows were scanned for the entire slide using a polarizer at about 'dusk' darkness; starch is positively identified by the presence of an extinction cross visible under polarized light (Loy 1994). Because starch grains are subject to damage if heated for a prolonged period, scanning of each sample was timed and kept under 30 minutes. Phytolith slides were made using a volumetric amount that approximated a standard mount of (0.001 g) in Canada Balsam (a scale with this level of precision was lacking). A total count of 200 phytoliths was completed for all samples where there was enough material; this included spheres, short cells, long cells, other diagnostic phytoliths and environmental indicators. The remainder of the slide was then scanned for diagnostics. This approach was chosen to get a rough handle on what kinds of plants and plant tissues were represented in the samples; given that there is so little phytolith work completed on African archaeological sites to date, this seemed like a logical first step. Starch and phytolith samples were both examined at 400x magnification using a Leica DME microscope.

In order to extract phytoliths from comparative plant material, I used the dry ashing technique (Pearsall 2000), which allows extraction of silica and non-silica crystals alike (Coil et al. 2003). Plant material is subjected to 400-500° C heat in a muffle furnace until it is reduced to ash, usually in two to four hours. Organic material is burnt away, leaving silica and calcium compounds. Ashed samples are then mounted in immersion oil and examined at 250-400x magnification.

Phytolith analysis in African contexts: analytical approaches

Phytolith analysis, as a method, was primarily developed in the 1970s for archaeological applications and research has grown steadily ever since (Piperno 2006). Application of phytolith analysis to African contexts began with studies in the 1980s and 1990s on modern African plants (Palmer and Tucker 1981, 1983; Palmer et al. 1985; Palmer and Gerbeth-Jones 1986, 1988; Runge 1996). These studies were oriented towards documenting phytolith production in African plants for paleoenvironmental applications, though the use of phytoliths in paleoenvironmental reconstruction has only just started to gain popularity. Later and even less common are the studies that use phytolith analysis to answer archaeological problems (the earliest application in Africa was to the problem of bananas in central Africa: Mbida et al. 2000). West Africa remains one of the last frontiers for phytolith analysis; to date there has been only one archaeological phytolith study published (Fahmy and Magnavita 2006), and one paleoenvironmental study on archaeological sediments (Neumann et al. 2009). In this section, I introduce the state of phytolith analysis in Africa, and discuss the applicability of this previous research to Banda. To this I add comparative work that I have completed on phytolith production in modern plants from Banda, and discuss the approach I take to analysis of Banda phytolith samples.

Phytoliths are silica casts of cells or intracellular spaces that form in plant tissues. Multiple phytolith forms are usually found in taxa that silicify their tissues. The resulting silica bodies may be either redundant (i.e., produced across plant families) or diagnostic to varying degrees (i.e., family, genus, species). A quantitative assemblage based approach may also be taken, which compares the relative amounts of phytoliths from different sources to reconstruct which plants are present or the local environmental conditions (Pearsall 2000; Piperno 2006). Generally there are two types of phytolith studies that have been completed for the African continent; the first reconstructs environmental sequences from African soils based on phytoliths, often using modern soil samples as an analog; the second are taxonomic studies that report on phytolith forms found in African plants, in other words, they document the different phytolith morphologies and their distribution across plant taxa. A third and much less common type of study is the application of phytolith analysis to archaeological sites. I illustrate these different analytical approaches below throughout my description of paleoenvironmental phytolith studies and phytolith production in African grasses and non-grasses.

Applying paleoenvironmental phytolith studies to archaeological contexts

Paleoenvironmental studies focus on characterizing the make-up of overall assemblages in order to reconstruct dominant vegetation. The major focus of such studies in Africa is to determine arboreal vs. grass cover and the composition of grasslands in order to aid in paleoenvironmental reconstruction (Barboni et al. 2007). Specific plants that may signal wet or dry environments are also used when it is possible to identify them (e.g., Eichhorn et al. 2010; Neumann et al. 2009; see next section). Here I briefly review such methods and discuss their applicability to archaeological sites.

Phytolith production in grasses has long been used to reconstruct grassland composition, a proxy for temperature and moisture gradients in the past. Different grass subfamilies prefer different temperature and precipitation regimes, and fortunately also tend to produce distinctively shaped phytoliths (Twiss et al. 1969; Twiss 1992). Panicoid (C4) grasses produce lobed phytoliths and prefer warm and moist environments; chloridoid (C3) grasses produce saddle-shaped phytoliths and prefer dry and warm environments; and festucoid (Pooideae) (C3) grasses prefer cold and dry climates and tend to produce rondel to square based phytoliths. Since this system was designed, other analysts have added additional subfamilies that tend to be found in the tropics, including the bamboos (Bambusoideae) and canes (Aristideae), which problematizes this simple division somewhat (Piperno and Pearsall 1998). These classifications are also complicated by phytolith production in grass inflorescences, which have not been as well studied (Piperno 2006; Piperno and Pearsall 1998). This basic research on phytolith production in grasses is still in progress in Africa, but rapidly growing (i.e., Fahmy 2008; Fahmy and Neumann in prep.).

Despite these complications, the distinction between panicoid, chloridoid, and festucoid grasses has been used for paleoenvironmental reconstruction in Africa, especially in drier regions. Barboni et al. (2007) summarize the measures used for these types of studies. An aridity index (Iph; chloridoid/ [chloridoid+panicoid]) expresses the percentage of chloridoid grasses amongst C4 grasses, where a high ratio indicates drier environment, and a low one indicates moist, humid conditions. A climatic index (Ic) expresses the pooid/C3 contribution [(rondel, trapeziform, polylobate sum)/total short cells] (based on Twiss 1987, 1992). Finally a water stress index (Fs) is expressed by investigating the contribution of bulliform grass cells, which tend to accumulate in high water situations (bulliform [fan-shaped]/sum of grass phytoliths minus the elongate type; Bremond et al. 2005).

Can these measures be used reliably in archaeological contexts to help reconstruct the environmental background? Yes and no. All archaeological sites are essentially human landscapes; as with interpreting patterning among wood charcoal, it is hard to separate environmental indicators from human activities. In the case of grasses, this is especially problematic since some of the most commonly used plants are domesticated grasses. The contribution of domesticated grass phytoliths to archaeological assemblages is significant, as measured by the indices I designed (described below). Pearl millet, sorghum, and maize are all panicoid grasses, meaning that they will always inflate the number of panicoid grass phytoliths in any archaeological site where they were used, masking any dry or wet trends that may have altered the composition of local grasslands. Some of the same issues apply to arboreal vs. grass ratios, as discussed below. Are any of these measures of use in Banda? I conducted grass counts on all Banda phytolith samples, and Pearsall, in an earlier study (Stahl 1999a: 35-36; Pearsall 2010 pers. comm),[2] also counted grass phytoliths. Here I have illustrated the basic grass data[3] from soil samples at three sites (Table 3.1). One thing is immediately evident—panicoid grasses clearly overwhelm the Banda assemblages. This is not surprising; panicoid grasses dominate the local humid environment and also local diets, since sorghum, millet, and maize are panicoid grasses. Thus both the aridity and climatic indices are very low, showing a wet warm climate.

It is instructive that there is no change between KK and MK grass assemblages. Both sites are very close to one another, and despite the fact that Kuulo Kataa was occupied during a multi-century drought and Makala Kataa was occupied during a wet period this is not reflected in the composition of grass phytoliths. The grass assemblage masks this, either because the area remains a panicoid grassland even in drought

[2] Deborah Pearsall has very generously provided the raw data from her pilot study of Banda phyoliths in the mid-1990s.

[3] I include only simple (i.e., mirror-image) short cells here, as those with very different sides (complex short cells) are often produced in inflorescences and also do not follow the panicoid/choridoid/festucoid shape divisions. For example sorghum and millet both produce saddle forms in inflorescences. These data are still broadly comparable to Barboni et al., though they include some redundant forms in their measures and do not take inflorescences into account.

conditions, agricultural strategies altered grassland composition, and/or because the use of millet, sorghum, and at times maize masks any environment change. Both the aridity and climatic indices are also problematic since phytolith production in grass inflorescences does not always follow the lobed/rondel/saddle subfamily pattern; sorghum and millet, for example, are both panicoid grasses, but they produce saddle shaped phytoliths in their inflorescences. Likewise, sorghum and maize inflorescence produce abundant rondel forms, which are usually associated with festucoid grasses. Thus the elevated saddle count is best interpreted as use of millet and sorghum, rather than a dry period. In short, grass counts are limited in their ability to reconstruct environmental conditions at West African archaeological sites. While I nonetheless conducted grass counts, I did so with special attention to those forms produced in the domesticated grasses (see below).

TABLE 3.1: Simple short cell data from soil (non-artifact) samples from Banda by site (KK and half of MK data from Pearsall; NK and some MK data this study; see Appendix C)

	Ngre Kataa[4] Ct. (Avg per sample)	Kuulo Kataa Ct. (Avg per sample)	Makala Kataa Ct. (Avg per sample)
No. Samples	10	9	10
Panicoid	368 (37)	967 (107)	890 (89)
Festucoid	29 (3)	10 (1)	6 (<1)
Chloridoid	96 (10)	47 (5)	56 (6)
% panicoid	75	94	93
Aridity index	0.21	0.05	0.06
Climatic index	0.03	0.01	0.01

Another potential means of tracing local environmental change is a tree cover (D:P) ratio, which is the ratio of ligneous dicotyledons to Poaceae phytoliths (Barboni et al. 2007: 461). This entails recording the number of globular granulate (or nodular) spheres that are produced in woody plants, and comparing it to the number of grass phytoliths (sum of short cells, bulliforms, and trichomes[5]). A high value indicates a

[4] The grass assemblage from Ngre Kataa appears to be an outlier, so an explanation is necessary. Because this was an exploratory study, a somewhat modified counting procedure was used, meaning that fewer short cells were recorded; thus the data may not be representative for this type of comparison as the standard 200 count for grasses was not recorded. Instead a 200 count of ALL phytoliths was conducted in order to facilitate D:P ratios, below. There are also considerably more complex short cells that are not included in this table (see Appendix C).

[5] Barboni and collleagues include hair cells in the grass count, but hair cells are variable and produced across plant families, including Asteraceae and Cucurbitaceae (Piperno 2006, 2009), and thus are not

greater proportion of woody plants, while a low value reflects a strong grass presence. Banda phytolith samples are dominated by spheres, including the globular granulate (nodular sphere) variety Barboni uses for the D:P ratio (Appendix C, Table 3.2). High proportions of spheres are also encountered at the few other West African archaeological sites that have been sampled, including Nok (K. Neumann 2011 pers. comm.) and Dekpassanware, Togo (Logan 2009 lab notes). This suggests that spheres—at least those recovered from archaeological sites—may be less useful for paleoenvironmental reconstruction, but may instead indicate human plant use.

TABLE 3.2: D:P ratio in Banda soil samples

	D:P ratio Avg. (Range)
Ngre Kataa (n=10)	
M7	1.30 (0.71-3.36)
M8	1.40 (1.02-1.62)
Makala Kataa St. 6 (n=4)	0.66 (0.41-1.30)

What commonly used plants do these spheres represent? Several monocot and dicot families are prolific producers of spheres (Marantaceae, Zingiberaceae, etc.; Piperno 2006; Runge 1996). Spheres also tend to accumulate in different quantities across different plant parts, with sphere concentrations being particularly high in wood and stem material (Mercader et al. 2000). Additional clues comes from examination of different types of archaeological contexts. A sample from Burn Features 6 & 7 in unit 14N 22E at Ngre Kataa Mound 7 was overwhelmingly dominated by wood charcoal and large quantities of ash, to the point where there was very little soil present. The phytoliths were completely dominated by spheres, with a D:P ratio of 3.36, about three times higher than most samples. Smooth spheres were also present in very large amounts. Overall, this suggests that ash from wood burning acts to concentrate the percentage of spheres present in a sample. Burning and cooking activities are a very common activity evidenced on archaeological sites, which may account for the abundance of spheres in archaeological

included in my D:P ratio calculations. I think they are referring to trichomes, which are much more restricted to grasses.

soils. Sphere concentrations vary considerably by context, though they are always present in some quantity. The same flotation sample provides one more clue, since the wood charcoal taxa present were identified. It was almost uniformly *Terminalia*. This wood is not only one of the most common firewoods in Banda (as attested by the charcoal record), but is also widely used for construction.

Some of the spheres may represent other non-woody taxa. The particular kind of sphere is of great importance; smooth spheres, for instance, are produced across plant families, in both monocotyledons and dicotyledons. Small globular granulate spheres are produced in grasses (Barboni et al. 2007; Neumann et al. 2009). They can thus not be used to identify specific taxa, but are linked perhaps with burning activities and often wood use. The presence of high amounts of smooth and medium to large globular granulate spheres could indicate several possibilities: 1) a heavily forested environment, 2) areas where plant material was burnt, leading to concentrated accumulations of spheres, or 3) use of woody plants irrespective of burning activity. (In other words, spheres give multiple and mixed messages.)

The association between spheres and burning complicates the ability of archaeologists to use the D:P measure to reconstruct paleoenvironment anywhere that humans have actively occupied the landscape. The same can be said of the presence of Poaceae phytoliths, which will increase with human use of grains on a site. This explains in part the lower than expected D:P ratios in unburnt contexts at Banda, which range from 0.6-3.36, with an average of 1.0. But this does not completely hold true; Makala Kataa Station 6 kitchen deposits were heavily burnt on abandonment, and preservation of macrobotanical remains was consequently superb (Ch. 6). But the D:P ratios there are quite low compared to NK contexts, and seem to reflect a greater presence of grasses. I discuss the possibility that the D:P ratio can help determine what was being burned, but also crop processing activities and roof construction.[6] Thus, fluctuations in the D:P ratio do not seem to be due to environmental change, but rather cultural activities, particularly burning activities and utilization of grasses.

[6] A high grass ratio may reflect thatch, while a high wood ratio may reflect a wooden or wood and dirt roof. I suspect this is the case in Makala phase samples, which have very high grass markers, while the domestic Kuulo phase samples seem to have much higher wood counts, which may indicate wood or wood/soil roofs.

In a more recent study, Neumann et al. (2009) use some of these environmental indices along with other morphotypes to examine paleoenvironment in ancient Ounjogou, Mali. Their combined approach takes advantage of recent work on specific grass short cell morphologies (Fahmy 2008) as well as detailed comparative work on tropical dicots (Runge 1996). Woody dicots are indicated by elongated and polyhedral faceted bodies, decorated globular spheres, tracheids and schlerids. Ferns and woody/herbaceous dicots produce globular psilate and faceted spheres and block polyhedrons. Family and genus level diagnostics include Cyperaceae, palm, Marantaceae, Annonaceae/Cucurbitaceae, *Hibiscus*, and Podostemataceae types defined by scholars working in other regions in the African and New World tropics (see below). Finally, specific grass short cells are used to produce a more specific reconstruction of the composition of the local grassland (Neumann et al. 2009: 90).

My analytical approach to Banda involves recording most of these general indicators, with the caveat that many are human-introduced rather than environmental indicators. It is useful to know whether or not panicoid grasses dominate, which suggest a hot wet environment and perhaps domesticated grasses. The D:P ratio is useful as a general indicator of woody to grass vegetation, both of which signal different kinds of activities and occupations. While short cells are confined to grasses, medium to large decorated spheres are produced mostly in woods and leaves of some woody dicots as well as a few grass inflorescences. Though different decorations on spheres exist and can help narrow down taxonomic affiliation, I follow Neumann et al. (2009: 93) who also find it difficult to distinguish these surfaces using only light microscopy. These spheres are thus labeled globular decorated spheres. Smooth spheres (globular psilate) are found in inflorescence and wood material of some dicots, monocots, gymnosperms, and ferns, though given their appearance in large numbers in ashy and burnt contexts, I suggest we can use them to trace burning activities.

Phytolith production in grain crops and grasses in Africa

In this and the next section, I turn to taxonomic identifications of specific plants. As mentioned above, in some cases it is possible to use unique phytolith forms to identify certain species, genera, or families. However, for unequivocal identifications, this requires that the analyst examine phytolith production in related plants to rule out the possibility that the morphotype is produced in another plant (i.e., redundancy). The International Code for Phytolith Nomenclature defines a diagnostic when it is only present in a given taxon or taxonomic group; otherwise a form is merely described as 'observed' in a given taxon (Madella et al. 2005). Where enough time and money exists, the usual approach is to develop regional phytolith comparative collections, making it possible to define diagnostics that work in that local flora. However, in order to use these forms for identification elsewhere, the prudent analyst needs to test their uniqueness against the local flora. This is no small task.

Unfortunately, given the infancy of phytolith analysis in Africa (especially West Africa), this is not possible for most regions at the moment. Below I describe the progress that has been made in this regard, but my general approach here is to use indicator methods. Indicators may or may not be diagnostics, since phytolith production in the local flora is not defined well enough to evaluate this. Instead, I assign the identification a weak, moderate, or strong probability that it represents the particular species. In other words, these descriptors describe the strength or likelihood of the identification. *Strong identifications* mean that the phytolith shape has also been found to be unique across other world floras or that within any given sample, there are multiple and recurrent indicators of that taxa (especially for the grasses). For example, echinate spheres are found throughout the palm family (Arecaceae) and are diagnostic across New World and Old World contexts (Pearsall 2000; Piperno 2006), leading to a strong identification in samples where these spheres are found. Identifications labeled *moderate* have a good probability that they represent the species of interest, assessed based on their diagnostic level in at least one other tropical flora, apparent uniqueness of the form based on global phytolith literature and/or the Banda flora studied, or common presence in a given sample. *Weak* probability identifications mean that forms observed in a taxon of interest are also observed in the archaeological sample, but similar forms may be observed in closely related taxa, or closely related taxa have not been studied and may produce similar forms. Large variant 1 crosses that are diagnostic of maize leaf in the Americas are a good example; while concentrations of these might weakly or even moderately suggest the presence of maize leaf in a sample, isolated occurrences could represent maize, or a number of other African wild grasses that produce this form (see below).

The need for a probability system is especially acute with domesticated grains, as grasses are prolific phytolith producers, with related taxa often producing similar forms. For archaeological purposes, the documentation of phytolith production in wild and domesticated grasses is perhaps one of the most important steps. These studies are also critical to reconstructing paleoenvironment as phytoliths are often far more specific to grass taxa than other kinds of indicators such as pollen.

Some of the earliest examples of phytolith research on African flora were by Palmer and colleagues, who documented phytolith production in East and some West African grasses in the 1980s (Palmer and Tucker 1981, 1983; Palmer et al. 1985; Palmer and Gerbeth-Jones 1986, 1988). They conducted scanning electron microscopy surveys of *in situ* (i.e., articulated phytoliths) grass leaf tissues of a large number of grasses in East Africa, and some in West Africa (though many genera are shared). Most or all of the forms present were documented and well-illustrated, including stomata, long cells, prickles, short cells, silica bodies, micro hairs, macro hairs, and special features. These surveys are less useful for distinguishing specific 3-D short cell morphologies and details, as all of the work was done in 2-D, in other words, the short cells were not rotated so the full decoration could not be described (Piperno 2006). Short cells are the primary phytolith type used to identify grass subfamilies, since they tend to produce different shapes (above; Twiss et al. 1969). Additional comparative work has shown that viewing their detailed morphologies in 3-D allows a much greater level of taxonomic specificity (Piperno and Pearsall 1998), as with maize, below. One area where the Palmer SEM studies are useful is in illustrating the distribution and form of long cells in the grasses studied, something which more recent studies do not consider. As I describe below in reference to archaeological samples, all of the SEM photos reported in the five Palmer volumes were examined to determine whether or not wild grasses produced the long cells found in *Sorghum bicolor*, or whether they were unique to domesticated sorghum.

Fahmy (2008) and Fahmy and Neumann (in prep.) have documented short cells production in the leaves of Sahelian and Sudanian grass species, recording their morphologies as well as size criteria. This large dataset is important for defining genus and species specific diagnostics. Fahmy (2008) examined short cell production in leaves of 66 species of the tribe Paniceae (=Panicoid C4 grasses) and divided them into 13 morphological groups. He found certain nodular bilobate and polylobate types that were produced only in selected genera; in other words, certain phytolith morphotypes could be used to identify a handful of grass genera. A study currently in progress extends these classifications to include a number of Sahelian and Sudanian grasses beyond the Paniceae (Fahmy and Neumann in prep.). They illustrate an ideal approach to the problem of grass identification in Africa: that by examining phytolith production in all of the commonly found grasses in these ecozones, it is possible to arrive at identifications of some surety, even if they are above the level of species (i.e., genus or groups of genera specific).

Maize illustrates how diagnostic identification methods work (or do not, in this case). Because Fahmy and Neumann have already outlined phytolith production in related grasses in the Sahel and Sudan, I am able to compare the forms produced in maize leaf to wild grass leaf phytoliths, and determine whether or not identification of maize leaf is possible. Maize leaf tissue has been identified in the tropical Americas by a specific cross morphotype called Variant 1 that is mirror-image; in other words, both sides are crosses. Pearsall and Piperno (1990) found that only maize produces large (over 15 µm on longest side) Variant 1 crosses. Pearsall conducted a pilot study on the Banda materials in the mid-1990s and found Variant 1 crosses in column samples from Kuulo phase contexts in Kuulo Kataa, and Early Makala contexts at Makala Kataa, which she tentatively identified as maize. While she was confident that these crosses could be distinguished from crosses produced in sorghum, she acknowledged that they may be produced in wild African grasses, which had not yet been studied (Stahl 1999a: 35-36).

Many years later, my finds of charred maize remains in the same contexts at both sites supports her identifications (Ch. 5). In this time, our database of phytolith production in African grasses has grown considerably, and is now sufficient to evaluate this method. According to Fahmy (2008), who focused on lobate phyoliths in the Paniceae tribe in the Sahel, six other taxa produced large crosses: *Cenchrus biflorus, Digitaria ciliaris, Pennisetum purpureum, P. stenostachym, and Setaria pallida-fusca*. However, this study focused on spodograms (phytoliths articulated in tissue) rather than their three dimensional morphology, so the different cross variants were not defined. A new study by Fahmy and Neumann (in prep.) takes both 3-D morphology and size into account among a wider sample of Sahelian and Sudanian grasses. They found large (18-26µm) Variant 1 crosses in *Andropogon gayanus*, *Bracharia jubata, Digitaria lecardii, Pennisetum ramosum*, *Sorghum arundinaceum*, and *Vetiveria nigritana*. Andropogon grasses are one of the main dominants in the Banda area, where 14 different species are found; each of the other genera is also commonly found in the Banda area (Innes 1977). In other words, the large Variant 1 crosses produced in maize leaves are also produced in wild grasses found in the area, so *cannot* be used for definitive identification of maize. In combination with other indicators, like cob phytoliths, they may help support an identification, but alone, large crosses are just as or more likely to signal wild grasses as maize.

Grass inflorescence phytoliths have received almost no attention in Africa. This is because they are less useful for paleoenvironmental applications, as the vast majority of the grass phytoliths in the soil are from leaf material, which produces higher concentrations of phytoliths than inflorescences (K. Neumann 2011, pers. comm.). However, inflorescences are also the parts most likely to be present in archaeological sites, as they include the seed, glume, rachis, and other connective material that are harvested and used. Phytolith production in grass inflorescences is mostly confined to glume and connective tissue rather than the seeds. Tracing grass inflorescences is of interest because, along with macrobotanical analysis, it is possible to identify different crops processing stages (Harvey and Fuller 2005).

The few studies that do focus on grass inflorescences in Africa have focused on domesticated grains. In 2006, I conducted a preliminary analysis of sorghum inflorescence long cell (or elongate dendritic) phytoliths and was able to separate them from the dominant grasses in northern Sudan (Logan and D'Andrea 2008). This method is based conceptually on the wheat and barley identification methods outlined by Arlene Rosen (1992). The key is a focus on the dendritic or long cells instead of the short cells that are the focus of most phytolith analysts. After consultation with Rosen in 2007, I added a size component and also assigned the identifications a probability, as above.

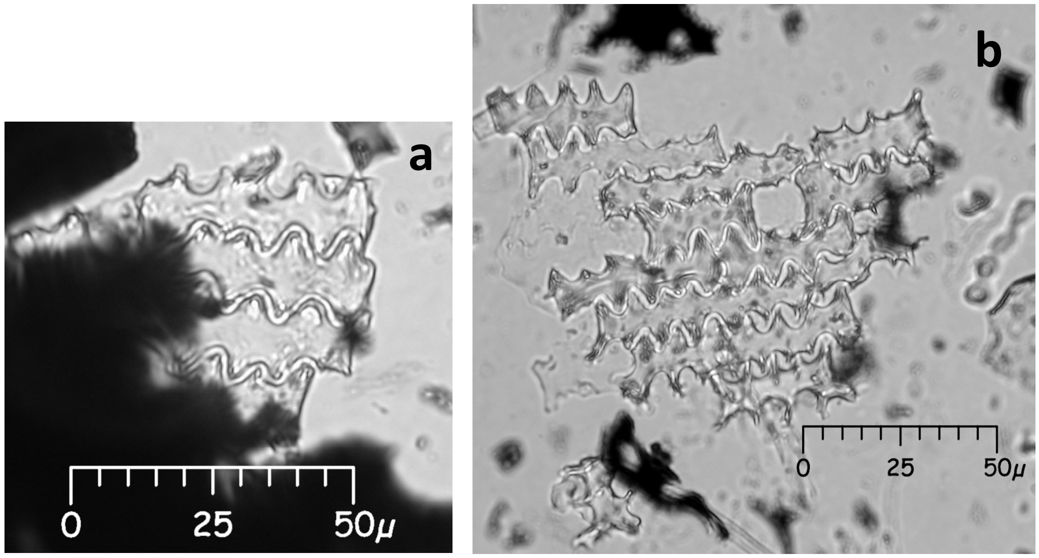

FIGURE 3.1: Long cell forms in *Sorghum bicolor*: a) Type 1, and b) Type 2 elongate dendritic

Sorghum produces distinctive silicified long cells, often found articulated in sheets in comparative and sometimes archaeological samples. I discriminate between two types which appear to have different diagnostic potentials: Type 1 long cells are regular, sinuous waves, which are very regular in shape and heavily silicified (Figure 3.1a). The margins appear to have a double outline and waves are often parallel. They are so generalized in form that I believe them to be redundant; in other words, the likelihood is high that similar forms are produced in other grasses. Type 2 elongate dentritics, however, are quite distinctive (Figure 3.1b). They are irregular and pointed, with a very distinctive appearance. They are heavily silicified and very abundant in modern comparative material (below), ideal for archaeological applications. The margins of these long cells do not show a double outline; instead the peaks are triangular and display a raised, tent-like line along each peak. The waves are rarely parallel. Long cell thickness ranges from 7.5-22.5µm, but generally falls in the range of 10-15 µm; wave height (from base to tip of wave on one side of long cell) is generally 2.5-5 µm.

Northern Sudan lies on the arid edge of the Sahel, and is thus a much different environment from Banda, which lies on the other much wetter end of the spectrum and is thus home to a different grassland community. While the database on wild grass inflorescences is lacking, it is possible to compare these forms to those produced in leaves of wild grasses depicted in the SEM photographs of East and West African grasses (Palmer and Tucker 1981, 1983; Palmer et al. 1985; Palmer and Gerbeth-Jones 1986, 1988). Based on these SEM photos, there are no similarly shaped long cells present in the leaves of African wild grasses; whether or not there is a clean separation from wild grass inflorescences will need to be evaluated when more inflorescence data is available. Minimally, the presence of these long cells indicates the presence of grass inflorescence material. Used in combination with short cells found in sorghum, it should be possible to arrive at moderate and strong probability identifications of sorghum in archaeological contexts.

A recent study by Radomski and Neumann (2011) helps to substantiate these observations and also outlines potentially diagnostic short cells in sorghum inflorescence. Briefly, the authors examined 18 species of African grasses, comprising mainly domesticated grains and their wild progenitors. The abundance of sorghum elongate dendritics was quantified, comprising 36.9% of the grass phytoliths in sorghum inflorescence (Radomski and Neumann 2011: 157). By contrast, wild sorghum (*S. bicolor arundinaceum*) contained only 12.4%, and of the other 16 grass species studied, none produced elongate dentritics in percentages over 4%, with most producing none at all. The authors did not describe the specific morphologies of dendritics in these grasses, so it is not possible to evaluate whether or not the morphologies of sorghum dendritics or Type 2 tissue overlap or are distinctive. But the large percentage of these kinds of phytoliths in comparative sorghum does suggest that these forms should appear quite readily and in abundance in archaeological contexts where sorghum was processed. Radomski and Neumann (2011) also noted the existence of a complex[7] bilobate to rondel with a saddle-like top in sorghum that appeared to be unique to *Sorghum bicolor* (Figure 3.2). I agree with their assessment that the presence of both dendritics and this saddle-like form probably indicates the presence of sorghum. It is the *quantity* and *co-occurrence* of these forms that is important, especially since wild grass inflorescence

[7] Here I use the term "complex" as a general way to refer to short cells with top ends that are not mirror image; the top may be keeled, plateaued, or otherwise decorated with spikes, ruffles, etc. A more specific way to talk about them is in terms of Variants (mirror image, tented, plateau) per Piperno 1984 and the system adapted by Fahmy (2008) to African grasses. However, this does not describe their decoration in any detail, which is important for genus and species level identification (i.e., Pearsall et al. 2003).

phytoliths have not been studied; though some wild species may produce similar forms they are unlikely to produce both.

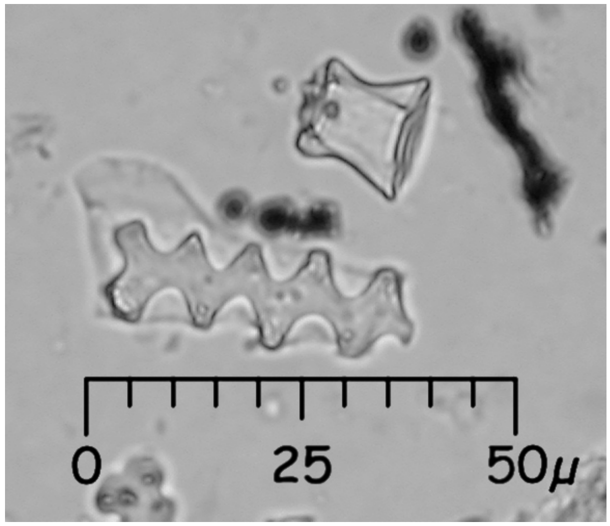

FIGURE 3.2: Saddle-like top with rondel to bilobate base in *Sorghum* spp. (top), with Type 1 long cells (bottom)

Other types of cells produced in sorghum inflorescences, though probably of less diagnostic value (i.e., are likely to be produced across grass taxa) are bilobates, polylobates, small saddles (7.5-12.5 µm), large, tall, irregularly spiked top rondel to bilobates, plateau top bilobate to rondel, keel top rondel, and hairs. Many of these are redundant forms (i.e., bilobates with convex margins) according to Fahmy (2008; Fahmy and Neumann in prep.), but some of the more distinctive types include the tall, spiked rondel to bilobate, and are included in the indicator ratios below.

Pearl millet and maize are considerably trickier to trace. As described above, the cross body method for identification of maize leaf cannot be used to identify maize in African contexts. But maize also produces several distinctive phytolith forms in its cupules, including several types of complex rondels, with keeled tops, ephemeral tops, wavy tops, plateau tops, and ruffle tops. Two of these have been used quite effectively for identification of maize cob material in the New World—the wavy top rondel and the ruffle top rondel (Figure 3.3; Pearsall et al. 2003). I also add another type, the ephemeral top rondel, which is abundant in maize. These three types are not produced in sorghum, though it is unknown whether or not they are produced in local wild grass inflorescences.

Other differences from sorghum, which is in the same tribe and thus closely related, are the clearly rondel forms in maize; sorghum tends to produce indented to vaguely saddle or bilobate forms. Maize complex rondels are not near as tall as those of sorghum. Finally, maize tissues do not silicify in sheets in similar fashion to sorghum.

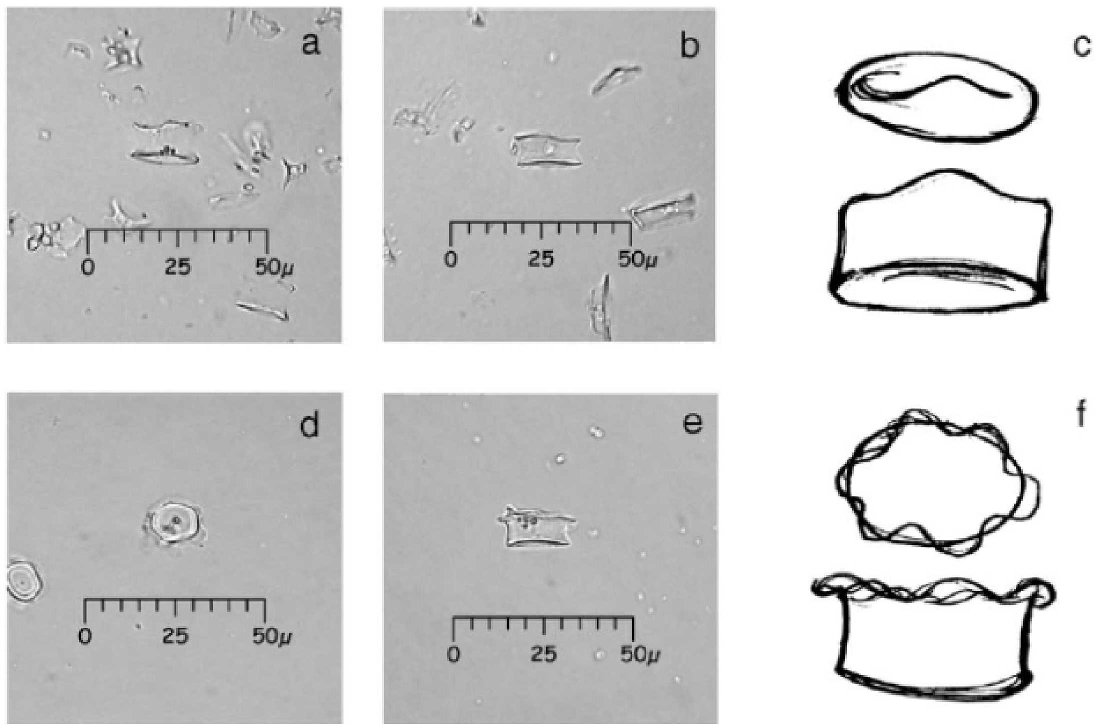

FIGURE 3.3: Maize cob bodies: Wavy top rondel (top) and Ruffle top rondel (bottom) (from Pearsall et al. 2003:612; used with permission)

Pearl millet is the most difficult of domesticated grasses to trace using phytoliths (so we are lucky it preserves well in the macrobotanical record!). The inflorescence produces irregular phytoliths and is not as heavily silicified as some of the other grasses. I recorded the following forms as occurring in pearl millet inflorescence, with their relative abundance noted:[8] small bilobates (7.5-12.5 µm) (VA), small square to saddle to lobed short cells (7.5 µm) (VA), long and short hairs (A), small crosses (7.5 µm range) (C), lightly silicified tissue skeletons (17.5-20 µm cell width) (C), 2-3 spike rondel (7.5-12.5µm) (C), and trichomes (C). Immediately noticeable was the small size of most of these short cells as compared to other grasses. Indeed, the forms are so small at times to make it difficult to see 3D morphology at 400x. But this may be significant. Examination

[8] VA=Very Abundant; A=Abundant; C=Common; R=Rare; VR=Very Rare

of size and shape data by Fahmy (2008) of West African Paniceae (the same tribe as pearl millet) shows that only one other grass genus produces bilobate short cells under 10µm in length: *Panicum* (Fahmy 2008: 9,11). More genera produce small crosses, including *Acroceras, Beckeropsis, Bracharia, Echinochloa, Panicum, Paspalidium, Paspalum,* as well as *Pennisetum* (Fahmy 2008: 13). A more recent study in preparation by Fahmy and Neumann (in prep) expanded the grass sampled to include grasses from other tribes. Small flattened (i.e., not notched) margin bilobates were produced in Andropogonae, and small convex margin bilobates produced in 7 genera. In other words, while small bilobates and crosses are not unique to pearl millet, they are produced in only a small subset of grasses. However, I should caution that there is only information available from leaf material; it is quite possible that small bilobates are more widely distributed in inflorescence material. Elevated amounts of tiny crosses and bilobates may indicate pearl millet especially in closed contexts like grinding stones or house floors. Clearly there is room for false positive identifications here; but at present it is the best phytolith indicator of pearl millet available.

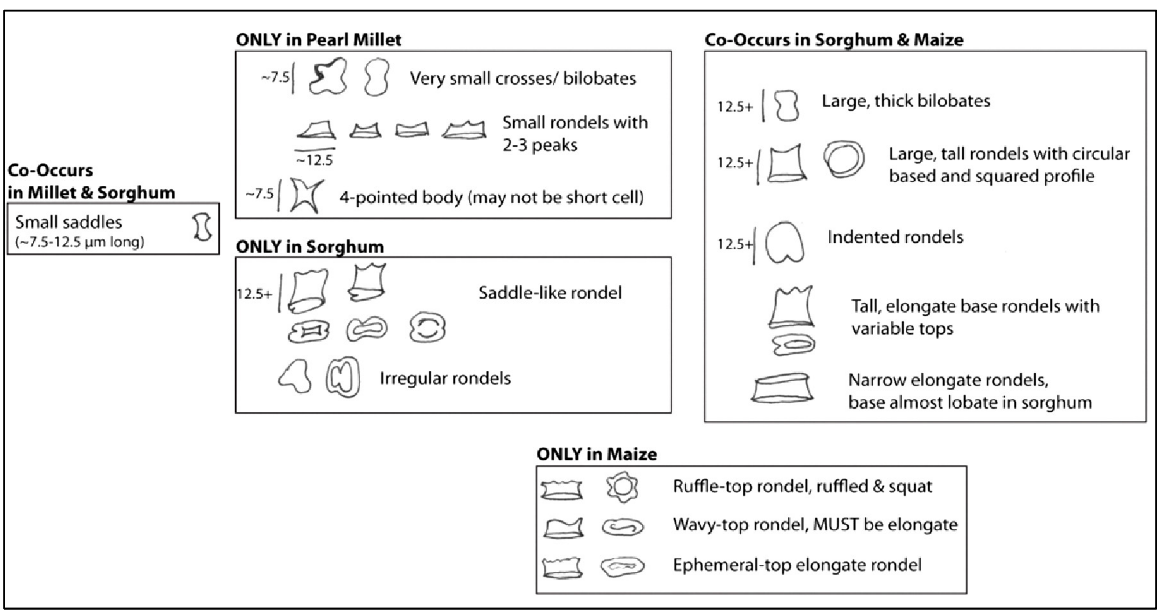

FIGURE 3.4: Short cell forms in inflorescences of domesticated grains (units in µm)

What is clear is that it is definitely possible to separate the domesticated grasses from each other (Figure 3.4); millet produces small bilobates and crosses, while maize and sorghum do not. Sorghum produces several complex short cells which are generally taller and not elongate, including the potentially diagnostic saddle-like rondel. Maize produces more elongate and squatter rondels than sorghum, in addition to three forms which may be diagnostic.

The real challenge is distinguishing these taxa from wild grasses in the archaeological record. My approach here is to use a series of ratios to quantify strong, moderate, and weak probability identifications of sorghum, maize, and millet. The method should be considered tentative until independent means are used to test their accuracy. The best check I have at present is whether or not charred grains of the same taxon occur in similar contexts, but since the objective in using phytoliths is to find processing activities that did not involve fire or whole grains, this is problematic.

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1. **Sorghum Indication**: based on % sorghum indicators: [(Tall squared variable top with rondel and lobed base + saddle-like with lobed to rondel base + Type 1 long cells +Type 2 long cells) / total grass cells] x 100; and presence of two forms likely to be diagnostic: Type 2 long cells and saddle-like short cells. Strength of identifications defined as follows:
    a. Strong probability: over 30% sorghum indicators plus presence of both Type 2 long cells and saddle-like short cell
    b. Moderate probability: over 15 % of sorghum indicators plus presence of either Type 2 long cells or saddle-like short cell
    c. Weak probability: 5-14% of sorghum indicators

2. **Maize Indication:** based on % maize indicators: [(Lg. Var. 1 Cross + Wavy top rondel + Ruffle top rondel + Narrow elongate rondel + Ephemeral top rondel + Elongate plateau rondel) / Total grass cells] x 100; and presence of two forms likely to be diagnostic: ruffle top rondel and wavy top rondel
    a. Strong probability: over 30% maize indicators plus presence of ruffle top and wavy top rondel
    b. Moderate probability: over 15% maize indicators plus presence of ruffle top or wavy top rondel
    c. Weak probability: 5-15% of maize indicators

3. **Pearl Millet Indication**: based on % millet indicators: [(small (<10μm) bilobates + small (<10μm) saddles + small (<10μm) crosses + other small (<10μm) short cells + small 2-3 spiked bilobate + pearl millet type long cells)/total grass short cells] x 100
    a. Strong probability: no strong identifications are possible
    b. Moderate probability: over 30% pearl millet indicators
    c. Weak probability: 5-29% pearl millet indicators

FIGURE 3.5: Probability or strength of indication method for identification of sorghum, maize, and pearl millet inflorescence using phytoliths

Several cautions to using this method merit discussion. First, none of these should be understood as definitive identifications, even in the case of a strong probability identification. We simply know too little about phytolith production in African wild grass inflorescences to make any unequivocal identifications. For example, it is possible that the maize and sorghum equations may be picking up on not just a sorghum or maize signature, but on Andropogonae grasses in general. As more data on phytolith production in wild grass inflorescences become available, this method can be refined.

Second, the percentage cut offs are partly arbitrary, but were confirmed in the case of blind tests against the macrobotanical record; in other words, where there are strong or moderate probability amounts of these indicators, I also found charred seeds of the same taxon in the same contexts or in ones close by. It is telling for example that sorghum indicators are completely lacking in the Upper Structure in NK M7, where they are present in the Lower Structure in the same mound (Ch. 5). This more than any other results suggests that it is not local weedy grasses that are producing sorghum or millet indicators, but sorghum and millet themselves. It also confirms that sorghum and millet can be discriminated from each other based on their phytoliths.

The alternative here is to use percentages derived from quantitative analysis of the true percentages of each of those forms in modern comparative plant material, e.g., if an archaeological sample possesses 37% of dentritics, which matches its true concentration in modern comparative sorghum (36.9%), then a firm sorghum identification can be made. Radomski and Neumann (2011), for example, adopt this perspective. Leaving aside the problem of different extraction methods (ashing vs. chemical separation) for the moment, the main problem is that this will grossly under-identify the presence or absence of domesticated grasses. For this to work, the archaeological contexts sampled will have to be composed of a pure assemblage of only the domesticated grass of interest, and no other wild or domesticated grasses. This almost never happens in real life; any item (even a grinding stone) that is buried or exposed to blowing dirt or sand is exposed to the many millions of silica phytoliths that were deposited as grasses decayed. In a savanna environment dominated by grasses, this is particularly the case. In addition, people in the past use grinding stones for multiple grains. Therefore a more sensitive method is necessary to pick these grasses up amongst the sea of other grass forms; here I adopt more reasonable percentages as well as use potentially diagnostic forms.

Only once the inflorescences of all dominant West African wild grasses are studied will it be possible to develop a method suitable for identifying domesticated grains using phytoliths. The method I present here is tentative, but does seem to pick up the occurrence of the grains with some regularity. It is also easily modified as more wild grass data become available. The identification potential is highest for sorghum followed by maize; millet remains a challenge. However, it does allow me to tentatively evaluate whether sorghum and maize are more ubiquitous than the macrobotanical record suggests.

Phytolith production in non-grasses in Africa

Phytolith production in plants outside of the grass family is even less well known, though research is steadily growing. Production patterns and morphological types vary considerably, unlike grasses which tend to produce a restricted set of morphological types. However there is also considerable redundancy in non-grasses. Types that tend to both preserve and be of diagnostic significance are epidermal cells, hairs, hair cells bases, and spheres (Piperno 2006). Here I briefly review the work to date on comparative African non-grass plants, and describe my work on non-grasses collected from Ghana, Togo, and Senegal.

Runge (1996) was one of the early pioneers of phytolith analysis in Africa. She examined phytolith production in 130 species of dicots from rainforest and montane forest in Rwanda and Congo. Her aim was to determine whether or not some of the species studied produced diagnostic (unique) forms in that specific flora. Her results suggest that only *Annonodium mannii* (Annonaceae) produces a specific unique type of phytolith—a faceted sphere—that is likely to preserve in soil samples (Fig. 3.6). In addition, silicified epidermis from both *Kigelia africana* (Bignoniaceae) and *Higenia* *abyssinica* (Rosaceae) appeared to be diagnostic.[9] Runge's comparative work has been the basis for most subsequent archaeological and paleoenvironmental studies.

Runge's work is a good illustration of one of the central tenets of phytolith analysis. Namely, diagnostics vary in their level of specificity, and this can only be determined once other potential producers of that form are ruled out. Generally, the best approach is to examine phytolith production in as many other plants from the region of interest, particularly those that are closely related. Runge, for example, examined a large number of dicots from her region of interest to define which forms were diagnostic (unique) to individual dicot taxa. The advantage to this type of approach is that diagnostic forms can be used with high certainty to identify certain taxa; the limiting factors are that it requires access to a large comparative collection, as well as considerable time to examine every species. Another disadvantage is that these methods are by definition regional in scope; Runge's *Annonodium* body may also be diagnostic in the flora of the Banda area, but until I have examined a large array of dicots from the area, I cannot say with absolute certainty that that phytolith represents that species.

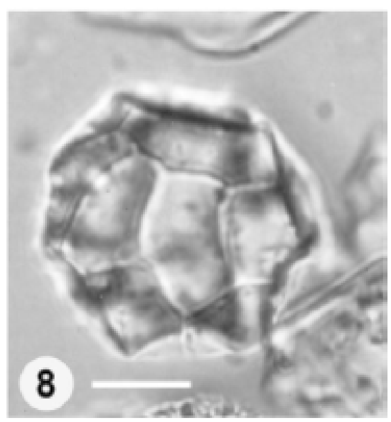


FIGURE 3.6: Diagnostic *Annonodium* faced sphere for central African rainforest
(Runge 1999: 34; used with permission)

While Runge ambitiously focused on the tropical forests of central Africa, most analysts focus on a more specific regional and ecological unit. One such example is work by Mercader and colleagues in the woodlands of Mozambique. They examined 90

[9] The existence of only these three potential diagnostics out of the 130 taxa examined by Runge is actually quite disappointing, when compared to the large number of diagnostics in the Neotropics (e.g., Piperno 2005, 2006).

species (41 families), and grouped phytolith types into 57 morphotypes which were then built into a quantitative taxonomy. This study illustrates the typical range of forms produced by non-grass woody plants. Ten morphotypes were the most common. The first are epidermal polygonal, which tend to be very common in leaf epidermal tissue. Members of the Anacadiaceae, Euphorbiaceae, Fabaceae, Moraceae, and Verbenaceae are particularly abundant producers of this type. Stomata, hairs, and hair cell bases were also very common, especially in Asteraceae, Ebenaceae, Euphorbiaceae, Fabaceae, and Urticaceae. Vessel members, from the xylem's tracheary elements, are produced in high numbers in Clusiaceae, Apocynaceae, Combretaceae, and Fabaceae. Globular psilate types (which appear to be almost smooth spheres) are especially common in Cucurbitaeae, Fabaceae, Annonaceae, Apocynaceae, and Musaceae, particularly in stem material. Globular echinates (spikey spheres) are exclusively produced in the palm family (Arecaceae), a type that has long been considered a 'universal diagnostic' and is produced across plant parts in palms (Piperno 2006; Pearsall 2000). Blocky polygonals are found in Apocynaceae, Asteraceae, and Fabaceae, usually in stems. Epidermal jigsaw types are irregular epidermal cells, produced in high numbers in Thelyptderidaceae, and less so in Euphorbiaceae, Asteraceae, Combretaceae, and Fabaceae (especially *Afzelia*). Cylindroid bulbous types are produced in large percentages by Fabaceae (especially *Piliostigma* and *Pterocarpus*) and Arecaceae. Finally blocky phytoliths are produced in high numbers in Acanthaceae, Rhamnaceae, Fabaceae, Asteraceae, and Rubiaceae (especially *Pavetta*), especially in stem material[10] (Mercader et al. 2009: 99-104).

Examination of such a large sample of the local flora allowed Mercader and colleagues (Mercader et al. 2009: 104, 107-108), like Runge earlier, to associate specific phytolith morphotypes with certain taxa. Using multivariate statistics the authors were able to discriminate less specific taxonomic groups. They also found unique or diagnostic phyoliths in the following taxa: *Uapaca nitida, Cassia* spp., *Solanum panduriforme*, *Cassytha* spp., *Podocarpus falcatus*, and *Aeschynomeme* spp. (Figure 3.7, Table 3.3). Though there are certainly some similarities between Miombo woodlands and the savanna woodland that characterizes Banda, there are also some important differences, so I hesitate to use these specific identification methods in Banda. The

[10] I also noticed this type in *Dioscorea* tubers; do these stem types also characterize underground stems?

diagnostics observed in six different species, depicted in Figure 3.7, are not completely convincing to me; the forms appear somewhat generalized, and without examination of all Banda woodland taxa I hesitate to use them for identifying these species.

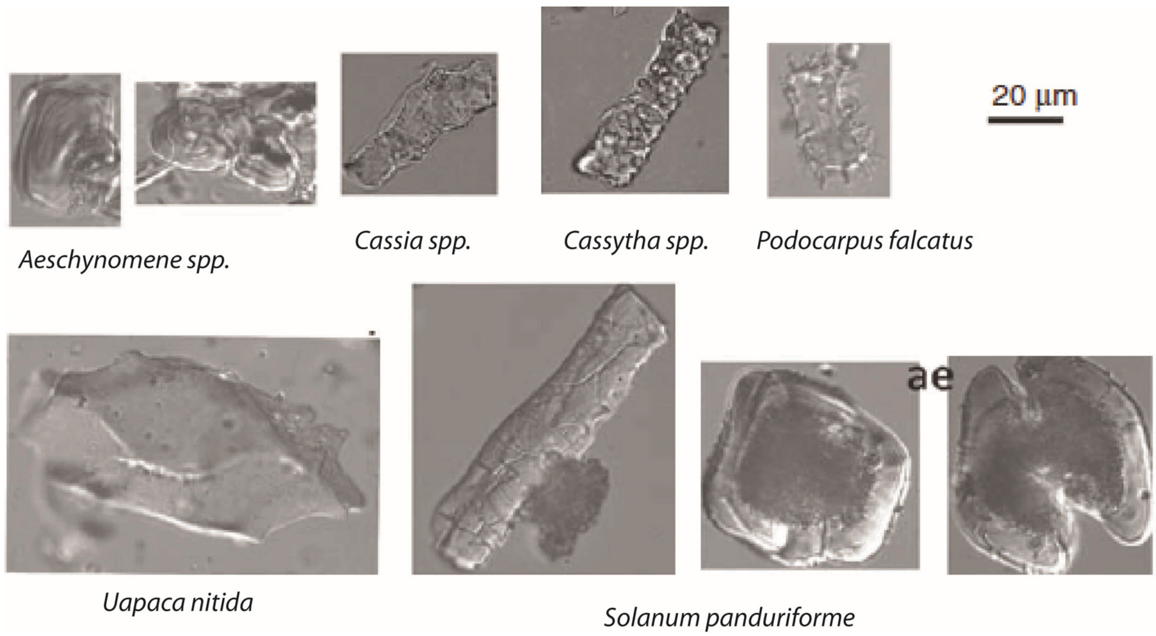


FIGURE 3.7: Diagnostic types for Miombo Woodlands, Mozambique
(Mercader et al. 2009: 99; used with permission)

Other studies have focused on defining and identifying specific taxa. Banana, which is southeast Asian in origin, has been identified in tropical central Africa using distinctive Musaceae volcaniform phyoliths (Figure 3.8; Mbida et al. 2000, 2001; Lejju et al. 2006), though not without considerable debate (Neumann and Hildebrand 2009; Vrydaghs et al. 2009). This debate has led to a tightening and clarification of identification criteria (Ball et al. 2006; Vrydaghs et al. 2009). The volcaniform should be able to be used to identify bananas in Ghana, and perhaps evaluate Blench's (2009) hypothesis that they originally came to Africa from the western, rather than eastern, shores.

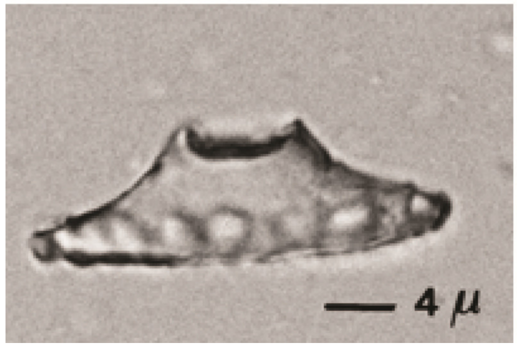


FIGURE 3.8: ***Musa*** **sp. Volcaniform Type**
(Mbida et al. 2000: 158; used with permission)

Eichhorn and colleagues (2010) detail phytolith production in Commelinaceae, several types of which are genus- and species-level diagnostics. This study also nicely shows how additional comparative samples can considerably change identifications. Two morphotypes found in ancient samples resembled epidermal phytoliths produced in Cyperaceae seeds (Ollendorf 1992), and Marantaceae seeds (Chandler-Ezell et al. 2006; Piperno 2006) in the New World. Upon further examination, they were found in West African Commelinaceae, which are typically weeds of fields, villages, and wet areas. This shows the benefit in having some idea of phytolith production in a regional flora, especially when attempting to identify taxa based on diagnostic forms designed for use in other world regions. Eichhorn and colleagues go a step further in examining many species in one family to define phytolith production within it. Three main morphological groups were defined: 1) the polygonal platelets, found in two genera *Aneilema* and *Stanfieldiella*), and produced in numerous other plant families, so thought to be redundant; 2) flat polygonal prisms with conical tops (*Pollia, Murdannia, Floscopa, Cyanotis,* and *Commelina subulata*), which could be discriminated into further subtypes useful for genus level identification; and 3) subcylindric, distinctly anisopolar, upper part a polygonal prism with subconical top (*Commelina* spp., except *Commelina subulata*), variants of which can identify some *Commelina* to species level (Figure 3.9). Unfortunately the specific decoration that defines many of these types were defined with an SEM and are difficult to see using just a light microscope (Eichhorn et al. 2010: 306-307); for Banda I note the occurrence of these types and identify them simply as Commelinaceae.

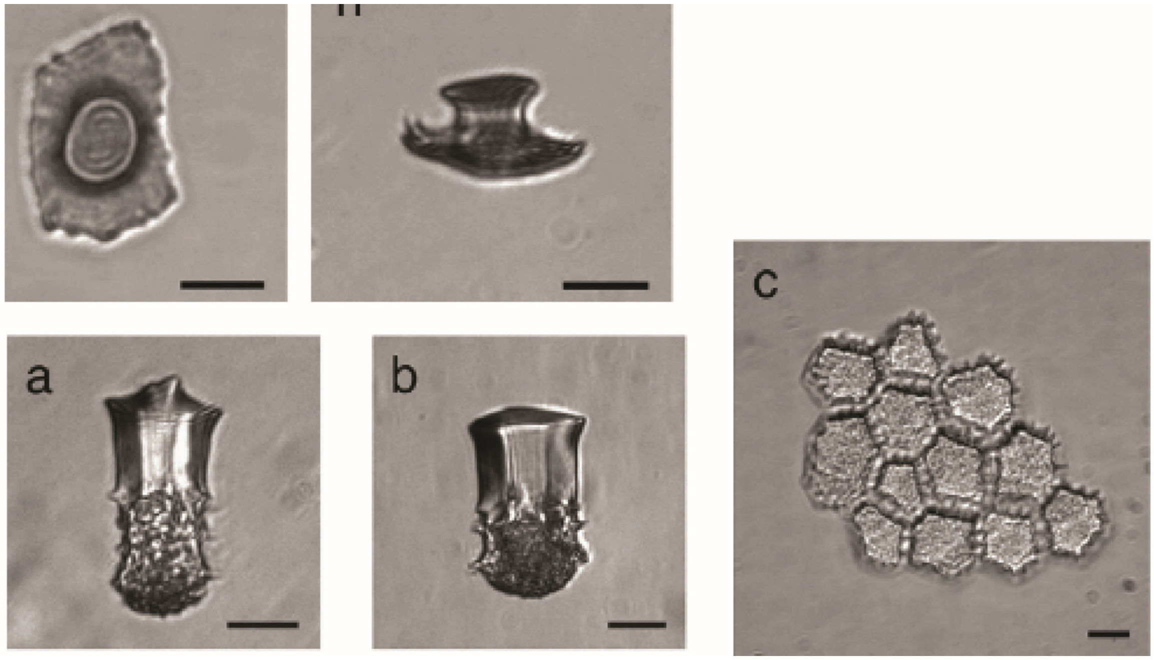


FIGURE 3.9: Examples of Commelinaceae Types (Eichhorn et al. 2010): polygonal prisms with conical tops (top and side views) (top line) and subcylindric, distinctly anisopolar, upper part a polygonal prism with subconical top (bottom three, far right is bottom view) (bar=20μm) (used with permission)

Ideally, phytolith production would be examined in all the dominant and utilized taxa in the Banda area; this would allow me to delineate any number of potentially specific diagnostics and evaluate whether those defined for other regions can be used effectively in Banda. Unfortunately it was not possible to embark on a project of that magnitude for this study. I confined my observations to useful plants, which were meant as a supplement to the studies already completed by Runge, Mercader, and others. This includes both the cultivated and wild plants that are used for subsistence purposes. As many of the wild plants used tend to also be ecological dominants, at least for the dicots, this served the dual purposes of defining phytolith production in many of these. For this study, I have so far examined 45 of the most important of 117 samples of material that I dry ashed (Table 3.4). Of these, 18 produced little to no silica, and thus cannot be identified using phytoliths. Thirteen produced some silica, albeit usually redundant forms that were not present; however the presence of observed forms may help indicate these taxa. Another 12 taxa produced silica in considerable amounts; many of these produced potentially useful forms.

TABLE 3.3: Non-grass phytolith diagnostics used in tropical Africa

Region/Study	Taxa/Specificity	Phytolith Morphotype
Universal (Piperno 2006)	Arecaceae	Echinate sphere
Rainforest and montane forests, Uganda/Congo (Runge 1996) (Fig. 3.6)	*Annonodium mannii* (Annonaceae) *Kigelia africana* (Bignoniaceae) *Hibiscus* (Malvaceae) *Higenia abyssinica* (Rosaceae)	Faceted sphere Silicified epidermis Silicified epidermis
Bananas (Ball et al. 2006, Mbida et al. 2000, Vrydaghs et al. 2009) (Fig. 3.8)	*Musa acuminata* (Musaceae)	Volcaniform phytolith crater
Miombo woodlands, Mozambique (Mercader et al. 2009) (Fig. 3.7)	*Aeschynomeme* spp. *Cassia* spp. *Cassytha* spp. *Podocarpus falcatus* *Solanum panduriforme* *Uapaca nitida*	Blocky radiating, m.8 Epidermal laminate, m.21 Tabular thin pilate, m.56 Blocky hairy, m.5 Globulose bisected, m.37 Cylindroid reticulate, m.18 Blocky facetate, m.4
Commelinaceae (Eichhorn et al. 2010) (Fig. 3.9)	*Pollia condensata* *Murdannia/Floscopa* *Cyanotis* *Commelina subulata*	Variants of polygonal prisms with conical tops
	Commelina africana, C. bracteosa, C. aspera, & *C.erecta ssp. erecta* *C. benghalensis* *C. diffusa* *C. erecta ssp. livingstonii* *C. nigritana* *C. forskaolii*	Variants of subcylindric, distinctly anisopolar, upper part a polygonal prism with subconical top

TABLE 3.4: Phytolith production in comparative plant material from Ghana

	Taxa	Forms present
Little to no silicification	*Abelmoschus esculentus,* MALVACEAE—S	None
	Abelmoschus esculentus, MALVACEAE—fruit head	Calcium oxalate druses[2]
	Azadirachta indica, MELIACEAE—L[1]	Calcium oxalate druses, light silif. tissue
	Bembe kpɔɔ (edible leaf)—L	Calcium oxalate druses, raphides
	Capsicum annuum, SOLANACEAE—F,S	Calcium oxalate druses, raphides
	Cassia occidentalis, FABACEAE—P	Calcium oxalate raphides
	Cassia occidentalis, FABACEAE—L	Tissue embedded with calcium oxalate
	Ceiba pentandra, MALVACEAE—P	Calcium oxalate druses
	Ceiba pentandra, MALVACEAE—S	Calcium oxalate druses and blocks
	Cissus sp., VITACEAE—I	Calcium oxalate druses, raphide bundles
	Cissus populnea, VITACEAE—L	Calcium oxalate druses, raphide bundles
	Kanya (edible)—S	Calcium oxalate druse
	Manihot esculenta, EUPHORBIACEAE—L	Calcium oxalate druses and blocks
	Ocimum gratissimum, LAMIACEAE—I	None
	Pavetta crassipes, RUBIACEAE—L	Amorphous silica, calcium oxalate druses and raphide bundles
	Pavetta crassipes, RUBIACEAE—S	None
	Solanum sp., SOLANACEAE—L	Calcium oxalate druses, tracheids
	Vigna unguiculata, FABACEAE--P	Inconclusive
Moderate silification	*Butyrospermum paradoxa,* SAPOTACEAE--L	Silicified dicot tissue, calcium oxalate blocks
	Capsicum annuum, SOLANACEAE—L	Smooth spheres (A)[3], segmented hair (VR), epidermal tissue (VR)
	Cissus sp., VITACEAE--L	Silica sheet w/projections (VR), Silicified dicot tissue (VR), calcium oxalate druses and raphides
	Corchorus tridens, TILIACEAE—L (x2)	Faceted hexagonal tissue (R), calcium oxalate druses

	Dioscorea rotundata, v. tela, DIOSCOREACEAE—T	Blocks of silica (R), Calcium oxalate raphide bundles
	Dioscorea rotundata, v. tela, DIOSCOREACEAE—L	Silicified dicot tissue (double outline polygons), raphide bundles
	Kanya—L	Large spherical bodies with calcium oxalate core, irregular silica
	cf. *Hymecardia acida*, EUPHORBIACEAE--L	Dicot silicified tissue, similar to *Bridelia*, calcium oxalate druses and blocks
	Ocimum basilicum, LAMIACEAE—L	Segmented hair (VR), schlerids/tracheids
	Ocimum gratissimum, LAMIACEAE—L	Elongate cells with dendritic to speculate projections (R)
	Parkia biglobosa, FABACEAE--S	Lightly silicified hair cell bases and dicot tissue
	Piliostigma thoningii, FABACEAE--L	Silicified dicot tissue (C), Smooth spheres (R), Hair cell base (VR), calcium oxalate blocks and druses (C)
	Vitex doniana, VERBENACEAE--L	Lightly silificied hexagonal tissue, calcium oxalate blocks
Heavy silification	*Bridelia feruginea*, EUPHORBIACEAE--L	Hexagonal tissue, (C) hair cell base (VR)
	Ficus gnaphalocarpa, MORACEAE—L	Silicified dicot tissue (C), Double outline unicellular hairs (VA), Hair cell bases, poss. diagnostic
	Hibiscus cannibus, MALVACEAE—L	Epidermal bodies (VR), Silified globular cells (VR), Hair cell bases (C)—poss. diagnostic
	Lagenaria siceraria, CUCURBITACEAE—L	Large segmented hairs (A), hair cell base (R) (see published descriptions)
	Laportea aestuans, URTICACEAE—I	Lightly silicified decorated hexagonal epidermal bodies (A), Long double outline hairs (C), small spheres (VA)
	Laportea aestuans, URTICACEAE—L	Tubular bodies with projections (VA), Double outline hairs (VA)
	Parinari curatellifolia, ROSACEAE—L	Hair cell bases with stellate center (A), Silicified dicot tissue (VA), Blocky tissue (R)
	Pennisetum glaucum, POACEAE—I	See above

	Vigna unguiculata, FABACEAE—L	Double outline hairs, often twisted (C), possible hair cell bases (R), silica disks, Silified dicot tissue (R)
	Sorghum bicolor, POACEAE—Stalk	Squat bilobates (A), Stomata (A), Complex rondel (VR), Rondel (R), Long cells (P)
	Sorghum bicolor, POACEAE—I	See above
	Zea mays, POACEAE—Cupules (x2)	See above

[1] These abbreviations refer to plant part. L=Leaf, I=Inflorescence, S=Seed, P=Pod, T=Tuber
[2] I recorded calcium oxalate forms, in part because I had previous experience with them during the course of my Masters research, and in part because yam is well known as a prolific producer of calcium oxalate raphides (needles); I was curious to see what production looked like in African plants and if they could be used to help indicate yam.
[3] These are short hand abbreviations for the frequency of these forms; VA=Very Abundant, A=Abundant, C=Common, R=Rare, VR=Very Rare

Those taxa that are heavily silicified hold the most potential to be identified using phytoliths. Three taxa produce hair cell bases that may be diagnostic: *Ficus gnaphalocarpa, Hibiscus cannibus,* and *Parinari curatellifolia*. *Laportea aestuans* produces both epidermal bodies and hairs that may be useful for identification. *Lagenaria siceraria* silicifies hairs and spheres that have been used in the New World for species level identification (Piperno 2006). While there is considerable work to be done to see if other taxa in the Banda flora produce these types, this pilot project represents an important start. It suggests that there is at least potential to track useful leaves and fruits using phytoliths.

Studies of phytolith production in West African plants, especially those valued by people, are still few and far between. A select handful of plants can probably be identified, including bananas, *Annonodium manii*, various Commelinaceae, and perhaps *Kigelia africana*, *Higenia abyssinica, Ficus gnaphalocarpa, Hibiscus cannibus,* and *Parinari curatellifolia*, *Laportea aestuans*, and *Lagenaria siceraria.* Most are more useful as environmental indicators than of human activity. I record these forms where present in Banda samples (Appendix C), but the lack of comparative work frustrates a full reconstruction of food and environment in this area at present.

The Pitfalls and Potentials of Starch Grain Analysis in Africa

At the time I joined the Banda project in 2008, there were no published applications of starch grain analysis to West African contexts, and almost none for the African continent as a whole; the situation has not changed much. There are only three positive reports of starch grain recovery in Africa. One study by Mercader and colleagues (Mercader et al. 2008; Mercader 2009) found evidence for wild grass starch grains (including wild sorghum) in a cave site in Mozambique dating to over 100,000 years ago. In 2006, as part of the study of artifact residues from Dangeil in northern Sudan (in collaboration with C. D'Andrea), I located sorghum-like starch grains on bread molds (Anderson et al. 2007; Logan and D'Andrea 2008). These studies gave me hope that the method would work in West African contexts, despite negative results from Early Iron Age contexts in Togo. The allure of recovering starch grains was strong; it is not only a potentially important tool to examine plant processing techniques (Henry et al. 2009), but would provide one of the only means of tracing the role of tubers in ancient economies. In particular, the tissues of yams (*Dioscorea* spp.) and cassava (*Manihot esculenta*) do not silicify or only slightly silicify (Chandler-Ezell et al. 2006; Piperno and Holst 1998), and neither preserve as charred macroremains. Both taxa are of primary importance in modern diets, and the origin of yams, a West African domesticate, has long been the subject of speculation (e.g., Coursey and Coursey 1971).

However, for all of these potential contributions, starch grains are limited in terms of their preservation. They are destroyed by heat through the process of gelatinization—the same process that makes thickeners work in soups. Gelatinization destroys the identifying features of starch grains, including their shape and extinction crosses, making it difficult to identify them as starch grains, much less narrow them down to a particular plant. Wet heat seems to be particularly deleterious to starch grain survival. This is not to say that starch grains are not found in places where they have been exposed to (even wet) heat; for instance, Zarillo's find of maize starch in cooking pots in coastal Ecuador suggests that not all grains are destroyed in this circumstance (Zarillo et al. 2008). However, it does explain why many analysts working in the American tropics prefer to focus on grinding tools, where heat is not an issue. Grinding too takes its toll on starch grain morphology, but along with other activities such as boiling and toasting, can leave damage in predictable patterns (Chandler-Ezell et al. 2006; Henry et al. 2009). Therefore, even if one's ability to identify a particular plant species is compromised, it may be possible to identify the activity represented, a great asset to those trying to reconstruct geneaologies of food practice.

With all of this in mind, I optimistically embarked on an extensive sampling campaign for starch grains in Banda. Two types of samples were the focus: residues on artifacts, mainly grinding tools and pots, and soil samples from archaeological contexts, including domestic and midden areas. All samples tested were co-processed for phytoliths using the piggyback procedure described in Pearsall et al. (2004) (above). Light fractions from many of the same contexts were also analyzed, ideally allowing for an as complete as possible representation of activities.

Unfortunately, after testing 32 artifact residue and soil samples, no archaeological starch was recovered. The only sample containing starch had one large mass of starch grains still in tissue, which I suspect might have been a contribution of modern plant material given the phenomenal state of preservation. To test if the problem was one of processing procedures, I looked at raw samples (no processing) and ran side by side tests of samples using both the Chandler-Ezell and Pearsall procedure as well as one Linda Perry has used with great success in the New World (Perry et al. 2006: Supplemental Materials). I tested both soil samples and artifact residues, from sites spanning the entire period of interest (1000-1920). I focused especially on the late 18th/early 19th century kitchen contexts in Makala Kataa Station 6, which are very well preserved. But not a single starch grain, either damaged or complete, was found.

This may indicate a wider problem in West African archaeological sites, but given the infancy of starch grain research in Africa, it is impossible to evaluate at this point. I also had no luck recovering starch grains in Early Iron Age samples at Dekpassanware, Togo, and reportedly the archaeobotany work group in Frankfurt has also not been successful in Nigeria (K. Neumann, 2011 pers. comm.). This is hard to explain. In Banda, the soils were near neutral in their pH, being only slightly acidic or basic, thus should have been the perfect contexts for starch recovery (in fact even more so than the New World tropics). They are also brown, rich soils that are not heavy in laterite like much of the rest of West Africa. Today, starchy foods are everywhere, but they are prepared by boiling and pounding (in the case of yams) and combinations of boiling and beating in the case of sorghum, maize, and millet. These practices would be very damaging to starch grains. But most grains are ground (at least today) prior to cooking, so it makes little sense that they do not appear on grinding stones or in soil samples. Indeed, the complete absence of starch grains in all contexts makes it look as if something or someone has cleaned them all away! This low recovery may be the result of an environmental or biological process; for instance, heavy downpours in the rainy season may literally wash grinding stones clean, or certain bacteria may feed on starch. This is likely to remain an unsolved mystery until experimental research can be carried out, and archaeological samples from a diversity of African environmental and culinary landscapes are analyzed.

Consequently I decided not to pursue further investigations into starch grains in Banda. While it is possible that I would have recovered a small handful eventually, this does little to answer my research questions about how plants were prepared and processed. Fortunately, the combination of other sources—macrobotanical, phytolith, archival, and oral—still have interesting things to say.

Integrating Multiple Kinds of Data

In summary, my approach to constructing a history of foodways in Banda employs ethnoarchaeological, archival, and archaeological data. I use two types of archaeobotanical data—charred botanical remains and phytoliths—to reconstruct foodways in detail. These diverse data sources complement in each other in several ways. First is chronological; ethnographic interviews only extend to the limits of human memory, which even in the best cases usually stops at 1930. Archival sources help pick up the threads (or grains) of foodways from the late 19th to 20th centuries. The archaeological record is available for most of the sequence (1000-1920s), almost connecting to the limits of local memory. But the advantage to using several sources is not just that they increase chronological depth, but in instances where multiple types of source material are present, it is possible to compare them. This kind of upstreaming methodology envisioned by Stahl (2001), among others (i.e., Vansina 1990, 1994), allows one to critique each type of source material with other sources. It also allows me to play off the strengths and weaknesses of each type of data. The major issue here is one of preservation and taphonomy from the plant remains themselves to the selective and biased recording of information colonial officials. For archaeobotanical remains, physical preservation in archaeological sites is limited. For the most part, seeds preserve only in charred form, necessitating the use of specialized techniques like phytolith and starch grain analysis, which allow me to glean something of daily practices that did not bring plant materials into contact with fire. In ethnographic accounts, time depth is limited by one's lifetime or that of one's immediate ancestors. Food practices are not necessarily remembered in the ways archaeologists might hope. Oral histories do not necessarily record changes in daily life, especially those that are gradual. Archival sources are similar; they have a limited time depth, with colonial records extending back only to the late 19th century for this region of Ghana, and earlier accounts usually not extending far inland. These texts rarely focus on mundane activities, since these were not viewed as important for trading and other colonial enterprises. Linguistic data are greatly influenced by interactions between languages and social groups. But tacking back and forth between these sources creates a more richly textured record of the past, and also serves as a check on each type of source, especially in more recent time periods where more source material is available (Stahl 2001: 27-40; Wylie 1989).

Making up for differential preservation is not the only advantage of using multiple sources. As the quote at the beginning of the chapter suggests, food has more than one history, and the type of data used determines which story is told. Archaeobotanical remains tell the story of what was left behind, accidentally or purposefully, and the residues of bodily practices that characterized daily life. Ethnographic accounts recount how foodways are incorporated into family and economic life. Archival sources and linguistic data tell us about culture contact, how outsiders viewed local foodways and how much they missed familiar foods from home. They also inform on practices of distinction and trade. These sources are not neatly complementary, but tell different food histories. Sometimes the stories they tell are the same, but many times they are different. In the pages to follow, I reconstruct a story of food in Banda from these different perspectives.

Chapter 4

Demanding Tastes of Afar:
Food, Environment, and the Emergence of Long-Distance Trade before 1450

Before European ships embarked on trans-oceanic voyages in search of spices, gold, and eventually people, trade caravans crossed the Sahara, and valuable goods moved between forest and desert, overland to the Middle East and Europe, and through Indian Ocean trade networks (Mitchell 2005). This 'pre-modern' world exchange system was influential in building desires for certain tastes, as well as the routes to and sources of wealth in the modern era (cf. Abu-Lughod 1991, though note her omission of Africa). The long-ranging networks that developed before Europeans arrived on the West African coast continued to be important well into the colonial era, as were the desires for certain goods from afar (e.g., Insoll 2003; S. McIntosh 1995b, 1999; R. McIntosh 2005). Involvement in long-distance trade networks also had an impact on daily life, as people engaged in production of surplus craft and subsistence goods to meet the ever-changing needs of themselves and others. This chapter is about how these connections developed and influenced daily life and foodways with particular focus on Banda, as well as how they structured later engagements in Atlantic trade.

I begin by considering the wider West African sub-region and its involvement in inter- and intra-continental trade networks. I then discuss the movement of foods and other goods through these networks, and, where possible, how foods were prepared and processed. I narrow the archaeological discussion to sites occupied in Ghana from the first to early second millennium AD in order to evaluate the development of long-distance connections at that time. Finally, I arrive at Banda's doorstep on the eve of significant investment in long-distance trade as glimpsed through sites Banda 13 and 27, and when Banda became enmeshed within those systems based on insights from Ngre Kataa, Kuulo Kataa, and Banda 41. At each of these sites I reconstruct the inventories of plant foods present and, to the degree possible, how they were produced and prepared and produced. I consider evidence for wood procurement practices, environmental change, and long-distance trade. Finally, I compare the Banda findings to the broader region and discuss the effects of shifting environmental change on trade, as well as variability in agricultural and culinary practices over space and time.

Continental flows: people, products, and practices

The role of non-Africans in the development of everything from agriculture to metalworking to sociopolitical complexity has loomed large in colonial and early postcolonial portrayals of Africa's past, even by some early archaeologists. It was presumed that local populations did not have the ability to independently invent new technologies and statecraft (e.g., Murdock 1959). Subsequent generations of archaeologists have devoted considerable energies to debunking these misconceptions (see Mitchell 2005; Robertshaw 1990; Stahl 2005), even to the extreme point of dismissing archaeology that focuses on external connections altogether (Schmidt 2009: 2). However most scholars seek a more nuanced perspective. The fact remains that foreign goods were present early on in West Africa, but they are now seen as evidence of how local people articulated their own roles as producers and consumers in long-distance trade networks and intercultural contact (Mitchell 2005; Ogundiran 2002, 2009; Richard 2010; Stahl 2002), or, put another way, as part of how Africa discovered Europe and the Middle East (cf. Northrup 2002). After all, to deny Africa's global connections is to remove it yet again to the backwaters by denying local African agency in constructing the modern, global world (Richard 2010; Stahl 2010). In this section, I provide a brief background to the development of trans-Saharan trade networks and African trading empires as a prelude to understanding the plants and people that moved through them.

People and Trade

Long before Europeans made landfall trade loomed large in the lives of merchants and producers in many parts of early Medieval Africa,[1] particularly in the Sahelian and Sudanian zones. This period is generally associated with the arrival of Arab merchants in the Sudanian zone sometime in the 7th century (Nixon 2009). West Africa became visible in written records left by travelling Arab merchants and scholars beginning in the 9th century (i.e., Hopkins and Levtzion 2000; Levtzion and Spaulding 2003). One key point that has emerged from archaeological research in the area is that long-distance trade in West Africa predated the arrival of Arab merchants by centuries and even millennia (Mitchell 2005). For example, there is earlier evidence in the form of rock art depicting horse-drawn chariots across two routes that stretch from the Niger Bend through the Sahara (Insoll 2003: 209, 211; Mitchell 2005: 138-140). Sustained contact was not evident until the early Islamic era, when Islamic powers tried to gain control over access to West Africa's gold and ivory reserves beginning as early as 650, as documented by recent archaeological investigations (i.e., at Tadmakka). Arabic sources then shed light on the peak of such trade rather than its origins (Nixon 2009).

Foreign goods and the desires for them percolated throughout the wider region prior to the arrival of Arab merchants (Insoll 2003: 212, 317). For example, small amounts of exotic trade goods made their way into the Niger bend area, as evidenced by beads of Asian (at 250 BC-50 AD), and Roman (at 300-800 AD) provenance recovered from the site of Jenne-jeno (Brill 1995: 252-256). The development of urban centers and political complexity also predated the arrival of Arab merchants in the 9th century. The *in situ* development of Jenne-jeno from a settlement of iron-using peoples around 300 to an urban center by 500 remains the best evidence for this (R. McIntosh and S. McIntosh 1980; S. McIntosh 1995b, 1999). Other trading centers like Gao, Tegdaoust, Koumbi

[1] The terms used to describe this era of West African history are problematic, drawn as they are from European definitions of time (Medieval) or emphasizing the importance of Islam though many regions remained outside its influence. The alternative—Late Iron Age, is also less than ideal, for reasons summarized by Stahl (2004:146). Here I avoid use of these terms except where clarification seems necessary, though my focus on absolute and linear time could also be critiqued.

Saleh, and Tadmakka were occupied by the 6th century, and engaged in regional and long-distance trade (Fig. 4.1; Insoll 2000, 2003: 212; Nixon 2009).

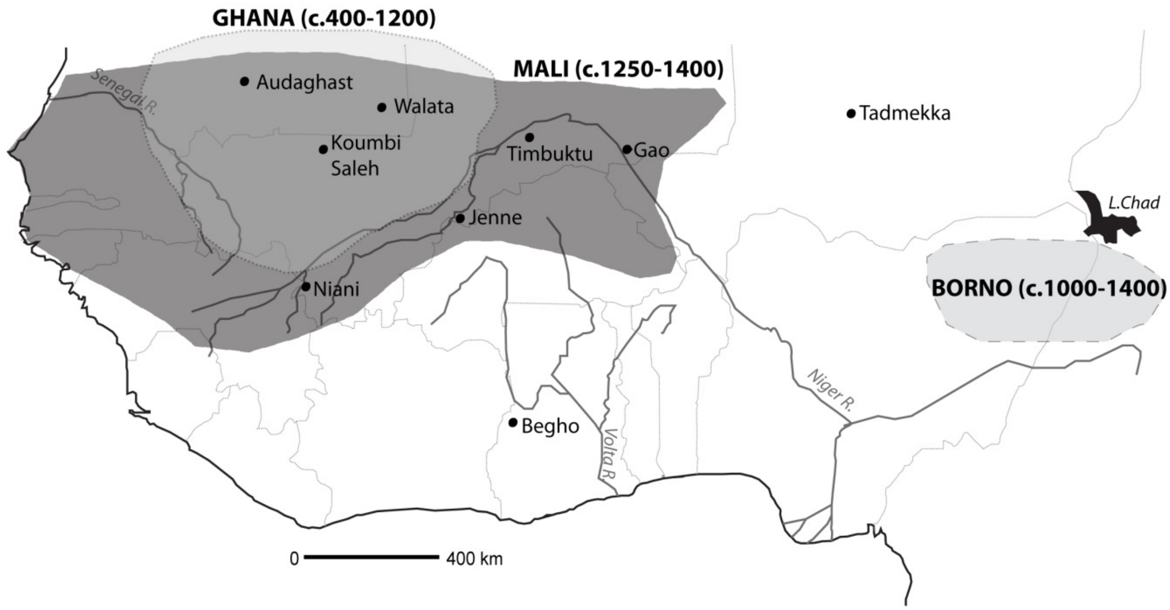


FIGURE 4.1: West African empires and entrepôts before 1450

Both prior to and after the arrival of Arab merchants, large African trading empires expanded in the interior Sahel and Sudanian zones (Fig. 4.1). Here I present brief sketches of these polities, which were potential end-of-the-line trading partners, or at least influenced trade, at the time of Banda's occupation. These political entities sought to control the valuable trade between southern and northern parts of West Africa and ultimately to regions further afield. Some have interpreted these political units as centralized governments (Davidson 1998), while others argue that urban entrepôts like Jenne-jeno instead show evidence of heterarchically arranged corporate groups (R. McIntosh 2005). The earliest documented trade empire was Ghana, located in southern Mauritania and Mali (Fig. 4.1). It existed from sometime in the early-mid first millennium to about 1200. The key exchange was in gold and salt. Salt was derived from mines in the Western Sahara, and gold from Bambuk on Senegal River and Bure on upper Niger, perhaps Lobe south of Jenné (Levtzion 1973).

The state of Mali (1235-1400/1433) was formed by Mande-speaking peoples in the vacuum left by the demise of Ghana, but Mali expanded well beyond its borders to control much of the West African Sahel and Sudan, including the trade centers of Timbuktu, Gao, and Jenne (Fig. 4.1). With Mali's ascendancy, the economic center of gravity shifted southwards into the savanna, to the goldfields at Bure and searches for sources even farther south, extending eventually into southern Ghana (Levtzion 1973: 132). Mali reached its height in the early 14th century, commanding vast trade networks that stretched far beyond those of ancient Ghana to control all of the internal trade routes that carried gold north to the trans-Saharan networks (Levtzion 1973: 133). Mali's rulers were fully converted to Islam, exemplified by the famous Malian king, Mansa Musa, who made the pilgrimage to Mecca in 1324. The gifts of gold he made in Cairo were of such large quantities that the gold market in Egypt collapsed and took over a decade to recover (Levtzion 1973: 134; Insoll 2003). Mali's capital was located at Niani, on the border of modern day Guinea and Mali, positioned where forest and savanna meet to take advantage of the valuable north-south trade. The purported site of the capital (still debated) appears to have had three quarters—one for merchants, another for royals, and a third for commoners (Insoll 2003: 320).

Songhai was a competing state that eventually succeeded Mali. Centered on Gao to the east, Songhai emerged as an independent state in the 15th century and lasted until the late 16thor early 17th century (see Fig. 5.1; Levtzion 1973). Trade in gold, slaves, grain, and kola nuts was important to Songhai political economy. Songhai conquered the important trading and learning centers of Timbuktu and Jenné during the second half of the 15th century, and by 1507 Jenné was a key entrepôt for goods from the forest zone and western Sudan through Dyula trade merchants. Songhai fell to a Moroccan invasion late in the 16th century and trade subsequently shifted eastwards (Insoll 2003; Levtzion 1973). As political power and the source of gold shifted, so too did the commercial centers and termini of the trans-Saharan networks. Audaghast and Koumbi Saleh were important in the early days of Ghana when gold that flowed to Morocco came primariliy from Bambuk,. They were eclipsed by Walata, which was the terminus for trans-Saharan caravans up to 1352. Walata in turn gave way to Timbuktu and Jenné, sometime before the 15th century as the gold trade shifted towards Bure and the Akan goldfields (Levtzion 1973: 139). Gao, occupied by the 6th century, was connected to its northern neighbor Tadmakka as termini of the eastern arm of the trans-Saharan trade to Algeria and Egypt (Insoll 2000; Levztion 1973: 144). Power over these commercial nodes shifted as they came under the political control of the various trading empires.

Products and Practices

It is important to separate the movement of goods from that of people and ideas. Trans-Saharan trade has long been associated with the spread of Islam, and in many instances, such as the kingdom of Mali, the association holds. Arab and later Mande (Wangara) Muslim merchants were key agents in the expansion and operation of these vast trade networks (Insoll 2003: 331,333). However, not only were there many non-Muslim groups involved in the trade, but regions connected to trade networks in different ways or in some cases avoided them altogether. Interactions thus ranged from instances of full-scale cultural contact and religious conversion to down-the-line trade partners to pirates and resisters. Equally important is that as goods moved through trade networks we should anticipate that they would have acquired new uses and meanings. Unfortunately, we are reliant on records from foreign merchants who lived in and travelled between political and trade centers, with little familiarity of the many 'edges' that supplied and participated in this trade. As with later colonial encounters, understanding how new objects and goods were valued locally is an important avenue of inquiry that speaks to processes of culture-making in these 'edge' areas. A related question is how local people adapted processes of craft and food practices to engage in surplus production for export. By tracing the flows of trade goods I hope to better understand some the networks through which new foods may have traveled.

The first separation that can be made is between goods from within Africa and those from areas farther afield. Those goods produced and traded within Africa may have been part of continental flows before the arrival of Arab merchants, and may have been valued before the development of trans-Saharan networks. Goods that moved from forest and savanna to the Sahel and further afield included gold, ivory, kola nuts, slaves, hides, spices, and civet musk. Gold was in high demand particularly in Arab and European worlds to convert into currency, and was also desired by West African kings and elites. Before the discovery of the Americas, West Africa was the principal source of gold for both the Muslim world and Europe (Levtzion 1973: 148-149).

Most of West Africa's gold fields are concentrated in savanna and forest regions, particularly in southern Senegal (Bambuk), the Upper Niger (Bure), and southern Ghana (Akan or Adanse) (Fig. 4.4). Trade from the Bambuk fields may have started as early as the mid-first millennium (Garrard 1980: 3; Gokee 2012). Exploitation of the more dispersed alluvial Akan goldfields began somewhat later (Insoll 2003: 317; Posnansky 1973). The shift towards exploitation of Akan gold beginning in the 14th century had a major impact on what is today south and central Ghana, including the emergence of trading centers like Begho along the forest fringes. These gateways to the forest marked the boundary where animal caravans were precluded by both tsetse fly, vector of trypanosomiasis (sleeping sickness), and dense forest vegetation (Insoll 2003: 333; Stahl 1994: 84).

Ivory has been an export since at least the end of the first millennium in both finished and raw form, and remained an important trade good well into the colonial era (Insoll 1995, 1997; Stahl and Stahl 2004). In Africa, ivory comes from the tusks of both elephants and hippos, animals that in the period after the early centuries AD exclusively inhabited areas south of the Sahel, meaning that trade between zones was necessary to acquire ivory to sell to agents farther afield (Insoll 1995, 1997; Stahl and Stahl 2004).

Kola distribution is restricted to certain areas in the forest zone. The kola nut was highly desired throughout West Africa as a stimulant that suppresses thirst. Unlike many of the other long-distance trade commodities, most kola was consumed within the African savanna and Sahel; in other words, the desire was generated internally, not internationally (this may be related to the short-shelf life of the fresh nuts). The strong local and regional desire for kola nuts may explain why its trade remained important long after the decline of the gold trade, and well into the Atlantic and colonial periods. An important source of kola nuts was central and southern Ghana, the only place in West Africa where both gold and kola are found in abundance (Levtzion 1973: 180-182).

What did inhabitants south of the Sahel want for their gold, kola, and ivory? Chief among desired imports were salt and copper, whose trade likely predated the arrival of Arab merchants. Salt was much valued in ancient West Africa, being traded at times for an equivalent weight in gold. It derived from three main sources in West Africa: the ocean, certain plants, and Saharan salt mines. Saharan salt was particularly valued for it transported and kept well, unlike the more accessible sea salt. Salt was transported in blocks cut from Saharan salt mines on the backs of camels to trading centers. The distances involved were large and conditions difficult, explaining in part why salt fetched a high price at market. Salt merchants sold their cargo in trade centers like Timbuktu, where it was loaded onto canoes for transport down the Niger River to trade centers such as Jenné. There, blocks were broken up for transport on the heads of porters, who delivered it to the gold lands further south. The same porters returned with head loads of gold (Levtzion 1973: 171-172). It was upon these two commodities that the trading empire of Ghana developed in the early/mid first millennium (Insoll 2003; Levtzion 1973).

Copper, the 'red gold of Africa' (Herbert 1984), has long been a valued exchange commodity in West Africa, perhaps extending back to c. 1500 b.c. (Childs and Herbert 2005: 279), and becoming part of the trans-Saharan trade in the mid-first millennium AD (McIntosh and McIntosh 1980). Like gold, copper sources were restricted in their distribution, occurring in the southern Sahara (Mauritania, Mali, and Niger), eastern Nigeria and North Africa (Childs and Herbert 1984: 113-115; 2005: 281-282). In other regions and at various times in the trans-Saharan trade, slaves were an important commodity. Slaves were used to mine salt in Saharan mines and to head load gold and other goods to trading centers in the Niger bend. There was also demand for slaves abroad, in the Maghreb and Europe at least as early as the 11th and 12th centuries (Levtzion 1973: 175-177). It is difficult to estimate the volume of this trade, but Lovejoy (2011: 25) provides a range of 3.5 to 10 million people from 650-1600.

Trade in salt, gold, and slaves brought new goods and created new desires for things from afar, including cloth, beads, horses, manufactured goods, and silver (Levtzion

1973). The introduction of cotton cloth had particularly important ramifications. The arrival of cotton is associated with Arab merchants in both documentary and archaeological sources (Nixon et al. 2011; Murray 2005; Levtzion 1973: 179). Cotton and cloth were soon produced locally, with trading centers like Jenné and Timbuktu containing large quantities of weavers (Levtzion 1973: 179). Despite this local production, there was still demand for imported cloths from Morocco, Europe, Asia, and the Middle East.

Beads made out of stone, coral, and glass were highly valued as adornment and currency (Levtzion 1973: 180; also DeCorse et al. 2003; Magnavita 2003). Many beads came from great distances, such as carnelian from India (Insoll et al. 2004). Their ubiquity across archaeological sites suggests that tastes and desires for them was very wide ranging. Other goods like horses were restricted to the ruling elite or specific subsets of the population, such as soldiers (Levtzion 1973: 177-178). Trade in horses likely predates the arrival of Islamic merchants. They were highly desired for raiding and warfare, whose captives were often sold into slavery, in exchange again for things like horses (Insoll 2003: 299; Levtzion 1973: 178).

While prestige goods beyond the reach of many have been emphasized here, it is important to note that other kinds of goods, including iron and pottery, were also frequently exchanged in regional and sometimes extra-regional networks (e.g., iron bars in Senegal, Brooks 1993). These networks may have had a much more central role in the lives of most West Africans—as both producers and consumers—than long-distance trade relations (Stahl 2001: 83, 87). Crops and wild plants were also significant in the Niger trade, including kola nut, shea butter, sorghum, millet, rice, and wheat (discussed below; Levtzion 1973: 181-182; Mitchell 2005: 13-14). Similar to luxury goods, there was a geographic dimension to these goods; not all areas could support the high fuel demands of iron working (cf. Goucher 1981), and many areas, especially those along the Saharan margins, could not support agriculture on any scale. Since many of the trading empires discussed earlier were positioned in dry environments, trade in agricultural goods was critical to their survival. The infrastructure of these states depended on agricultural products obtained through taxation, including pearl millet, sorghum, rice, fonio, and cloth (Levtzion 1973; Lovejoy 1985). However, unlike precious commodities, the trade and distribution of these goods was probably under less political control, and may have occurred at several scales from local to regional to extra-regional. As different regions were brought into long-distance trade networks, there may have been increased pressure to produce or mine specialist goods (such as iron, pottery, and copper alloys), decreasing available farm labor. Whether or not this contributed to changes in agriculture towards surplus production is unknown, and will be evaluated to the degree possible in Banda (below). For now, I turn to the food plants that dominated West African landscapes and palates before 1450.

Food plants and the emergence of Niger and trans-Saharan trade

Here I consider the adoption and spread of plant foods and food preparation techniques throughout the Niger Bend region and trans-Saharan trade networks and continuity and change in local diets. The distribution of different plant foods based on both archaeological and documentary sources throughout West Africa before 1450 is summarized in Figure 4.2 and Table 4.1. These data are superimposed on approximate outlines of the major empires that arose during this time. As it is likely that Banda was connected to some of these areas through long-distance trade networks at least by 1450, it can be hypothesized that Banda's inhabitants may have had access to or knowledge of some of the crops from these areas, whether or not they chose to adopt them.

I rely on Lewicki's (1974) book that compiled all available Arabic source material on African food into an English volume.[2] The strength of Lewicki's volume is in its accessibility and critical evaluation of taxa. It must be remembered that these sources were written mostly by Arab outsiders, some of whom were unfamiliar with the specificities of African crops (at least in a botanical sense), and thus assigned them general or erroneous names at times. For my purposes, the weakness is that the sources

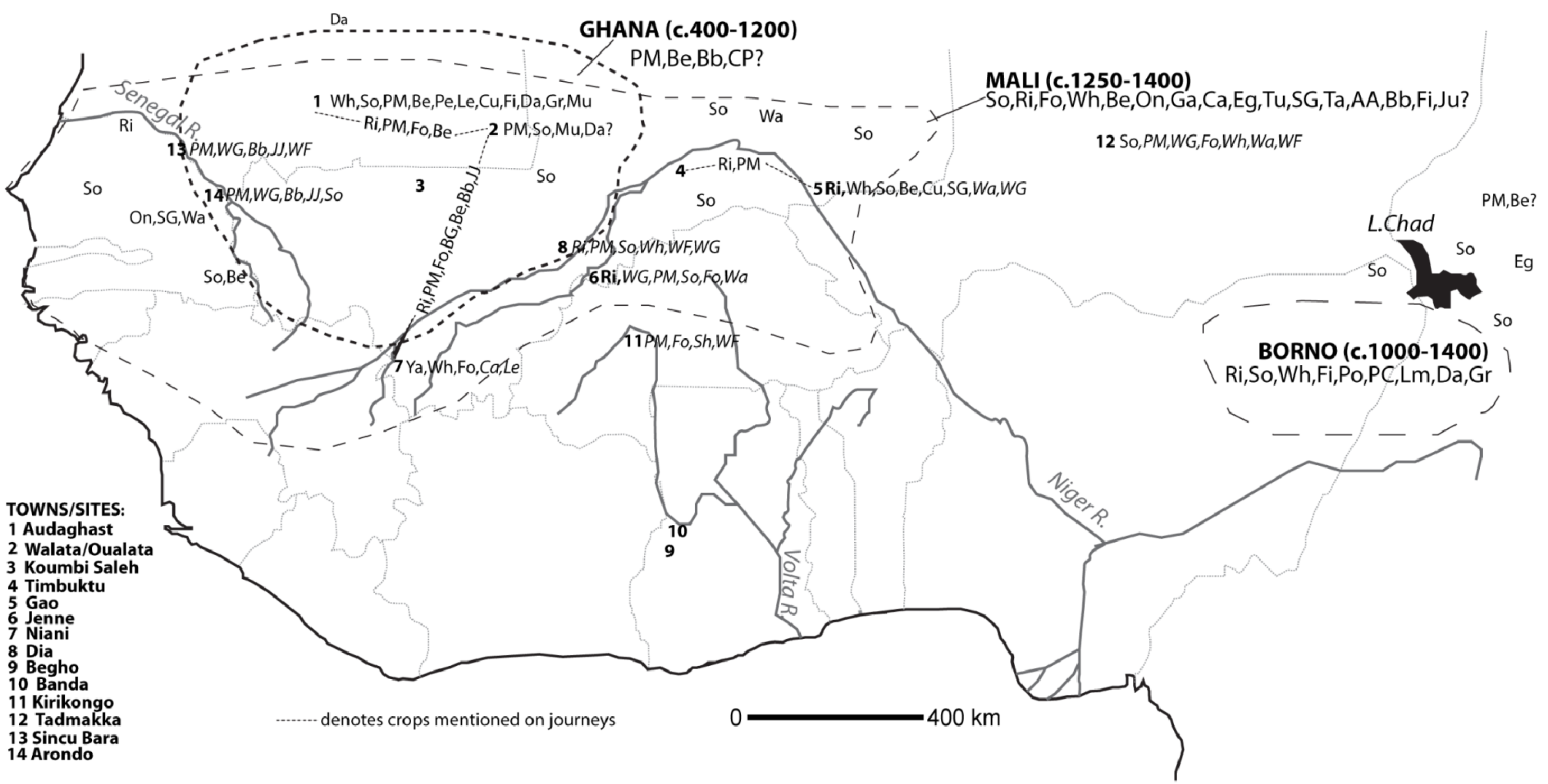
[2] Ultimately it would be beneficial to examine the original Arab accounts; Lewicki (1974) suffices to provide a general idea of timing and location of certain crops, not a detailed analysis of happenings in the Sahel/Sudan, which lie outside of my primary research area.

are restricted to areas visited by Arabs, which does not include the southern, wetter portion of West Africa. An additional weakness inheres in the nature of the sources themselves, which were mostly written by merchants and others interested in economic activities or religious conversion; they are thus are incomplete records of the variability in foodways or female activities like cooking. Finally, many authors referred to works of earlier scholars, sometimes centuries earlier, and used the same information; this makes observation of chronological difference or change difficult.

TABLE 4.1: Distribution of grains in West African towns before 1450

Site/Town	Pearl millet		Sorghum		Rice		Wheat		Fonio	
	0-1000	1000-1450	0-1000	1000-1450	0-1000	1000-1450	0-1000	1000-1450	0-1000	1000-1450
Arondo	X		X							
Audaghast	X	X	X	X			X			
Dia	X	X	X	X	X	X	X	X		
Gao		X		X		X		X		
Jenne	X	X	X	X	X	X			X	X
Kirikongo	X	X?	?	?					X	X
Niani								X		X
Saouga	X	X								
Sincu Bara	X									
Tadmakka	X	X					X	X		X
Walata	X?	X	X?	X						
Borno Empire				X		X		X		
Ghana Empire	X	X								
Mali Empire				X		X		X		X
Senegal/Takrur				X						

Sources: Bocoum and McIntosh 2002; Dueppen 2008; Fuller 2000; Gallagher 1999; Kahlheber 1999; Lewicki 1974; McIntosh 1995a; McIntosh and McIntosh 1979; Murray 2005, 2008; Neumann et al. 1998; Nixon et al. 2011)
Bold indicates archaeological sites where flotation was used, i.e. a reasonable sample was obtained



KEY TO FOOD PLANTS (Normal=Arabic source; *Italics=Archaeological find*; **Bold=Both sources**):

AA=Akee Apple	Ca=Cabbage	Fi=Ficus trees	Le=Lentils	Pe=Peas	So=Sorghum	WF=Wild fruits
Ba=Barley	CP=Chickpea	Ga=Garlic	Lm=Lemon	PM=Pearl millet	Ta=Tamarind	WG=Wild grasses
Bb=Baobab	Cu=Cucumber	Gr=Grapes	Mu=Mushroom	Po=Pomegranate	Tu=Turnip	Ya=Yams
Be=Beans	Da=Dates	JJ=Jujube	On=Onion	Ri=Rice	Wa=Watermelon	
BG=Bambara groundnuts	Eg=Eggplant	Ju=Jute	PC=Peaches	SG=Squash/Gourd	Wh=Wheat	
				Sh=Shea butter		

FIGURE 4.2: Distribution of plants across West Africa before 1450 from Arab and archaeological sources (Lewicki 1974 and see text)

With several notable exceptions, there is little available archaeobotanical data relating to this period. Exceptions include reports of plant remains from several of the major trade centers (Jenné, Dia, Gao, Tadmakka) These data have greater potential to speak to everyday and non-elite activities, the prevalence and importance of particular species and to change over time than do Arab documentary sources. However, given the paucity of archaeology (and archaeobotany) at sites outside of the major urban centers, it remains difficult to disentangle what folks living in rural areas were producing and consuming (Neumann et al. 1998: 58).

Distribution of food plants before 1450

In this section, I describe the documentary and archaeological evidence for plant foods moving from the westernmost portions of West Africa (i.e., Senegambia) to work eastward to modern day Nigeria.

Pearl millet and beans (presumably cowpea) are mentioned as staples of the empire of Ghana as early as the 9th and 10th centuries. This is not surprising as both were domesticated and cultivated in West Africa millennia earlier (i.e., Amblard 1989; D'Andrea et al. 2001; D'Andrea et al. 2007; Manning et al. 2011). Pearl millet is also mentioned in 12th-14th century accounts as being grown in Senegambia, and consumed at the northern trade towns of Audaghast and Walata, where it was probably imported (Lewicki 1974: 27).

Rice seems to have increased in importance over time, as well as expanded eastward. For example, rice is not mentioned in early reports of the Ghana Empire, but its cultivation is reported in the Senegal River valley later (Lewicki 1974: 35). This is supported by recent archaeobotanical analysis at Sincu Bara, a central Senegal Valley site occupied from about cal. AD 388-990 (Bocoum and McIntosh 2002: 89). At this early date, no evidence for rice was recovered; instead pearl millet and wild grasses dominated, supplemented by tree and shrub fruits such as baobab, jujube (*Ziziphus*), and *Vitex* (Murray 2008: 58). Arondo, a contemporaneous site down river from Sincu Bara near the confluence with the Falemme, was also dominated by pearl millet and wild grasses. These were supplemented by tree and shrub fruits like baobab and jujube, with small quantities of sorghum recovered (Gallagher 1999). Finally, at Culabel, just upriver from Sincu Bara, pearl millet, fonio, and a wild *Panicum* grass dominated; smaller numbers of other wild grasses, jujube, and small Fabaceae seeds were recovered (Murray et al. 2007). These sites all date to the time of the Ghana Empire, and substantiate Arab records that millet (and probably not much sorghum) was grown at this time. However, currently there are no archaeobotanical records of the period immediately following from the Senegal River valley, so it is difficult to evaluate the timing of sorghum and rice adoption into the region. Archaeobotanical analysis currently underway at the site of Diouboye on the Falemme River will help address this question (Gokee 2011 pers. comm.). Results from sites in the Gambia that date between 400-1500 indicate the presence of pearl millet in almost every sample and a single occurrence of rice alongside weedy grasses and wild fruits (Gallagher 2004). Might this represent the early adoption of rice in Senegambia? Without further samples and tighter chronological control it is difficult to know, but the results are suggestive.

Arab sources suggest that sorghum was a part of the diet from what is today Senegambia to Audaghast from at least the 11th to first half of the 14th centuries. Archaeobotanical studies in Senegambia generally confirm the absence of sorghum in the first millennium (above). The cultivation of sorghum on any scale may not have been possible in far northern outposts such as Walata and Audaghast (Lewicki 1974: 30). Lewicki (1974: 30) reasons that these towns must have imported sorghum from wetter areas, though one source does mention its cultivation around Walata. One could hypothesize that sorghum cultivated in Senegambia and southwestern Mali may have been traded into areas on the fringes of the Sahara.

While wheat was not consumed in Senegal as of 1154, it was in Audaghast as early as the 10th century. But it seems to have remained something of a rarity; even in 1318, Watwat remarked that only princes in Audaghast ate wheat, while their subjects ate sorghum. While cultivation was recorded in Audaghast, given that wheat was ill-suited to the extremely arid conditions, the yield was probably insufficient to meet demand, and sources also note its import from the north (Lewicki 1974: 39). Even today, wheat remains a widely but thinly scattered commodity throughout much of West Africa, as I detail below.

Moving eastwards, the site of Dia is located in the inland Niger Delta close to Jenné. According to documentary and oral evidence, Dia was not a commercial entrepôt but a center of agriculture, herding, and learning (Murray 2005). The settlement reached its zenith between 1000-1600. Murray's (2005) analysis of over 500 flotation samples provides a rich dataset on agriculture and plant use that is rare for this period. The sequence at the Shoma mound is dominated by rice (at around 40% of the assemblage), augmented by handful of pearl millet grains until the late first millennium/early second millennium, when other domesticated grasses including pearl millet, sorghum, and free-threshing wheat (*Triticum aestivum/durum*) began to appear. The first occurrence of pearl millet, sorghum, wheat and cotton, in small amounts, is associated with Phase II, 500-1000. Wheat is rare, with only four grains represented, and is directly dated to AD 990 ± 189, representing one of the earliest archaeological occurrences in West Africa. Common fruits throughout the sequence are *Vitex*, *Grewia*, doum palm, and jujube (Murray 2005: 258).

Phase IV (1000-1400) contexts at the site of Shoma are characterized by an increase in the abundance and diversity of wild grass grains (Murray 2005: 155). African rice makes up 94% of the domesticated grain assemblage. Tree and shrub fruits form an important part of the assemblage, at 48% overall, dominated by *Gossypium*, which was present in large quantities. Both sedges and herbaceous plants also reached their highest diversity at this time (Murray 2005: 156).

A different assemblage is observed at the neighboring site of Mara during the same period (1000-1400). Rice occurs much more rarely (11% of assemblage), and pearl millet instead dominates at 40% of the assemblage. A few grains of sorghum and wheat are also present. Wild grasses make up 19% of assemblage, with 18 different taxa represented. As at Shoma, tree and shrub fruits are present in large amounts (49% of the assemblage), and similar species are represented (Murray 2005: 157). Other forms of archaeological evidence (burials, pottery, artifacts, bones), along with these plant data, suggest to Murray that an immigrant population may have settled at Mara (Murray 2005: 268). In other words, this may be evidence for an early division of people into rice vs. millet eaters that is well known from later times (e.g., Osseo-Asare 2005).

Jenné, in the extreme southeast of modern day Mali, is famous as an entrepôt in the Niger and trans-Saharan trades and a source of evidence for the emergence of pre-Islamic urbanism. From a food perspective, this site is important as a substantial producer of surplus agricultural goods. R. McIntosh (2005:1) describes Jenne as having "dominion over the granary of West Africa, the Niger River's vast interior floodplain that, at its heyday, covered more than 170,000 square kilometers…[c]ompared to Pharaoh's 34,000 square kilometers and the maximum cultivable 51,000 square kilometers of Mesopotamia…" Surplus agricultural production at Jenné was on a scale sufficient to feed settled populations at other distant Saharan trade towns, including Timbuktu, Es-souk, and Walata (McIntosh and McIntosh 1979: 228). The seasonal flooding of the Inland Niger Delta enables both the cultivation of rice before the waters rise, the cultivation of various *décrue* crops, including sorghum and millet, to be planted as the floodwaters recede (Harlan et al. 1976). African rice (*Oryza glaberrima*) was most likely domesticated in the region, and was the most important staple grain of Jenné (McIntosh and McIntosh 1979).

The old town of Jenne-jeno has seen extensive archaeological excavation, including flotation and analysis of 126 samples (S. McIntosh 1995a: 348; R. McIntosh 2005; McIntosh and McIntosh 1979, 1981).[3] Overall, the assemblage is dominated by a wild grass (*Bracharia racemosa*), African rice, and sedges, some of which were probably weeds of rice fields. The ubiquity of *Bracharia* (in 88% of samples)[4] suggests it was more than just a weed; today it is collected in the region as food on a large-scale along

[3] Samples taken were large, especially for African contexts, at 10 liters. All were taken from nonstructural contexts, including occupation floors, areas outside houses, pits, hearths, funerary urns, etc. Identifications made by Jack Harlan and Yossouf Bare and Abdoulaye Sow of ICRISAT Mali (McIntosh 1995a: 348).
[4] I have calculated these ubiquity measures from S. McIntosh's data tables (1995a: 349-350). Ubiquities are probably slightly overestimated, as she lumps multiple samples of the same contexts together (i.e., 3 samples from Level 24), and reports the data this way. Since it is impossible to know how many of these lumped samples the taxon was derived, I just counted it as one sample. Data are reported as presence/absence; seed counts are not reported.

with several other wild grasses. In other words, it was and is used not just as a famine food but as an everyday food. Both domesticated (*Oryza glaberrima*) and wild (*O. barthii*) rice are commonly present (in 64% of samples) in Jenne-jeno samples. The presence of the wild variety is not surprising as it is a frequent mimetic in rice fields today. Pearl millet, sorghum, fonio, and watermelon are also present, but in small quantities, at 12%, 8%, and 4% presence respectively. Purselane (*Portulaca* sp.), a wild edible green eaten today in West Africa and around the world, is also found. These data show that rice, millet, and sorghum were present alongside wild grasses from the very beginning of the sequence (c. 180 BC-AD 400), suggesting fully developed agricultural strategies suited to the Inland Niger Delta at the founding of Jenné. Additionally, the assemblage is remarkably local, with no evidence for trade plants (depending on how one interprets the two seeds of watermelon, see below). In fact, all taxa recovered can be grown within the immediate vicinity, suggesting that Jenné indeed was self-sufficient and probably a producer of agricultural surplus (McIntosh 1995a: 351-353).

Between Jenné and Gao lie two sites in Burkina Faso of interest: Kirikongo and Saouga. Kirikongo, the focus of recent excavations by Dueppen (2008, 2011b), was occupied between 100 and 1450 (and later), and is located in southeastern Burkina Faso on the Mohoun River bend. The Mohoun River is the northwestern arm of the Black Volta, thus occupants of Kirikongo were located in the same drainage system as Banda. Analysis of a subsample of botanical remains by Gallagher indicates the presence of pearl millet and fonio, and a single occurrence of sorghum. Interestingly, pearl millet is found in the earlier part of the sequence (c. 100-1100), but not the later part. Fonio is found throughout the sequence. Tree fruits including shea butter shell and locust bean (*Parkia biglobosa*) were also recovered. Herbaceous weedy plants including *Ficus, Portulaca*, and *Sida,* among others, were also identified (Dueppen 2008: 244-247).

Saouga, a town on the periphery of the empires of Ghana, Mali, and Songhai, was occupied from the 9th to 16th centuries. Cultivated plants included pearl millet and legumes, with the former present in all layers. There was very little evidence of wild grasses, suggesting that pearl millet was a focus of subsistence activities. Other taxa recovered included several species of edible wild fruits (baobab, *Celtis integrifolia*, *Diospyros mespiliformis*, *Grewia* sp., *Schlerocarya birrea*, *Vitex* sp., and *Ziziphus* sp.), alongside shea butter shell. There is no clear evidence for trade in plants (Neumann et al. 1998: 59,74; see also Kahlheber 1999).

Further north and west, along the Niger River is Gao, capital of the Songhai empire, which was founded in the 7th century and reached its height in the 15th and early 16th centuries (Insoll 1996, 2000). The parts of the archaeological site of Gao excavated and reported on here focus on the early part of the sequence between 700-1400. Plant remains were examined by Fuller (2000); unfortunately flotation was not used at the site, so the remains are limited to those hand-picked over the course of excavation, and thus are not representative. Taxa recovered include African rice, pearl millet, date palm, doum palm, watermelon, cotton, *Balanites aegyptica*, and *Ziziphus* (Fuller 2000: 28-29). The presence of date palm and cotton provide the best evidence of trade relations, as they are not African cultivars. While there are clear indicators of the exotic, Maclean and Insoll (2003) do not see any evidence for class-based food distinctions (i.e., luxury foods). Dates, for example, while exotic, today range in quality from those fed to animals to those fed to royals (Maclean and Insoll 2003: 563). Fortunately, Arabic sources add breadth to knowledge of food practices at Gao. Fourteenth-century authors note that wheat was growing nearby, and sorghum was available and was consumed as a drink (Lewicki 1974: 23, 31,40). Rice was also available in abundance in Gao (Lewicki 1974: 36). Bread of some form was eaten in the 16th century (Lewicki 1974: 85), and perhaps earlier.

More specific information is available from the recently excavated trade center of Tadmakka, to the northeast of Gao along the very arid northern edge of the Sahel (Nixon 2009). Occupation at Tadmakka began before 750 and persisted until 1400, and again in the 19th century. Before 750 the only cereal present was pearl millet, which continued to be used until 1100 and then dropped off in later phases. Possible fonio (*Digitaria* sp.) was present from 1100-1300. *Echinochloa*, a wild utilized grass, was present in large quantities from 750 onwards, along with other wild grasses including *Bracharia/Setaria*, as well as small quantities of *Panicum* (Nixon et al. 2011: 228-230). Free-threshing wheat (*Triticum durum/aestivum*) was found in levels dating from 750-1400, which makes it the first pre-Islamic wheat occurrence in sub-Saharan Africa. While sorghum grains were not recovered, sorghum chaff does seem to have been used as pottery temper, mainly from 1100-1300, on pots imported from the Niger Bend. This of course does not attest to sorghum consumption at Tadmakka. Small legumes that could indicate foddering are also present. *Ziziphus* fruits are present earlier but all other fruits, including watermelon, date, and balanos (*Balanites aegyptica*) are found only in the late period (1300-1400) (Nixon et al 2011: 233).

Watermelon, though initially from Africa, was probably consumed for its oily seeds and cooked rind, as its juicy flesh was not palatable until the development of improved varieties (Watson 1983; Murray 2000). Such varieties may have been re-introduced during the Iron Age (Pelling 2005, 2008) and may have spread widely during the early Islamic period (Nixon et al. 2011: 233; Watson 1983). Dates reached the Sahel early as part of the Islamic trade, with finds from Niger dating as early as the 7^{th}-9^{th} centuries. A small number of cotton seeds were found in the phase dating from 1100-1300, with one flax seed also present from 1300-1400 (Nixon et al. 2011: 233). The authors suggest that the few cotton seeds were probably from importing raw cotton for local spinning, as cultivation would be unlikely in the dry Tadmakka environs. The seeds were probably impurities in imported raw cotton that had been grown and ginned in another locale. Although there is a wild African cotton (*Gossypium herbaceum*) (Wendel 1995), *G. arboreum* is a domesticate from Pakistan (Zohary and Hopf 2000: 134). While so far none of the West Africa specimens has been identified to species, because cotton has not been found to predate Islamic contexts, it is most likely the domesticated variety (Fuller 2007; Murray 2007). Flax was also probably an import (Nixon et al. 2011: 234-235).

Patterns and distinctions in food, trade, and identity before 1450

The evidence reviewed above suggests several trends in the distribution of crop plants from roughly 500 to 1450. First, there are spatial and temporal differences in the dominant grain crop across the sub-region. While several grains were used, including pearl millet, rice, sorghum, fonio, wheat, and wild grasses, there appears to be a division between millet and rice eaters. Rice eaters were concentrated along the Niger River and into northeastern Nigeria, whereas millet eaters dominated other regions (Fig. 4.3). While this in part delineates the extent of environments well-suited to African rice cultivation (particularly *décrue* techniques), it is notable that in later times rice cultivation expanded, particularly into Senegambia, among other regions (it is cultivated in Ghana today). While not hard and fast, this seems to represent a diffuse social and culinary boundary.

On the other hand, both fonio and sorghum were used throughout the sub-region from Senegambia to Lake Chad (Figure 4.2, above). This is one area where comparison of Arab and archaeological sources is illuminating. Fonio is only very rarely mentioned in Arab accounts, while references to sorghum are common. The archaeological record suggests that though the distribution of sorghum is wide, it occurs in only limited quantities. By contrast fonio, once thought rare, appears at nearly every archaeological site in the Sahel and savanna where proper recovery methods have been instituted, a surprising result given the exceptionally small size of the seed and difficulty of identification. In other words, fonio is surely under-identified and under-preserved in archaeological sites compared to millet or sorghum.

The low quantities of sorghum present versus much higher recovery of rice or millet may also indicate different preparations were used for these grains. One possibility is that sorghum was ground and then made into liquid, flatbread, or porridge-type foods, while millet and rice were steamed or boiled whole, preparations that would have favored accidental charring. Rice and millet are today still prepared by boiling and steaming, though millet is commonly ground and prepared into porridge-like substances as well. Might millet have been steamed and boiled more in the past? Or was it also ground into flour and used to make porridge-type foods? Did these preparation techniques vary over time and space? Interestingly, Arabic sources rarely mention porridge, but instead highlight drink preparations, steaming (i.e., couscous), and flatbreads (Lewicki 1974: 31, 113-114; Maclean and Insoll 1999: 85). However, one must remember that culinary descriptions were not a priority for Arab merchant scholars, who may have been inclined to note only familiar food preparations like bread or couscous.

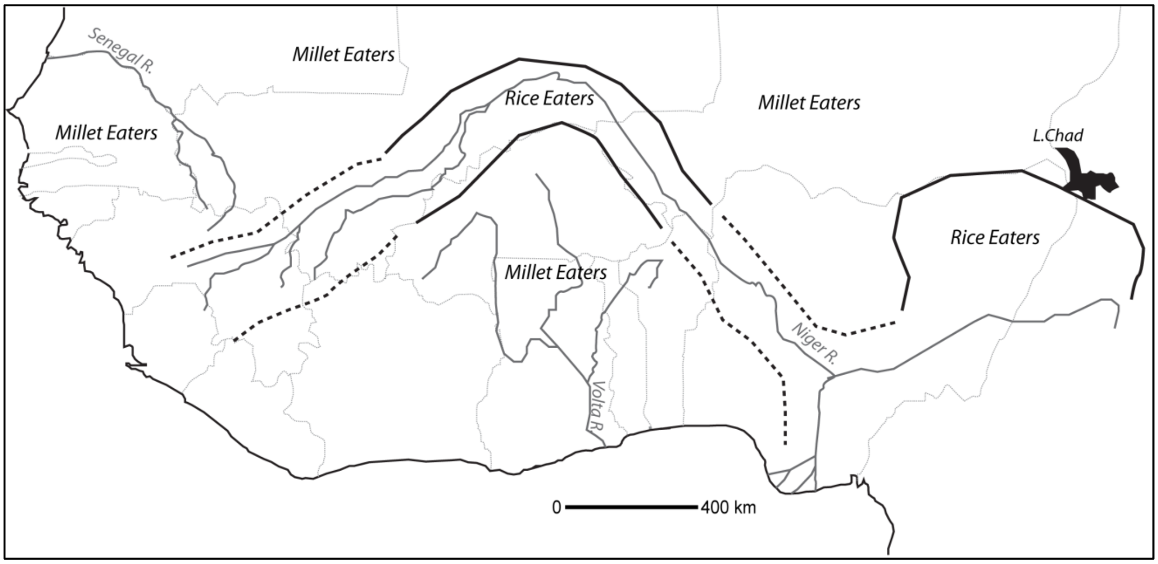


FIGURE 4.3: Regional variation in dominant staple crop before 1450 based on data presented above (see Table 4.1)

Both pottery forms and grinding stones may help address food preparation techniques. Two studies attempt to address questions of food preparation using these data sources. At Gao, Maclean and Insoll (1999) argue that the presence of cooking pots and *couscousières* (colander/steamer) suggest a cuisine focused on wet-cooking activities such as boiling and steaming. They do not mention grinding stones, and wooden mortars do not preserve, so it is hard to tell whether or not porridges were made from flour. There is one textual record of porridge made of sorghum at Augham, in between Koumbi Saleh and Timbuktu (Lewicki 1974: 31).[5]

[5] The word Lewicki (1974: 146) translates as porridge is *^{c}aysh*, which he notes "is now used by the Arabs primarily for bread (cf. Wahrmund, Handworterbuch, II, 330), and in Morocco especially for flat pancake-like bread made from barley flour…Sometimes the word is used in the Sahara for couscous."

McIntosh (1995c) conducted a detailed chronological analysis of pottery forms in order to trace changes in culinary techniques at Jenne-jeno. Her study showed a contrast between the preponderance of shallow, small volume bowls and low representation of small cooking pots between 400 BC-AD 500 and the subsequent (AD 500-1500) assemblage that was dominated by wide mouth cooking pots. Wide mouth cooking pots and steamers are rare in the earliest phases, though sandstone grinders, for flour milling, are common; during this phase, the dominant food preparation technology may have been preparation of grains into unleavened pancake-like flatbreads. In the later phase, in addition to the prevalence of wide mouth cooking pots, McIntosh notes the appearance of carinated (easy-grip) vessels, pot lids, and large serving vessels. Coupled with a decrease in sandstone grinders, this may indicate a reorganization of kitchen technologies to be more time-saving, where foodways shifted away from the laborious preparation of breads, to cooking of large quantities of whole or cracked grains and soups.[6] She interprets this as a shift from baking of grains into unleavened, pancake-like bread in earlier phases to a focus on boiling and steaming of grains and preparation of sauces in later ones, similar to modern food preparation (McIntosh 1995c: 157-161; McIntosh and McIntosh 1995: 60).

McIntosh's analysis suggests that preparation of wet foods may have been common in the area by the latter half of the first millennium, though this was not necessarily porridge, which would have also required laborious pounding or grinding. McIntosh makes an important point in regards to increasing efficiency in the kitchen: the adoption of new cooking strategies and technologies is closely associated with shifts in women's labor in many parts of the world. Such shifts may have also had a major impact on the preservation of botanical materials. A concentration on flatbreads, which would have likely been made of millet and/or sorghum,[7] would have left little in the way of charred seeds (a similar problem exists in Ethiopia with the preparation of indigenous vs. Near Eastern grains: Lyons and D'Andrea 2003), especially compared with steaming and

[6] The term 'soup' is used here, and presumably by McIntosh, to indicate the liquid stews that often accompany a starch in modern West African cuisines.

[7] This leads me to speculate what kinds of Eastern African or Saharan preparation techniques may have diffused with sorghum to West Africa; bread making may be one of them, if McIntosh's argument is correct.

boiling whole grains. This may account in part for the differential representation of rice (which was likely boiled or steamed) and millet/sorghum at Jenné and Gao.

The differential representation of sorghum in the archaeological record compared to Arabic records may also speak to the primary consumers of this grain and its relatively late adoption compared to pearl millet. Pearl millet, as mentioned above, has been cultivated in West Africa for at least 4000 years; sorghum was likely domesticated farther east, and does not appear to have reached West Africa until considerably later (e.g., its occurrence in Jenne-jeno at c. 180 BC-AD 400). This hints that sorghum may have dispersed via the Niger River and from there spread outward, though this pattern may well be an artifact of sampling. It is interesting, however, that it does not appear in well-sampled Senegambian archaeological sites until about 1000, and is not mentioned as occurring in the Ghana Empire. Its first mention in Senegal is by Al-Bakri in 1068. At the same time and perhaps as early as 996, it was considered the main food of Audaghast, where it was very likely traded in (Lewicki 1974: 29-30). Its limited occurrence in archaeological sites might indicate minor use, as is common in early stages of food adoption.

Another (and not unrelated) argument can be made for the use of sorghum as a grain of commerce, which would explain both its frequent mention by Arab travelers and the low representation in archaeological locations, where people may have been producing it for export. One key advantage of sorghum over millet is that it can be used as fodder (Lewicki 1974: 31), which may have been critical for provisioning travelling caravans, and explain why Arab merchants made frequent note of the grain. Yet another possibility is that sorghum may have been more common in cities or among merchants and elite classes; it is rarely mentioned, for example, as occurring in the villages encountered between major trade centers, whereas pearl millet always is. One could hypothesize that pearl millet was the food of the masses, and sorghum a grain of commerce, though more evidence is needed to evaluate this scenario.

The arrival of Arab traders may have further stimulated an already existing trade in foodstuffs. This trade shifted grains from agriculturally productive areas, such as the

Inland Niger Delta, to less productive centers that were usually involved in the trans-Saharan trade, such as Audaghast and Timbuktu. Such trade was essential because many of the trade centers along the northern Sahel were too dry to cultivate foodstuffs in sufficient quantity to support their populations (surely even more so the case during arid periods). Both Arab and archaeological sources suggest that the area around Jenné produced a critical surplus of rice, which was traded down the Niger River. It is also reasonable to assume that the residents of rural hinterlands may have been engaged in trade of surplus agricultural produce; their voices are mostly silent in the historical record, but descriptions of journeys between urban centers by Arab merchants are suggestive. For example, villages between Timbuktu and Jenné produced rice, pearl millet, sorghum, and watermelon; of these, sorghum at least was obtainable in quantity (Fig. 4.2; Lewicki 1974: 31). Villages between Audaghast and Walata produced rice, pearl millet, fonio, and beans. From Walata to Niani, several authors report rice, pearl millet, fonio, bambara groundnuts, beans (likely cowpea), baobab, and jujube (Fig. 4.2; Lewicki 1974). Interestingly, bambara groundnuts, baobab, and jujube are never mentioned as occurring in urban centers, but are common in Sahelian archaeological sites—perhaps they too were food of the rural areas. Trade in foodstuffs was required to support an increasingly urbanized and specialized labor force such as workers in gold and salt mines, as well as the many weavers and metalworkers. However, it is at present difficult to determine which regions engaged in this trade.

Arab sources also inform on practices of distinction and ethnic and elite tastes in medieval Africa. One can make the reasonable assumption that at least in urban centers, Arab travelers preferred to eat familiar foods and were interested in the commerce of those foods; they were also probably in closer contact with higher status locals. The clearest example of this is wheat, a crop that would have penetrated West Africa from northern Africa. The occurrence of wheat seems to be confined to places with a significant Arab merchant scholar presence, such as Gao and Dia, though wheat is curiously absent at Jenné. This limited distribution is not surprising as wheat cultivation would have been very difficult, especially along the northern edges of the Sahel. From several sources we learn that wheat was hand watered with buckets, and cultivated in inhospitable locales, even at Audaghast. This suggests a strong desire for wheat, at least by some. Consumption of wheat was limited to foreigners and the elite, being reserved for princes at Audaghast (Lewicki 1974: 39-41). It is not surprising then that wheat cultivation did not seem to penetrate farther south than the Niger River.

Arab travelers also encountered unfamiliar concepts of 'elite food'. Maclean and Insoll (2003: 565) relate the following instance of such cultural contact and differing concepts of luxury. During the mid-14th century, Ibn Battuta stayed in the capital of Mali, where the Sultan Mansa Sulayman held a feast in his honor. The Sultan sent Ibn Battuta a gift, which he describes here:

> I got up, thinking that it would be robes of honour and money, but behold! it was three loaves of bread and a piece of beef friend in *gharti* [shea butter] and a gourd containing yoghourt. When I saw it I laughed, and was long astonished at their feeble intellect and their respect for mean things.

Ibn Battuta was clearly operating with a different cultural conception of distinction. Recall Goody's (1982) examination of African cuisine, which he describes as 'undifferentiated' compared to Europe and its *haute cuisine*. He attributes this difference to the more homogenized social structure of African cultures, conditions that would place value on the quantity rather than quality of food (Maclean and Insoll 2003: 564; see also de Garine 1997).[8] While Ibn Battuta's vignette may be taken as evidence that this same concept of 'fine dining' existing in medieval times (as Maclean and Insoll 2003 suggest), one can hardly call a society with an absolute ruler socially homogenized. And the presentation of not one or two, but three loaves of bread (which I assume to be wheat, as loaves would suggest gluten and rising dough), in a place and time when wheat was probably very precious indeed, was a gift of considerable, if local, value.

Wheat was not the only new food introduced and desired in West Africa at this time. The plant catalog listed in Figure 4.2 includes a number of fruits (dates, lemons,

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[8] Guyer (2004: 139-147), in comparing the finds of a Ghana Living Standards Survey completed in the early 90s and Polly Hill's (1957) work in southern Ghana, notes a remarkable similarity in how 'household' budgets are spent irregardless of income level. In other words, rich people and poor people spend relatively the same percentage of their income on food. This basic pattern may underlay Goody and Garine's observation that rich people tend to eat the same foods, but in larger quantity since they have more actual income.

pomegranates, grapes, peaches), spices (garlic, onion), and legumes (lentils, chickpeas), among others. Perhaps not unlike later British colonial officials who had the comforts of home growing in their vegetable gardens, Arab merchants also desired tastes of home. Enterprising locals may have produced oddities that appealed to certain foreign groups. It is difficult to know whether these new foods were desired as part of distinction-making practices and/or suited local tastes. Certainly many goods from afar were highly sought after by African princes and elites; this may have also extended to exotic foodstuffs. Yet other foods gained popularity among the masses, like onions, cucumbers, and watermelon in Senegambia, which took root by the 12^{th} century (Lewicki 1974: 58), alongside chicken (Dueppen 2011) for which there is archaeological and historical evidence. Many of these crops (e.g., garlic, lemons, dates) are cultivated and traded today, though this may also have resulted from re-introduction in later times rather than continuity with medieval happenings.

In summary, before 1450 West Africa was a vibrant place immersed in flows of goods, people, and ideas. Little is known about how people in the hinterlands adjusted to increasingly wide ranging and intensive trade relations with the Arab world and farther afield. In the remainder of this chapter, I narrow my focus to one of those areas within the modern nation state of Ghana to consider the ways in which daily life and foodways related to these broader networks of interaction.

Ghana and the Volta Basin before 1450

Ghana has a long record of human occupation as well as involvement in long-distance trade.[9] Some of the earliest evidence of trade and foodways is to be found communities in the Late Stone Age (LSA) Kintampo Tradition, who were among the

[9] A word is necessary here about why I have used 1450 as a break point in my analysis, which appears somewhat arbitrary especially in the discussion of trans-Saharan networks which continued long afterwards. Stahl (2007a, pers. comm. 2011) uses it as the terminal date of the Ngre phase in Banda's working chronology, though she also sees continuity between phases which is partly why dates in the subsequent Kuulo phase are overlapping (1350-1650). For me it is useful as this is about where there is a shift in environmental conditions, and 1450 also immediately predates the arrival of Europeans on the Ghanaian coast in 1471, two issues that are central to my argument. However, it should not be understood as necessarily indicating a discontinuity in daily life.

earliest agriculturalists in West Africa, dating to the mid-second millennium BC (Casey 2005; Stahl 1985b, 1986; Watson 2005, 2011). Kintampo subsistence economies focused on domesticated pearl millet (D'Andrea et al. 2001; D'Andrea and Casey 2002), cowpea (D'Andrea et al. 2007), and perhaps cattle and sheep/goat (Carter and Flight 1972; Gautier and Van Neer 2005; Stahl 1985b: 139), alongside locally available wild resources like oil palm (D'Andrea et al. 2006; Stahl 1985a,b, 1986, 1993b) and game from the bush (Stahl 1985a,b). Culinary changes are evident from the preceding (Punpun) phase, including the addition of domesticated plants, increased use of jars (boiling, sauce preparation), and ubiquitous small grindstones (Stahl 1989, 1993b, 1994: 77).

These data are important for several reasons. First, these studies are the only (published) studies of archaeological plant remains in Ghana, and are among only a handful of faunal reports (i.e., see Gautier and Van Neer 2005). For plant remains, there is not a single published analysis focusing on the Iron Age (c. 2500 b.p. onwards). Perhaps more importantly for my work, they establish a beginning point in the story of foodways in Ghana (and much of West Africa), reverberations of which continue throughout the Banda sequence. These include a focus on pearl millet and use of cowpea; consumption of caprines, cattle, and bush meat; and a continued presence of cooking jar forms. Finally, the wild progenitors of pearl millet, cowpeas, cattle, and caprines are not found in Ghana, but in drier northern regions, suggesting that the movement and trade of foodstuffs in this region is very ancient indeed.

The next phase of culture history is poorly known, but is distinguished based on the arrival of iron metallurgy (i.e., the Early Iron Age (EIA), 2500-1000 b.p., Stahl 1994: 79). Evidence for early iron is scattered among a handful of sites north of the forest boundary (including Bono Manso and New Buipe; Stahl 1994: 80), but it is Daboya, on the edge of Gonja and just north of the Black Volta River (Shinnie and Kense 1989), that is interesting for my purposes. Daboya appears to have been occupied for a very long time, spanning the Kintampo to EIA. This was likely facilitated by its attractive location near to alluvial salt deposits, which are not found anywhere else in central Ghana (Shinnie and Kense 1989; Stahl 1994: 80). The inhabitants of Daboya relied on domesticated animals and fish; there is no report of plant remains (though surely they were consumed) (Shinnie and Kense 1989).

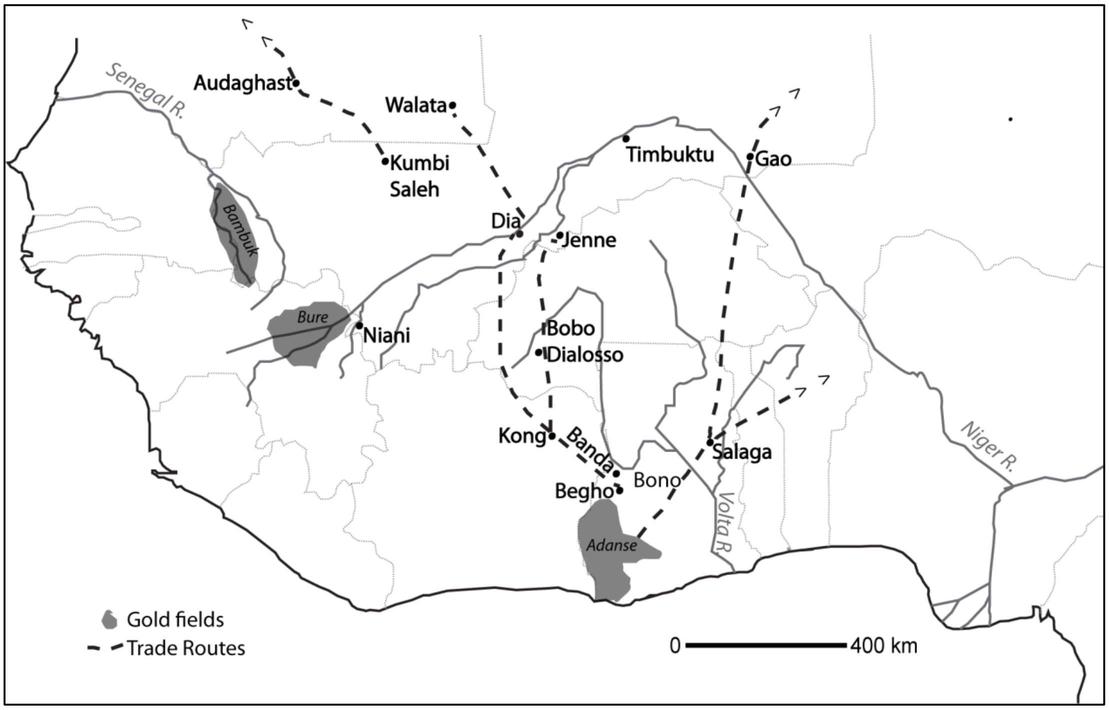

FIGURE 4.4: Trade routes from modern Ghana in the mid-second millennium (after Anquandah 1975 and Wilks 1962)

During the first half of the second millennium, inhabitants of Ghana became involved in northern-focused trade networks, but the degree and type of participation varied considerably. It seems reasonable to begin with what historical data suggest is the best integrated of Ghanaian sites: Begho, also known as Bighu, Bi'u, or Biku in Arab accounts. Positioned at the northern fringe of the forest, travel from Begho to Jenné took approximately 45 days. Mande (i.e., Dyula)[10] traders traversed this route (Figure 4.4; Wilks 1962: 338). According to Wilks (1962: 338), Begho and this route were probably established by 1400, though there may have been earlier gold-kola trade networks linked to Bonduku to the west. From Begho several routes extended east and westwards to the Atlantic coast. The Jenné-Begho network persisted for four centuries (to c. 1800) (Wilks

[10] Dyula-speakers (i.e., Wangara) are only one of the Mande language groups that migrated into the Begho area as traders. In the present there are several other languages represented, including Hwela, Numu, and Ligby (Wilks 1962: 338), the last of which is still spoken in the Banda region today (Stahl 2001).

1962: 339-340), and thus continued to be active well into the next few phases of Banda's history (Chs. 5 & 6).

The archaeological site of Begho is located near present-day Hani, about 30 km south of Banda (see Ch. 5; Figures 4.4, 4.5). A large town occupied between the 12th and 18th centuries, Begho was an entrepôt in trans-Saharan trade networks where gold and kola from the south was exchanged for northern commodities like salt, cloth, and copper alloys (Posnansky 1973, 1987; Stahl 1994; Wilks 1962). The town of Begho was large (up to 10,000 people), and the site today comprises over 1500 mounds that may represent house mounds (Anquandah 1993: 648), with several slag heaps along the exterior reaches of the town itself (Posnansky 1987: Maps 1-1 & 1-2). Archaeological excavations were extensive, lasting from 1970 to 1979 (Posnansky 1987), but the results have unfortunately not been fully published. This makes it particularly difficult to evaluate change over time. Most of the archaeological evidence seems to cluster between AD 1430 ± 100 and 1710 ± 100 (Posnansky 1973: 158; Posnansky and McIntosh 1976: 189), with the town peaking in the late 1500s and early 1600s, so I reserve a detailed discussion until the next chapter. Relevant for Banda's Volta and possibly Ngre phases (see below) is the Nyarko quarter (dating to AD 1045 ± 80 and 1120 ± 75), where ivory, copper wires, and iron arrowheads were found in small amounts (Crossland 1976: 86). Pottery in the Nyarko quarter was dominated by red design-painted ware (Posnansky 1987: 17). Interestingly, this pottery is distinctive from subsequent phases (much like Banda, below) (Crossland 1976). According to Posnansky (1987: 17) such designs are common in the middle Niger area, though assigning a northern origin to the pottery based on design alone is problematic for many reasons (see below; Stahl et al. 2008: 379).

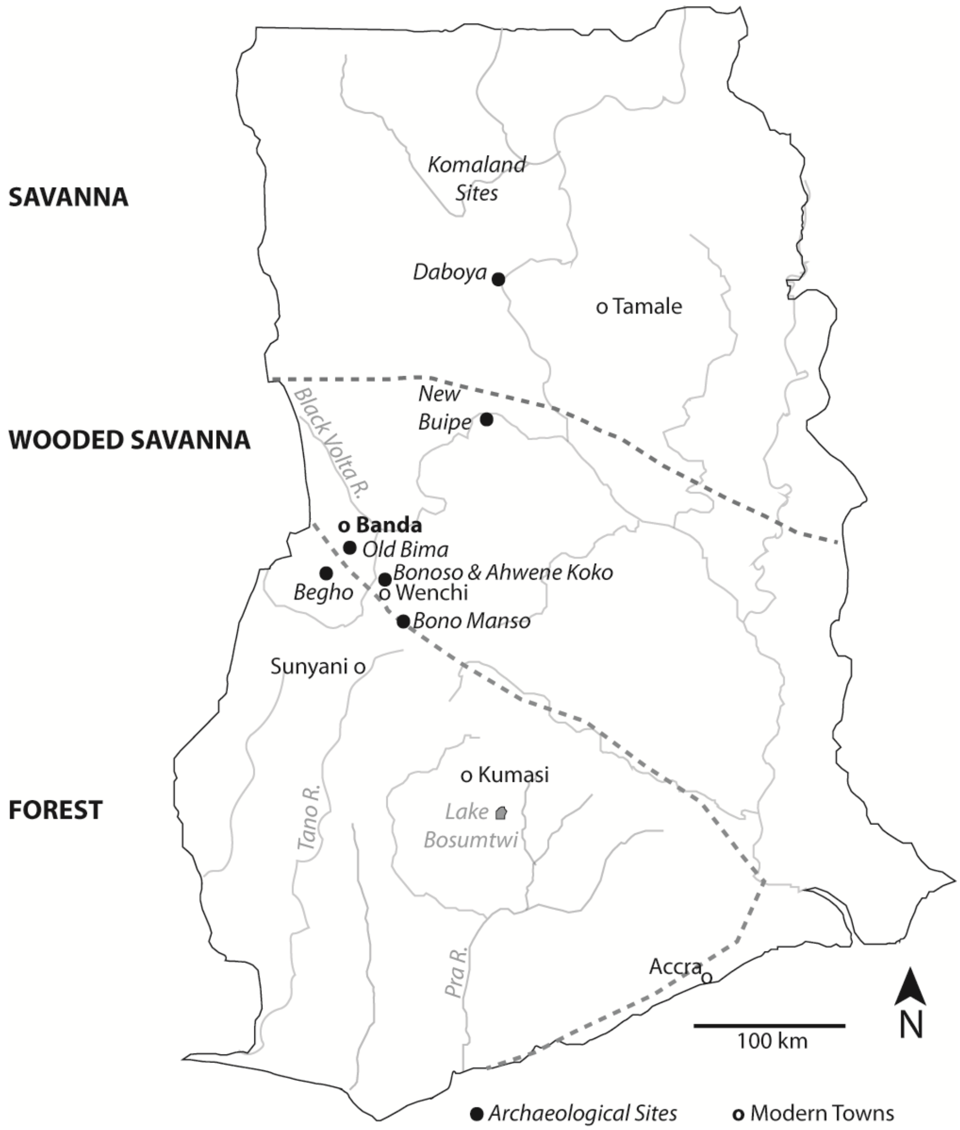

FIGURE 4.5: Archaeological Sites in Ghana before 1450 mentioned in text

The nearby site of Old Bima (Fig. 4.5), which lies along the Chɛn River, is believed to be contemporaneous with Begho and was according to oral histories occupied by the ancestors of the Dumpo (Kuulo). Two radiocarbon dates place its occupation between the 11th to 15th centuries, and oral histories suggest it was inhabited until the Asante invaded in the 18th century. Test excavations by Bravmann and Mathewson (1970) revealed deeply stratified floors, and painted wares with incised and impressed decorations.

Somewhat further east and also on the forest fringe is the site of Bono Manso, which oral histories suggest was the capital of the first Akan state. This important site was excavated by Effah-Gyamfi in the mid-1970s (Effah-Gyamfi 1985). Bono Manso was occupied at least as early as the 13th until the 17th century. It is Effah-Gyamfi's Phase 1 that concerns me in this chapter. Effah-Gyamfi (1985: 203-205) separated this early phase of Bono's occupation into 'Phase 1' with calibrated dates of AD 1297 ± 85 and 1385 ± 75, and 'Late Phase 1' dated to AD 1458 ± 30 and 1488 ± 70, making them roughly contemporaneous with the Ngre and early Kuulo phases in Banda. Abram, a large iron smelting nearby, appears to date to Phase 1 and perhaps earlier (Effah-Gyamfi 1985: 106).[11] There is limited evidence for trade goods at this time: one copper scrap along with a crucible was found in Phase 1 contexts, as well as some glass beads, and perhaps cuboid stone weights and spindle whorls[12] (Effah-Gyamfi 1985: 88-90, 197).

To the north near Wenchi are the sites of Bonoso and Ahwene Koko (Fig. 4.5). Oral traditions and radiocarbon dates suggest that Bonoso was occupied earlier (AD 10 ± 90 and AD 980 ± 85) and Ahwene Koko later (AD 1585 ± 80)[13] (Boachie-Ansah 1986: 286, 290). Ceramics at both sites suggest affinities to Begho (Boachie-Ansah 1986: 289-290). While there is evidence for long-distance trade in the later occupation of Ahwene Koko in the form of copper, a piece of a brass bowl, spindle whorls, pipes, and corn-cob roulette pottery, none was found at the earlier site of Bonoso (Boachie-Ansah 1986: 292-294).

In northern regions of Ghana, to the north of the Black Volta, there seems to be somewhat greater evidence for northern influence in the form of ceramic style. At Daboya, red-painted pottery of York's (1973) Silima tradition, often interpreted as evidence of Mande influence, was found in 13th century contexts, predating by several centuries the founding of the Gonja state by horse-mounted invaders. Shinnie and Kense (1989: 130) interpret the red-painted pottery not as the result of direct Mande influence,

[11] Though he notes earlier in his text that this area was also associated with Phase II sherds (Effah-Gyamfi 1985: 84); but in discussing chronology he places it firmly in Phase I.
[12] Chronological affiliation of the spindle whorls is unclear from Effah-Gyamfi's (1985: 197) description, though it seems that they may be present in all three phases, including Phase 1.
[13] It is unclear whether or not these dates are calibrated.

but as a tradition originally rooted in the wider Sahelian region that was later regionalized in specific locales.

Komaland sites in northernmost Ghana also provide evidence of trade in the form of cowrie shells and copper, and terracotta figurines which stylistically resemble those of Jenne-jeno (Anquandah 1986; McIntosh and McIntosh 1979; Stahl 1994). Some of the terracotta figurines have embedded gold dust. These sites seem to date to the late 15th/early 16th centuries based on two thermoluminscence dates on surface terracottas. The area may have been part of an unknown kingdom involved in trans-Saharan trade networks (Anquandah 1986) or perhaps was home to skilled artisans who were once part of a Mande diaspora (Davis 1988 in Stahl 1994: 88). Recent research suggests that the sites are probably the remains of ancient shrines, some of which data back as far as the 6th to 10th centuries (Kankpeyeng and Nkumbaan 2009).

In summary, the archaeological evidence dating to the early period of Niger and trans-Saharan trade in Ghana is quite limited. At present there are few clearly dated examples of involvement with northern trade before 1450. While Begho is probably the best candidate for this type of interaction, the earliest 'quarter' of the town contains slim evidence for trade goods or craft production. Evidence from the early occupation of Bono Manso suggests similarly small amounts of trade goods but there is considerable evidence for iron smelting. This pattern accords with the historical understanding that Niger trading empires did not shift focus to Akan goldfields until the 14th century or later. However, it is clear that the trading centers that expanded as a result of northern trade networks were occupied prior to those connections, suggesting that local populations were active and willing participants in trade and craft production of some sort.

Though direct evidence for long-distance connections is not abundant, the available evidence suggests the incipient development of these networks in the centuries before 1450. These networks had not yet expanded to their later capacity, but at minimum, down-the-line and regional-scale exchanges are possible and likely. One must also consider forms of trade that are not visible archaeologically, at least given the very fragmentary state of archaeological knowledge for this period in Ghana at present. Trade in foodstuffs and other perishable goods like hides and spices is possible, though invisible without the use of specialized techniques. I now narrow my focus even further to examine the evidence for local subsistence, environment, and trade in Banda.

Daily life in Banda during the Volta and Ngre Phases

Like much of central Ghana, the Banda region has seen human occupation since at least Kintampo (3500-3000 b.p., about 1500-1000 b.c.) times (Stahl 1985a, 1986). Following what appears to be a hiatus in occupation, limited evidence of people again appears on the landscape in the first few centuries AD in the form of mostly undecorated, highly eroded soft paste pottery, which occurs in basal layers of most sites in the region. The few decorated sherds are dentate impressed with remnant red paint. Iron is present in these early levels, though there is no evidence of exotic materials (Stahl 2007a: 53). I conducted analysis of a few samples (n=4) from pre-Volta phase contexts at two sites designated as A-212 and B-112 (Fig. 4.6). The basal levels (7-10) of Mound 7 at the multi-component site of A-212 contexts have been dated to the 1^{st} to 4^{th} centuries (Stahl 2007a: 55-56), and the B-112 context is an earth ring that may have Kintampo affiliation (BRP 2002). Neither yielded any identifiable seeds, which is consistent with a poorly preserved early occupation.

Volta Phase (cal. AD 1000-1280): Banda 13, Banda 27

The Volta Phase (what Stahl in earlier work termed Iron Age 3/IA3; Stahl 1985a, 2007a) is comparatively better known. It appears, based on relatively limited evidence from several sites, to predate significant involvement in long-distance trade. Ceramics are characterized by red-painted pottery with geometric designs, decorative motifs that are also found in areas to the north (above). Previous researchers interpreted the appearance of red-painted pottery with the first Sudanic connections in the area, reifying the belief at the time that all innovations were northern-derived (Stahl 2007a: 53). However, the pottery appears to be locally manufactured, with Instrumental Neutron Activation Analysis (INAA) suggesting most vessels recovered from Banda 13 and Banda 27 were produced from a clay from east of the Banda hills (n=41), a few from sources west of the hills (n=6), and the remainder (n=6) consistent with clays from the general Banda region

(Stahl 2007a: 59; Stahl et al. 2008). Likewise, there is no evidence to date of long-distance connections in the form of trade beads or copper goods (Stahl 2007a: 59).

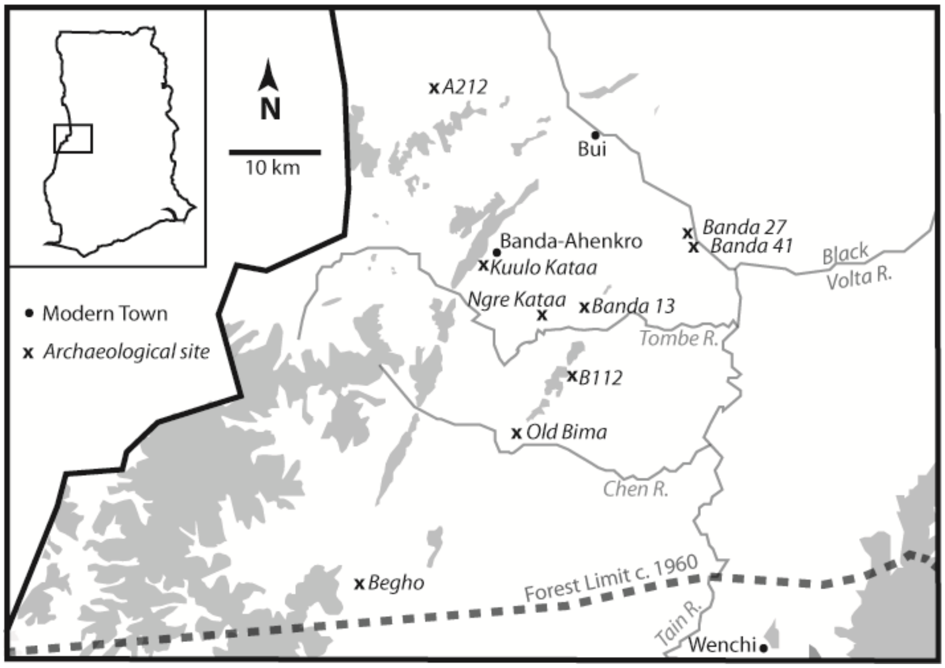

FIGURE 4.6: Map of Volta and Ngre Phase sites analyzed for plant remains in the Banda region (based on Stahl 2007a: 54)

The site of Banda 27 is comprised of twelve elongate, L-shaped, and conical mounds near the Black Volta River. Test excavations probed both a midden and structural mound (BRP 2002). I analyzed a stratigraphic sequence from Mound 2, which Smith interpreted as midden deposits (n=6). More extensive excavations were recently undertaken in 2009 at the site of Banda 13, with the aim of exposing domestic, crafting, and midden contexts (Stahl 2007b). The site consists of at least four low mounds (BRP 2002). This material is still being analyzed, but our general impression is that no well-preserved domestic structures were encountered, though there were potentially domestic contexts recovered in several units along with midden deposits (BRP 2009). Six 2 x 2 m units were opened; flotation samples from the two deepest units (10N 0W, 28N 2W) units were analyzed to assess change over time; a limited number of samples were also analyzed from potential domestic and midden contexts in two additional units (20N 4W, 24N 4W) to help define spatial and contextual variability.

Charred Plant Remains

Pearl millet is the most common identifiable seed at both of the Volta phase sites analyzed, while sorghum appears in smaller amounts (Table 4.2). At Banda 13, ubiquity[14] of pearl millet at the site overall was 50%, which ranks fairly high compared to other contexts; Banda 13 samples almost invariably contain pearl millet if they contain anything at all. At Banda 27 pearl millet ubiquity was only 20%, though only one unit was analyzed, producing low counts. Sorghum ubiquity is higher at Banda 27 (20%) than at Banda 13 (5%), though sorghum counts are very low at both sites, so this is probably not significant. No byproduct (i.e., glume or rachis) material that would indicate crop processing was recovered from Banda 27, but it was present in small amounts in one unit at Banda 13 (28N 2W).

TABLE 4.2. Volta Phase Grain Crop Macrobotanical Remains

VOLTA PHASE	Banda 13, M1					Banda 27	Phase Overall Total
Provenience	10N0W	20N4W	24N4W	28N2W	Site Total	M2, U1	
No. of Samples	6	2	2	12	22	6	28
Ubiquity Pearl Millet (%)	67	100	0	42	50	17	43
Count Pearl Millet	8	3	0	23	34	2	36
Ubiquity Sorghum (%)	0	0	0	8	5	17	7
Count Sorghum	0	0	0	1	1	2	3
Byproduct Ubiquity (%)	0	0	0	17	9	0	7
Byproduct Count	0	0	0	4	4	0	8

[14] Ubiquity is a simple measure of percentage presence. It expresses the percentage of the samples analyzed that contain the plant of interest. For example, at Banda 13, 11 out of 22 samples contained pearl millet, so the ubiquity is 50%.

Beans, likely cowpea (*Vigna unguiculata*), were recovered from both sites, and shea butter shell (*Butyrospermum parkii*) appears in 50% of samples from Banda 27. No seeds from wild plants other than shea butter were found at either site, though it is difficult to tell whether this indicates poor preservation or a significant pattern. The high numbers in the unidentifiable seed fragment category (Banda 13=189 fragments; Appendix B) suggest that preservation of small wild and weedy seeds may be an issue. In summary, there was uniformity among the Banda 13 samples, which commonly contained pearl millet and little else, with cowpea rarely present. Banda 27 samples contained a few grains, but presence of shea butter nutshell in 50% of the samples and in slightly higher counts (n=6) may suggest oil processing at the site.

Phytoliths and Plant Processing

Glume and connective tissue from grains was present in small amounts in the unit at Banda 13 that also contains the highest grain count, indicating that grain processing or cooking may have taken place there (28N 2W). Few grinding stones were present in the archaeological assemblages from any unit. But, because a family only needs one grinding stone which can outlast one woman's lifetime, the number of grinding stones on site does not necessarily indicate processing intensity (or lack thereof). While a household may possess multiple types of grinding stones, one would not expect multiples of the same type to be in use simultaneously. Grinding stones have multiple uses, including for other non-food purposes such as clay preparation (cf. David 1998). The absence of large bottom saddle querns suggest that plant processing either took place outside of excavated areas; querns were moved with people upon abandonment; or they were discarded elsewhere. Compared with the preponderance of such stones at Ngre Kataa (below and Ch. 5), Banda 13 was likely the focus of other activities or occupied for only a short time.

Grinding stones were a focal part of phytolith analysis; all suspected grinding stones encountered during Banda 13 excavations in 2009 (n=6) were collected (BRP 2009). This was not the case at Banda 27 which was excavated before the major phytolith work began. Only two grindstones from Banda 13 were suitable[15] for phytolith analysis: a

[15] "Suitability" means there were clear indications that grinding had taken place with the stone, i.e., flat or grooved surfaces. Given the expense and time requirements for phytolith analysis, I did not attempt to analyze 'possible' grind stones.

narrow basin fragment from 10N 0W and a spherical hand grinder from 24N 4W. Both morphological types are also present in later phases.

Grass phytoliths on the narrow basin fragment suggests possible maize presence (moderate to strong probability) and weak possibility of pearl millet (Appendix C; see Chapter 3 for explanation of probability identifications). This suggests that the grindstone post-dates the Volta Phase occupation, which is confirmed by its provenience in the top two levels of unit 10N 0W. The semi-spherical hand grinder was recovered from secure Volta Phase contexts in unit 24N 4W and phytoliths suggest that sorghum may have been processed with it (moderate probability). Despite the near invisibility of sorghum in this site, it appears to have been processed and therefore most likely consumed there, if the phytolith identification can be confirmed.

Wood Procurement Practices and Environmental Reconstruction

Charcoal from flotation samples at both sites was identified by Alexa Höhn (Goethe Universität) to aid in reconstruction of wood procurement practices and local microenvironmental conditions. Wood charcoal was identified and quantified from three samples at Banda 13 and two at Banda 27 (Appendix D), and is summarized in Table 4.3.

Most of these taxa are found in the savanna woodland or transitional zone that today characterizes the Banda environment. The transitional zones tend to contain representatives of trees endemic to both Sudanian savanna and Guinean forest zones, making it somewhat difficult to trace ecological change. Only one species identified is characteristic of the wetter portion of the transitional zone, *Lophira* cf. *lanceolata*. Likewise, only one recovered taxa (*Ziziphus*) occurs in the drier parts of savanna woodland. Most of the remaining taxa, like *Afzelia*, *Detarium, Terminalia, Pericopsis, Bridelia, Anogeissus, Combretum, Pterocarpus, Crossopteryx*, and *Vitellaria paradoxa,* are found throughout Sudanian woodlands in both wet and dry areas (White 1983: 105). The one remaining clue is the fragment of probable *Carapa procera*, which is found in much wetter swamp or riparian forest (White 1983: 82).

TABLE 4.3: Volta Phase Charcoal Identified from Banda 13 and Banda 27 (shaded taxa are associated with wetter habitats; bold indicates trees that are not used as firewood today)

Wood Taxa (order of prevalence)	Total Count	Overall Ubiquity (%)	% of assemblage	Modern Uses*
Detarieae 2, cf. *Afzelia*	76	100	52.1	F, M,S,T
Terminalia	22	100	15.1	F,C,M,O,T
Indeterminate	10	60	6.8	
Detarium	**8**	**60**	**5.5**	**E,C,M**
Pericopsis-type	7	60	4.8	
Bridelia cf. *micrantha*	4	40	2.7	F,C,E,M,T
Anogeissus leiocarpa	4	40	2.7	F,M,T
Combretum molle/nigricans	3	40	2.1	F,M,T
***Pterocarpus*-type**	**3**	**40**	**2.1**	**M,T**
Rubiaceae II, cf. *Crossopetryx/Mitragyna*	3	40	2.1	F,C,M,T
Vitellaria paradoxa type	3	40	2.1	F, E,O
cf. *Carapa procera*	1	10	0.7	F,C,M,T
Lophira cf. *lanceolata*	1	10	0.7	F,C,E,M,O
Ziziphus	1	10	0.7	F,E
TOTAL VOLTA PHASE	146			

*From Irvine 1961. Abbreviations: F=firewood/charcoal; E=Edible fruits or leaves; M=Medicinal; O=Oil; C=Construction, T=Technical processes (i.e., dying, tanning, etc.); S=Sacred

Interesting patterns emerge when these data are compared to the taxa recovered from the other phases (discussed below). Compared to the subsequent Ngre phase with 31 taxa, Volta phase assemblages are very low in diversity of taxa represented (n=13), and contain far fewer indicators of moist forest trees given overall sample size. This is likely due to lower precipitation during the Volta phase, as recorded in high resolution data from Lake Bosumtwi (Fig. 4.7 below). A similar drop in diversity is observed in Kuulo phase contexts, when dry conditions return. Still, Volta phase charcoal assemblages display the lowest diversity in the Banda sequence, which may be an artifact of small sample size; indicate an unfamiliarity with a possibly new landscape; restricted representation of activities (i.e., little metalworking); or restricted clearing of lands. The one hint of trade (or perhaps migration) is the single piece of *Ziziphus*. This is the only occurrence of this tree in the sequence, and Banda is well south of its normal range; for example, it is not even listed in the comprehensive useful plants guides of Ghana (Abbiw 1990; Irvine 1961), though it does grow in the driest northern reaches of the country. The small fruits of *Ziziphus* are commonly consumed in the Sahel, where they are frequently found in archaeological sites (e.g., Murray 2005). Whether or not this small piece of wood was part of a bunch of fruits acquired through trade or locally or simply collected it as firewood is hard to know.

It is also worth noting some variation in the different contexts analyzed. The two samples analyzed from Banda 27 are even less diverse than those from Banda 13, with only five taxa (*Terminalia, Afzelia, Vitellaria, Pterocarpus*, and *Combretum*), all of which do co-occur at Banda 13. This may indicate that a more restricted set of activities is represented in the Banda 27 sequence. I should also point out the presence of shea butter tree wood in both sites. Its use as fuel might explain the limited presence of shea butter shell, rather than oil extraction. The low diversity in woods is consistent both with drier conditions at the time and with a more restricted set of activities (i.e., domestic with little crafting), which I explore in depth below.

Involvement in trade

In sum, the botanical evidence is consistent with currently available archaeological evidence in suggesting no clear evidence of long-distance connections at this time. Influence, if such connections were present, was probably indirect. Pearl millet and cowpeas were present long before the Volta phase, though this is the first documented occurrence of sorghum in Ghana (but also the first archaeobotanical study postdating the Late Stone Age). As discussed above, it is at about this time that sorghum appears to have diffused to much of West Africa. Its limited occurrence during the Volta phase suggests that it was either a recent introduction, made into foods or drink primarily after grinding (which is consistent with the possible sorghum phytoliths on a grindstone), or, as I explore below, cultivated less often in dry phases.

Ngre Phase (cal. AD 1210-1450) & early Kuulo Phase (cal. AD 1350-1450): Ngre Kataa, Banda 41, Kuulo Kataa

We know more about the Ngre phase,[16] which coincides with the first evidence for northern-oriented long distance trade in the form of copper alloy objects. Extensive excavations at Ngre Kataa in 2008 and 2009 have yielded ample evidence of trade and metalworking, but analyses are ongoing, so I present only a limited summary (BRP 2008, 2009; Stahl 2007a,b). Red-painted pottery that characterized the Volta phase persists, but otherwise there is more similarity between Ngre and the subsequent Kuulo phase pottery than with Volta phase ceramics. Diagnostic though not necessarily common characteristics include mica paint or slip, wavy line roulette, and a variety of fiber and carved roulettes. Cord roulette is very common though also characteristic of later phases. Both bowls and jars are present and commonly carinated (angular shoulders). Ngre phase pottery includes a distinctive everted jar form with an incurved rim (one example also present at Bono Manso; Effah-Gyamfi 1985: 114, 116). Ngre phase sites are often associated with visible slag heaps, suggesting iron smelting on site. Crucibles have also been recovered from excavated contexts, suggesting casting, possibly of copper alloy items (BRP 2009; Stahl 2007a: 60-61). INAA data suggest regional exchange of pottery both from the east and west of the Banda hills (Stahl 2007a: 61; Stahl et al. 2008). Preliminary results from faunal analysis (from combined Ngre and Kuulo phases) suggest that wild game made up a considerable part of subsistence. The wild taxa utilized include carnivores, fish, turtles, tortoise, and large rodents. Though a significant proportion of the

[16] Additional chronological details: While I have mostly relied on the phasing of Stahl (1999, 2001, 2007a), because she uses overlapping dates for Ngre and Kuulo phases I found it necessary to reorganize and compare contexts that are contemporaneous with each other to facilitate comparison with environmental and other data. I discuss all contexts dating to before cal. AD 1450 in this chapter, and between cal. AD 1210-1450 in this section. This meant combining contexts that fall within the early part of Stahl's Kuulo phase at KK with Ngre phase contexts at NK. I have combined contexts with absolute dates or closely associated with levels that have been dated between AD 1210-1450 at both KK and NK. I do take some hints from excavator notes and material culture to aid in this distinction, e.g. whether or not tobacco pipes are present, but use primarily absolute dates, as reported in Stahl 1999a: 15, 2007: 55-56, 2011 pers. comm.). Contexts dating to between cal. AD 1210-1450 are as follows: KK Mound 101 (Levels 20 and deeper), as absolute dates for these levels fall between AD 1280-1490 (calibrated, at 2 sigma); KK Mound 138 (all) as most dates cluster between AD 1285-1440 (with outside ranges at about AD 1100 and 1600); NK Mound 3 (cal AD 1329-1452, Lev. 7); NK Mound 4 (cal AD 1210-1400); NK Mound 8 basal level 29 at about AD 1250-1400 (based on contextual details I include Lev 23-29 in Ngre phase, and those above in Kuulo and Makala phases); and Banda 41 between AD 1220-1420.

faunal assemblage is from bovids, they are highly fragmented, preventing determination of whether they were domesticated (Stahl 2007a: 61). Another domestic animal that can be identified is dog, which appears to have been eaten and also used in ritual contexts later on in the Kuulo Phase (Stahl 2007a: 61; 2008a).

Three Ngre phase sites were the focus of archaeological and archaeobotanical inquiry, though many more were sampled as part of a regional testing program (BRP 2002; Stahl 2007a). The first is Ngre Kataa, a large, multi-component site with at least 14 conical and linear mounds. Originally designated Banda 40 during a regional testing phase (BRP 2002), the site was later claimed by the nearby town of Ngre (Nyire) and the site renamed. Ngre Kataa was extensively excavated in 2008 and 2009, but only some contexts date to the Ngre Phase. I return to this village site in my discussions of the Kuulo Phase, when it was also occupied and for which we have better resolution on domestic activities (Ch.5). Four areas with Ngre phase deposits were analyzed for plant remains. Mounds 3, 4, and 8 are deep conical midden mounds. Mound 6 is a metalworking and ritual area (BRP 2008, 2009; Stahl 2007a).

Kuulo Kataa is a large site of approximately 28 hectares, composed of many low and some large conical mounds (Stahl 1999a: 16). It was occupied beginning in the 14th century and continuing through the 1650s, as well as during the Makala Phase (Stahl 1999a: 18). Excavations in 1995 and 2000 focused on a deep midden mound (101), domestic areas (Mound 118 and 148), and a metalworking area (Mound 138) (Stahl 1999a, 2001, 2007a). Remains of pottery, slag, and bone were extremely dense per unit volume compared to sites dating later in time. I discuss the earliest occupations of the site (to c. 1450) here, and return to the site in Chapter 5, where I pick up the later portion of the occupation. Contexts sampled here are those dating to the pre-1450 period, including basal levels of Mound 101 (Levels 20 and deeper) and Mound 138. Both show abundant evidence for slag, while Mound 138 includes a collapsed smelting or forging furnace; the quantity and scale of slag in excavated contexts suggests surplus iron production (Stahl 1999a: 19, 21).

Banda 41 is located close to Banda 27, on the south bank of the Black Volta River. Banda 41 was sampled as part of the 2000/2001 Regional Testing Program and also appears to be a multi-component site. Eight mounds are present, though only three appear to have an Ngre Phase component (BRP 2002). Smith (BRP 2002: 31) noted similarities between materials at Banda 41 and Ngre Kataa Mound 4. The site has evidence for iron, iron working (slag), beads, and copper objects, suggesting involvement with northern-oriented trade (BRP 2002; Stahl 2007a).

Charred Plant Remains

To date, approximately 51 flotation samples from Ngre Phase contexts have been analyzed. Most (n=38) are from four different mounds at the site of Ngre Kataa. Below I also present the samples from Mound 6 separately, as it appears to have been used both during and after the Ngre Phase. An additional 10 samples were analyzed from early Kuulo phase samples at Mounds 101 and 138 at Kuulo Kataa, as well as three additional samples from Banda 41.

Like the preceding Volta phase, pearl millet dominates Ngre phase samples, but sorghum is more ubiquitous in comparison to Volta phase contexts (Table 4.4). Ubiquity of pearl millet at Ngre Kataa (69%) and for the phase as a whole (59%; 53% with M6)[17] is high, perhaps because most samples were derived from midden contexts. Sorghum appears in fewer contexts (31%) and in smaller amounts in all mounds and is absent from some contexts altogether (NK Mound 8 and KK Mound 138). Although both pearl millet and sorghum were recovered from Banda 41, they occurred in limited quantity, with only four grains identified. However, the occurrence of both sorghum and millet in almost all areas suggests that their use was common. By contrast, only one potential fonio (cf. *Digitaria* sp.) seed was recovered, from Mound 4; this limited occurrence probably suggests limited use, but the diminutive size of fonio seeds certainly impacts their preservation and recovery. Byproduct material is present in higher ubiquity than in the previous phases and in the subsequent Kuulo phase, but this can be in part attributed to

[17] For the most part, Mound 6 samples are excluded from these phase-wide calculations, both because of the multi-phase occupation and the special purpose nature of the contexts.

the midden nature of most of the deposits analyzed for Ngre phase, as well as the increased focus on sorghum. Sorghum glumes are especially hardy and appear to survive better than those of pearl millet.[18]

TABLE 4.4: Ngre Phase Grain Crop Macrobotanical Remains

NGRE PHASE	Ngre Kataa			Site Total NK	Kuulo Kataa		Banda 41 M1	Phase Total
Provenience	M3	M4	M8 L.23,29		M101, L.20-25	M138		
No. of Samples	3	11	2	16	6	4	3	29
Ubiquity Pearl Millet (%)	100	64	50	69	100	0	33	59
Count Pearl Millet	30	15	4	49	44	0	1	94
Ubiquity Sorghum (%)	67	36	0	38	17	0	67	31
Count Sorghum	3	12	0	15	1	0	3	19
Count Fonio	0	1	0	1	0	0	0	1
Byproduct Ubiquity (%)	33	27	50	22	33	0	33	28
Byproduct Count	1	5	1	14	5	0	1	20

Other taxa represented in small quantities include beans, likely cowpea, shea nut shell, possible cucurbit shell, and possible okra (cf. *Abelmoschus esculentus*). The cucurbit was very fragmentary, and could represent a squash/gourd or melon seed. Wild edible and weedy plants also appeared in the assemblage, including Euphorbiaceae/Lamiaceae and *Zaleya pentandra* at NK Mound 3 and Lamiaceae (*Cassia/Ocimum*) in KK Mound 101. *Zaleya* is both a common weed and occasionally consumed green; the Euphorbiaceae and Lamiaceae may represent either use, though *Cassia* and *Ocimum* are both eaten as leafy greens in the area today. In general, non-grain seeds and nutshell occur in small quantities (Table 4.5), though this should not be taken to mean they were rarely used. It is interesting that shea nut shell occurs in both soil and in a vessel at what is thought to be a metalworking area at Kuulo Kataa (M138, 126W 24S & 130W 24S). This taxon appears to be thinly scattered throughout Ngre Phase contexts, and occurs at NK Mound 6, another metalworking/shrine area (Table 4.6).

[18] Given the very fragmentary nature of most byproduct material, I did not try to separate sorghum vs. pearl millet glume fragments.

TABLE 4.5: Macrobotanical remains other than grains in Ngre Phase contexts

NGRE PHASE	Ngre Kataa (B40)			Kuulo Kataa		Banda 41 M1	Phase Total
Provenience	M3	M4	M8 L.23,29	M101, L.20-25	M138		
cf. *Abelmoschus esculentus*		1					1
Butyrospermum paradoxa		1			12	1	14
cf. Cucurbitaceae		1					1
Euphorbiaceae/Lamiaceae	1						1
Fabaceae (likely cowpea)	1		1				2
Lamiaceae *(Cassia/Ocimum)*				2			2
Zaleya pentandra	4		1				5

Remains from Ngre Kataa Mound 6 generally mirror those found in the rest of the site, with the exception of a much more limited occurrence of sorghum. Pearl millet ubiquity at Mound 6 is comparable to the phase total (45% and 55%, respectively), suggesting that it was commonly consumed or deposited or crop processing remnants were used as fire starters.[19] There are only two grains of sorghum present in just one sample, in one of the deepest layers (48N 8W, L.10, 150-160 cmbd) and it is not present in any samples derived from the interior contents of whole pots. One possible interpretation is hinted at by the presence of a cluster of pearl millet grains (n=15), along with small carpal and phalange bones (small human or animal) inside of a vessel in 48N 8W (142-170 cmbd; NK09-F326). I should also note that pearl millet remains are abundant in the basal layers of KK Mound 101, where slag also occurs in quantity; only one grain of sorghum is present, compared to 34 millet grains, distributed across all samples analyzed (i.e., 100% ubiquity). Whether interpreted as the remains of a daily meal or ritualization of craft, it suggests that millet and sorghum were prepared and valued differently. It is tempting to see this as evidence for the ritual importance of millet, which not only has a very deep history in the area, but continues to be the ritual food of choice in most contexts today (Chapters 2 & 8). However, it is equally possible

[19] The virtual absence of any byproduct (i.e., glume and rachis fragments) remains suggests that this is not the primary use of grains at M6. There is slightly more evidence for this at KK M101 & M148 (Ch. 5).

that sorghum was present in another form—as beer or porridge—that would leave few archaeological indications, whereas millet was prepared in a manner more conducive to preservation, such as steaming.

TABLE 4.6: Summary of Ngre Kataa Mound 6 Macrobotanical Remains

	Pot Contents*	48N 8W	50N 4W	Total M6
No. of Samples	7(10)**	8 (11)	4	22
Grains				
Ubiquity Pearl Millet (%)	14 (22)	55 (55)	75	45
Count Pearl Millet	2 (18)	14 (29)	4	35
Ubiquity Sorghum (%)	0	11 (9)	0	4.5
Count Sorghum	0	2 (2)	0	2
Byproduct Ubiquity (%)	0	11 (9)	0	4.5
Byproduct Count	0	1 (1)	0	1
Non-Grains				
Butyrospermum paradoxa			2	2
Boraginaceae			1	1
Celtis integrifolia		1		1
Euphorbiaceae/Lamiaceae		1		1
Ficus sp.		1		1
Moraceae	1			1

*Includes contents of 10 pots (Bag Nos. NK08-388, NK08-515, NK08-521, NK08-522, NK09-411, NK09-651, NK09-760, NK09-789, NK09-790, NK09-859); see Appendix B
** Three of the samples of pot contents come from unit 48N 8W; in order to avoid double reporting I have shown the results without including those samples and (with those samples).

There are also remains of wild and weedy plants in Mound 6 samples (Table 4.6). A small amount of shea nut shell is present, along with many wild species. It is difficult to know whether these represent weeds growing nearby, remains of edible fruits or leaves, or simply part of the fuel used for metalworking activities (suggested by *Celtis integrifolia*, whose wood charcoal was also found on site, below).

Phytoliths and Plant Processing

Much like the previous Volta phase, evidence for plant processing is limited in Ngre Phase contexts as no clear domestic structures were uncovered. However, charred remains suggest that a small quantity of glume material is present at all three sites analyzed, with the majority concentrated in NK M4 and M8 and KK M101 middens. The byproduct material is for the most part glume fragments, which would have been removed in late stage crop processing, prior to consumption.

At present, only one grinding stone has been analyzed from a secure Ngre Phase context.[20] It is a cylindrical shaped stone that was uncovered in the Mound 3 midden at Ngre Kataa. This form would have comfortably fit in one hand. A similar shaped stone is also present in domestic contexts at NK Mound 7 dating to the early Kuulo Phase (Ch. 5), possibly demonstrating some processing continuity. The Mound 3 grindstone residue contained very few phytoliths (n=10); all were types present in both sorghum and pearl millet inflorescences, with no evidence of any grass leaf contribution. Given the low phytolith counts these identifications should be considered provisional.

Wood Procurement Practices and Environmental Reconstruction

Charcoal was identified from six Ngre phase contexts at Kuulo Kataa and Ngre Kataa. Two samples were derived from NK Mound 6 (Lev.8 & 10), a metalworking area interdigitated with shrine deposits (BRP 2008, 2009; Stahl pers. comm. 2009). Two additional samples came from the base of a deep midden at the same site (Mound 8). Another two samples were analyzed from the base of a deep midden at Kuulo Kataa Mound 101. Results are reported in Table 4.7 and Appendix D.

The types of wood used in the Ngre Phase were more diverse than the previous phase, with 31 taxa identified compared to 13 in the Volta Phase—more than a twofold increase and the most diverse assemblage of any phase in the sequence.[21] There are several possible explanations for this pattern. The variety of taxa recovered, and information on how they are used in modern times, suggests that not all of these species

[20] The only suitable stones are all from Mound 3 and Mound 6. This sampling issue relates to my initial impression that parts of Mound 7 (which was extensively sampled) were Ngre Phase, which was subsequently revised when absolute dates were later in time.

[21] One potential reason for this diversity lies in the methods used. To test how well identifying 30 samples per sample captured the diversity of the samples, charcoal analyst Alexa Höhn picked a few of the better preserved samples for further analysis, doubling the number of identified pieces to 60. One of these fell within the Ngre Phase (KK, M101, L.21) and contained over 15 taxa, which was the most diverse sample; however, only 2 of these taxa had not been previously identified in samples dating to this phase. Thus I do not consider it an adequate explanation of increased diversity.

TABLE 4.7: Ngre Phase Charcoal Identified from NK and KK (shaded taxa are associated with wetter forested habitats; bolded taxa are those that are not used today as firewood)

Wood Taxa (order of prevalence)	Total Count	Overall Ubiquity (%)	% of assemblage	Modern Uses*
Terminalia	37	83	21.4	F,C,M,O,T
Indeterminate	24	100	13.9	
Detarieae 2, cf. *Afzelia*	16	67	9.2	F, M,S,T
Vitellaria paradoxa type	12	67	6.9	F, E,O
Detarium	**10**	**50**	**5.8**	**E,C,M**
Detarieae 1, cf. *Berlinia/Isoberlinia*	**9**	**50**	**5.2**	**C,M,T**
Rubiaceae II, cf. *Crossopetryx/Mitragyna*	8	50	4.6	F,C,M,T
Bridelia cf. *micrantha*	6	67	3.5	F,C,E,M,T
Anogeissus leiocarpa	5	50	2.9	F,M,T
***Pterocarpus*-type**	**5**	**67**	**2.9**	**M,T**
Combretum molle/nigricans	4	33	2.3	F,M,T
Daniellia	3	33	1.7	F, E,M,T
Petersianthus macrocarpum	3	33	1.7	
Uapaca	3	33	1.7	F,C,E,M
Parinari	3	17	1.7	F,C,E,M
cf. *Prosopis*	2	33	1.2	F,C,E,M,T
Grewia* cf. *mollis	**2**	**17**	**1.2**	**E,M,T**
Khaya	**2**	**17**	**1.2**	**C,M,T**
cf. *Klainedoxa*	2	17	1.2	F,C,E
Monotes, Dipterocarpaceae	2	17	1.2	
Piliostigma	2	17	1.2	F,C,E,M,T
cf. *Pteleopsis*	**2**	**17**	**1.2**	**T**
Triplochiton schleroxylon	2	17	1.2	F,C,M
Canarium/Dacryodes type	1	17	0.6	F,E,M,O
cf. *Carapa procera*	1	17	0.6	F,C,M,T
Celtis* cf. *integrifolia	**1**	**17**	**0.6**	**E,M,T**
Lophira cf. *lanceolata*	1	17	0.6	F,C,E,M,O
Microdesmis	**1**	**17**	**0.6**	**E,M,T**
Ongokea gore	**1**	**17**	**0.6**	**E,M,T**
Pericopsis-type	1	17	0.6	
Sapotaceae, dendritic, *Synsepalum* type	1	17	0.6	
Sapotaceae, banded	1	17	0.6	
TOTAL NGRE PHASE	173			

*From Irvine 1961. Abbreviations: F=firewood/charcoal; E=Edible fruits or leaves; M=Medicinal; O=Oil; C=Construction, T=Technical processes (i.e., dying, tanning, etc.); S=Sacred were used primarily as firewood. Almost all of the trees represented have medicinal uses, many have edible parts and can be used in craft production or house construction. For most specimens, however, it is impossible to separate these uses from that of firewood (i.e., shea nut tree), though one can speculate in the case of taxa that are today reserved for exclusively non-fuel uses. Fruits from several taxa, including *Detarium, Grewia mollis*, and *Celtis integrifolia* are commonly consumed. *Grewia* cf. *mollis* fruit has also been uncovered at the contemporaneous archaeological sites of Dia (Murray 2005) and Saouga (Neumann et al. 1998). However, it does not usually grow in savanna woodland environments; the genus is scattered across environments ranging from the dry Sahel to coastal thickets (White 1983: 98, 113, 236, 242). Yet other tree taxa are frequently used in construction, especially *Terminalia* and *Khaya*. And a few have very specific technical uses; for example, *Pterocarpus* is used as a dye and in tanning (Irvine 1961).

However, the majority of taxa were likely used as fuel woods, and collected from the local environment. Like the Volta phase, most of the tree taxa represented are found throughout the wet and dry Sudanian woodland. The taxa that occur in both ecological microzones include *Terminalia, Afzelia,, Terminalia, Vitellaria paradoxa, Detarium, Berlinia/Isoberlinia, Crossopteryx, Bridelia, Anogeissus, Pterocarpus, Daniellia, Combretum,Parinari, Prosopis, Khaya, Piliostigma,* and *Pericopsis* (White 1983: 105). These types also dominate the assemblage. There are, however, several taxa that indicate wet savanna woodland (*Uapaca, Lophira* cf. *lanceolata*) and Sudanian transition woodland (*Celtis* cf. *integrifolia, Pteleopsis*; White 1983: 105, 107).

One of the most interesting results is the high number of forest tree taxa that are represented, especially when compared to the preceding phase. These include three taxa found only in drier semi-peripheral evergreen forest and secondary rainforest (*Triplochiton schleroxylon*, *Klainedoxa*, *Canarium/Dacryodes*) (White 1983: 79, 81, 172). Though *Terminalia* has a wide distribution, *Triplochiton scheroxylon* does not, and along with *Terminalia superba*, is the prime colonizer of cleared land in drier peripheral semi-evergreen rainforest and transitional types (White 1983: 57, 79). A few other tree taxa recovered are found only in moist and mixed moist semi-evergreen forest, including *Petersianthus macrocarpum* (White 1983:77) and *Ongokea gore* (prota.org). *Carapa* *procera* is found in short and scrub forest, especially in uplands as well as swamp and riparian forest (White 1983: 82-83). *Microdesmis* occurs in damp secondary and primary forest (prota.org). If interpreted through an ecological lens, the presence of these forest taxa suggests that, although the majority of areas exploited for firewood were Sudanian woodland, there were nearby areas of encroaching dry and mixed semi-evergreen forest. In the 1960s, this boundary was south of Nsawkaw, about 30 km south of Ngre (Figure 4.6; Wills 1962), suggesting that the Banda area was either significantly wetter and/or had been less impacted by clearing for agriculture in the Ngre phase.

The clear increase in the number of forest taxa represented in Ngre times (n=7) compared to the Volta phase (n=1) may suggest a change in the intensity of metalworking or clearing activities, or more humid conditions. Forest trees are often large hardwoods, ideal for applications that required long burning fuels, such as metalworking. Iron working in particular requires large amounts of charcoal from hardwood species, thus large-scale production demands a ready supply of hardwood from nearby woodlands (Brook 1993: 52; Goucher 1981). Several of the contexts that contained evidence for metalworking (3 samples in NK M6 and KK M101) in the form of abundant slag also contained humid forest species; but at least one sample at the base of Mound 8, associated with a child burial, also had a humid forest taxa but no significant metalworking debris. It is also worth mentioning that of all the taxa recovered, Irvine (1961: 113, 218) only notes two of them as supplying excellent fuels capable of intense heat (*Anogeissus* and *Bridelia*), neither of which are humid forest trees. One must be cautious interpreting this: Irvine's information all comes from a time when African iron working (especially smelting) had died out almost completely, so many of the species used in former times for specific uses probably went unrecorded.

Charcoal is the preferred fuel of iron smelters, but according to Goucher (1981: 181) "not every tree is suitable for the charring process. Even fewer species provide charcoal suitable for the smelting and forging of iron. For these purposes a slow-burning, dense, hard wood, usually with high alkali and silica contents and a granular structure ensuring the packed charcoal's permeability in the charge, must be utilized." In addition, smelters are very particular about which tree species are used. In the Begho (Hani) area in the 1970s, Goucher (1981: 182) observed preparation and selection of charcoal for iron-smelting. She noted that most of the trees suitable for charcoal are also slow-growing and take a long time to regenerate. Thus intensive iron smelting would likely lead to severe environmental degradation, especially locally. In addition, drought conditions would have seriously diminished the number and density of suitable trees on the landscape, and may have significantly affected iron smelting industries (Goucher 1981: 183, though her time frame for drought in Ghana is outdated, see below).[22]

This much higher diversity of species as well as presence of many forest trees could suggest that more secondary forested land was nearby, and either being cleared for cultivation or perhaps just an area where firewood for special activities like metalworking was collected. People in modern west-central Africa tend to collect domestic firewood from where it is most convenient: in and around their fields, especially as part of the clearing process. There is little preference for specific taxa, but people tend to prefer harder woods that are longer burning and of relatively small diameter, which suits being fed into three-stone hearths (Gelabert et al. 2011). While it would be remiss to extend these preferences and motivations onto Ngre Phase peoples, it does seem consistent to assume that normal domestic firewood needs are met by what is convenient, i.e., woods that are especially difficult to fell and transport would not be the focus of collection activities. Such large trees are often felled today for the production of charcoal, which is then transported *en masse* and sold at markets. This is however, a strategy very much attuned to present day markets and the demand for charcoal by urban populations.

While it is tempting to draw a link forest trees and an increase in either metalworking or the amount of land under cultivation, it is likely that they reflect more humid conditions, at least in part. This is supported by recent paleoenvironmental reconstructions at Lake Bosumtwi, some 200 km south/southeast from Banda as the bird flies (Figure 4.7 below; Russell 2003; Shanahan et al. 2008, 2009; Talbot et al. 1984). Reconstruction of rainfall amounts during the Volta, Ngre, as well as later phases suggests changing environmental conditions. Most apparent is a wet period coincident

[22] This suggests that during the post- 1450 Kuulo phase, drought-like conditions may have discouraged iron smelting on any scale. The wood charcoal from KP shows a considerable contraction. This may have reoccasioned a shift in economic activities, i.e. diversification into other types of craft production.

with the Ngre phase, with the highest rainfall amounts in the entire sequence observed in the terminal Ngre phase and early Kuulo phase between about 1300-1450.[23] Conditions during the Volta phase and especially the Kuulo phase were considerably drier. During both of these dry phases, the number of identified charcoal taxa drops considerably, and humid forest tree taxa are extremely rare. The pattern is the opposite for the humid Ngre phase.

Additional support for changing climatic conditions is to be found in the subsistence remains themselves. Most notable is the increased ubiquity of sorghum during the Ngre phase, where it occurs in 37% of Ngre Phase contexts (17-67% range across three sites) compared to only 7% of Volta Phase contexts (5-17% range across two sites). The ubiquity of sorghum drops considerably again in the dry Kuulo phase (Ch.5). Banda is at the high end of precipitation for pearl millet today, and from what local farmers say, too much rain especially at the wrong times can have disastrous effects on millet harvests. Sorghum on the other hand is much more tolerant of high moisture levels. The increased presence of sorghum during the Ngre phase may therefore represent an adaptation to wetter conditions.

Involvement in trade

There are no definitive botanical indicators of long-distance trade, but several pieces of evidence are suggestive. *Grewia mollis* wood may indicate that its fruits or an object crafted of its wood were consumed at Banda. This species is typically associated with drier Sahelian and savanna environments, and frequently found at Sahelian archaeological sites (not unlike *Ziziphus*, above). Might these isolated finds suggest tastes for wild fruits (and perhaps people themselves) from further north were also present in Banda? Without direct evidence it is hard to know. There are two other possible lines of evidence for trade within the Banda region and farther afield during this phase; but their discussion requires that I return to considering Banda within the wider subcontinent.

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[23] Alexa Höhn (2011 pers. comm.) has pointed out that trees, especially slow-growing forest trees, need time to advance and mature; this short 150 year wet phase may not have engendered a complete shift of Banda's vegetation to that of semi-evergreen forest, but the charcoal data do suggest that at least some areas nearby were already being colonized by secondary forest trees.

Comparing Banda to wider West Africa

I conclude this chapter by discussing evidence from Banda in relation to the wider West African trade and culinary scene before 1450. As archaeological evidence in the form of copper suggests, Banda was involved in northern-focused trade networks by at least the Ngre phase. Banda farmers and cooks, like those of many other regions outside the Niger Bend, focused on pearl millet and sorghum. In what other ways may practices in Banda have been shared with and/or different from their neighbors? How did environmental change and trade impact foodways and interactions before 1450?

A curious pattern is evident in comparing environmental shifts in Banda (above) with those in wider West Africa, especially at its drier margins. Brooks (1985, 1993), Mayor et al. (2005), and McIntosh (1998, 2000) present the typical scenario of climate changes from a Sahelian and savanna perspective (Figure 4.7). The period between c. 300/400-1000/1100 was wet, based on data from Lake Chad and Nigeria. A trend towards aridification began in the 11th century, attested to by a regression of Lake Chad and migration of populations southwards (Maley 1981; McIntosh 1998). Severe droughts plagued the Sahel between 1200-1500 (McIntosh 1998: 73). McIntosh and Brooks see a return to humid conditions between c. 1500-1630. Conditions are generally dry, and droughts punctuate the sequence from 1630 to the mid-19th century, as attested by numerous documentary accounts of severe drought (McIntosh 2000: 152). A somewhat different pattern characterizes the Lake Bosumtwi sequence (above and Fig. 4.6), and is attested to locally in the Banda area by charred botanical remains. Is this a real difference, or simply a shortfall in reliable data? [24]

[24] And perhaps calibrated dates? The dates used by paleoenvironmental researchers usually are, and the ones McIntosh (1998, 2000) uses appear to be, but this has been quite difficult to backtrack.

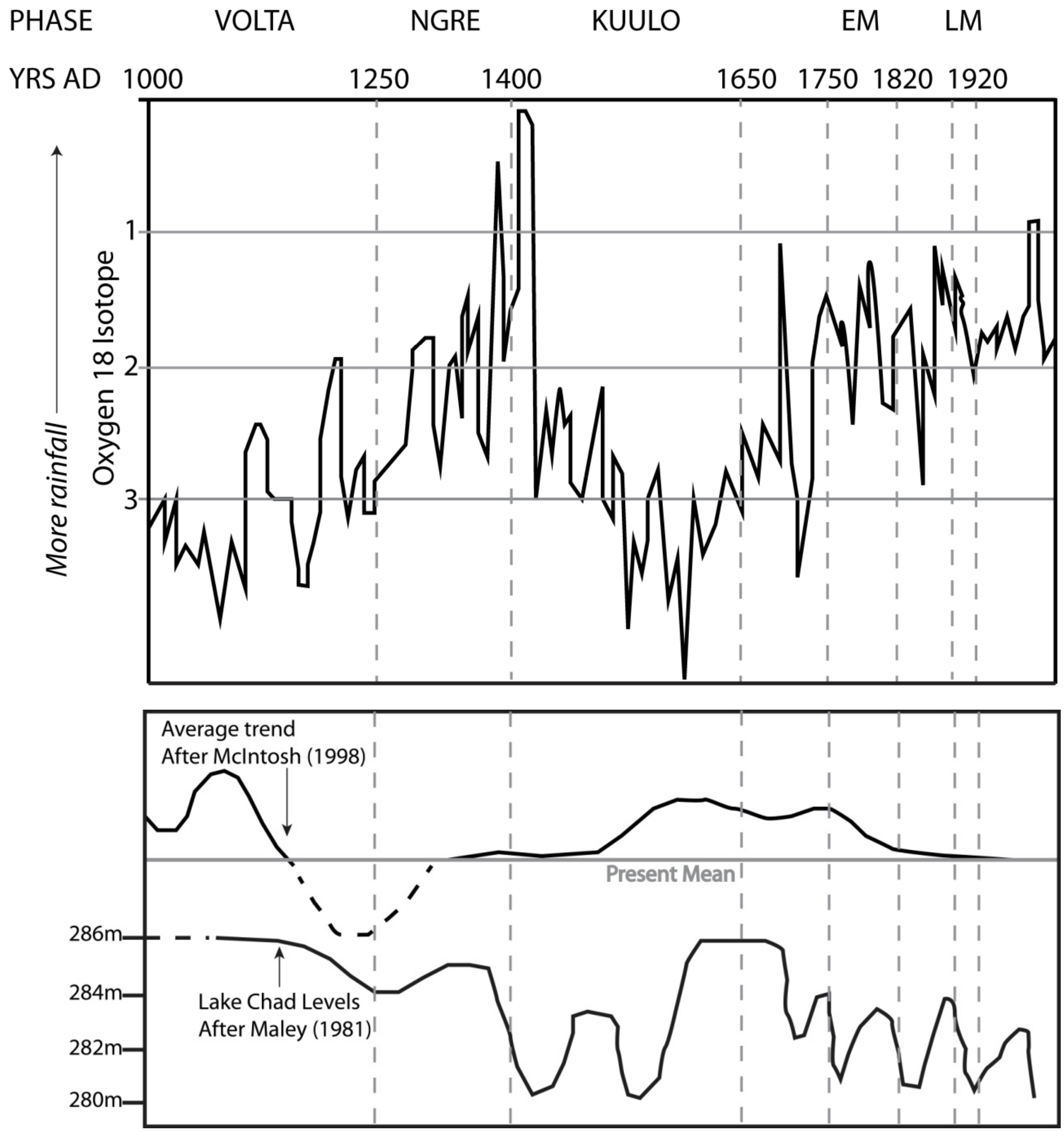

FIGURE 4.6: Comparison of Bosumtwi record (top) and Sahel (bottom) climatic shift sequence (after Mayor et al. 2005: 50; Shanahan et al. 2009: 379)

While the Brooks and McIntosh scheme is presented as a general and unified narrative of climate change that is repeatedly referenced in archaeological and paleoenvironmental literatures, there are several interpretive problems as well as contradictory paleoenvironmental records. In a recent synthesis, Mayor and colleagues (2005) note the tendency of both naturalists and archaeologists to use paleoenvironmental and cultural data to reinforce shifts in each record without reference to supporting supplementary data. Paleoenvironmental and historical sequences from disparate parts of the continent are often amalgamated to come up with average curves and grand narratives (i.e., Brooks 1993; McIntosh 1998, 2000), without attention to the very real regional variability in the scale and timing of climatic shifts. This is exacerbated by the paucity of records of environmental change during the historical era—in other words, the dots that are being connected are few and far between (Mayor et al. 2005: 29).

What does this regional variability look like? Recall that the first millennium was interpreted as a wet period that would have favored, for example, the expansion of the Ghanaian empire. Contradictory records are found in eastern Sahelian West Africa (NE Nigeria), which show that a more unstable hydrological regime prevailed after cal AD 450. At this time, dust deposition doubled, suggesting a more arid Sahara and/or increase in Harmattan winds. This arid phase reached its apogee between cal AD 770-960, when the most severe drought in over five millennia is recorded. This is in contrast to the configuration described above, when this period was supposedly wet and enabled settlement of the far northern Sahel, at least in the western half of West Africa.

There is similar variability in the period after the 10th century. In contrast to a trend of increasing aridity beginning in the 11th century (Maley 1981), multiple records across the Sahel show increasingly wet conditions (Vernet 2002). In northeast Nigeria, wetter conditions seem to return after 1000 cal. B.P. (c. AD 950), with some variability (Street-Perrott et al. 2000: 297). Increased precipitation at this time is also suggested for the Timbuktu region (McIntosh and McIntosh 1986). This humid period apparently came to an end sometime between the 11th and 13th centuries depending on the region (Vernet 2002: 57). Likewise, while some sources see a return to stable, humid conditions after the 15th century (McIntosh 2000), other records show an accentuation of aridity at this time. In Lake Chad records, Maley (1981) sees significant regression in the 15th-16th centuries, and a return to first millennium high lake level stands in the 17th century.

There are several possible explanations for such regional variability. One important point made by Mayor and colleagues (2005: 27) is that paleoenvironmental records are proxy records, in other words, they measure the effects of change on the landscape rather than cause. Many of these shifts are actually the result of anthropogenic impacts on the landscape, particularly those interpreted as resulting from increased aridification. Different environmental shifts also happen on various scales, from local or regional to worldwide. Shanahan and colleagues (2008: 9-10) suggest that there is variability between what causes precipitation in inland areas (African Easterly Waves) and coastal regions (position of ITCZ and tropical SSTs). Nicholson's (1986) reconstructions of different modes of precipitation change over the African continent in the last century also suggest that there is considerable spatial discontinuity in the timing of precipitation shifts. Thus it is possible that at the time the Niger Bend and Inland Niger Delta were experiencing drought, or at least less than ideal conditions, Banda and perhaps much of the savanna and forest were experiencing wet conditions. More detailed environmental records and careful reporting of calibrated dates are needed to evaluate this scenario more fully.

With reference to Figure 4.7, it is clear that the Bosumtwi region was undergoing a trend towards increasing precipitation beginning in the mid-Volta phase in the late 12th century. Though there were slightly more humid blips at this time in Lake Chad and other Sahelian records, the general trend is one towards increasing aridity during the first millennium. The Bosumtwi record does not show a trend towards increasing aridity at this time, but seems to have been more strongly affected by increased precipitation from the 12th-15th centuries, followed by a multi-century drought (Chapter 5). Based on the patterns evident in charcoal and grain crops, the pattern of ecological change in Banda seems to more closely resemble that observed at Bosumtwi. This has implications both for subsistence and trade, especially on a sub-regional scale.

I suggest that this spatial variability in environmental change, if it can be confirmed, may have had an important impact on the production of surplus agricultural goods, but perhaps an even stronger impact on the demand for iron smelting. The seeming increase and profusion of iron working activities and probably smelting as suggested by large quantities of slag associated with Ngre phase sites (Stahl 2007a: 60)

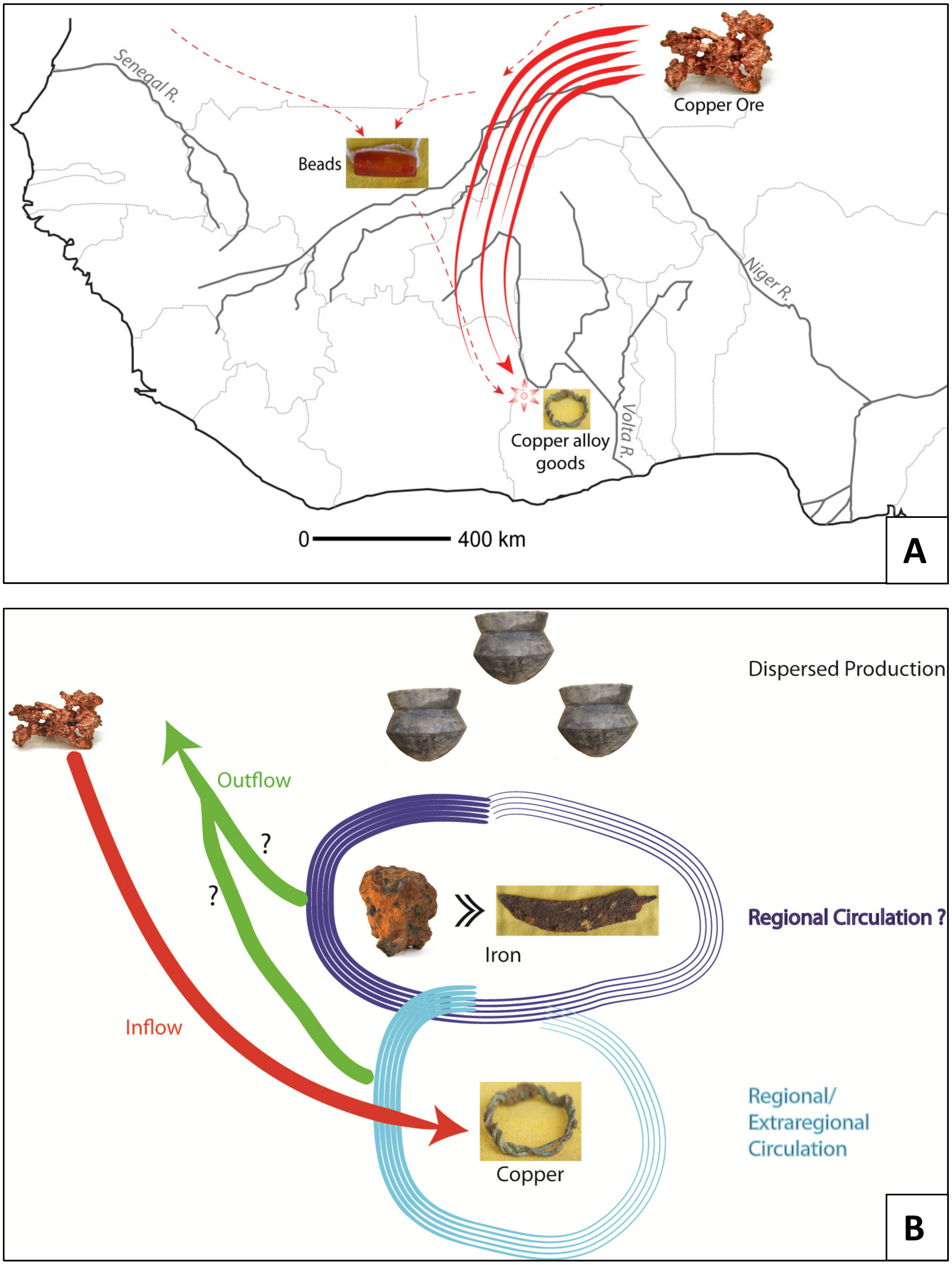

FIGURE 4.7: Schematic views of a) continental trade, and b) organization of regional trade in Banda between 1250-1450 (artifact photos courtesy of Ann Stahl)

may indicate increasing demand for iron. While the presence of iron working is not unequivocal evidence for extra-regional trade, it is telling that Bono Manso (Abam iron smelting site, Effah-Gyamfi 1985: 79-84) and perhaps Begho (Goucher 1981; Posnansky 1987) also show iron smelting evidence on a large scale before 1450, especially between about 1200 and 1450, straddling a Sahelian dry phase and central Ghana wet phase.[25] These areas are not only full of iron-rich laterite (Posnansky 1971: 118) but of forest trees well-suited for use as fuel. These sites were all occupied before significant and unequivocal evidence for involvement in trans-Saharan trade networks in the form of obvious trade goods (i.e., copper, spindle whorls, gold weights). When trade goods are present in these sites in this early phase, it is always copper and beads that appear before anything else. This copper, in turn, seems to be casted locally, again taking advantage of abundant firewood supplies.

It seems plausible, then, that the gravity of demand for iron and its production shifted southwards as fuel sources dried up during Sahelian dry periods, and that producers in central Ghana took advantage to produce and trade iron. Figure 4.7 schematically illustrates this dynamic. Iron bloom and perhaps semi-finished or finished goods smelted and perhaps worked in the Banda area and neighboring areas may have been traded for copper and beads (Fig. 4.7a).[26] Figure 4.7b presents a schematic view on how trade and exchange may have circulated in the Ngre phase, with iron, and copper alloy items being locally produced, but perhaps circulated regionally or extraregionally, pulling the gravity of trade southwards. Later trade in gold, kola, and slaves was probably built upon these networks (Ch.5, compare to Fig. 5.14).[27]

What impacts would environmental change and trade have had on food and agriculture in Banda? Was Banda part of the same culinary spheres discussed above?

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[25] This is supported by Mayor et al.'s (2005:33-34) study which uses climatic, archaeological, and oral historical data to reconstruct occupation of the Dogon Plateau, Mali, during a period when it was wet and forested, which they date to AD 1230-1430, at precisely the same time we see elevated rainfall in Ghana.

[26] This is all speculative of course, and dependent upon a detailed presentation of the dates for iron smelting in Banda.

[27] I am not the first to suggest that trade in metals proceeded other kinds of trans-Saharan trade (e.g., Posnansky 1973:150), though this is the first time we have clear chronological and environmental evidence.

Since there is little clear evidence for the presence of exotic plants (excepting perhaps *Grewia mollis* and *Ziziphus*), I consider these questions through the lens of agricultural and food preparation techniques.

Like other contemporaneous villages in West Africa where archaeobotanical analysis has been conducted, in Banda pearl millet dominates, and sorghum and fonio are present in small amounts. This suggests that pearl millet was the dominant grain in diets, or that it was prepared in manners conducive to its preservation. However, there is a notable increase in the amount of sorghum recovered and the percentage presence in the Ngre Phase. I attribute this in part to increasingly humid conditions, when the cultivation of millet would have been more risky, and sorghum more predictable and productive. Banda today lies at the southern, wet range for millet cultivation, and too much rainfall can easily destroy a millet harvest (Ch. 2). Sorghum on the other hand is tolerant of high precipitation regimes. Increasing production of sorghum may have been a risk-reducing strategy. It is unclear if sites in the Niger Bend and elsewhere also adjusted which grain crops were produced according to changing precipitation regimes. Probably they did, and this may account for the differential distribution and adoption of sorghum and fonio across the wider region. Unfortunately the very few quantified archaeobotanical assemblages and contemporaneous paleoclimatic sequences make it difficult to evaluate these kinds of strategies on a sub-continental level.

A final point I consider is food preparation and consumption in Banda compared to other regions in West Africa. I address this by expanding my observations to both faunal and ceramic remains, though most of these are still in write-up stage and should be considered speculative. Faunal data is not yet available for the Volta phase, but the limited sample available from combined Ngre and Kuulo phase contexts suggests consumption of wild game, a profile not mirrored in the botanical remains, which are by and large domestic. Another interesting indicator is the highly fragmented nature of bovid remains (Stahl 2007a: 61), which may suggest cleaving into small chunks as if for inclusion in stews (Maclean and Insoll 1999) rather than roasting of whole chunks of meat.

The predominance of pearl millet may be a result of different preparation techniques that would have favored pearl millet preservation over that of sorghum. Namely, if sorghum was prepared as a porridge of some sort or even as beer (or possibly flatbread, Chs. 5 & 8), and pearl millet was instead prepared as a *couscous* that is steamed, millet would have come into contact with fire more often as nearly complete grains than sorghum. Based on remains of perforated pots or *couscousières* in Iron Age Mali and Jenne-jeno, steaming was certainly known at this time; it was also mentioned by Arab travelers (Maclean and Insoll 1999; McIntosh 1995). Perforated pots are found in Banda pottery assemblages, at least for later periods (Stahl 2012 pers. comm), suggesting that the technique of steaming appeared later in time (or that non-pottery steamers were used). Steaming would have been an efficient way to prepare pearl millet, which was perhaps an increasing pressure on diet as the inhabitants of Banda became more involved in surplus craft production.

Other kinds of pots present in the Banda sequence are also suggestive of specific culinary or storage functions. Among them, recurved rim jars are found in the Ngre sequence (just when sorghum becomes more popular), whereas constricted orifice jars are present in the later Kuulo phase (Stahl 2007a: 60). These constricted orifice jars often display considerable pitting, which is common in beer vessels (Smith in Stahl 2007a: 60). Sorghum is today the grain of choice for beer preparation, though pearl millet is also widely used to make beer in other regions. Might recurved rim jars have served a similar function, and been replaced by constricted orifice forms? Both types would have been appropriate for holding and storing beer. While this is speculative, there does seem to be a shift in ceramic forms in Banda between the Volta and Ngre phases (Stahl 2007:60) that may very well coincide with culinary shifts, perhaps an increasing reliance on sorghum foods or drinks. This will be evaluated as more ceramic data become available. But for the present, it is notable that McIntosh (1995c) observes a shift from small cooking and serving pots to steamers and large cooking pots around 500 at Jenne-jeno, as the town became increasingly involved in production of surplus and long-distance trade. It may be that the women of Banda made a similar choice as the area became increasingly involved in long-distance trade. Though some of this waits evaluation upon publication of the full

Banda sequence, I pick up the threads of these culinary strands in Chapter 5, when new foods from across the Atlantic begin to alter this picture, and consider shifts for the region as a whole over time in Chapter 8.

Chapter Summary

In this chapter, I outlined the contours of the Niger and trans-Saharan trade, and how goods and foods circulated over West African space. Records from Arab merchants and scholars are supplemented by archaeobotanical remains at several sites across the Sahel and Sahara, and trace the movement of grains, fruits, and industrial crops from the Arab world into the drier portions of the subcontinent. These new foods met already established food traditions based on pearl millet in most areas, and rice along the Niger, with the addition of sorghum for the most part after 1000. From the very limited evidence we have, pearl millet and sorghum appear to have been prepared both as flatbreads and in porridges, and later steamed. Sorghum appears to have either been prepared or used differently, perhaps as a grain of commerce.

However, neither Arab records nor archaeobotanical studies have penetrated as far south as modern day Ghana. Archaeological sites in central and northern Ghana indicate limited involvement in the Niger trade before 1450, with beads and copper alloys being the first evidence for long-distance trade. In Banda, people relied on pearl millet at this time, and used sorghum more commonly in periods with more rainfall, such as the Ngre phase. This phase was quite wet, as evidenced in both the Bosumtwi and local charcoal records. These ideal conditions contrasted to the arid conditions that plagued much of the Sahel at the same time, and made Banda an ideal location for fuel intensive activities such as iron smelting. I suggest that trade in metals underlay Banda's initial involvement in Niger trade networks, something that expands considerably in the subsequent Kuulo phase.

Chapter 5

Consumers and the Consumed: Food and Early Atlantic Entanglements, 1450-1700

This chapter is about transitions to things novel and ties that bind people to the familiar. Writ over the long time scale that structures archaeological imaginations, the shift from trans-Saharan trade to Atlantic connections is a break point that structures our phases and our thinking. In practice, this shift was composed of a number of daily decisions in households, amongst elders and chiefs, and between those from abroad and those indigenous. Ideas are not the only actors in decision-making; bodies and the routines they perform are also gatekeepers that constantly guard the familiar and challenge the unknown (Bourdieu 1977, 1984; Stahl 2002). In this chapter, I explore how new foods and habits from the Americas were collected and recontextualized in the initial phase of Atlantic trade, and how previous trade relations structured local exchange and tastes for things from afar.

In Chapter 4, I began exploring the circulation of goods through trade networks across the Niger and Sahara, the forces that pulled Banda north, east, and westwards towards African empires and Arab worlds. Here I continue to investigate these connections as the inhabitants of the Gold Coast intensified production and involvement with long-distance trade networks. At the same time, the centrifugal pull towards the Atlantic began, spinning local production and tastes southwards. This marks the beginning of what some call the 'Columbian Exchange' (Crosby 2003), as biological and cultural goods were traded between the Eastern and Western hemispheres. I briefly review the role of the gold trade in expanding Atlantic connections in Ghana, and how these interactions were structured by preexisting Niger trade links. I then turn to the biological and cultural side of this exchange, and critically question Africa's role in the

Columbian Exchange. I review the evidence for the adoption and spread of new crops from Asia, the Mediterranean, and the Americas into Africa. Finally, I zero in on Banda, where I explore how these many currents of continuity and change intersect in cooking pots and farmer's fields.

Gold to shackles: Saharan and Atlantic trade in the 15th-17th centuries

The land that falls within the boundaries of the modern nation of Ghana was at the center of the battle for control of trade beginning in the 15th century. Merchants and states from the Middle Niger sought to maintain control over the precious gold trade. Led by the Portuguese and French, Europeans aimed to eliminate Arab middlemen and obtain gold from African sources directly. Obtaining stable trade links with the Akan goldfields of southern Ghana was the primary goal of both. In these few centuries the elaboration of trade based on gold gave way to a trade based on human captives (Wilks 1982a,b). In this section, I review the historical and archaeological evidence for involvement in trade and the changing political economic landscape in West Africa in the 15th to 17th centuries. In the next section, I narrow my focus to the adoption and spread of new crops as part of these enlarging networks.

Politically, the 15th to 17th centuries were a time of great upheaval as different powers sought to control trade. The reach of the empire of Mali (Figure 4.1) extended into the Akan gold fields, which were conceptualized by those in the core as the 'edge' of the empire (Wilks 1982a). Songhai was a competing polity centered in the Sahel to the east of Mali (Figure 5.1). Expansion into areas formerly under the control of Mali began in the mid-15th century; eventually the provinces still under Malian control were targeted, particularly in the 16th century. Instead of conquering Mali completely, Songhai continued to launch small raids, keeping the formerly strong polity alive and probably paying tribute through the 16th century. Songhai was not the only player seeking control of trading centers like Timbuktu, Jenne, and Walata; other groups like the Futa, Fulbe, Tuareg, and Mossi were a continued source of competition. A Moroccan invasion in 1590/1 toppled the Songhai empire, took control of the three principal trade centers, and caused widespread turmoil and raiding as central authority collapsed. However, the aging empire of Mali benefited, since it was no longer subject to the aggressive tactics of the

Songhai. Although the king of Mali tried to rebuild his former territories, he eventually lost control over the Bambuk goldfields, placing the final nail in the imperial coffin (Levtzion 1980: 84-99).

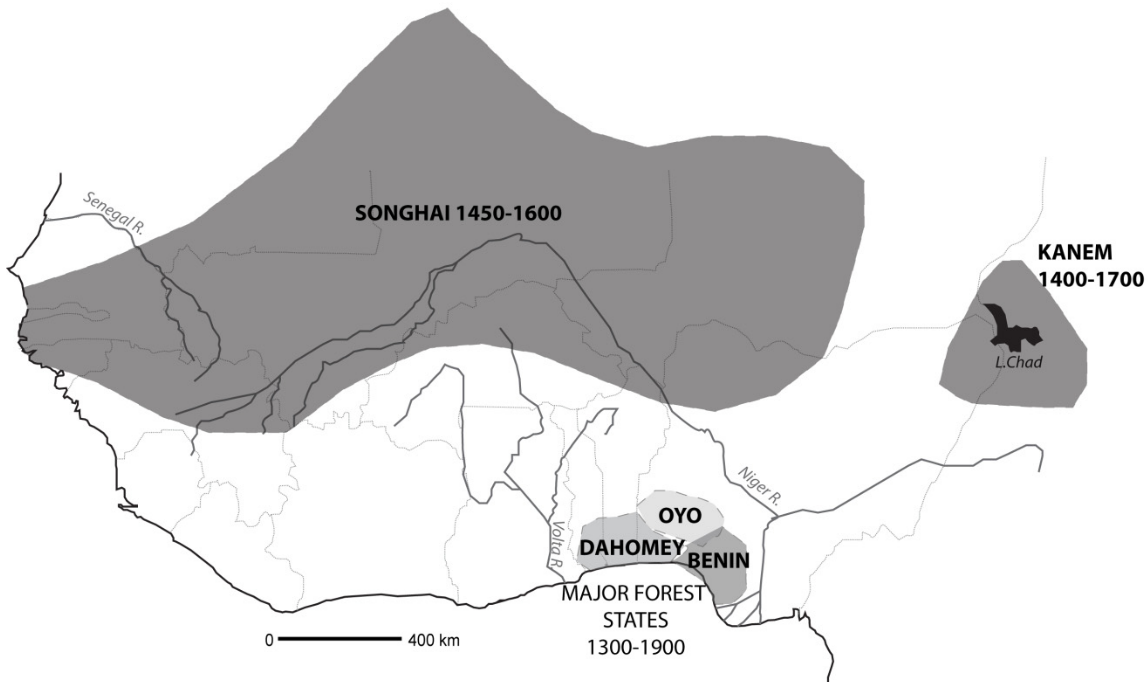

FIGURE 5.1: West African Empires, c. 1450-1650

The rise (and fall) of kingdoms and states was not limited to the Sahel and Sudan; several polities were formed in the forest zones in the area of modern day Benin and Nigeria. Exactly when and under what circumstances these polities developed are unknown; they probably formed sometime after 1000 and gathered strength in the centuries to come. These include the Yoruba state of Oyo, the Edo state of Benin, and Dahomey. Because it is unclear what (if any) influence they had on Ghana, I do not review them there, but suffice it to note that they were among the strong urbanized polities that the Portuguese encountered on the West African coast in the 15th century (see also Ch. 6; Davidson 1998: 107-128).

The Gold Coast comprised the coastline of eastern Côte d'Ivoire and Ghana and was the subject of Portuguese exploration beginning in the 15th century. In 1471, the Portugese discovered the traffic of gold at a place they called Mina (literally "mine").

The trade here was so brisk that they commenced the building of a castle in 1482, later known as Elmina. Gold trade out of Elmina was on a large scale; between 1487 and 1489, an annual average of 8000 oz. (over 225 kg) of gold reached the Lisbon treasuries; by the beginning of the 16th century, annual totals exceeded 25,000 oz. (over 700 kg). Such a large-scale exportation of gold was facilitated by preexisting extraction industries and distributive mechanisms which were already in place at the Portuguese arrival. Several Akan groups as well as the Wangara were responsible for these networks (Wilks 1982a: 336-337).

The Wangara (also Dyula, Juula) have achieved almost mythic importance in discussion of the gold trade. They were specialized long distance traders originally from the empire of Mali. Wangara traders dispersed and established the first link between people of the gold lands and the parties interested in obtaining it. As such, the Wangara spread far and wide, from Gambia to Hausa lands and southwards to the Akan goldfields (Wilks 1982a: 335-336). One central node in this network was Begho or Bitu, where Wangara merchants from Jenne and destinations northwards came to trade with Akan peoples for gold and kola nut. Begho was positioned along the northern fringe of the forest, an ideal point of control to exchange forest goods for northern commodities (Posnansky 1973, 1987; see below).

The 1540s was time of turmoil both in Akan country and along the Niger as Mali and Songhai vied for power, causing interruptions to the gold trade and ultimately a permanent shift towards the Atlantic coast (Wilks 1982b: 467-468). The re-direction of the gold supply angered the Malian king, who sent an envoy to Begho to demand gold. Begho refused, and a Malian cavalry force was sent to occupy the town. One of the officers leading the expedition was Naba'a, who later split off and founded the Gonja state just north of the Black Volta between 1553 and 1583 (Wilks 1982b: 469; Wilks et al. 1986). The neophyte state soon expanded through violent means: decimating, displacing, and in some cases enslaving local people. Gonja then proceeded to conduct a brisk trade with the Akan, with Begho as the principal entrepôt (Wilks 1982b: 471). Lying in the path of all of these developments was Banda, to which I return to below.

While the gold trade between Begho and Jenne had resumed by the mid-16th century and continued for many decades thereafter, the center of gravity and nature of the gold trade changed dramatically in the 17th century. Mali fell and was replaced by Songhai. In addition, sources of gold were discovered in the 'New World' and came to replace those of Ghana in the global economy (Wilks 1982b: 472). These forces combined to cause a shift towards a more insidious trade—in human beings—using the infrastructure already built for the gold trade (such as castles at Elmina and Cape Coast). The Gold Coast slave trade was minor due to unpredictable supplies of captives for much of the 17th century; but as wars between competing polities cropped up in the late 17th and early 18th century, supply of war captives increased (Lovejoy 2011: 56-57). By the early 18th century, one of these polities—the Asante—emerged victorious (see Ch. 6).

Trade and Daily Life in the Gold Coast

How was daily life impacted by these shifting connections? The documentary evidence just presented paints broad brush strokes of changing demands and directionality of trade during this period, but archaeological evidence is required to speak to how local people in specific places adapted to and took advantage of these shifts. Archaeology is particularly well suited to disentangling shifts in settlement patterns, the extent of influence of different polities, and how local people adopted and recontextualized novel goods and practices (DeCorse 2001b; Stahl 1994, 1999a, 2001, 2002). Here I describe evidence for how local communities and regions were involved in and affected by trade, working from the coast, where archaeological work has focused, to areas further inland. This review is not comprehensive; details of finds, particularly of trade goods from selected sites can be found in Table 5.1, and their locations in Figure 5.2. One word of caution is necessary: precise chronological control is lacking or not fully reported for most sites excavated before 1990, making it difficult to determine when and at what rate lives became entangled in these different spheres.

Coastal Sites

The Ghanaian coast has seen extensive archaeological work in the last few decades in an attempt to document life before the arrival of Europeans in 1471 and determine how African polities and daily life transformed as a result of such contact. I limit my discussion to two well-researched sites that illustrate the variability in involvement with Atlantic trade: Elmina, a polity that arose in response to European influence, and Dawu, a well-documented example of a craft-producing hinterland region. Two general trends are evidenced in the coast and its hinterlands. First, there was a demographic shift towards the coastline after the arrival of the Europeans, and second, there was an increase in craft production in these areas, at times supplied by the influx of European raw materials (DeCorse 2001b, 2005).

FIGURE 5.2: Map of Ghana and sites mentioned in text

TABLE 5.1: Summary of material remains from selected Ghanaian sites occupied in the 15th-17th centuries

Site (Source)	Dates A.D.	Iron	Iron slag	Copper	Copper working	Ivory	Beads	Cowrie	Spindle whorls	Weights	Pipes	Gold items	European goods	Domestic architect.	Wild fauna	Domestic fauna	Plant remains
Ahwene Koko (Boachie-Ansah 1986)	1585±80 c.14th-18th centuries	X	X				X		X		X				NR	NR	NR
Asantemanso* (Shinnie 1988; Vivian 1990)	c. 1200-1699, perhaps earlier	X	X												NR	NR	NR
Begho* (Posnansky 1973,1987)	14th to 18th centuries**	X	X	X	X	X	X	X	X	X	X		X	X	X	X	NR
Bono Manso (Gyamfi 1985)	Phase II (c.15th-16th C) Phase III (c. 17th-early 18th C)	X X	? ?	X X	? ?	X X	X X		X X		X X			X X	X X	X	NR
Daboya (Shinnie & Kense 1989)	4th millennium B.P. to present**	X		X		X	X	X	X		X		X		X	X	NR
Dawu (Shaw 1961; Sutton 1981)	c.15th/16th century to 1680	X		X	X	X	X				X				X	X	NR
Eguafo (Spiers 2007)	Pre-1000 to 20th C	X	X	X		X	X			X	X	X	X		X	X	**C**
Elmina (DeCorse 1992,2001b)	c. 1000-1500 c. 1482-19th C	 X	X X?	 X	 X?	 X	X X			 X	 X	 X	 X	 X	 X	 X	NR, HS; Palm kernels
New Buipe (York 1973)	Mid-15th-early 18th C	X	X	X		X	X	X	X	X	X			X	X	X	NR
Yendi Dabari (Shinnie & Ozanne 1962)	c.1500-1675	X					X				X			X?	NR	NR	NR
Yikpabongo (Anquandah 1986)	c.14th-17th centuries	X		X				X		X?							NR

NR=Not reported, unclear if sampled; C=Collected, not yet analyzed; HS=Historical sources; * Full report awaited, so presence/absence should be considered provisional; **Material culture is not reported by phase, and phase dates are unclear, so all material remains of interest are reported here.

In 1482, the Portuguese constructed a fortress next to an extant African settlement which came to be known as Elmina. The Castle shared the fates of trade interests in the area, switching hands to the Dutch in 1637 and later the British in 1872 as the influence of these polities waxed and waned in the African Atlantic trade. However, unlike many other world regions which saw sustained efforts at colonization, in this early period European incursion on the Gold Coast remained bound by the fortresses: confined, protected spaces to facilitate trade alone (DeCorse 1992: 164, 169).

However, European presence did have measurable impacts on local societies. Before the arrival of the Portuguese, the African settlement at Elmina had been subservient to various polities including nearby Eguafo and Fetu. By the 17th century Elmina had asserted its own sovereignty. The Dutch may have helped secure and maintain this independence, and served as mediators in local disputes. Their authority did not extend much further, however; African inhabitants at Elmina could simply 'vote with their feet' if European policies overstepped, something European traders were determined to prevent in order to ensure steady trade (DeCorse 1992: 169-170).

Elmina grew rapidly from the time of European contact well into the 19th century, as people from other regions migrated there to take advantage of the booming trade. This density of residents was matched by a density of multi-storied, flat-roofed stone architecture that distinguished Elmina from neighboring towns. Likewise, the density of trade goods was higher there than at other coastal settlements. Before the late 17th century, the focus of this trade was gold, not captives, which the Portuguese thought damaging to the gold trade. Slaves were however important to fill the labor shortage in the coastal hinterlands, and were imported from other regions in Africa (DeCorse 1992: 172).

Elmina represents one of the wealthier towns along the coast that enjoyed (or endured) higher levels of both European presence and imported goods from Europe, Asia, and the Americas than many other settlements along the coast. In general, populations did aggregate along the coastline to take advantage of trade with Europeans; this population aggregation peaked in the 16th and 17th centuries, but later was subject to deurbanization as smaller polities were absorbed into larger political units (DeCorse 1992; Kea 1982; Stahl 1994: 97).

One center that may have sprung up to take advantage of new trade opportunities with Europeans is Dawu, inland of Accra about 25 km. Today, Dawu is a large midden mound, which was excavated and carefully documented by Shaw in 1942 (Shaw 1961). It was probably occupied for about a century and abandoned in c. 1680 as the Akuapem state expanded into the region (Sutton 1981). The inhabitants were clearly involved in craft production, as there is evidence for brass casting, probably with raw material (copper) obtained from Europeans. There is also evidence for ivory working. Both of these crafting traditions had a long history in the Gold Coast and may have increased in scale in hinterland areas with the arrival of Europeans. Locally made pipes are present throughout the sequence, with a shift towards manufactured European ball clay pipes near the end. As discussed below, Shaw (1961) suggested that these locally made pipes most closely resemble those of the southeastern United States.

African structures of craft production and political organization appear to have persisted through this period of early European contact (DeCorse 2005; DeCorse and Spiers 2009). Artifact inventories from coastal sites suggest that at early European contact, the material remains were similar to preceding phases, being dominated by stone beads, some slag and iron, lithics, and ceramics. From the 17th century onwards, European imports increased significantly. Kea (1982) suggests that this was a time of gradual wealth accumulation and increasing social stratification. This pattern seems to characterize not only Elmina and surrounds, but other sites along the coast, including Eguafo (Spiers 2007) and the Shai hills (Ozanne 1962), where there is evidence for pre-European craft production such as brass casting and gold working (DeCorse 2005).

Inland Sites

Areas inland from the coast were dominated by several small polities that may have formed as part of attempts to control long distance trade networks directed both north and south. The level and nature of control was varied and not necessarily political. Begho, for example, seems to have acted as a trade center instead of a unified polity. In some areas states did arise, such as Bono Manso and Gonja.[1] Here I focus on the

[1] It is possible that Begho had more political control than has been acknowledged. To date, most projects aiming to investigate the impact of nearby polities on local people have been somewhat frustrated by the

evidence for how these areas were incorporated into regional and extra-regional trade networks, particularly at Begho (see also Table 5.1).

Though the name Begho is today used to refer to a cluster of archaeological sites near Hani (Posnansky 1973, 1987), documentary references to Begho may have referred to the region in general (Wilks 1982a). The area in question is nestled in between forest and savanna, in the midst of good sources of iron ore and elephants (for ivory), and just north of the major Akan gold fields and the natural distribution of red kola trees (Posnansky 1971: 118). The sites near Hani are believed to be the remains of a large town comprising over 1500 mounds divided into four 'quarters' (Posnansky 1973, 1987). Nyarko was the oldest quarter and predated significant involvement in the Niger trade (see Ch. 4). The Brong quarter was the largest and the most recently abandoned. The Dwinfour quarter housed artisans, judging by the remains of a brass foundry (Garrard 1980). Finally, there also appeared to be a Muslim (or Kramo) quarter, which may have been home to Mande (Wangara) merchants. An open space lying between these quarters is suggestive of Begho's market area (Posnansky 1973, 1987). While the results of the Begho excavations are not fully published, there are a few observable differences between the quarters. For example, burials in the Kramo (Muslim) quarter are extended and on their backs, while in the Brong and Dwinfour quarters, bodies are found flexed, on their sides, and in close association with houses. Grasscutter (greater cane rat: *Thryonomys swinderianus*) remains were few in the Kramo quarter but abundant in Brong quarter, perhaps due to Muslim dietary restrictions. All quarters had evidence of ceramic and stone weights, perhaps for weighing gold (Posnansky 1987: 18).

The inhabitants of Begho and surrounding areas were engaged in several kinds of craft production. Iron slag is abundant throughout the site (Posnansky 1973: 158). At Dapaa, a site near to Begho, there is evidence for iron smelting on a large-scale between 1400 and 1700. Based on the size of the slag mounds, Goucher (1981: 182) estimated that over 300,000 trees would have been required for fuel, which would have had a considerable impact on the local environment. A brass foundry in Dwinfour indicates that copper alloys were being worked (Garrard 1980). Textiles, beads, and ivory ornaments

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lack of material traces, for example the work of Shinnie and Kense (1989) at Daboya. One wonders whether or not this is simply an issue of preservation, or if the nature of 'control' is in a much different form than we expect.

were also probably manufactured in town, based on the quantity of spindle whorls, presence of dye pits, as well as bead and ivory blanks at several stages of manufacture (Posnansky 1971, 1973, 1987).

Evidence for long-distance trade, while present, is not as abundant as archaeologists would like. There are a few clear examples of foreign imports, including glass beads, copper goods, and blue and white Chinese porcelain of the late 16th century (Posnansky 1971: 120). Other goods indicative of exchange, such as cowrie shells, are present along with rounded pottery discs. Garrard (1980) postulates that these discs fall into the *mitkal* and *wakia* weighing system of Jenne, suggesting their use as weights. Atlantic connections are signaled indirectly by the presence of tobacco pipes at Begho, though the pipes are more similar to Malian styles than those on the coast. Pipes were common, stylistically diverse, and appear to have been distributed differentially between the quarters of the site (Afeku 1976 in Stahl 2001: 140). There is no evidence for other Atlantic crops, as plant remains were not reported or analyzed.

There may have been a greater degree of political control over the surrounding region in other areas than is evidenced at Begho. One such polity is Bono Manso, thought to be the earliest Akan state. At present the level of political control that Bono exacted over the surrounding areas is unclear, though one new project in the area promises to address this issue (A. Compton, 2011 pers. comm.). The large site of Bono Manso itself is believed to be the capital of the polity. Though occupied much earlier (Ch. 4), Bono reached its peak around 1600, when over 10,000 people may have lived in the core town. There is evidence that Bono inhabitants were engaged in iron production, copper working, and cloth production, and obtained ivory objects and beads. These items point to a northern as opposed to an Atlantic dominated trade. The presence of smoking pipes may signal Atlantic connections, but it is likely that these pipes first reached central Ghana via the Niger rather than the coast (below) (Effah-Gyamfi 1985).

There is more evidence for the origin of Gonja and the pressure it exacted on local populations. Gonja subsumed several different ethnolinguistic groups according to history recorded by oral sources and an Arabic text dating to the mid-17th century (Wilks et al. 1986). Despite the violent nature of Gonja expansion recorded in historical accounts, there is little evidence for significant changes in daily life as a result at nearby village sites. Related archaeological sites excavated to date include New Buipe (York 1973), Daboya, and several sites tested as part of the Western Gonja Archaeological Project (Shinnie and Kense 1989; Table 5.1).

New Buipe is a mound site where a large-scale salvage excavation was conducted by York (1973). He found evidence for three separate occupations spanning the Kintampo phase to the 18th century, the last of which concerns me. Phase 3 probably dates from the 16th to 18th centuries, with several subphases or periods. Importantly, York saw a shift around period 5 (c. 1600-1640) when there is an increase in luxury metal goods (iron and copper), ivory, cowries, and beads. The site does not appear to have engaged in production of these crafts, but spindle whorls occur with some frequency, suggesting that thread was produced. This inflection point, along with a shift in pottery style (to Tradition C), suggests that from period 5 onwards Buipe came under the influence of Gonja. The site seems to have been abandoned in the first half of the 18th century, perhaps as a result of Asante raids on eastern Gonja (York 1973: 173-185).

Daboya, a site with a very long history (see Ch. 4), was excavated by Shinnie and students to determine whether or not the Gonja presence could be detected by in material culture; however the major shift in pottery occurs with the arrival of red-painted ware, similar to that at New Buipe, several centuries before the Gonja incursion. There is considerable continuity in pre-Gonja and Gonja (Phase C and D, respectively) pottery; the only Gonja related material culture are iron items that resemble horse paraphernalia from recent times (Shinnie and Kense 1989: 244-245; Stahl 1994: 90-91). Historically, Gonja was a major source of tobacco for the coast, where tobacco did not grow well. Shinnie and Ozanne (1962) estimate that the smoking habit had reached northern Ghana by 1625.

Even less is known regarding the states of Dagomba and Mamprussi centered in the far reaches of northeastern Ghana. Yendi Dabari, the capital of Dagomba, was excavated in 1961 by Shinnie and Ozanne (1962), and was probably occupied between about c. 1500 and 1650 (Shinnie and Ozanne 1962: 88). Rectangular rooms that were part of a complex structure were uncovered (Shinnie and Ozanne 1962: 94). Double-angle tobacco pipes were recovered in large quantities, suggesting an early to mid-17th century occupation based on pipe chronologies of the coast (Ozanne 1969; Shinnie and Ozanne

1962: 9). Like Gonja, the Mamprussi kingdom near Gambaga was also formed by an immigrant group who exacted control over local populations, with occupation(s) dating to the last 500 years. Evidence for iron smelting was recovered as were tobacco pipes and spindle whorls (Kense 1992; Stahl 1994: 91).

The themes of migration and the formation of complex polities continued in later periods as a multitude of forest polities arose, including the Asante (Ch. 6). Different regions were drawn into Atlantic networks at different times; after centuries of northward dominated trade, social and economic ties were likely stronger in this direction for many areas. Craft production was likewise geared towards regional and northern focused markets. Local tastes had a long history of development in relation to regional and long-distance trade. The patchwork nature of incorporation of inland polities into the Atlantic economy suggests that local relations to trade, production, and taste varied considerably over space. Bono Manso, for example, seems to have continued to produce for regional and perhaps Niger markets, and obtained raw materials like copper and sundries like tobacco and beads from these areas, during the same time frame that Begho and sites to the south became increasingly entangled in Atlantic economies. Unfortunately, a lack of detailed dating or reporting of most relevant sites precludes detailed reconstruction of these dynamics.

This problem is compounded by a focus on large towns at the expense of rural populations who were certainly affected as demands for different crafts and agricultural goods shifted. Many of these rural areas were probably responsible for supplying the larger centers with food, thus the impact of American crops may have been strong in these regions. Though many archaeologists have documented the role of animals in these economies, plant remains are woefully understudied, despite the oft-repeated mantra that American crops were utterly transformative to local subsistence economies (e.g., Table 5.1). Such a ‘transformation’, and the assumptions behind it, merit careful empirical evaluation (cf. Stahl 1994: 99).

Africa and the Columbian Exchange

The introduction of new crops from distant continents was not a process restricted to Africa, but one that permeated both hemispheres, particularly in the post-Columbian era. This process is generally referred to as the "Columbian Exchange" (Crosby 2003 [1972]), a broad term used to describe the biological and culture exchanges that occurred between the Eastern and Western hemispheres after Columbus's 'discovery' of the Americas. The exchanges that resulted were unprecedented in scale as compared to what came beforehand. Animals, plants, people, diseases, commodities, and knowledge also came to pass between the Western and Eastern hemispheres which had previously been isolated. From the view of biological organisms, which had evolved to thrive in certain latitudes in their hemisphere, all of the sudden entirely new lands that met their ecological needs were opened up, ripe for colonizing (Crosby 2003).

The traditional rendering of the Columbian Exchange paints Ghana and Africa more generally as subservient trade partners, a much different image than the scholars whose work was reviewed above. Africa's so-called inferior role in trade was derived from a colonial worldview that saw Africa as a land ripe for plundering rather than an equal partner to be negotiated with; a paucity of information from Africa itself only confirmed this stereotype. While discussions of trade have moved far past this simplistic and biased view, for the most part this kind of thinking still pervades explanations of the introduction of American and Asian crops to Africa. Consider Crosby's portrayal of the African adoption of American crops (occupying less than 4 pages in his tome):

> The importance of American foods in Africa is more obvious than in any other continent of the Old World, for in no other continent, except the Americas themselves, is so great a proportion of the population dependent on American foods. Very few of man's cultivated plants originated in Africa…and so Africa has had to import its chief food plants from Asia and America…(Crosby 2003:185).
>
> The rapid rise in African population following 1850 not only coincides with the spread of political stability and modern medicine techniques [the result of colonial empires]…but also with the accelerated spread of maize, manioc and other American foods. As for the influence of these crops before 1850, we might hypothesize that the increased food production enabled the slave trade to go on as long as it did without pumping the black well of Africa dry (Crosby 2003:188).

The Africa Crosby paints is one desperate for food crops suited to its environment, but unable to 'invent' them (this eerily resonates with many modern development dogmas). Fortunately, Europeans came to the rescue with (ironically, American) crops already suited to African environments. These highly productive crops raised population levels, allowing continued exploitation of Africa for human captives, and a speedy recovery courtesy of colonial development.[2]

Crosby makes two important assumptions that continue to be repeated in most explanations of the adoption of American crops in Africa and need to be carefully evaluated. The first is the Malthusian notion that new crops enabled population growth post-Columbus, despite the population losses suffered to slavery (Alpern 1992: 13; Crosby 2003: 167; McCann 2005: 26). However, scholars like Walter Rodney (1982: 77) argue that the rate of growth was virtually stagnant in Africa between 1600 and 1900 if compared to growth rates in other continents, a thesis more in line with the human cost of plundering captives. And more recent scholarship points to the regional variability in population loss and impacts on settlement patterns and social organization (e.g., Inikori 1994). A more realistic view is that the Atlantic slave trade depopulated some areas of agricultural laborers in their prime, perhaps motivating people to adopt more productive crops like maize or less labor intensive crops like cassava (Carney and Rosomoff 2009; van Oppen 1999). However, since very little is known about the timing of and local circumstances under which these crops were adopted (especially in inland areas), it is next to impossible to evaluate these hypotheses (see Ch. 7).

The environmental compatibility of tropical Asian and American crops to the African tropics is also another common explanation for why these new crops were adopted and are so popular today. This explanation has considerable merit, particularly in the case of maize (described below) and cassava (see Ch.7). However, almost no attention has been paid to the ecological conditions *at the time of adoption*, something I address below. Furthermore, a focus on only environmental variables implies that local tastes had little to no role in decisions on whether or not to adopt new crops. Scholars of foodways know this is not the case—foods are very often rejected because they do not suit local palates or preparation techniques, except in cases of severe distress (Macbeth and Lawry 1997). The tendency to emphasize environmental factors in the case of African food adoptions is in contrast to how similar processes are portrayed in European

[2] Jared Diamond's (1999) book *Guns, Germs, and Steel* rests on the same premise, that Africa lacked highly productive crops and this is why it was left out of the arms and colonization race later on. Clearly, it is an idea that sells, but one which is strongly rooted in a modern industrialized '*Homo microeconomicus*' view of agriculture.

contexts, where beliefs, political conditions, and local tastes are acknowledged as central to the adoption of new crops (e.g., Salaman 1985; Walvin 1997).

Superior yields of American crops and especially maize are also commonly cited as reasons for their quick adoption. But this runs contrary to the central tenets of African agriculture, at least as practiced today, in which farmers select for risk-adverse crops rather than high yielding ones (Ch. 2). A focus on yield is a decidedly industrialized view of how agriculture should function. It is quite possible that the motivations of farmers during the Atlantic phase were very different from those of their descendants as well as of modern industrial farmers. While we remain hard pressed to reconstruct past mindsets and motivations, the responses of farmers to these perceptions can be recovered. In sum, I do not wish to belittle the few scholars who have attempted to write African food histories, all of whom are working with a very slim dataset; but a simplistic focus on demography, environment, and yield can appear all too similar to the offensive statements of Crosby (above), and tend to recreate the present image of Africa as chronically food insecure (see also Mandala 2005). One important exception to this is the work of Judith Carney (2001, Carney and Rosomoff 2009), which I detail below.

Whatever the diverse motivations behind their adoption, crops originating in the Americas, Asia, and the Mediterranean are important in modern African food and agriculture. Just a handful of these—maize, cassava, bananas, and peanuts—are responsible for major shifts in nutritional and agricultural ecology, but over 250 new plants were adopted in total, many of which had impacts on local tastes and culinary preferences (Alpern 1992, 2008: 63-64). In Tables 5.2 and 5.3, I list these new crops and their origins, and in Figure 5.3 I show their geographic distribution in West Africa between 1450 and 1700. This is followed by a discussion of the most important of these crops, and a vignette of how they were used and perceived by Europeans and Africans in the early 17th century Gold Coast.

Crops from the Mediterranean and Asia

Many crops were introduced from other parts of the 'Old World' into Africa over the millennia preceding the Columbian Exchange. While crops grown in Mediterranean conditions are not well suited to tropical African climates, many that hail from Asia are adapted to tropical conditions and were good matches for African farms. Mediterranean/southwest Asian crops grown in interior areas prior to the arrival of Europeans include wheat, barley, figs, melons, pomegranates, onions and garlic, chickpeas, tiger nuts, citrus fruits, and cucumbers (Table 5.2) (Alpern 1992, 2008; Lewicki 1974). As was described in Chapter 4, many of these taxa first appeared at trading centers along the Niger such as Timbuktu and Gao in the 11th to 15th centuries (see Figure 4.2).

Table 5.2 lists crops of Asian origin that were introduced to Africa. Crops of Asian origin introduced before 1700 include Asian rice (*Oryza sativa*), water yam, banana/plantain, coconut, and some spices. Africans domesticated their own rice species (*O. glaberrima*), probably along the Niger Bend, but it is much less productive than its Asian cousin. Asian rice was introduced to Africa probably by the Arabs, but does not seem to have taken hold until it was introduced yet again by Europeans on the coast (Alpern 1992: 20-21; Murray 2005), providing evidence against the Western-centric assumption that higher yields are always the primary goal of farmers. Instead, it appears that a taste preference for African rice and its tolerance of poor growing conditions were desired (Alpern 2008: 69). Though Asian rice has today replaced African rice in many areas, small pockets of cultivators remain (Murray 2005), including one in Brawhani, south of Banda. Asian or water yams (*Dioscorea alata*), though they have today been adopted across many parts of West Africa, did not replace the native African yam varieties like rice did (Alpern 1992: 21). In Ghana, there is still a strong preference for the culinary and taste qualities of African yams, even when Asian yams are grown. Coconuts, like bananas (Ch. 4) and taro, were introduced to the African

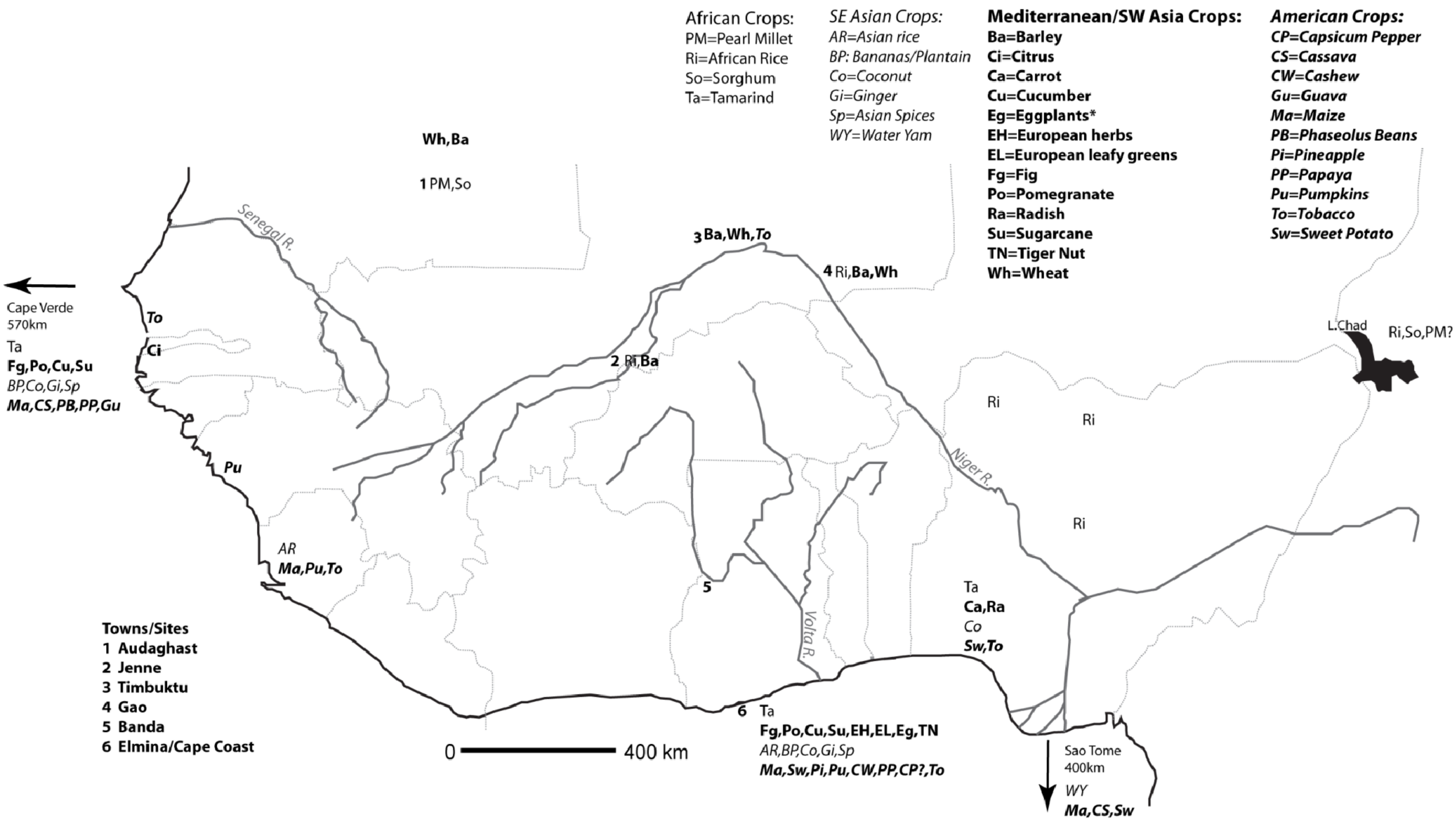

FIGURE 5.3: Distribution of Crops and Selected States from 1450-1700 (Alpern 1992, 2008; Lewicki 1974)

TABLE 5.2: Early introduction of crops from the Mediterranean and Asia to West Africa (from Alpern 1992,2008[3])

Origin	Crop	Place/Time of Early Introduction to West Africa
Mediterranean/ Southwest Asia	Fig	10th-11th centuries, Audaghast; 1337-1338, Mali & Kanem; 1506-1507, Cape Verde; 1572, Elmina
	Melons[4]	1352-1353, Gao; 1506-1510, Cape Verde; 1579/83, Congo
	Pomegranates	1269-1286, Kanem; 1520-1540, Cape Verde; 1572, Elmina
	Onions/shallots/garlic	1154, Senegal; 1337-1338, Mali; 1645-1648, Congo; early 19th century, Akan, Yoruba & Dahomey
	Chickpeas	1512, Congo
	Tiger Nut	Ancient Egypt; 1662-1669, Gold Coast; common in 1930s on coast
	Cucumbers	11th century, Audaghast; 1506-1510, Gao; 1579-1583, Cape Coast
	Herbs and leafy greens	1572, Elmina
	Turnip	1337-8, Mali/Kanem; 1572, Elmina
	Carrot	1698, Whydah
	Radish	1698, Whydah
	Pea & Fava bean	1600-1601, Senegal/Benin/Gold Coast
Southeast Asia via Mediterranean	Citrus[5]	1337-1338, Kanem; 1456, Gambia
	Sugarcane	12th century, Gao; 13th century, Kanem; Late 15th century, Cape Verde; 1512, Congo; 1572, Gold Coast
	Eggplants	1337-1338, Mali & Kanem; 1572, Gold Coast
Asia, directly and via East Africa	Asian rice	1574-1625, Sierra Leone; 1682, Gold Coast
	Water yam	1591, Sao Tome
	Taro/cocoyam	No data
	Banana/plantain	Early 16th century, Cape Verde; 1572, Gold Coast; 1579/83, Congo
	Coconut	1519, Cameroon; c.1540, Cape Verde; 1579-1583 , Kongo; 1639/45, Gold Coast
	Mango	1824, Senegal; 1843, Gold Coast; 1863, Dahomey
	Breadfruit	1850s, Lagos; 19th century, Akan
	Ginger	early 17th century, Cape Verde & Gold Coast
	Other Spices	16th century, Cape Verde & Gold Coast
Africa via India/Asia	Tamarind	1579-1583, Congo; 1686, Cape Verde; 1705, Whydah, 1709-1712, Cape Coast

[3] Alpern admits that his work is not exhaustive and not based entirely on primary sources; for the present purposes I rely on him here, and discuss additional sources in text.
[4] Species not specified. Some melons are indigenous to Africa. See Ch. 4 for discussion.
[5] Five species are involved and often confused by authors: sweet orange (*Citrus sinensis*), sour oranges (*C. aurantium*), lemons (*C. limon*), limes (*C. aurantifolia*), and citrons (*C. medica*) (Alpern 1992:16).

TABLE 5.3: Crops introduced to West Africa from the Americas (Alpern 1992, 2008)

Origin	Crop	Time/Date of Early West African Introduction
South and MesoAmerica	Maize	1534, Sao Tome; 1554, Gold Coast
	Cassava	1612, Gabon; 1619, Sao Tome; 1644, Warri (Nigeria); 1700-1710, Gold Coast
	Groundnuts (Peanuts)	1664, Congo/Angola; late 17th century, Gold Coast
	Sweet Potatoes	1520-1540, Sao Tome; early 16th century, Gold Coast; early 17th century, Benin
	Yautia (New World cocoyam)[6]	1843, Gold Coast
	Phaseolus beans[7]	1648, Kongo; 1660s, Fetu
	Capsicum peppers	1640s/1677, Elmina
	Pumpkins/squashes	1564/5, Guinea; 1572, Elmina; 1607, Sierra Leone; 1620, Gambia
	Tomatoes	1824, Senegal; 1839, Liberia; 1846, Whydah; 1861, Accra
	Pineapples	1600-1604, Gold Coast & Benin
	Papayas	1647, Cape Verde; 1679, Anamabo (Ghana)
	Guavas	1647, Cape Verde; 1664, Congo and Angola; 1686, Guinea-Bissau
	Avocados	1824, Senegal; 1843, Gold Coast
	Cashews	1682, Kongo; 1690s, Axim (Ghana)
	Arrowroot	1843, Gold Coast
North America	Tobacco	1580, Whydah (Benin); 1594/96, Timbuktu; 1602, Senegal; 1607, Sierra Leone; 1612, Kongo; throughout Kwaland in first half of 17th century

[6] This is *Xanthosoma sagittifolium*, which eventually became more common than Taro, the Old World cocoyam

[7] The different species of beans are commonly confused; here I only report clear evidence for *Phaseolus.*

continent long before the Europeans arrived, but their spread to West Africa may have occurred only during the Atlantic trade period (Alpern 1992; Blench 2009).

In summary, many foreign crops from the Mediterranean and Asia were introduced prior to the start of Atlantic trade, possibly through the same long, vast networks that brought other goods (like beads). Foods however are subject to preservation and storage constraints, so we can imagine their spread in 'hops', where their cultivation had to be taken up from time to time at stations along the trade routes in order to raise viable seed to disseminate the plant further.[8] This was likely not a conscious or ordered process. However, tastes for things and foods from afar seems to have been common across West Africa at this time. Several crops, especially banana and tobacco, probably made their way to West Africa from several directions.

Crops from the Americas

At least 15 cultivated plants that were domesticated in North and South America were introduced to Africa as part of the Columbian Exchange (Table 5.3). Here I limit discussion to the most important of these that were introduced before 1700—maize and tobacco.[9] Other crops introduced to the Gold Coast in this time frame include sweet potatoes, pumpkins, *Capsicum* peppers, and pineapples, which are discussed briefly in the vignette to follow.

Maize was one of the earliest crops introduced to the African continent from the Americas, and along with cassava, is one of the most important crops today. Historians have long speculated about the date and pathway of its introduction, and how and why it became central to African subsistence. Earlier scholars debated whether or not maize was introduced from the north via Arab trade networks, or in southern coastal areas via Europeans, especially the Portuguese. Jeffreys (1954, 1963) argued based on linguistic evidence that maize was introduced before the Portuguese arrived on the West African coast, i.e., before 1492. His argument has been largely discredited, as it relies on the

[8] In fact, routine transport of crops to West Africa directly by sea rather than overland is one important differences in the Columbian Exchange and what came before; this would facilitate rapid spread since the 'hop' pattern was no longer necessary.

[9] This is not to downplay the other crops that were introduced; tobacco and maize seemed to have reached Banda before these other crops, hence the focus here. I do not mean to duplicate the misconception that only maize and cassava are important, a point Alpern (2008) rails against at length.

mistranslation of *milho zaburro* as maize (instead of sorghum or grain in general) (McCann 2005: 25, 234). These issues aside, Jeffrey's work drew attention to two important issues: that the spread of maize was extremely rapid, and that maize was referred to by names similar to sorghum. Biologically, maize is related to and closely resembles sorghum prior to flowering, a similarity that was probably not lost on African farmers. This process of naming is an essential step in making something new into something familiar, thus telling us something about how maize was perceived (McCann 2005: 33).

Determining the source and speed of the spread of maize hinges on identifying the variety of maize that first appeared in West Africa—flint or flour. Flint maize has flatter, squared or triangular kernels with hard starch, and would have fit well within the agricultural ecologies designed for millet and sorghum. Flint maize was first encountered by the Spanish in the Caribbean who subsequently introduced it to Europe (McCann 2005: 27-30). Portères (1955) argued that it moved south and west along pilgrimage routes to Mecca, a hypothesis supported by Hausa and Fula names for maize. In rice growing areas along the Niger that were the likely recipients of such northern-derived maize, the new crop appears to have been used as a niche vegetable that was eaten fresh, rather than used as a storable grain surplus, as it was in grain-based areas (McCann 2005: 28)[10]. This differential adoption and use of maize in rice growing vs. grain growing areas (see Figure 4.2) relates not only to the type of maize adopted, but also its ecological suitability and local culinary preferences.

In contrast, southern coastal regions may have preferred floury types, which have rounder grains with softer starch that is easier to mill. Floury maize is assumed to have arrived later, because it was common only in the interior reaches of Mexico and the Andes, which were penetrated later by the Europeans. It is believed that floury maize made great inroads into interior West Africa, supporting the development of large states through increasing the availability of carbohydrates[11] (see Ch. 6). Maize is not only well

[10] It is unclear how McCann knows this; my guess is that there is little evidence for how it was used at its introduction, but that it is used as a vegetable today. The conditions of and manner of its adoption in these areas may have been very different than present patterns.
[11] It is remarkable how similar this argument is to the spread of maize explanations in the Americas. It is completely hypothetical as we lack any description of the circumstances of maize adoption by the forerunners of these states, nor any evaluation of whether or not it increased in importance with the

suited to cultivation in the forest-savanna mosaic, where most is produced today (Staff Division of Agriculture 1962: 372), but was a transportable, storable surplus (McCann 2005: 29, 31).

Most of these explanations for the spread of maize are highly speculative and based on a thin historical record. For example, there is little evidence to suggest which types of maize were in use in interior vs. coastal West Africa (this is a problem that archaeobotanical data could solve). The earliest textually documented occurrence of maize is in São Tome in a Portuguese account dating to 1534, though there are claims that it was introduced as early as 1502 (Alpern 2008: 68; Jeffreys 1954, 1963). It arrived on the Gold Coast shortly thereafter, in 1555, even before it was known in England (Alpern 1992: 25). Marees, who visited the Gold Coast in 1601, reports that maize was brought from the West Indies via St. Thome by the Portuguese, and was at the time of his visit becoming a staple.[12] One clue as to the variety in use is the description of maize in Cape Verde by an anonymous Portuguese pilot around 1540: "At the beginning of August they begin to sow grain, which they call *zaburro*, or in the West Indies *mehiz* (maize). It is like chick pea, and grows all over these islands and all along the African coast, and is the chief food of the people" (Blake 1942 quoted in Jeffreys 1954: 198). The reference to chick pea suggests a more spherical, rounded seed that tends to characterize floury rather than flinty types.

If the Portuguese were indeed responsible for the introduction of maize to West Africa, what accounts for its rapid spread along the coast? McCann (2005) cites the nutritional capacity of maize as one of the primary reasons. However maize itself provides mostly starch and few other nutrients, and must be eaten in combination with the right amino acids in order to avoid nutrition deficiencies like pellagra (Miracle 1966: 11; below). African diets at the time of maize's introduction were by no means lacking in starchy alternatives (millet, sorghum, and yams), and despite assumptions to the contrary,

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development of political complexity. Furthermore, West Africa was by no means lacking in carbohydrate sources—possessing not only millet and sorghum, but yams. Pearl millet and sorghum are highly storable and transportable, even more so than maize. I return to these issues in considering the role of maize in Asante (Ch. 6).

[12] There is some confusion about this quote; it is reported in the translated edition of Marees' account (van Dantzig and Jones 1987), but others attribute it to Dapper, who visited the Gold Coast in 1668 (McCann 2005: 24; Miracle 1965: 41-42).

there is no evidence to suggest that coastal Africans needed to expand their food supply, at least for themselves.[13]

A more likely explanation relates to the quick maturity time of maize and the increased demand for surplus foods brought on by the arrival of Europeans and the development of the slave trade. In humid West Africa, maize is planted at the beginning of the rains, and matures in three months. Yams are planted at the same time but take six months to mature. Millet and sorghum must be planted a month or two later, and take four months to mature. Maize thus matures early in the wet season, while the other crops are still growing, filling the hungry season gap. In two-peak rainfall areas, a second crop of maize can be planted and will mature in the early dry season. In other words, maize yields at precisely the right time and produces twice as many crops per year as indigenous African grains (Miracle 1965; Stahl 1999a: 37).

Miracle (1965) and Carney and Rosomoff (2009) argue that the demand for storable surpluses increased dramatically as a result of the slave trade. The source for most of those surpluses was West Africa, as it was untenable to store and transport large quantities of food from Europe or the Americas (Carney and Rosomoff 2009). Miracle (1965) suggests that maize was key. By the late 17th century, Barbot remarked that

> Tis generally observ'd, that Indian corn rises from a crown to twenty shillings betwixt February and harvest [August according to Bosman], which I suppose is chiefly occasion'd by the great number of European slave ships yearly resorting to the coast... (Barbot in Miracle 1965: 43)

Maize was the perfect candidate for provisioning slave ships because it filled two essential requirements: it was storable on long transatlantic journeys, and could be produced locally. The African staple grains that would have met the criterion of storability—namely, rice, millet, and sorghum—were restricted in availability and produced much lower yields (Miracle 1965: 43-44). Miracle attributes this economic

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[13] I hesitate to disagree with McCann, who has paved the way for discussion of African food history (McCann 2005, 2010). However, there is much speculation in his accounts. He champions the increased nutritional contribution and yield of maize as compared to indigenous grains. However, he assumes rather than demonstrates the need for additional starchy contribution, citing poor ecological conditions for agriculture (aridity, bad soils, etc), but this isn't the case on the coast at all, where maize is plentiful because it can produce two crops a year. Again, the image of Africa as perpetually starving and ecologically challenged bears more resemblance to the present than a state convincingly demonstrated for the past.

reasoning to the Portuguese, whom he suggests purposefully encouraged maize and introduced higher yielding varieties, though it seems equally plausible that African farmers who were familiar with local agriculture made this decision (Carney and Rosomoff 2009: 48). This evidence suggests that the Africans encountered by the Portuguese were quick to determine what products made a profit; this is not surprising given the long-term involvement of local populations with trade and ability to anticipate and control demand.

High demand for foodstuffs elevated crops from items mostly of significance in local and regional trade to those of international commerce—cash crops of the early modern era. This resulted in even higher demands for agricultural labor, so much so that slaves were actually imported into the Gold Coast before 1700 (Lovejoy 2011). Afterwards, a shift to exporting of human captives must have had major impacts on agricultural production, since it depleted the rural labor force of men and women at their primes (Carney and Rosomoff 2009: 46-56).

In sum, the popularity of maize along the Guinea Coast was not necessarily due to a lack of suitable indigenous foodstuffs; rather it is possible that "[t]his Columbian Exchange crop flourished because its cultivation and preparation made the cereal ideally suited to the trade in human beings" (Carney and Rosomoff 2009: 55). Maize was purportedly the staple of slave transport ships, and thus "a symbol of the dehumanizing condition of chattel slaves, who were no longer able to exercise dietary preferences or choose the type or amount of food they consumed" (Carney and Rosomoff 2009: 55). Maize, in this formulation, has fallen from the 'grace' of Africa's savior (sensu McCann 2005) to a reminder of one of the darkest periods of its history, just as much as the castles at Elmina or Cape Coast. Obama's *kenkey* of Chapter 1 thus acquires another level of commemorative meaning.

The reception of maize by non-captive African palates seems to have differed. Evidence is scarce, but suggests that its taste was desirable to Africans on the coast; nothing is known about people inland, the primary source for captives. Marees (1602[1987]: 113) provides us with a vignette of how maize was used and received on the Gold Coast in the early years after its introduction:

> They use it in a mixture, grinding it together with their Millie (probably millet), sometimes taking half Millie and half Maize. Other Negroes, who live among the

> Portuguese, grind it on its own, without mixing with Millie, and bake good excellent bread out of it, like Leyden buns, and do good business selling it to the Portuguese…The children also eat it instead of bread, roasting it a little on a fire and picking grains out of their husks. Those who eat much of it without being used to it, because they may find it tasty, tend to be tortured with scabies and itch, or are at any rate plagued with great boils, because it makes the blood hot.

Several insights about the nature of maize adoption on the coast can be drawn from this passage. First, that it was the preference of the indigenes to mix maize with "*Millie"* (see below). This suggests that maize was used to make familiar foods using familiar techniques. It is only those natives who lived with the Portuguese who ate maize alone, and they were quick to expand on an economic opportunity, learning how to make foods familiar and apparently liked by the Portuguese.[14] The convenience of maize is also evident—in that children ate roasted ears—an important motivation for food adoptions in shifting economic situations (at least recently; Ch. 8). Finally, it is clear that not everyone was eating maize, but that those who did liked the taste very much, eating so much as to make themselves sick. This suggests that the taste of maize suited African palates, but at the turn of the 17th century, there was still considerable experimentation and uncertainty regarding how to eat and prepare this crop.

The reference to illness in the form of scabies, itch, and boils, though disregarded by the translators of Marees's account (1602[1987]: 113), could refer to pellagra, which results from a nutrient deficiency caused by a diet overly reliant on maize, and can result in skin lesions, among other unpleasant things. Pellagra was avoided in Mesoamerica by processing maize with an alkali, which makes niacin more available and reduces incidence of the disease (Miracle 1966: 11); the possible presence of pellagra in 16th century Ghana suggests that this processing technique did not diffuse with maize, at least initially. It also suggests that maize was consumed as a staple by at least some individuals, indicating a rapid shift in diet.

Maize was also prepared using another familiar processing pathway, one that Marees had also observed among New World natives: "they soak this grain in water till it

[14] However, several sources suggest that the Portuguese disliked the taste of maize, at least initially. In the 1590s, at least two Portuguese describe maize as "the vilest of grain and only fit for swine" (Lopez, 1591, in Miracle 1965: 43), a grain that "nourisheth but little, and is of hard and evil digestion, and a more convenient food for swine then men" (Gerarde, 1597, in Miracle 1965: 43). Miracle claims that this applies only to the ground form of maize that would have been used as ships; he suggests that maize was commonly consumed fresh as a vegetable in port (Miracle 1965: 43).

germinates, and then brew from it Beer to be drunk. In the same way, Negroes trading with the Portuguese in these lands also make a drink which they call Poitouwe" (Marees 1602[1987]: 113). Local populations would have been familiar with beer made of millet or sorghum, which is today called *pito*.

The limited information available suggests that maize was readily and heartily adopted among West African coastal populations, both as a commodity and a food product. Nothing is known about populations farther inland outside of the gaze of Europeans. Examination of plant remains from archaeological sites provides one of the few ways to understand how maize was adopted at a household level, as I detail in the case of Banda below.

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Another American crop that spread quickly and early throughout West Africa was tobacco. Tobacco is used primarily for smoking, and is thus a crop of luxury or free time. It is an interesting case study to juxtapose against maize, which is often interpreted as being adopted to fill a caloric need. Tobacco, like maize, may have been introduced from both the north and south. It is first recorded at about the same time in Timbuktu (1594/6) as the result of a Moroccan and Spanish invasion, and on the coast at Whydah (modern Nigeria/Benin) around 1580. By 1602, Marees noted its cultivation in Senegal and the Cape Verde islands. By 1607, tobacco seems to have gained popularity in Sierra Leone, where Finch noted that tobacco "seemeth halfe their food," and was "planted about every mans house" (Finch in Alpern 1992: 30). Tobacco was not restricted to men, but was smoked by both sexes. The first mention of tobacco on the Gold Coast is at Elmina in 1639/45, when it was already a habit, suggesting a much earlier introduction (Alpern 1992: 30) (though it is notable that Marees did not mention it in 1602).

Three pieces of evidence suggest a northwestern introduction via Senegambia and perhaps the French. First, the main tobacco species 'traditionally' grown in West Africa is *Nicotiana rustica*, native to eastern North America (*N. tabacum* was grown from Mexico southwards and would have been the main crop accessible to the Portuguese). However, this is based on modern tobacco variety distribution—there is no evidence as to what variety was grown in the 16th and 17th centuries, though archaeobotanical studies could address this. The second line of evidence is that the earliest tobacco pipes, which were of local manufacture, resemble native North American types from Louisiana, then a French colony. These pipes are flat-based, and contain a large opening into which a reed or wooden stem is attached. Third, linguistic evidence suggests that local words for tobacco are most similar to the French *tabac* (Ozanne 1969; Phillips 1983).

According to Ozanne (1969), there were probably at least three other introductions. Tobacco was likely introduced from England or Spain via Morocco upon invasion of the Songhai empire in 1591; numerous Arabic sources suggest the introduction of tobacco to Timbuktu in this decade. Ozanne, however, suggests that this was only of local significance, and tobacco did not diffuse from Timbuktu. This is somewhat contradicted by several other Muslim sources which suggest that tobacco was introduced by 'pagans', i.e., black Africans (Philips 1983).[15] It is interesting that unlike maize, tobacco appears to have spread through the inland savanna just as quickly or more quickly as along the coast (Ozanne 1969: 35). This may be related to the early development of a taste for or addiction to tobacco amongst Africans and Arabs already familiar with another stimulant—the kola nut. And unlike kola, tobacco could be grown in the savanna. A savanna spread may have something to do with the ecological preferences of tobacco for alluvial or sandy soils rich in potash, lime, and humus. Later documentary sources suggest that coastal areas were unsuitable for tobacco cultivation, so much of their tobacco was probably obtained from savanna areas inland (Ozanne 1969: 31, 42). Other introductions occurred in the Lower Congo area, about which little is known, and the Accra area in the 1640s (Ozanne 1969).

Tobacco, or at least the practice of smoking, is also very visible in the archaeological record in the form of pipes, which have been used mostly for chronology

[15] One such event was recorded by al-Ufrānī in the late 17th century: "In the year 1001 (8 October 1592-27 September 1593) an elephant was brought from the Sudan to El Mansour. The day when this animal came into Morocco was a memorable occasion. The whole population of the town, men, women, children and old people came out of their homes to contemplate this sight. In the month of Ramadan 1007 the elephant was taken to Fez. Some writers claim that it was through the arrival of this animal that the use of the sorry plant called tobacco was introduced into the Maghreb, and that the Negros who brought the elephant also brought tobacco which they smoked and claimed that its use was very advantageous. The smoking habit which they imported became general, first in the Draa, then in Morocco and finally throughout the Maghreb" (translated from French in Ozanne 1969: 34). Ozanne (1969: 36) notes that this paragraph describes two stories—the elephant bringing tobacco tale that an earlier traveler recorded, and the subsequent spread of tobacco observed by al-Ufrānī a century later.

building, but also give some indication of just how rapid smoking spread (one wonders what our image of the spread of new crops would be if all had such high visibility!). Locally manufactured tobacco pipes predate manufactured ones from Europe, and have been used as chronological markers in Ghanaian sites. Ozanne's (1962, 1969; Shinnie and Ozanne 1962) typology, subsequently modified by later scholars (Bellis 1976; Shinnie and Kense 1989: 159), was based on changing pipe forms recovered from stratigraphic excavations at several sites. Pedestalled or double-angled pipe forms are the earliest, followed by flat-based, single-angled types, which later acquire a lobed or quatrefoil base, and finally, there are locally made imitations of European briars (Stahl 1994: 83). While Ozanne (1962) assigns these calendar dates based on the presence of other imports, the entry of these different styles to each region probably varied in timing and according to local concepts of style as well as external connections. For example, the northern areas possessed flat bottomed, elbowed type pipes that were meant to be set on the ground, while the southern regions had small hand held pipe styles that imitated European forms (Philips 1983). The acceptance and spread of each type required acquisition of a novel practice, which was then modified and recontextualized locally. In areas that saw the shift between flat based and hand held pipes, the matter of origins was probably less important than the reworking of the bodily practice of smoking (cf. Campbell 2006: 54; McIntosh et al. 2003).

Crops from Africa to the Americas and Europe

Lest I recreate Crosby's bias that Africa was merely a passive recipient of crops from the Americas, it is important to mention that crop plants from Africa have a long history of circulation to other parts of the world, beginning at least as early as the second millennium bp. Among these early diffusions were pearl millet, sorghum, and cowpeas, which became important in South Asia (Fuller 2003). Recent scholarship has stressed the importance of Africa's botanical legacy in the Americas (Carney 2001; Carney and Rosomoff 2009). While a full discussion of Africa's contribution to the Americas and Asia is beyond the scope of my argument here, it is worth describing European demand for one African plant in particular: the grain of paradise.

Melegueta or Guinea pepper, also known as the grain of paradise or *Afromamum melegueta*, is a capsule that contains aromatic, hot, and peppery seeds that have been compared to cardamom (Figure 5.4). It was especially desired in medieval Europe from at least the 15th century as a flavoring for meat, soups, stews, wine, or on its own[16] as a "cough drop" (in Beichner's 1961: 305 terms; also Van Harten 1970: 208). The earliest mention in Europe is in 1214, and it is also recorded in Dutch import records in 1358. In these early days, it was most likely obtained through trans-Saharan trade routes to the Mediterranean. The name "Grain of Paradise" is thought to have emerged in this period, when the lands it came from were unknown and it was of great value (Van Harten 1970: 208-209).

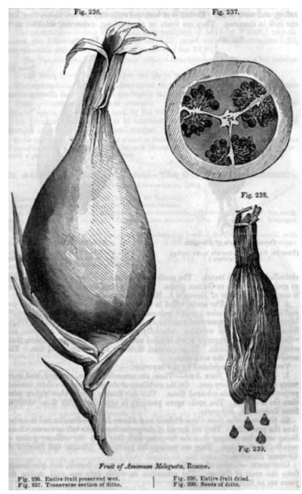

FIGURE 5.4: Melegueta pepper (*Afromamum melegueta*), from Pereira's *Elements of Materia Medica and Therapeutics*, 1854

The African source of this unknown 'greyn' was encountered as European sailors tried to ferret out a route to the source of the true pepper in Asia, finding along the way a good substitute (Van Harten 1970: 209). By the 15th century, the repeated portrayal of the grain in literature (notably Canterbury Tales) as used by common people, as well as its colloquial name 'greyn' suggest to Beichner (1961: 307) that it was readily available. This is likely related to an increase in commerce as French, Portugese, and Dutch vessels began direct trade along the African coast. The importance of this trade is suggested by the various names of Melegueta Coast, Grain Coast, and Pepper Coast to refer to the area

[16] According to Beichner (1961:305), the first use of the phrase grains of paradise occurs in Romaunt of the Rose (Chaucer) in its French form "greyn de parys".

of modern day Liberia. The coasts and forests of this region are the natural habitat of *Afromamum*.[17] Its natural distribution is along the entire West African coast from Guinea to Angola (Van Harten 1970). Marees' description of the Gold Coast around 1600 suggest that it was cultivated: "Grain or Manigette…grows in Fields, like Rice, but does not become as tall. It is also sown like corn…" (Marees 1602[1987]: 160).

In later centuries, melegueta continued to be used to flavor alcoholic beverages, but its overuse as an adulterant led to the banning of the seed in Britain in 1825. European palates had also changed, and the melegueta pepper was considered too sharp and pungent for their tastes. The spice still was used; for example in 1871 the Gold Coast exported almost 200,000 pounds of it; the next year, over 600,000 pounds were exported. Like any luxury good, tastes for the grain of paradise have waxed and waned—20th century uses include use as a pepper substitute for chemical research by the Nazis and its appearance on the shelves of gourmet grocers in recent years (Van Harten 1970: 209).

Colliding palates: European and African tastes on the Gold Coast

European and African tastes collided on the Gold Coast beginning in the late 15th century. The Gold Coast was one of the first places that American crops were introduced in West Africa, yet little is known about how they were adopted and spread. The little evidence available is documentary; archaeologists have shown little interest in sampling Iron Age or historic period sites for paleoethnobotanical remains, as Table 5.1 aptly demonstrates. This situation results from the lack of flotation, poor preservation (real or assumed), and an assumption of continuity in subsistence from the past to the present. The situation is not much improved in the rest of West Africa despite the oft repeated truism of the important role of American crops.

At present, historical sources provide the only evidence of the role of plants old and new during this period. Pieter de Marees, a Dutchman who visited the Gold Coast around 1600, wrote extensively of native customs, flora, and fauna during his era. I review his account of foodways on the coast in some detail, for it accomplishes several important aims. First, since Marees himself was a Dutchman and was mostly surrounded

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[17] The plant is characterized as a forest herb that prefers a reasonable amount of light, such as found in secondary forests (Van Harten 1970: 215).

by other Europeans, his impressions paint an interesting image of how African and Asian foods were received by Europeans. Though European perceptions of new foods are not my focus here, Europeans too encountered new foods in Africa, and were the primary medium of spread for American and Asian crops. Their impressions are important for disentangling this moment of culture contact. Second, Marees provides several tidbits describing how these new crops were used and accepted by local African populations. These insights are supplemented by faunal and ceramic data from Elmina (DeCorse 1992, 2001b). Finally, though there are many differences between the coast and towns farther inland, given the paucity of archaeological data on foodways in the 16th/17th centuries, the coast is the only other possible point of comparison with Banda.

Archaeological evidence from the site of Elmina provides baseline data on the role of animals in diet as well as some clues to practices of food preparation and consumption. Animals such as sheep/goat, fish, and many species of wild game were important components of the diet at Elmina (DeCorse 2001b: 104-114), as they are throughout Ghana at this time (Table 5.1). The availability of wild game probably decreased as a result of habitat destruction, as suggested by species observed in Marees (1602 [1987]: 133-153), such as elephant and leopards, which are no longer present in the area.[18] The shattered nature of the bone debris, a situation common to most faunal assemblages in Ghana, suggests consumption of soups and stews, as today. Ceramics are dominated by bowl forms, which support interpretation that past foodways resembled those of the present (i.e., an emphasis on soups/stews and a thick starch like *kenkey*) (DeCorse 2001b: 114-115). Marees (1602 [1987]: 43) mentions that Africans ate food with their hand, a practice that is still common. DeCorse interprets this evidence as reflecting little change in African food preparation and consumption practices, despite the introduction of American crops (DeCorse 1992: 188-190).[19]

[18] Though we also must recall that much of Marees' account is based on hearsay rather than his own direct observation; given European fascination with exotic animals it is quite possible that these were overemphasized in his account.

[19] It is important to mention that much of DeCorse's evidence comes from the later part of this sequence, towards the 19th century; this continuity in foodways with the present may reflect the later date of much of his material.

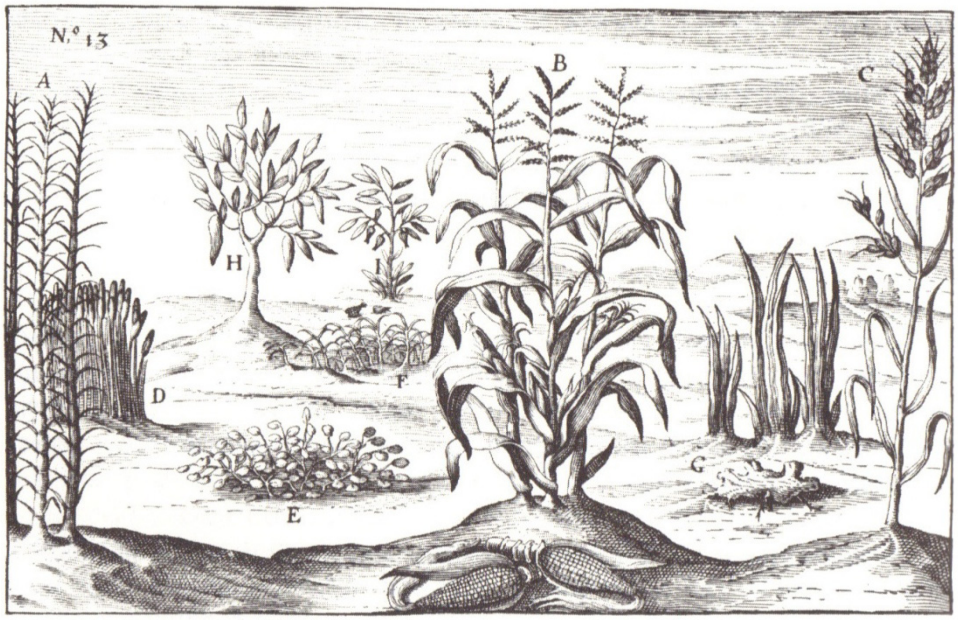

FIGURE 5.5: The grains and spices that grow in the Gold Kingdom of Guinea, according to Marees (1602 [1987]: 158): a) sugarcane, b) maize, c) rice, d) *Millie*, e) cowpea, f) herb, g) ginger, h) *Parkia*, i) melegueta pepper

From Marees, we learn that maize was already popular on the Gold Coast in 1600 (see above), but that yams were the common food of Africans (Marees 1602 [1987]: 164-165]. Other plants mentioned include *Millie*, sugarcane, maize, rice, probable cowpeas, ginger, melegueta pepper, a leguminous tree (*Parkia* sp.) and herbs (Figure 5.5). *Millie* may refer to sorghum and/or pearl millet. The illustration resembles millet and his description of agricultural practices seems to also refer to pearl millet.[20] He notes that after about three months, *Millie* is cut and left to dry in the fields for another month (Marees 1602 [1987]: 110-112). This short maturity time suggests that people were growing early maturing varieties of pearl millet on the coast, which require about 80-90 days to mature, versus the 140-190 days needed for late maturing types that dominate today (see Ch. 2). Early maturing millet would make sense in the two peak rainfall pattern of the coast, making it more competitive with maize than most authors have acknowledged (e.g., Carney and Rosomoff 2009; McCann 2005; Miracle 1965).

[20] As the translators of Marees note (van Dantzig and Jones 1987: 158), it is curious that he does not mention sorghum. This is an interesting if weak corroboration of the archaeological data below.

Pearl millet also competed with maize on African and European palates. As described above, the two flours were often mixed in preparation of meals. Marees (1602 [1987]: 112) characterizes millet specifically as

> a good and excellent Grain, which is turned into bread without difficulty, since it is not hard to break and is quickly ground into Dough. If they knew how to bake it nicely, it would look like and have the colour of rye-and-wheat bread; but as they do not use any Ovens and only bake on the cold [=bare] earth with hot ashes, it looks rather like buckwheat Cakes. It has a good taste and is wholesome to eat. It tastes salty, but grits your teeth a little, which results from the stones with which it is ground.

This passage provides several important insights into food preparation and preference in the 16th and early 17th centuries, right at the time maize was introduced. First, the taste of millet was favored by European palates. It was also preferred by African palates. Combined with the superior storage time of millet (maize is particularly susceptible to rot in tropical environments) and the short growing season required for early maturing varieties, pearl millet may have been in demand just as much as maize for provisioning forts and slave voyages. Maize was probably better suited to coastal environs, but at least in these early centuries, it was an unfamiliar plant, both in the field and in the pot. As a result, maize was the object of much experimentation.

This passage also suggests that millet was easy to mill, probably much more so than maize, especially if hard flint grains were the first variety to be introduced to the coast, as has been suggested. Milling took place on grinding stones, rather than wooden mortars. Furthermore, it is interesting that flat breads baked on the earth are referenced; this was a preparation method used in the Niger Bend in previous centuries (McIntosh 1995c; see Ch. 4) that is rare today. In fact, it seems possible that such flat breads were replaced by European breads baked in ovens as a result of European contact and colonialism, to the degree that flatbreads are unknown in modern Ghana. I consider the possibility of flatbread preparation in Banda below.

Marees mentioned another grain that may have been introduced at this time: Asian rice. He describes the grain as originating in India and spreading around the world, which suggests Asian rather than African rice. He was clearly fond of rice, comparing it to the best wheat. It was made into flour and porridge. Not only did it taste good, but rice had healthful affects too, helping “stop the Runs to the Small Room” (Marees 1602[1987]: 159).

The characterization of new foods in terms of their perceived health benefits was an important element of the European worldview, and certainly influenced how and why foods were adopted (Crosby 2003; Walvin 1997). This theme seems to have been commonplace on the mainland as well as in colonies and forts. For example, ginger, an Asian domesticate, was thought to ease digestion, and was consumed as a salad, with oil, salt, and vinegar (Marees 1602[1987]: 160). Pineapple, an American crop, was thought of as pleasant tasting, easy to digest, and an anti-inflammatory. Europeans consumed it in pieces and drizzled with wine (Marees 1602 [1987]: 163). Palm wine (probably from indigenous *Raphia* spp.) not only tasted good, comparing favorably to mead, but also resulted in much merriment and the healthful evacuation of extra water from the body (Marees 1602[1987]: 164-165). This association—between good taste and healthful qualities—is often repeated in European encounters with new crops. The reverse is also true (see Walvin 1997, as well as specific works on plants like the potato [Salaman 1985]).

Still other foods were conceived of in religious or mystical terms. For example, Marees describes the banana as sweet in taste and having the texture of a “mixture of Flour and Butter” (Marees 1602 [1587]: 162). The banana was so delicious that some Europeans thought it might represent the fruit that inspired the original sin of Adam and Eve. Apparently the Portuguese would never cut a banana across, for then it revealed a cross (i.e., crucifix) in the center of the fruit.[21]

While Marees provides an interesting image of how new foods were perceived by Europeans and Africans along the coast, his writings are still frustratingly incomplete. The image he does paint suggests that new foods like maize were being experimented with in the early 17th century, often prepared according to known techniques at the time, some of which are no longer used. This is important as it cautions against heavy reliance on the present uses of these crops for interpreting their initial acceptance. However his account understandbly does not address how new crops were valued by African

[21] Much more has been written about the European reception of new crops in Europe and the colonies, but I find these moments recorded by Marees an interesting contrast to how Africans appeared to have perceived these plants. To a modern audience, these superstitions are no more or less obvious than those of Africans.

populations, or why they were adopted. In addition, his focus was explicitly coastal, a region that was heavily and rapidly impacted by the arrival of Europeans and where one might expect to see early and widespread adoption of new crops for food or for sale. The integration of inland regions with Atlantic trade is less well known, and regarding foodways, there is no plant data. However, understanding how these interior regions adopted new crops is a critical missing link in discussions of the Columbian Exchange and effects of the Atlantic and later slave trade on local populations. I now return to Banda, and describe how one interior region was incorporated into northern and southern trade networks, and came to adopt crops from the Americas.

Daily Life in Banda in the mid-late Kuulo Phase (c. 1450-1650): Ngre Kataa, Kuulo Kataa, A-212

Stahl has designated the period that straddles the transition between Niger and Atlantic trade in Banda the Kuulo Phase (also late Iron Age 2/IA2: Stahl 2007a: 56-57). This phase is known from excavations at five sites in the Banda area, two of which have seen extensive excavation (Ngre Kataa and Kuulo Kataa), and three more sampled as part of a regional testing program (A-212, A-216, A-235) (Figure 5.6; Stahl 2007a: 57). Analysis of material from Ngre Kataa is ongoing, so I focus discussion of the general characteristics of Kuulo phase life on evidence from the site of Kuulo Kataa (Stahl 1999a, 2001, 2007a).

Kuulo Kataa

Kuulo Kataa covers an estimated 28 hectares and contains at least 12 mounds with Kuulo phase pottery. Excavations in 1995 and 2001 focused on one large midden mound (101), several smaller mounds with evidence for domestic life and craft production (Mounds 118, 130, 138, 148, among others), and an intervening depression (Stahl 1999a: 12,16,18; Stahl n.d.). The density of material remains suggests to Stahl (1999a: 18) an intensity of occupation not seen at the later Makala phase villages, even though Kuulo Kataa was much smaller than the contemporaneous sites of Begho or Old Bima. Villagers were engaged in craft production, including iron and ivory working and potting, but seemingly not textile production (Stahl 1999a, 2001, 2007a). Iron working is suggested by the ubiquity and abundance of slag across the site, especially around Mound 138 (cal. AD 1165-1485),[22] where large amounts of charcoal, slag, and fire-hardened earth suggest the presence of a smelting or forging furnace (Stahl 1999a: 14,19). Large amounts of slag were also recovered from Mound 101.[23] Both finds suggest iron production beyond the immediate needs of Kuulo villagers (Stahl 1999a: 21).

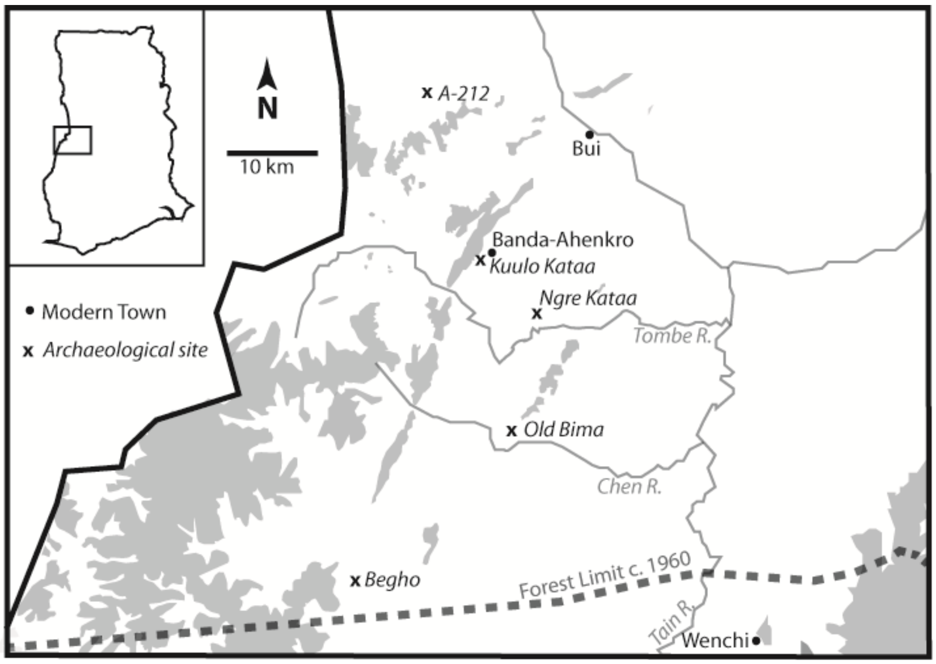

FIGURE 5.6: Map of selected Kuulo Phase sites in Banda area

Pottery from Kuulo Kataa compares stylistically with Begho ware in form and decorative treatment. Forms included bowls, everted rim jars, and globular jars, all of which were commonly carinated. Decoration was most common along rims and carinations. One of the most common surface treatments was cord-wrapped roulette or mat impression. Grooving, often with wavy line or dentate stamp, were also common pottery motifs. Other less common decorative treatments include carved roulette, red slip or paint, and mica painted or slipped, often with grooving or dentate stamp (Stahl 1999a: 23). INAA indicates that pottery was produced mostly east of the Banda hills, and though

[22] Note that this falls mostly in the early Kuulo or terminal Ngre Phase, thus could be used to support my arguments about iron working in Ch. 4.

[23] Stahl (1999a: 21) estimates that slag in excess of 30 kg per 10 cm level was recovered from Mound 101, but it is unclear if this refers to every level. Based on reading of field notes I would guess she refers to the basal levels of the mound which also fall within the early Kuulo or terminal Ngre Phase, but I might be mistaken.

there is little on-site evidence of pottery production, if pottery was fired in similar fashion to today few traces would be left behind (Stahl 1999a: 26). Pottery was obtained from fewer sources than in the Ngre phase, which Stahl and colleagues (2008: 378) hypothesize indicates community level specialization. This level of specialization, in conjunction with slag temper in some of the vessels, suggests an intriguing and perhaps complementary relationship between (presumably) male smiths and female potters (Stahl et al. 2008: 378; Stahl in press).

A large quantity of animal bones was analyzed from Kuulo Kataa (over 16,000 specimens). The assemblage was dominated by mammals. The highly fragmented bone precludes specific identification of most of the mammal assemblage which may include sheep/goat and cattle. Wild fauna attest to the diversity of habitats used, including riverine, wooded savanna, and forested areas. Both opportunistic and skilled hunting practices were probably used, as attested to by the presence of small animals more common to garden areas (i.e., the grass cutter), more formidable species like hyena, lion, leopard and hippo, and less accessible forest species such as colobus and Diana monkeys (Stahl 1999a: 28-32). Two horse bones may suggest an interesting savanna or Gonja connection. The most common identifiable mammal is dog, which seems to have been both consumed and used in ritual performance at Kuulo Kataa, a practice not seen in later phases (Stahl 1999a: 33; 2008a).

Evidence for long distance trade during this phase is in the form of weights and tobacco pipes and ivory working (Figure 5.7). At least three figurative brass objects that probably functioned as gold weights were uncovered in Kuulo phase deposits. One is a double headed seated figure while the others are single heads. The stylistic similarity between the figures as well as evidence for forges and casting molds suggests local manufacture (Stahl 2007a: 62-63). Although small auriferous deposits are scattered throughout the Banda region (Stahl 2001: 48), the presence of figurative weights may simply signal trade in gold from other regions or perhaps other commodities altogether.

Locally manufactured pipes appear for the first time in the Kuulo Phase. Both single and double angle stem-base forms occur, similar to the earliest pipe forms in the Gold Coast (Shinnie and Kense 1989). Bases were predominately pedestalled with a few quatrefoil bases represented (Campbell 2006). The number of pipes recovered by mound varied considerably across the site (Campbell 2006: 50). Interestingly, there is quite a bit of variability in decoration on the pipe bodies, with 20 decorative patterns repeated on more than one pipe, and 30 decorative combinations unique to only one pipe (Campbell 2006: 69). INAA data show that pipes were also made from a greater range of clay sources than pottery during the Kuulo phase (Campbell 2006: 80-81; Stahl et al. 2008: 377).

Working of both elephant and hippo ivory is evidenced by complete objects including decorated bangles and combs as well as by pieces of ivory at various stages of manufacture (Figure 5.7). The majority of these objects were recovered from the midden Mound 101 and other midden contexts in Mounds 102, 127, and 129. Some ivory objects were recovered from domestic contexts in Mounds 118, 130, and 148. The ivory assemblage at Mound 118 includes broken comb and bangle fragments as well as blanks, several of which were in association with house floor layers, suggesting that the inhabitants were engaged in the manufacture of finished ivory objects (Stahl and Stahl 2004).

Other trade goods include objects used to adorn the body. Copper is present in the form of brass or bronze objects, mostly for personal adornment (rings, earrings, pendants, bracelets). There is some evidence for copper working on site (Stahl 2007a: 62). Glass beads are present at Kuulo Kataa, albeit in much smaller quantities than at nearby Begho. Glass objects ultimately came from quite a distance (some from the Islamic world), perhaps through down-the-line trade networks (Stahl 1999a). The rarity and personal nature of both copper objects and beads suggests that exotic goods were of high value locally, "a practice that inscribed subcontinental exchange on local bodies" (Stahl 1999a: 37-38). Though we cannot be certain in what contexts objects like beads were worn, it is notable that they are central to the performance of female nubility rights today and are curated across the Banda area. Interestingly, it is objects and materials from afar like beads and copper that seem to be highly valued (see Stahl 2002), a theme I explore in regards to crops below.

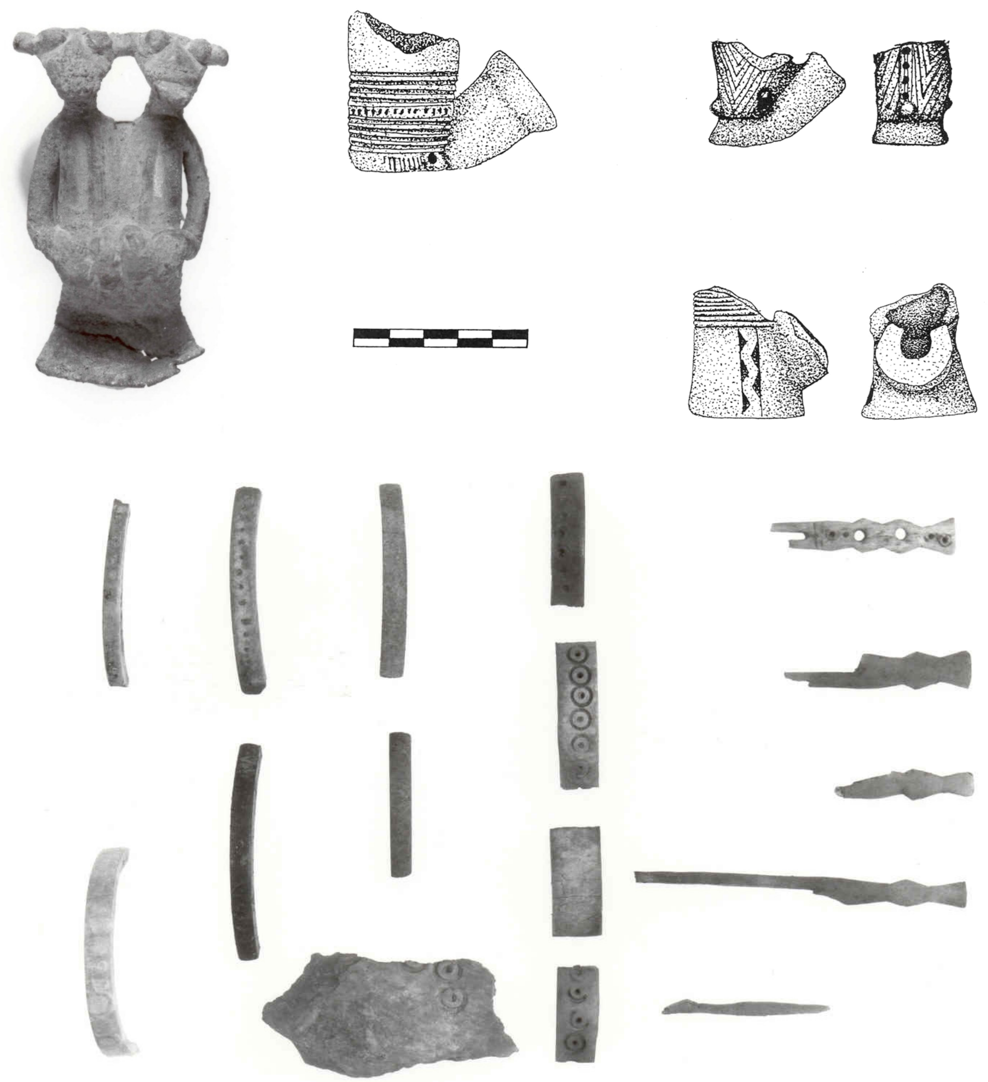

FIGURE 5.7: Examples of Kuulo Phase material culture (photos courtesy of Ann Stahl); clockwise from left, double headed figurative brass object from KK 62W4N; locally manufactured pipes from KK (two from M118 on right); and selection of ivory objects from KK

Kuulo phase contexts analyzed from Kuulo Kataa include midden deposits in the most of Mound 101[24] and domestic contexts from Mounds 118 and Mound 148, which are described in more detail below.

[24] The dates available for Mound 101 are exclusively from the deepest levels (20 and deeper) and suggest a date in the preceding Ngre phase (cal. AD 1280-1490). These deposits are full of slag and probably the result of extensive iron smelting. The nature of overlying these deposits is completely different, including a white slurry house floor and burial in Level 18 covered in layers of midden deposit (BRP 1995). Based on

Ngre Kataa and A-212

Like Kuulo Kataa, Ngre Kataa is a moderately sized village site comprised of at least 14 mounds, many of which also have evidence for occupation in Ngre and Makala phases. Excavations in 2008-2009 found evidence for domestic occupation as well as metalworking, including casting of copper alloys (Mound 6; though these may date to an earlier period). Much of the material is still being analyzed; additional details can be found in Chapter 4 and below. The contexts analyzed for this portion of the analysis include most of Mound 8,[25] a conical midden mound, and Mound 7, where remains of two superimposed Kuulo phase domestic structures were covered with a later Makala phase midden (BRP 2008, 2009).

A-212 was also a moderately sized village, composed of 14 or more mounds. It is located in the far northwest of the Banda area (Figure 5.6). The site contains several temporal components perhaps spanning the earliest occupation to Early Makala phase. The upper levels (1-6) of Mound 7 fall within the Kuulo phase based on ceramic data and the presence of locally made pipes (Stahl 2007a: 57; BRP 2002: 48-49), and were the focus of archaeobotanical analysis as Smith (BRP 2002: 48-49) noted the occurrence of a large number of grindstones and a possible granary base.

Domestic architecture and contemporaneity between sites

One focus of my analysis was the comparison of like contexts across sites to investigate regional and household level variability. Archaeobotanical sampling was designed to assess the variability between households and middens at Ngre Kataa (NK) and Kuulo Kataa (KK), in an analytical framework which I structured into two comparative pairs.

1. <u>Pair 1</u>. The first 'pair' of samples are from KK Mound 118 and the Upper Structure of NK Mound 7 (Figures 5.8 and 5.9). These appear to be multi-roomed rectangular domestic structures surrounded by outdoor activity areas, which may

the presence of pipes and similarity to Mound 118 I place Levels 2-18 in the mid-late Kuulo phase, subject to further revision if more dates become available.

[25] Basal layers (Levels 23-29) probably date to the Ngre Phase and are reported in Ch. 4. Two sigma dates of cal. AD 1472-1645 (AA94094) in Level 18 and cal. AD 1479-1649 (AA94095) in Level 9 are both firmly in Kuulo phase proper. Based on contextual evidence I can confidently place levels 9-22 in the Kuulo phase; those above (Lev. 1-8) have been assigned to the Early Makala phase based on the presence of small quantities of maize cob roulette and maize itself (Ch. 6), subject to change.

FIGURE 5.8: NK Mound 7 Upper Structure in unit 14N24E

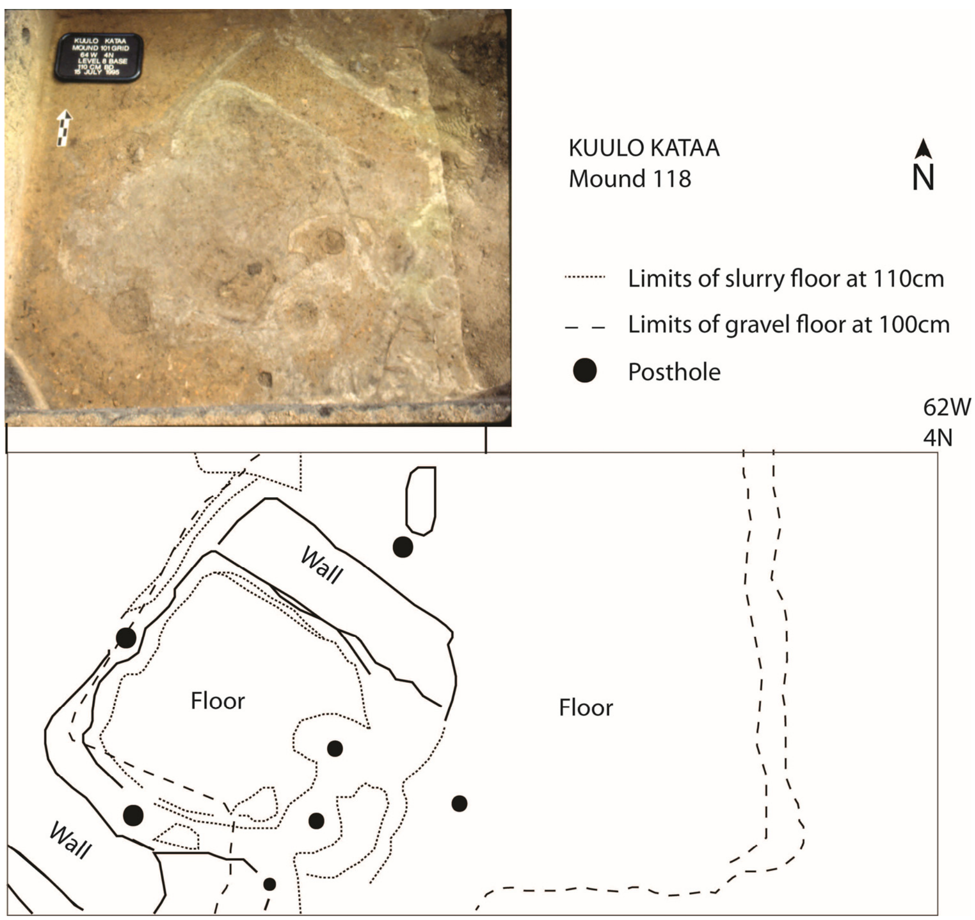

FIGURE 5.9: KK Mound 118 Structure
(map redrawn from Stahl 2001:120; photo courtesy of Ann Stahl)

or may not have been associated with food preparation. This structures are remarkably similar in appearance, construction, and depositional episodes. Both are coursed earth (*atakwami*) structures with walls about 30 cm wide and floors probably formed by beaten earth (sometimes with laterite inclusions) coated with layers of a whitish grey brown slurry. Both structures were refloored several times, with more floors recorded at Mound 118 than Mound 7, suggesting a longer occupation (cf. Stahl 2001: 119). Both structures had burials underneath one of the house corners. Post-abandonment, walls deteriorated, 'melting' atop the wall stubs and floors. Both sites were subsequently used as midden dumps (BRP 1995, 2008, 2009).[26]

2. Pair 2. The second 'pair' of contexts is Kuulo Kataa Mound 148 and Ngre Kataa Mound 7 Lower Structure (Figure 5.10). Both of these areas show some evidence of a structure in the form of flooring and, at Mound 7, a wall of some sort. Walls are less clear than in the other structures. Floors also appear to be somewhat different than Mound 118 or Upper Mound 7; Mound 148 has a laterite floor (covered with slurry?) and the floor of the Mound 7 Lower Structure is covered in a dark grey clay rather than a whitish grey brown sandy slurry. What is most distinctive about these areas is the presence of multiple burned features outside the structure limits, and in particular, the presence of bowl or basin shaped burn features with a diameter of about 30-50 cm. In both cases a three stone hearth or pot stand is also nearby (Banda Research Project 1995, 2000, 2008, 2009).

[26] Domestic architecture in the Kuulo and later phases is the subject of an ongoing project that incorporates soil micromorphology with variation in architectural forms and a 2011 ethnoarchaeological study of change in living memory. Briefly, one of my central arguments is that the configuration of rooms in the Mound 7 Upper Structure suggests that the structures were agglomerative, with rooms connected to one another back to back and side by side, instead of the open rectangular compounds that characterize Banda today. This represents a major break with architecture in the Makala phase, which seems to resemble that of today. Kuulo phase architecture shows closer affinities to contemporaneous architecture in Begho (Posnansky 1973:157-158, 1987:18) and Gonja (York 1973:115) based on the limited evidence available.

FIGURE 5.10: Lower structure and burned basins in NK Mound 7

One central question is whether or not these structures and associated deposits can be considered as roughly contemporaneous within and between pairs. In other words, did the heavily burnt features and associated architecture in Pair 2 predate Pair 1, or were these two types of structures occupied contemporaneously, but corresponded with different activities or groups? At NK Mound 7, the Upper Structure clearly overlays the Lower Structure, but the radiocarbon dates are nearly identical (Table 5.4). There is considerable room for variation with a 2 σ range of 160 years or more, meaning that these occupations may have been separated by as many as 8 generations. Ongoing soil micromorphology will also help determine whether the construction and use of the structures was similar or different. For the meantime, I suggest that the structures, and those at Mound 118, are close in temporal space, but were the products of different social or economic groups. My main evidence is from the Mound 7 stratigraphy, which shows that the Upper Structure was built right atop the Lower Structure. There was clearly some time for the walls of the Lower Structure to melt, but it is likely that the stubs or low mounds of melt were visible on the landscape at the time that the Upper Structure was built. About 50 cm of uniform, non-midden fill is present in one unit before the construction of the Upper Structure, whereas in other units the architecture almost touches the wall stubs and features of the Lower Structure.

TABLE 5.4: ^{14}C and Thermoluminescence Dates from Kuulo Phase structural contexts

Site/Md	Unit	Level (cmbd)	Lab No.	Date b.p.	cal. AD (2 σ)
KK M118 (Pair 1)	64W4N	8	OX 299b1 (TL)[2]	320±25	1625-1725
	66W6N[1]	6 (80-90)	AA 94093	300±34	1484-1660
	66W6N	7 (90-100)	OX 299c1 (TL)[2]	400±30	1535-1655
	66W6N	7 (90-100)	OX 299c2 (TL)[2]	380±30	1555-1675
	66W6N	9 (110-120)	Beta-90474[3]	480±60	1380-1530
	70W4N	9 (110-120)	Beta-94075[3]	400±60	1420-1640
	70W4N	9 (110-120)	Beta-90476[3]	380±50	1430-1640
KK M148 (Pair 2)	68E50N	8 (92-97)	A-12587[4]	360±55	1440-1650
	68E52N	10 (100-109)	A-12586[4]	460±55	1320-1630
	70E48N	F1 (95-100)	A-12584[4]	590±40	1290-1420
	70E50N	8 (90-100)	A-12585[4]	740±80	1150-1410
NK M7 Lower (Pair 2)	14N22E	BF6 (181)	AA 91278[5]	339±34	1468-1641
NK M7	14N24E	10 J	AA 83881[5]	407±32	1432-1625
NK M7 Upper (Pair 1)	14N22E	7 (105)	AA 91277[5]	372±34	1445-1635

[1] Direct date on maize cupule from float sample; the rest are charcoal dates
[2] TL dates from Stahl 1999a: 13
[3] Stahl 1999a: 14
[4] Stahl and Stahl 2004: 91
[5] Most recent round of dates from 2008-2009 seasons that will be published in full at a later date (Stahl pers. comm. 2009, 2011).

Likewise, KK Mounds 118 and 148 may also be close in date. Though two dates at Mound 148 trend earlier, Stahl and Stahl (2004: 96) suggest that this may be an old wood problem, a strong possibility in possible metalworking contexts where large hardwoods are often used for fuel. The presence of a tobacco seed in M148 Feature 1 confirms a later date. Tobacco is also present in Mound 118 (see below). These finds suggest that both contexts date to after 1594/6, the first recorded date of tobacco in West Africa (in Timbuktu). Combined with radiometric dates, Mound 118 probably falls within the period 1594-1660 (slightly later with TL dates) and Mound 148 was probably occupied between 1594-1650, a separation of at most one or two lifetimes. The lack of tobacco seeds may suggest that Mound 7 dates slightly earlier; however these seeds rarely preserve, and one pipe fragment recovered from the level just above abandonment of the Upper Structure may indicate a later date. In sum, though the contexts at KK seem to trend slightly later than those domestic contexts at NK, the apparent similarities in construction techniques and features described in each of the analytical pairs suggests affiliation of some sort, whether simply functional or along social lines.

Charred Plant Remains

A total of 138 flotation samples were analyzed from Kuulo phase occupations at the three sites described above. More samples were analyzed for this phase than any other, since tracking the introduction of American crops was a primary goal of my research. All sites are dominated by pearl millet, though quantities remain low in terms of absolute counts (Table 5.5). On average, pearl millet was recovered from almost 50% of analyzed contexts at these sites. Sorghum on the other hand is present rarely (0-4% presence) and in very small quantities (7 seeds total). This is in contrast to the preceding Ngre Phase where sorghum is more frequent (31% ubiquity on average). Importantly, maize makes its first occurrence in domestic contexts at Kuulo Kataa Mound 118. Both sites contain about the same number of glume and rachis fragments that signal millet and sorghum processing, though they are more widely distributed in contexts at Ngre Kataa.

Comparison of grain recovery across contexts shows some interesting patterns. First, with the exception of maize, the overall percentage frequencies of pearl millet, sorghum, and processing byproducts at Kuulo Kataa and Ngre Kataa are similar. This pattern holds when functionally similar contexts are compared. Middens (NK M8 & KK M101) show high ubiquities of pearl millet (82-87%) and byproduct materials in 27% of samples. Two of the mounds with domestic contexts and structures are also similar; pearl millet was recovered from about half of the contexts in NK M7, and in slightly fewer contexts at KK M118. Both of these domestic areas show little evidence for grain processing byproducts. The outlier is the domestic areas in KK M148, where pearl millet is much more ubiquitous (67%) and byproduct material is found in almost half of samples

(44%).[27] This suggests that more grain processing was going on or its byproducts used as fuel in the M148 structure and surrounds, which is interesting considering that a burned basin is present. One of the most interesting finds is the presence of maize in M118 contexts and its absence in all other contexts. Was this the only house that had access to this novel crop, or does it simply postdate all of the other contexts analyzed?

Plants other than grains were also recovered (Table 5.6), notably tobacco seeds. The seeds appear to belong to the *rustica* group which originated in North America, though poor preservation inhibits secure identification. They were found in each of the structures at KK (M118, M148, notably in a burned basin feature F1), but are missing at NK. Pipes of local manufacture were also discovered in Mounds 118 and 148 (Campbell 2006:50), confirming the presence of smoking.[28]

TABLE 5.5: Kuulo Phase Grain Crop Macrobotanical Remains

KUULO PHASE	Ngre Kataa		*NK KP Total*	Kuulo Kataa			*KK KP Total*	A212 M7, U1	Phase Total
	M7	M8		M101	M118	M148			
n	51	6	*57*	15	55	9	*79*	2	**138**
Ubiquity Pearl Millet (%)	33	100	*40*	87	33	67	*46*	50	**43**
Count Pearl Millet	51	30	*81*	40	42	15	*97*	4	**182**
Ubiquity Sorghum (%)	2	0	*2*	0	5	0	*4*	0	**3**
Count Sorghum	2	0	*2*	0	4	0	*4*	0	**6**
Ubiquity Maize (%)	0	0	*0*	0	15	0	*10*	0	**6**
Count Maize	0	0	*0*	0	17	0	*17*	0	**17**
Byproduct* Ubiquity (%)	8	33	*11*	27	2	44	*14*	50	**13**
Byproduct Count	4	9	*13*	5	1	17	*28*	3	**44**

[27] This pattern is potentially complicated by the lower number of samples analyzed for M148, which makes comparison of ubiquities between these areas less than ideal. Taking raw counts and seed density into account may help confirm these observations. Fifteen grains of pearl millet and 17 byproduct fragments were recovered at M148, with a per sample density of 1.67 and 1.89, respectively. These are significantly higher densities than those at M7 (51 grains, density=1; 4 byproduct frags, density=0.08) and M118 (42 grains, density=0.76; 1 byproduct frag, density=0.02), especially for byproduct material. This confirms the pattern described in text.

[28] Pipes were not recovered from the M7 structures themselves but in layers just above the Upper Structure (BRP 2009). This depositional pattern also characterizes that at KK M118 and M148.

TABLE 5.6: Other charred plant remains recovered in Kuulo Phase contexts

Scientific Name	Common Name/Gloss	Ngre Kataa		*NK KP Total*	Kuulo Kataa			*KK KP Total*	A212 M7, U1	Phase Total
		M7	M8		M101	M118	M148			
Trade Plants										
Afromamum melegueta	Melegueta pepper/ grain of paradise		1	*1*	1			*1*		**2**
Nicotiana* cf. *rustica	Tobacco (North American)					5	2	*7*		**7**
Edible & Weedy Plants										
Butyrospermum paradoxa	Shea butter (shell)						1	*1*		**1**
Cassia tora	Edible and weedy herb				1			*1*		**1**
Dactylonium aegypticum	Wild grass					2		*2*		**2**
Elaeis guineensis	Oil palm (shell)	1		*1*						**1**
cf. *Euphorbia*	Wild weed	1		*1*						**1**
***Ficus* sp.**	Common tree with edible fruits	2	7	*9*	1			*1*		**10**
cf. *Laportea aestivans*	Edible and weedy herb	1		*1*						**1**
cf. *Vigna unguiculata*	Cowpea	1	1	*2*	2			*2*		**4**
"Yomaa"	Wild plant used in Banda today					1		*1*		**1**
Zaleya pentandra	Edible and weedy herb	9	11	*20*	1			*1*		**21**
cf. Asteraceae	Various					1		*1*		**1**
Boraginaceae	Various	1		*1*			2	*2*		**3**
Boraginaceae/Euphorbiaceae	Various					1		*1*		**1**
Cheno-Am	Various	1		*1*		1		*1*		**2**
Euphorbiaceae/Lamiaceae	Various	15		*15*	3			*3*		**18**
Fabaceae/cf. Fabaceae	Poorly preserved cowpea and wild beans	1	5	*6*						**6**
Lamiaceae (cf. *Ocimum*)	Wild basil					1		*1*		**1**
Malvaceae (cf. *Sida* sp.)	Various	1		*1*		1		*1*		**2**
Poaceae/cf. Poaceae	Poorly preserved grains	31	18	*49*	8	7	3	*10*	2	**61**

One surprise was the recovery of two melegueta pepper seeds in the middens of NK Mound 8 and KK Mound 101. While few seeds were recovered, this is to be expected given its value as a trade spice. It is difficult to determine whether or not the spice was used locally in food or Banda was trading in this good; Marees (1602 [1987]) notes that spicy foods were common along the Gold Coast. Whatever the case, it seems likely that melegueta peppers were valued.

Cowpeas were also present in low quantity in most of the areas sampled, a pattern not uncommon for beans in general which rarely preserve. The larger quantity of seeds identified conservatively as Fabaceae or cf. Fabaceae include several examples of what may be poorly preserved cowpeas. Shea butter shell is conspicuously absent, with only one shell fragment present in Mound 148. This paucity of shell remains is surprising as shea butter should have been the primary oil in this region, especially during the dry conditions that predominated (below). It is possible that this is a recovery issue rather than a real absence. The occurrence of a single fragment of oil palm shell may suggest that this oil was also used in the area, but again, the lack of preserved remains of this hardy shell is surprising if it was used in any quantity.

The rest of the plants in the 'edible and weedy' category are more difficult to interpret. Many are weeds that can be consumed, and are eaten in modern day Banda and West Africa, making interpretation of their actual uses challenging. This group includes *Cassia* spp., *Ficus* sp., *Laportea aestivans*, cf. *Ocimum* sp., cf. *Sida* sp., and *Zaleya pentandra*. *Cassia* spp. (Nafaanra: *bombo*), *Ocimum* spp. (Nafaanra: *napun* [*O. basilicum*] or *chasigbɔɔ* [*O. gratissimum*]), and *Laportea aestivans* (Nafaanra: *klakokagbɛɛ*) are all used today as leaves for making soup in the Banda area. Another complicating factor is that slightly different recovery techniques were used at Ngre Kataa and Kuulo Kataa (see Ch. 3).[29]

To facilitate further contextual and temporal comparison, I combined several taxa into useful analytical categories. Indigenous grains are sorghum and pearl millet. Trade plants include maize, tobacco, and melegueta pepper. The category edible and weedy

[29] Namely, in 2008-2009 light fractions were collected on smaller mesh size cloth (chiffon or cotton), while all previous excavations (including KK and MK) used cheesecloth, which has a much larger mesh. This may account for the difference in absolute quantity of wild/weedy seeds, which is higher at Ngre Kataa. However, the number of wild/weedy taxa recovered at NK and KK is similar (11 and 13, respectively), and very small seeds like tobacco were still recovered at KK, if infrequently.

contains many taxa that individually tend to occur rarely and are listed in Table 5.6. The indeterminate grass category is mostly composed of poorly preserved millet and possibly sorghum; some of the grains may represent shibras, a weedy version of millet, or especially small or distorted millet grains. Identifiable wild grasses are absent from the entire sequence, thus they are unlikely to be present in the indeterminate grass category. Finally, the grain processing byproduct category includes glumes, rachis, embryos, and grass spikelets that are the detritus from grain processing.

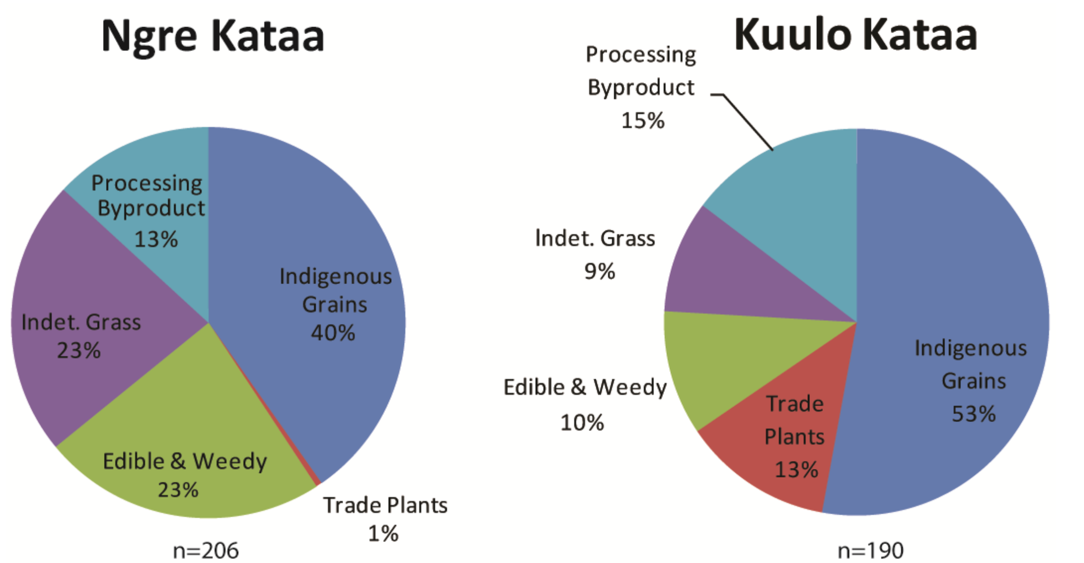

FIGURE 5.11: Overall percentage frequency of charred plant remains at Kuulo phase sites

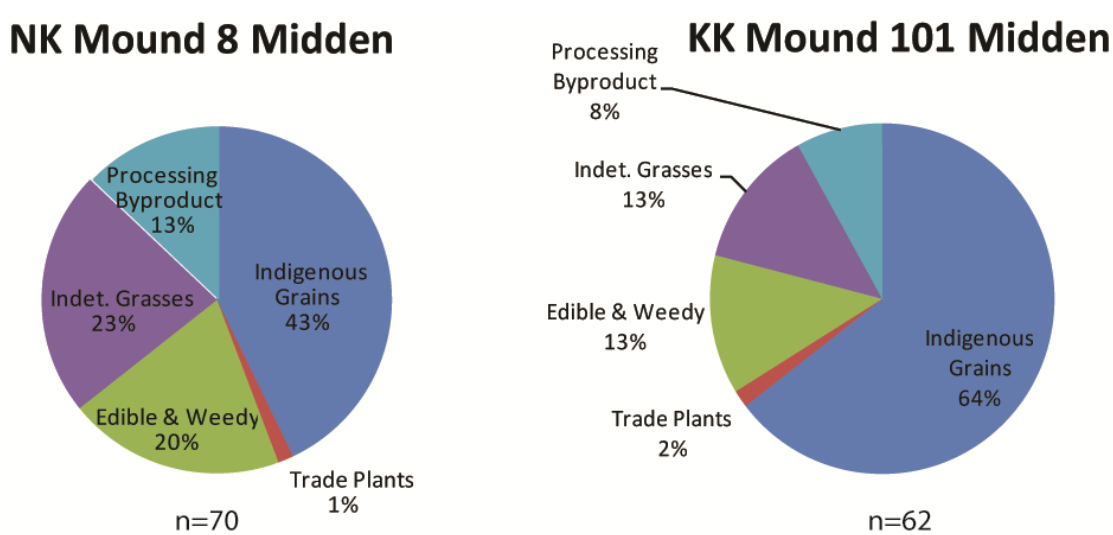

FIGURE 5.12: Percentage frequencies of charred plant remains in Kuulo phase middens

Figure 5.11 shows the percentage frequencies of these analytical categories for the sites of Ngre Kataa and Kuulo Kataa as a whole. There are many similarities, but it is worth mentioning that the Kuulo Kataa assemblage contains a higher percentage of identifiable indigenous grains (53%) compared to Ngre Kataa (39%). Kuulo Kataa also had much more evidence for trade plants, particularly maize and tobacco. Both pieces of evidence hint that Kuulo Kataa may have occupied a different place in the regional socioeconomic hierarchy (see below).

Higher representation of indigenous grains is particularly noticeable when the middens of KK Mound 101 and NK Mound 8 are compared, with frequencies of 64% as compared to 39% (Figure 5.12). More edible and weedy taxa as well as processing byproducts are found in Mound 8 as well. There is always the possibility that this pattern relates to differences in recovery or perhaps post-abandonment formation processes; however, the presence of maize and different material correlates at Kuulo Kataa confirms that these sites differed in economic and social activities. Both middens contained very high ubiquities of pearl millet (80%), confirming the importance of this grain in Kuulo phase. Sorghum is almost entirely absent in both units.

There are some important differences between M7 Upper Structure and Mound 118 (Figure 5.13), one of my analytical 'pairs'. Of the two mounds, Mound 118, like the rest of the site of Kuulo Kataa, contains slightly higher amounts of pearl millet, and very low quantities of processing debris. As discussed above, this may indicate that Kuulo Kataa occupied a different place in regional production than NK, perhaps being more involved in craft production and less in agricultural activities. The presence of maize and tobacco is important. This is the first appearance of maize in the Banda region or anywhere inland.[30] A maize cupule was AMS dated to cal. AD 1484 to 1660 (at 2 sigma) (AA94093) from Mound 118 (66W 6N, Lev. 6, 80-90cm). As discussed above, documentary evidence indicates the presence of maize on the coast for the first time in 1554; if we consider this reliable, the Mound 118 deposits date to 1554-1660, and considering the presence of tobacco, probably postdates 1594. This suggests a very early and rapid diffusion of new crops inland.

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[30] Presumably maize would be recovered at many inland and coastal archaeological sites if flotation were actually used.

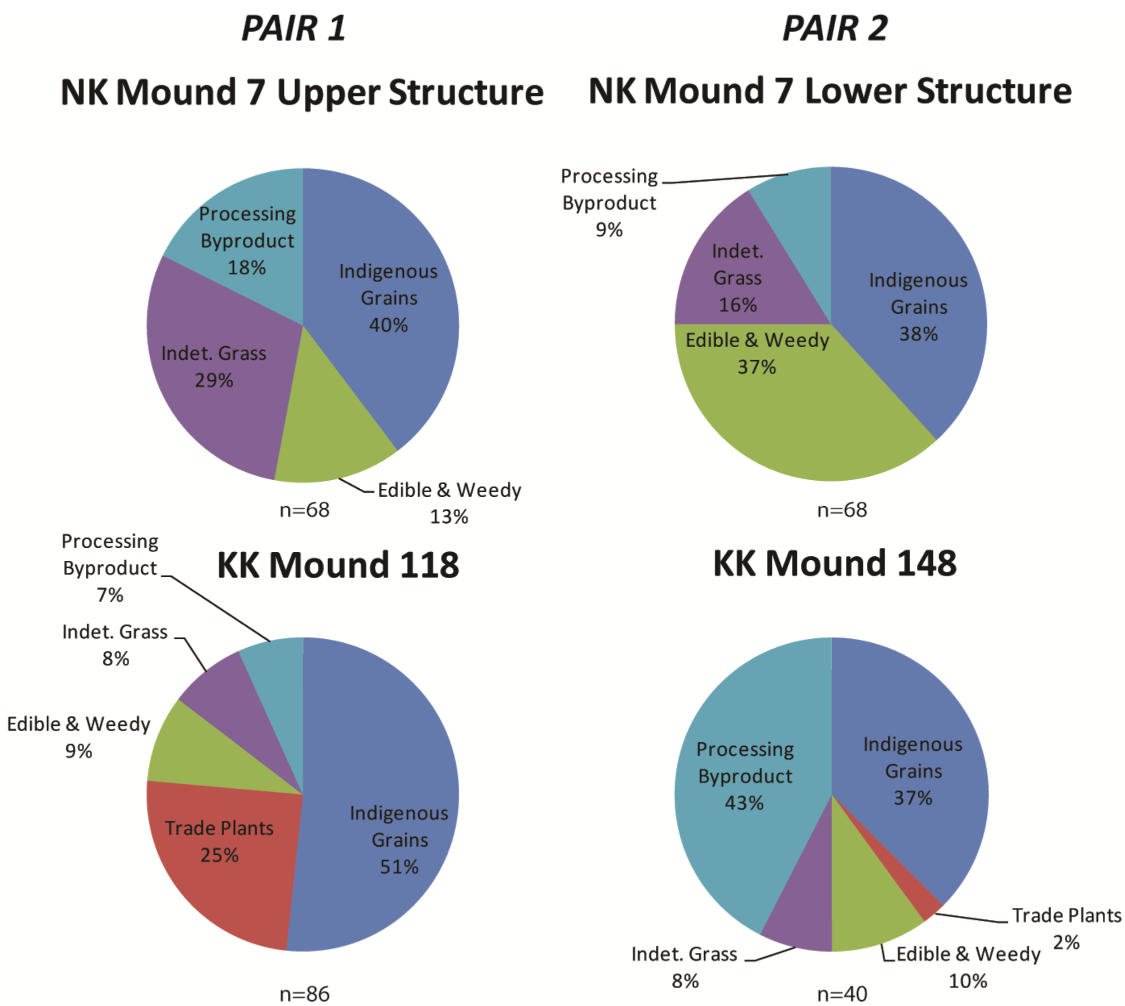

FIGURE 5.13: Percentage frequencies of charred plant remains in Kuulo phase domestic structures[31]

Pair 2, the lower levels of NK Mound 7 and KK Mound 148, both show a frequency of indigenous grains that is similar to the domestic contexts in the upper levels of Mound 7. There are important differences as well. The first is the higher percentage of edible and weedy plants at Mound 7, which may have something to do with recovery (see note above). Mound 148 stands out from the rest of the contexts sampled in its large percentage of grain processing byproduct present. Pearl millet is present in one-third of

[31] I attempted to do a more detailed unit-by-unit spatial analysis, but seed counts were simply too low to substantiate this approach.

contexts in Mound 7 and Mound 118, but in twice that (67%) of Mound 148 samples (Table 5.5). The Mound 148 assemblage thus appears quite domestic, but this is curious because of the presence of burned basins, which have been interpreted as metal working features (Stahl 2009 pers. comm.). It may be that grain processing debris was used to start the fires[32] in these features for metalworking in Mound 148, and perhaps dry weeds in the Mound 7 Lower structure.

Burnt basins are absent from the M7 Upper Structure and Mound 118, but there is evidence for food preparation, and perhaps cooking, in the form of numerous grinding stones and burnt patches.[33] Unlike Mound 7, Mound 118 contains tobacco and maize, and a higher amount of clean pearl millet grains. This may indicate that different processing technologies were in use, or that the residents of Mound 118 acquired grain in a cleaner state through exchange (below).

Phytoliths and Plant Processing

One way to evaluate cooking and processing practices (as well as other activities) is through analysis of grinding stones and phytoliths. While it is not yet possible to trace specific plants with absolute confidence using phytoliths in the African archaeological record, methods I described in Chapter 3 do enable me to investigate whether millet, sorghum, or maize presence is indicated.

The Kuulo phase was the focus of an earlier study by Deborah Pearsall and Ann Stahl to trace the introduction of maize to the area (Stahl 1999a: 35-36). Pearsall looked for maize leaf and cob phytolith forms known from the New World tropics to trace maize. She found many of those same types in two column samples from KK Mound 118 (Table 5.7). Since then, several studies have documented phytolith forms in African grasses that overlaps with phytolith forms in maize leaf (Ch. 3). This does not completely invalidate the earlier study as Pearsall uncovered several phytolith forms that are distinctive to maize cobs. Although further comparative work remains to be done to see if these same forms are produced in African wild grasses, they are morphologically quite

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[32] I observed a similar practice in Senegal in 2007; pearl millet processing debris was saved in a large area and used by women to help in the firing of pottery.
[33] Elderly women in modern day Banda describe grass fires in house corners being used to heat houses in the wet season in the past.

distinctive looking. And whether or not the phytolith methods are disproven, the presence of charred maize cupules and kernels in Mound 118 confirms that maize is present.

TABLE 5.7: Phytolith forms produced in maize in Mound 118 samples
(from Stahl 1999a: 36)

	66W0N		64W4N	
Depth (cm)	Lg. Var. 1 Cross	Cob body	Lg. Var.1 Cross	Cob body
0	-	3	-	4
10	-	-	1	3
20	2	1	-	4
30	1	-	-	1
40	-	3	-	3
50	-	-	-	3
60	2	-	-	1
70	-	3	2	-
80	-	-	1	1

I focused phytolith analysis on Kuulo phase contexts from the site of Ngre Kataa in order to compare domestic M7 contexts with Mound 118, and also to confirm the presence or absence of maize at Mound 7. Eight soil samples and one artifact residue have been examined. Here I present tentative evaluations based on the percentage of phytolith forms produced in millet, sorghum, and maize (Table 5.8; see Ch. 3). Most of the samples show a moderate probability of millet presence (recall that strong probability indications of millet are not possible with phytoliths, see Ch. 3). Most of these contexts or those immediately adjacent also contained charred pearl millet seeds. Two samples suggest a moderate probability that sorghum is present. Evidence for maize is low to nonexistent, confirming the pattern in charred botanical remains.

The one grinding stone that has been analyzed to date is a cylinder shaped hand held stone from Mound 7 Upper Structure (14N 26E, Lev.10). Only seven phytoliths were found on this object, with about 14% of them being produced in sorghum, yielding a low probability that sorghum is represented. Many more samples are available and await study once phytolith analysis in Africa matures to a point where appropriate identification methods are developed.

TABLE 5.8: Ngre Kataa Millet, Sorghum, and Maize Phytolith Indicators in Soil samples

Mound/ Unit	Lev (cmbd)	Description	% millet indicators	% sorghum indicators	% maize indicators
M7 Upper Structure					
12N 24E	10H (120-130)	Floor	**42.7**	5.62	3.37
14N 22E	7G (100-110)	Floor	32.2	20.3	20.3*
14N 24E	9G (110-120)	Burn feature on floor	**23.6**	5.62	2.25
14N 26E	10 Cluster C (100-110)	Cluster of ash, ceramics, grindstones	**56.7**	11.7	3.33
M7 Lower Structure					
12N 24E	14Q (163-170)	Floor/Burnt area	**42.7**	5.62	3.37
14N 22E	14 (174-187)	Bowl shaped burn features 6&7	30	**15**	15
14N 26E	(166-176)	Floor C	26.8	9.86	2.82
M8/8N 127E	8 (120-130)	Midden	**31.1**	8.11	2.7

(unshaded)	Little to no probability	(light grey)	Weak probability	(dark grey)	Moderate probability

Bold shows samples with same taxa represented in same or immediately adjacent contexts
* % indicators are moderate, but lacks any of the more distinctive forms, so is only a weak probability

Wood procurement and environmental reconstruction

Wood charcoal was identified from Mounds 7 and 8 at Ngre Kataa and Mounds 101, 118, and 148 at Kuulo Kataa; the results are summarized in Table 5.9. Most of the taxa present grow in the savanna woodland or transitional zone that is typical of the Banda region, including *Terminalia, Afzelia*, *Vitellaria paradoxa, Bridelia, Anogeissus, Berlinia/Isoberlinia, Pterocarpus, Prosopis, Pericopsis, Combretum,Crossopteryx, Detarium*, *Khaya*, *Parkia,* and *Piliostigma.* These taxa are found throughout Sudanian woodlands in both wet and dry areas (White 1983: 105), and dominate the assemblage. Most were probably used as firewood. Six taxa are not used in modern West Africa for firewood, but are exploited for their edible fruits (*Detarium*, *Parkia,* and *Ongokea*), medicinal properties (*Berlinia/Isoberlinia, Pterocarpus, Detarium, Khaya, Parkia, Ongokea*), in construction (*Berlinia/Isoberlinia, Detarium, Khaya, Parkia*), or for technical uses (*Berlinia/Isoberlinia, Khaya, Parkia, Ongokea*), such as dying (*Pterocarpus*) (Irvine 1961). None of these taxa occur in large amounts, but hint at a diverse repertoire of knowledge about the landscape.[34]

[34] This is in contrast to the lack of diversity evident in the Volta Phase samples, which are also from a dry period. Might this represent a wider knowledge base of the useful landscape in Kuulo phase?

TABLE 5.9: Charcoal identified in Kuulo Phase contexts (n=11) (shaded taxa are forest taxa, and bold indicates taxa that are not used for firewood today)

Wood Taxa (order of prevalence)	Total Count	Overall Ubiquity (%)	% of assemblage	Modern Uses*
Terminalia	68	91	26	F,C,M,O,T
Detarieae 2, cf. *Afzelia*	52	82	19.8	F, M,S,T
Vitellaria paradoxa type	26	73	9.9	F, E,O
Indeterminate	25	82	9.5	
Monotes, Dipterocarpaceae	17	36	6.5	
Bridelia cf. *micrantha*	16	64	6.1	F,C,E,M,T
Anogeissus leiocarpa	9	36	3.4	F,M,T
Detarieae 1, cf. *Berlinia/Isoberlinia*	**8**	**55**	**3.1**	**C,M,T**
***Pterocarpus*-type**	**7**	**27**	**2.7**	**M,T**
cf. *Prosopis*	6	45	2.3	F,C,E,M,T
Uapaca	6	27	2.3	F,C,E,M
Combretum molle/nigricans	5	27	1.9	F,M,T
Rubiaceae II, cf. *Crossopetryx/Mitragyna*	3	18	1.1	F,C,M,T
Detarium	**3**	**18**	**1.1**	**E,C,M**
***Khaya*, Meliaceae**	**2**	**18**	**0.8**	**C,M,T**
Lophira cf. *lanceolata*	2	18	0.8	F,C,E,M,O
Aliform with 5celled and >10celled homocellular rays	2	9	0.8	
Detarieae 3*, cf. *Parkia	**2**	**9**	**0.8**	**E,C,M,T**
Piliostigma	2	9	0.8	F,C,E,M,T
Ongokea gore	**1**	**9**	**0.4**	**E,M,T**
TOTAL KUULO PHASE	262			

*From Irvine 1961. Abbreviations: F=firewood/charcoal; E=Edible fruits or leaves; M=Medicinal; O=Oil; C=Construction, T=Technical processes (i.e., dying, tanning, etc.); S=Sacred

Practices of wood procurement and landscape use show some continuity with the Ngre Phase; with the exception of *Parkia*[35], all taxa were also recovered from Ngre Phase contexts. However, the diversity of wood species represented (n=19) is much lower than Ngre Phase (n=31), and resembles the Volta phase assemblage (n=14). I suggest that this is related to prevailing drought conditions suggested by proxy records at Lake Bosumtwi (Shanahan et al. 2009; Ch. 4 & below). This is supported by the fact that there are very

[35] *Parkia* is a very useful tree indeed; without a species level identification it is hard to determine what its specific uses may have been. One species (*P. biglobosa*), known as dawadawa or locust bean, is used in Banda today and was very common in the recent past; it is also widely used in West Africa as a food and drink and for its ashes (Irvine 1961).

few wet savanna indicators, and almost no evergreen forest taxa present in the Kuulo Phase assemblage. Those present are two taxa from the wet savanna woodland (*Lophira cf. lanceolata, Uapaca*) (White 1983:105), and a single fragment of one tree taxa that is restricted to the moist and mixed semi-evergreen forest (*Ongokea gore*) (prota.org). This contrasts with four wet savanna indicators and seven taxa from evergreen forest present in Ngre phase samples.

The limited array of taxa and lack of forest or wet savanna species indicates that the Banda area was drier than during the preceding Ngre phase, a supposition supported by the Lake Bosumtwi data which records a multi-century drought between c.1450-1700 (Shanahan et al. 2009: 379; Figure 4.6). One other possible explanation deserves discussion: namely, that extensive metalworking, primarily in the form of smelting which requires large amounts of fuel to extract iron from ore, may have denuded the landscape surrounding both Banda and Bosumtwi, especially of slow burning forest trees (cf. Goucher 1981). While this may explain the limited diversity of Kuulo phase charcoal as opposed to Ngre phase charcoal, the Lake Bosumtwi data presented in Chapter 4 (Figures 4.6 & 5.14) is based on several kinds of proxy data, including sediment varves and $\delta^{18}O$ (oxygen 18 isotope) values. $\delta^{18}O$ values of Bosumtwi lake water reflect the balance between precipitation and evaporation in the closed Bosumtwi basin (Shanahan et al. 2009: 377). This proxy record would not be expected to vary with human activities but instead be a reliable indicator of precipitation and temperature.

Drought and the 'Golden Ages': a different Africa emerges

My central aim in this chapter was to examine the impact of the opening of the Atlantic trade on foodways in interior regions of Ghana, and particularly to evaluate the larger than life role accorded to maize. By reviewing the archaeology of the period, and the material record of Banda in particular, I have shown that the economic circumstances of the wider region were quite different—and better, at least for some—than what is observed today (also see Mitchell 2005). Accordingly, the motivations for adoption of new goods and crops in the past likely differed in significant ways. This complicates previous explanations of the adoption of American crops, which rely on the assumptions that they were needed to solve nutritional and agronomic shortfalls.

Much of central and northern Ghana was heavily engaged in long-distance trade networks that moved goods like gold, ivory, and kola nuts northwards in exchange for goods like copper, salt, and beads (Figure 5.14a). Sites like Begho, Bono Manso, and Banda were actively engaged in the production of craft goods in order to access this lucrative trade. At Banda in particular, there is evidence for the production of pottery, metal goods (iron and copper), and ivory. Some of these goods, such as pottery and metals, were probably consumed in regional trade networks. Others, like ivory and perhaps gold, were destined to meet demands in markets further afield, mediated through the major trade center of Begho (Figure 5.14b).

Based on both pottery sourcing and my data on food and agriculture, people in Banda may have been organized into specialist groups (Stahl et al. 2008: 378). This is best illustrated by comparing the inventories and features at the four different structures reviewed above. Each of the analytical pairs may speak to different functions or occupants. Pair 1 (Upper M7 & M118) have few visible craft working features and instead appear to represent habitations. Pair 2 (Lower M7 & M118) are structures that appear to have been constructed differently or out of different materials, surrounded by an area of intensive burning and bowl shaped features that probably were used for working metal (i.e., forges). This supports the supposition that different specialist groups occupied the Banda area, who built their houses slightly differently from one another, and in the case of Pair 2, engaged in their trades just outside of their homes (or structures).

A closer look at material and plant inventories underscores some of these observations and suggests that there are also important differences between the sites (Table 5.10). There is evidence for iron and copper working at both Ngre Kataa and Kuulo Kataa, as well as exotic beads and cowrie shells (formerly used as currency). Figurative weights at Kuulo Kataa indicate trade in gold or other commodities, as does a copper alloy decorated miniature spoon recovered from NK M7 Upper Structure that may have served as a weight or measure. Evidence for spinning and cloth production at either site is exceedingly rare (BRP 1995, 2008, 2009).

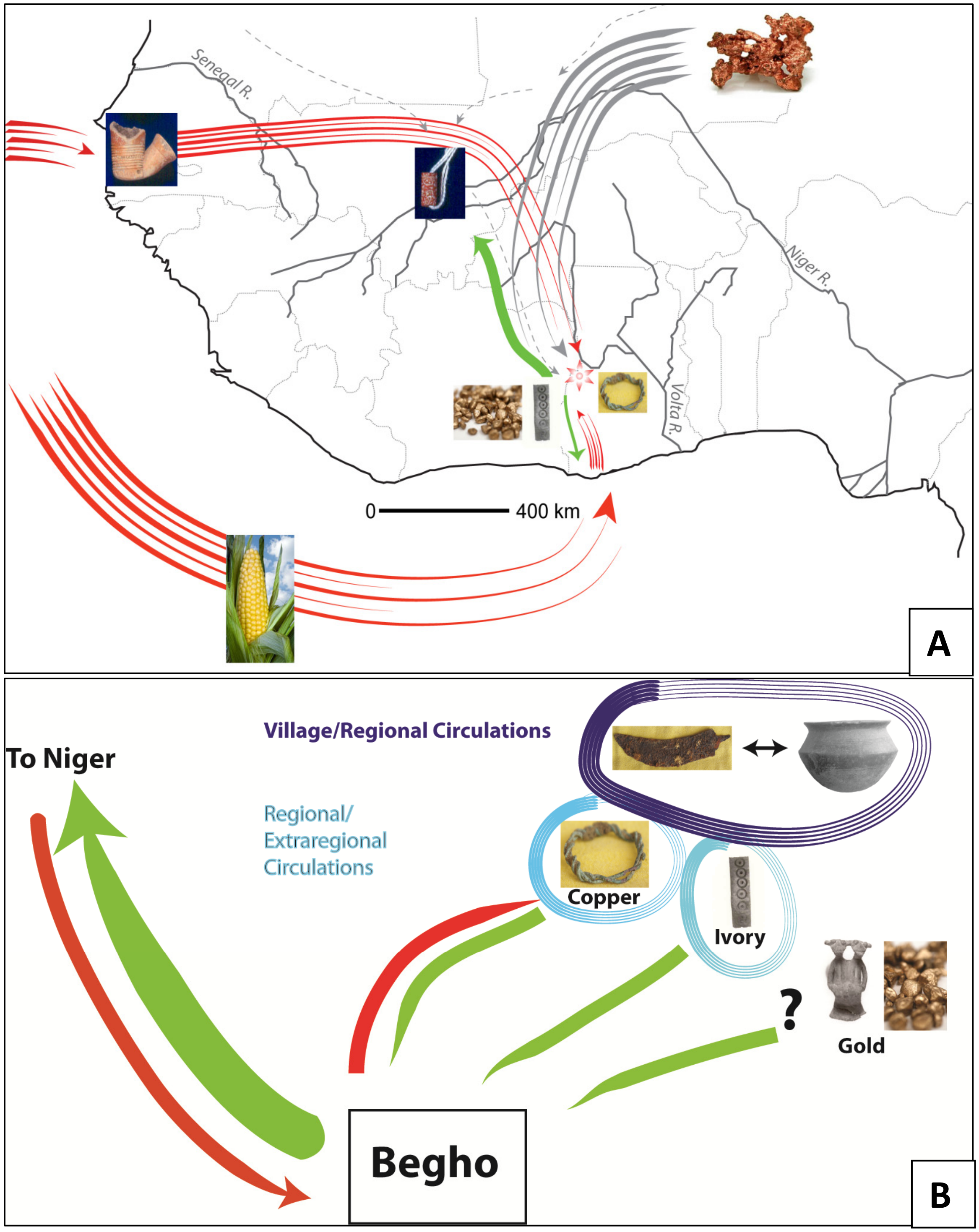

FIGURE 5.14: Schematic views of a) continental and oceanic trade, and b) organization of regional trade in Banda during the Kuulo phase

TABLE 5.10: Comparison of material culture and crops recovered in Kuulo phase deposits[36]

	Maize	Tobacco	Iron slag	Iron objects	Copper	Ivory	Figurative weights	Beads	Local pipes	Spindle whorl	Cowrie	Ceramic 'bananas'	Rounded sherds
NK M7 Lower structure			X	X	X			X					
NK M7 Upper structure			X	X	X		X	X	?[37]		X		
NK M8	X?		X	X		X?			X	X	X		
KK M101			X	X	X	X		X	X?		X	X	X
KK M118	X	X	X	X	X	X	X	X	X		X	X	X
KK M148		X	?	X	X	X		X	X?		X	X	X

The similarities stop there. There is evidence for ivory working in M118 (Stahl and Stahl 2004: 95), but apparently not in Mounds 7 or 148 (ivory is present in M148 but not in contexts associated with the living/use surfaces: Stahl and Stahl 2004: 96). M118 also contains rounded sherds that have been interpreted as weights by Garrard (1980) at Begho, and are absent at M7. Ceramic "bananas", small (about 3-5cm) objects that may have been tools[38] or perhaps weights, are found at M118 but not M7. The unequal distribution of ivory hints at variability in household specialization over time and/or space that is matched by the presence of maize and tobacco. Maize was restricted only to the inhabitants of Mound 118 structure, and may have been accessed through involvement in an additional sphere of trade through ivory production. Ivory was highly sought after by Europeans on the coast as well as those along the Niger Bend, and along

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[36] Kuulo Kataa inventories derived from Stahl 1999a, 2001, 2007a and Stahl and Stahl 2004, as well as field notes from 1995 and 2001 seasons; Ngre Kataa data are still being published; these finds are from 2008 and 2009 field notes and should be considered preliminary.

[37] Mound 7 has three pipe fragments, two in upper levels probably associated with fill dating to a later phase, and one in the 90-100 cm level 6 zone D in 14N 22E, which is fill one level above the floor of the Upper Structure, and may be associated.

[38] The presence of these in contexts where ivory working is present makes me think that they were perhaps tools for working ivory? Perhaps to sand/polish the ivory? The curvature is suggestive, as is there virtual absence at MK. They are a perfect size to fit in the hand and rub ivory pieces against. Similarly sized ceramic pieces were also found at New Buipe that York (1973:27) interprets as bracelet fragments, but with very small diameters. These may also be ivory working tools.

with gold, may have been one of the first goods used for transactions with both (Fig. 5.14a).

My data on food and agriculture, presented above, also corroborates the idea of multiple specialist groups. For example, the inhabitants of Mound 118 not only were the only ones with access to maize, but seem to have acquired indigenous grains in a cleaner form as well. Perhaps these important staples were obtained through exchange rather that primary production. The inhabitants of Kuulo Kataa also engaged in smoking of tobacco, for which there is currently very little evidence at Ngre Kataa. These site based differences may be chronological; but based on the dates presented above, not much time separated them. This suggests a rapid shift within a few generations in the relative access and affluence of Banda traders and craft producers, a dynamic that is schematically illustrated by tracing the probable entry routes of different trade goods in Figure 5.14a.

This world of interconnected and productive traders and artisans is quite the opposite of what one would expect to exist during a centuries-long drought that plagued the area from 1450-1700. The production of crafts beyond local needs, including luxury items crafted of ivory and copper, is not what one would expect if drought had resulted in widespread crop failure or food shortage. Neither are the imports of other fine goods like beads and the new habit of smoking. While some wild plants are present that are today used for soups, there is no clear evidence of famine foods. Instead, farmers may have slightly adjusted what they were growing in order to accommodate drier conditions. Very little sorghum was recovered, for example, and samples were almost always composed of pearl millet. It is possible that not everyone engaged equally in all aspects of food production, as suggested by the cleaner grain at Mound 118. This runs counter to risk-minimizing strategies of farmers today, who all produce a wide array of crops in many small fields spread out geographically to ensure that at least some receive adequate rainfall. More farmers and more fields means more variation, and evens out risks associated with skill and local environmental variability.

The evidence from Banda and throughout Ghana is more suggestive of a period of abundance and wealth than of catastrophic drought, at least until about c. 1650. This is important as it runs counter to expectations of the impacts of drought on modern day Africa. It also suggests that the Africa (or at least the small part that is the focus of this study) into which new foods like maize was received was a very different place indeed. The Banda of this 'Golden Age' (or at least the small part on which I have focused) did not need to adopt new crops like maize to make up for caloric shortfalls, even in the middle of a severe drought. In fact, as I show in the chapters to follow, conditions of starvation and chronic food shortage did not emerge until much, much later, and it was only then that people abandoned the foods they knew in favor of maize.

This is not to say that such a severe drought did not have an impact on life in Banda and surrounds. In fact, the area seems to have been abandoned sometime around 1650 and probably until the 1720s. Begho also collapsed in the early 18th century, as did Bono Manso. While this is in part related to instabilities that arose as trade shifted southwards and the Asante consolidated their power in central Ghana (Ch. 6), it is also possible that two or three centuries of high production levels during a severe drought took a toll on local environments and productive capacity. The demands for firewood for iron production alone would have been immense (Goucher 1981), at the same time that drying conditions would have led to the demise of many humid forest hardwoods favored for charcoal production. Whichever is the case, the productive capacity in west-central Ghana does appears to have declined by the 18th century Makala Phase, which I explore in the next chapter.

Chapter Summary

The 15th to 17th centuries was a time of rapid change in Banda and the Gold Coast as the area was drawn even further into the sphere of Niger trade and begun to accommodate a new trade along the coast. Some areas of Ghana saw population movements to take advantage of these new coastal opportunities, while others remained in place and continued to produce and exchange crafts made of iron, copper, and ivory in exchange for valued goods like copper and beads. In yet other areas, new powers and people migrated and consolidated to form expansive polities. The rise of Atlantic trade introduced new crops from the Americas into this shifting social landscape, continuing on a theme of increasing crop diffusion from Asia that had begun many centuries before. But the pace and impacts of the Columbian Exchange were different; they accompanied a hastened movement of wealth in gold and eventually people out of Africa. Viewed from the vantage of the present, many scholars have explained the adoption of crops like maize as important providers of calories in a time of need, but little is known about the conditions under which these crops spread.

During this time, the inhabitants of Banda were engaged in increasingly more specialized forms of craft production, particularly of copper alloys, ivory, and pottery. They were also active traders of gold and other items. The first indications of Atlantic trade are in the form of tobacco and maize, which appear in the first half of the 17th century, indicating a very rapid spread from their points of introduction. All of this occurred during a several-centuries long drought that plagued the Gold Coast from 1450-1700. Banda farmers adjusted to this climatic shift by increasing the amount of millet grown and reducing the sorghum crop, but not by adopting maize as a staple. Based on this pattern, I suggest that African crops, particularly early maturing millet, may have played a more central role in provisioning Europeans and their human cargoes. At least in the interior, maize was restricted in use and probably not widely cultivated. Its use may have been limited to those with access to novel imports. It was tobacco, a crop of relaxed luxury, that disseminated like wildfire from the north and throughout the interior savanna to the masses. In short, these two plants were adopted as novelties because their tastes and the tastes they made were desirable, not because people were desperate for food. Instead, Africans were fulfilling a taste for the novel that had developed in the many centuries before, a conversation I continue in Chapter 8. For now, I move forward in time to the 18th and 19th centuries, when the powerful Asante took control of areas like Banda, an expansion fueled by, according to some, the humble little crop called maize.

Chapter 6

Farming the Frontier: Food and Agriculture during Asante Rule, c. 1725-1825

At the beginning of the 18th century life in Banda became ever more contested as the human landscape shifted to incorporate newcomers and the natural one recovered from drought. Life in the resulting frontier zone had hybrid dimensions as people adjusted to new neighbors and new demands from their Asante rulers. These frictions produced novel political and economic arrangements as well as disjunctures in daily life cf. Tsing 2005). In this chapter, I examine these frictions and discontinuities through the vantage of food and agriculture in Asante and Banda. Although written sources about life in Ghana increase considerably for this time frame, our knowledge about agriculture and foodways remains scarce. I begin by describing the little evidence that exists for Asante agriculture and the impact of American crops on their food production systems and foodways. Next, I paint the broad brush strokes of Asante trade systems and trace the march of the state northwards towards the frontier zone of Banda. I describe the archaeological and oral historical evidence for life in Banda after the Asante, and evaluate what, if any, impact the Asante had on economic organization, food, and agriculture.

American Crops and Agriculture in Asante

The Asante[1] are an Akan-speaking group that formed a state in central Ghana beginning in the 18th century (Arhin 1967a; Wilks 1975). Asante or Akan origins are the

[1] Asante historiography is vast, and I review only a small portion of it here that focuses on agriculture, trade, and relations with the northern and inner provinces, in other words the information relevant to understanding its impact on food and agricultural production in Banda. I leave out most information on

matter of some debate, one of which hinges on the timing and role of agricultural production in the forest (e.g., Klein 1994, 1996; Wilks 1977, 1993, 2005). In 1977, Wilks hypothesized that the Akan were the first to cultivate crops in the forest in the 15th and 16th centuries AD. He argued that this transition to farming initiated a transformation in relations of production, resulting in the development of exogamous matriclans and increasingly complex political structures (Wilks 1977, 1993). Trade in gold allowed for further elaboration of agricultural production through the acquisition of 'unfree' labor. Unfree laborers were not slaves in the sense known in the Atlantic trade, but were often incorporated into family lineages and given rights in Asante (Arhin 1983: 13; Wilks 1993: 94, 96, 2005: 4-5). To Wilks (1977), unfree labor was especially critical in the initial clearance of the forest, which required much more labor than in subsequent years or for regrowth vegetation in fallow fields. The transformation of primary forest into farmland thus motivated a demand for labor beyond that of the kin group. The time frame when this shift was hypothesized to begin (15th-17th centuries) coincided with increased demand for slaves from European traders on the coast and the north (Wilks 1993: 77).[2]

Wilks (1993, 2005) found evidence for his thesis in Asante traditions which marry the inception of the Akan with the origins of agriculture and settled life. Asante oral histories claim that hunters found new sites for villages in the forest which were subsequently cleared and farmlands established (Wilks 1977; 1993: 66). Bowdich (1819), a British traveler who recorded Asante traditions in the early 19th century, reports on several patriarchal families named after certain animals or plants (including Plantain and Maize), red earth, and palm. Bowdich (1873 [1819]) associates these families with the introduction of planting and architecture and origins of settled life, respectively. In this scenario, the arrival of the foreign plants maize and plantain are specifically associated with the inception of agriculture (Wilks 2005: 27).

McCann (2005: 44) sees maize as the key ingredient in Wilks' 'big bang' hypothesis. He suggests that maize was needed to support diets in the forest which were protein rich but carbohydrate poor. Indigenous African grains were more suited to the

chieftaincy and sociopolitical organization as these are covered elsewhere (e.g., McCaskie 1995; Wilks 1975) and have already been discussed in relation to Banda (Stahl 2001).

[2] In his most recent formulation Wilks (2005: 28) suggests that it is not the origins of cultivation per se that is of interest, but the development of a "fully formed agrarian order."

long dry seasons of the north and required long periods to mature. Yams, which are well suited to growing in forest conditions, were also long maturing and required high inputs of labor. Maize on the other hand matured more quickly, and two crops could be produced per year (McCann 2005: 43-49; see also Chs. 2 and 5). The dissemination of maize (and cassava) into local agroecologies "spurred an agricultural carbohydrate revolution that allowed forest peoples…to feed a dense growing population and fostered an elite political class, royal courts, and a standing army" (McCann 2005: 46). As I observed in Chapter 5, I take issue with the assumption that diets in Ghana, and especially in the forest, were carbohydrate poor. As McCaskie (1995: 29) convincingly argued based on 19th-century health records, if there was any limiting factor in Asante diet, it was protein, not starch. This is because the Asante heartland lies predominately in the forested zone where the presence of tsetse fly inhibits livestock rearing.

It is difficult to evaluate these hypotheses because there is very little information on agriculture during the period in question. Almost all of our evidence for Asante agriculture dates to the 19th century (cf. McCaskie 1995: 26). Despite the lack of firm evidence for agriculture in the forest before 1500, I agree with other authors (Klein 1996; Shinnie 1996: 201) that Wilks (1977) places this development far too late in time. Although there is almost no evidence for agriculture in south-central Ghana before the arrival of American crops, the development of agriculture in the northern half of the country is sufficiently documented, and extends back to 1500 BC (i.e., D'Andrea et al. 2001, 2006, 2007; D'Andrea and Casey 2002). Evidence of pearl millet in the tropical forests of Cameroon, also very early in time (Kahlheber et al. 2009) suggests that African grains could be and were cultivated in these wet habitats. There is also little evidence for American crops in Asante before the 19th century. We do know that maize had reached the coast by the beginning of the 17th century, and was as far afield as Banda by around 1660 (Ch. 5); it seems probable that it was at least known in Asante by this time. In the remainder of this section, I critically consider the evidence for Asante food and agriculture, including the use of American crops, in the 18th and 19th centuries, based primarily on textual sources.

In the land of the Asante the principal food crops were probably plantain, yam, and cocoyam. Maize was cultivated in inland coastal areas, and perhaps in Asante and

Brong-Ahafo but seemingly not over large areas. Other crops produced included cotton, indigo, and kola, all of which could grow wild (Dickson 1964: 27). Wild resources have not been emphasized in scholarly writings, but McCaskie (1995: 27) surmises that they were perhaps more important in Asante than observed in the present. They would have included oil palm, palm wine and fruits, fungi, wild yams, and wild animals as supplements to agricultural diets. Forest snails were a particularly important animal food that was collected in large quantities and often bartered. In the 1920s, Cardinall (in McCaskie 1995: 29) described whole villages emptying out during snail season in the early rainy season, on such a large scale that their value in trade must have been "colossal". Documentary records suggest a landscape more rich in large animals than today, with especially productive hunting in northwestern Asante (i.e., Banda area and south).

What was the role of maize and other American crops in 19th-century Asante diet and agriculture? Both Dickson (1964: 27) and McCaskie (1995: 27) associate Asante's use of maize with its military campaigns, based on the observations of G. A. Robertson in 1818, that the cultivation of maize had been "lately more extensively introduced into the interior of Ashantee; both from its importance in feeding their stock, and being portable for the supply of their armies" (Robertson 1819: 201). To Dickson (1964: 27) the advantages of maize, a portable, storable surplus, were manifold over the main Asante staples of yam and plantain, which are cumbersome and subject to rapid spoilage. The indigenous grains sorghum and millet, however, were not only more widespread in most conquered areas (Dickson 1964: 27), but had a longer shelf life than maize (Ch. 5). Writing in 1819, Bowdich (1873: 250) summarized a soldier's daily fare, confirming the widespread consumption of grain:

> The army is prohibited during the active parts of a campaign from all food but meal, which each man carries in a small bag at his side and mixes in his hands with the first water he comes to; this, they allege, is to prevent cooking fires from betraying their position or anticipating a surprise. In the intervals (for this meal is seldom eaten more than once a day) they chew the boossee or gooroo [kola] nut. This meal is very nourishing and soon satisfies; we tried it on our march down.

The 'meal' may have been of any of the grains grown at that time, and I strongly suspect that it was not only or even primarily made of maize. Based on further descriptions of common fare in Asante by Bowdich (see below), pearl millet seems to have been commonly consumed as couscous in Asante, while maize was eaten roasted on the cob. The preparation method described for soldiers—a ground flour mixed with a bit of water—was commonly prepared in Banda using pearl millet (only) and served to men upon returning from the field (*sisa*[3]). There is no reason why maize or sorghum flour could not have been used, though we have no records of it ever being consumed this way. Asante armies were probably dependent on the areas they invaded for at least part of their provisions, and would have presumably consumed whatever grain was commonly grown in these locations.

Dickson cautions that the Asante may have only learned of virtues of maize in 1806, with the beginning of campaigns to southern Ghana, where maize was grown more extensively.[4] McCaskie (1995: 27) suggests that the popularity of maize waxed and waned with Asante's military campaigns, implying that maize may have supplied armies before 1800. Based on the present evidence, I see no reason why soldiers' rations were maize over millet or even sorghum. Given the slow uptake of maize in Banda (below), one might postulate that it was similarly slow to take hold in Asante, and instead the influx of unfree labor and increased demand in the 17th and 18th centuries may have had a stronger impact on the intensification of agriculture in the Asante heartland (below).

Plaintain and cassava were also important by the 19th century. Plantain was introduced possibly much earlier via the Indian Ocean and eastern Africa (see Ch. 5). Documentary evidence suggests that cassava arrived on the Gold Coast sometime between 1705-1785, and was probably introduced into Asante Brong-Ahafo (i.e., northwest Asante) by 1806. Cassava has many advantages over yams, with which it was probably in competition in both fields and cooking pots. It produces high yields in depauperate soils, requires little cultivation, and the tubers can be left in ground for a long time (Dickson 1964: 26-27, 1969: 119). Though there is even today a strong cultural preference for yams, cassava may have been used to make up periodic shortfalls in more desirable crops (McCaskie 1995: 27). Cassava leaves are also an important and nutritious green. However, because cassava varieties contain varying amounts of poisonous

[3] The same word also refers to paste or clay prepared on grinding stones for pots.
[4] He refers specifically to the campaign against the Fantes in 1806; Banda was also part of this campaign (Stahl 2001: 156).

hydrocyanic acid, the bitter tubers must be detoxified prior to consumption. This can be accomplished through soaking or grating/grinding the tubers and leaving them to ferment and drain (Jones 1959; van Oppen 1999). The acceptance of cassava along the Guinea coast seems to have been much slower than maize; it is possible that this is related to the need for detoxification, which may have not been properly conducted at first (Jones 1959: 74). Adopting cassava was not just adoption of a new plant but a new processing practice (more on cassava in Ch. 7).

Besides the introduction of cassava, Dickson sees little change in what was actually cultivated between 1700 and 1800 on the coast, which according to both Bosman (1705) and early 19th century writers included guinea corn (sorghum), millet, maize, rice, and yam (Dickson 1964: 26). There was a smattering of other crops introduced in the 18th and 19th centuries, including members of the onion family, breadfruit, cocoyam, tomatoes,[5] and avocados (Alpern 1992, 2008; see Tables 5.2 and 5.3). The New World cocoyam (*Xanthosoma mafaffa*), a more palatable cocoyam, had been introduced by 1840s (the other cocoyam, *Colocasia esculenta*, contains significant calcium oxalate, a digestive irritant; McCaskie 1995: 27). Around 1700, maize had established a niche on the coast but was still secondary to sorghum and millet; by 1800 maize was perhaps more common, though sorghum still dominated in many areas and millet was still grown. Rice was also produced in large quantities on the coast, along with yams, palm oil, coconut, pineapples, sweet potatoes, bananas, sugar cane, etc. (Dickson 1964: 26).

Farms were an important source of wealth in Asante. The state owned the land, and individuals were allowed access by virtue of membership in a lineage (Arhin 1983). The wealth of the land was expressed through abundant displays of food. McCaskie (1995: 34, based on interviews) offers us a glimpse of the lavish daily meals of the *Asantehene*, the paramount chief or king of Asante (notice that the only grain mentioned is rice):

[5] Today, most tomato and capsicum pepper based soups are prepared in shallow grinding bowls with incisions or grooves that facilitate pulverizing of these ingredients (see Fig. 2.9). These forms appear in Kuulo times or earlier but increase over time according to Smith (2008: 523-524), though they are never present in large numbers (Stahl 2012 pers. comm.). Curiously, grinding bowls that are similar morphologically are known in Mesoamerica, where both capsicum peppers and tomatoes are to be found (on display in Field Museum, Chicago in 2010). Might this imply a diffusion of this form with tomatoes, or did African potters devise a similar preparation tool?

> The *Asantehene's* household alone daily consumed large quantities of food…together with a leavening of imported delicacies. The *Asantehene* Kwaku Dua Panin (1834-1867) took breakfast about 8 a.m.; meat, plantain and yam 'in large quantities' were distributed to the *Asantehene's* wives and children. The main meal of the day was taken at 2 p.m., when the *Asantehene* and his household officials made a selection from 'mutton, turkeys, ducks, fowls, wild game of all kinds, except the buffalo; and fish from the lakes, and adjacent rivers…also yams, plantains, beans, rice, European biscuits, tea, sugar, wines, liqueurs, etc.'. Immediately afterwards, 'large dishes containing the great family dinner' were distributed, like breakfast, to the royal wives and children.

Foreigners were bestowed with large gifts of food and goods, emphasizing the 'privileged consumption patterns' of those linked with the Asantehene and his retinue (McCaskie 1995: 34). The main food of other elites was a "soup of dried fish, fowls, beef or mutton (according to the fetish), and ground nuts stewed in blood," while the poorer classes apparently made do with "soups of dried deer, monkey's flesh, and frequently of the pelts of skins" (Bowdich 1873: 267). There were apparently white soups and black soups, the latter made with palm oil, though we learn little else of their ingredients. The starch commonly was yam and plantain, at times made into fufu (a pounded gelatinous food), and Bowdich (1873: 267) noted that "they do not make cankey of their corn (a coarser sort of kouskous not cleared from the husk) as the Fantees do, but they roast it on the stalk, and when young the flavour closely resembles that of green peas." This statement implies that the Asante 'corn' (i.e., grain) may have been pearl millet,[6] which was eaten as a couscous, rather than maize which was commonly consumed along the coast by their southern Fante neighbors as kenkey. But in Asante, based on limited textual evidence, when maize was consumed it was prepared by roasting the whole cob. As suggested above, maize does not seem to have been common fare in Asante as of the early 19th century, nor does it seem to have filled the voids in soldiers' stomachs; instead, it was consumed on the cob, a pathway of incorporation described at its first introduction to the

[6] In this parenthetical citation I believe Bowdich is referring to their, i.e., the Asante's, 'corn', which from this description is most likely pearl millet. The reference to grains not cleared from the husk must refer to pearl millet; the 'husks' of sorghum are far too hard to be edible, and maize seeds are not enclosed within individual 'husks' and it cannot be consumed without removing the husk from outside the cob, which means this is probably not what he refers to. Pearl millet 'husks' are much softer and difficult to remove in processing. Pearl millet is also commonly made into a 'kouskous' in modern West Africa, either by steaming or simply roughly grinding raw millet on a stone and adding a bit of water. Bowdich is contrasting this corn of the Asantes with that of the Fantes, which seems to refer to maize given the reference to kenkey. The Asantes eat maize not as kenkey, but directly off the cob after roasting, based on his description.

coast some 200 years earlier (see Ch. 5). However, flotation on archaeological sites in the Asante heartland is needed to evaluate this speculative scenario.

The abundance of agricultural produce expressed in the Asantehene's daily meals and his gifts to foreigners boasted of a productive agricultural system under state control (McCaskie 1995: 33-35). Kumasi numbered between 20,000-25,000 inhabitants by the early 19th century and was largely composed of people involved in government business (McCaskie 1995: 33). European observers of 19th-century Asante commented on the prevalence and intensity of agriculture and the abundance of crops produced (Dupuis 1966 [1824]; Hutton 1821: 203; Wilks 1993: 49). This was especially true around urban centers like Kumasi, while areas farther afield appear to have enjoyed long fallows and less intensive agriculture (Wilks 1993: 50). Farther north, the density of farmed land increased as one approached major towns and satellite towns charged with producing crops for the urban areas (Dickson 1964: 27). The highly organized and intensive farming system surrounding Kumasi functioned essentially to supply the state apparatus; their surplus appears to have been large enough to support not only the Asantehene and his retinue, but government officials and members of the elite class, as well as local markets (McCaskie 1995: 33-35). There were, however, real limits on transport of perishable foodstuffs, necessitating state-controlled agricultural intensification by the late 19th century through shortened fallows and concentrated labor inputs (McCaskie 1995: 36-37).

The impressions of early 19th-century authors support the idea that Asante had food in abundance provided by an organized, intensive agricultural system. McCaskie (1995: 29) characterizes Asante diet as "basic and generally adequate, if somewhat monotonous..." Given the prevalence of carbohydrate rich staples including yams, plantain, grains, and later cocoyam and cassava, the supposition that Asante diets were lacking in carbohydrates cannot be supported. Additionally, food shortages are not mentioned in any documentary sources until hostilities in 1882 (see Ch. 7). Instead, the growing environment was favorable and agricultural system already well established by the 19th century. This intensive agricultural system used land and crop rotation, and land was plentiful compared to population levels (McCaskie 1995: 29). While new American crops were incorporated into this productive system, there is no evidence that they instigated it, or that they filled a missing role in everyday Asante diets.

This balance was not to last. The British abolition of the slave trade in 1807 set in motion a number of changes to agriculture and the landscape that were to have lasting effects. In short, people were forced to switch to 'legitimate trade' (e.g., see Law 1995), and a focus on production of cash crops for export was born. Early export crops in Ghana included oil palm, coffee, rice, capsicum pepper, melegueta pepper, and gum copal (*Daniella* sp.), the vast majority of which were forest crops (Dickson 1969: 120-121). This was to have major impacts on the demand for land and labor in the forest and beyond. Areas north of the forest, which are the focus here, were edged out of the economically productive sphere since they were unsuited to production of these crops, a pattern that continues even today. I pick up the threads of this story in Chapter 7.

Trade and the Asante State

Agriculture was not the only wealth producer in the Asante state; trade also played a major role in filling state coffers and stomachs in Kumasi. For example, the inventory of the Kumasi market in the early 19th century attests to desires for produce from not only around Kumasi, but from the north as well as Europe. According to Bowdich (1873: 320), market goods in Kumasi included local produce such as the staples (yam, plantains, grains, and sugar cane, and rice), vegetables (okra, peppers, and garden eggs), fruits (oranges, pawpaw, pineapples, bananas), meat (beef, mutton, wild hog, deer, monkey, smoked snails and dried fish), and drinks (*pito* and palm wine). Imports from both the north and Europe included household goods (mirrors, brassware, sandals, cloths, blankets, pillows, pipes, drinks, salt, tobacco, and calabashes), farm tools like hoe blades, crafting goods (thread and brass), and weaponry materials (iron, lead, flints, etc.).

Much profit was to be made on craft and especially trade goods. Cattle and livestock from the north were important and expensive goods, with cattle costing up to six times more in Kumasi than the northern trade center of Yendi (Figure 6.1; Bowdich 1873: 272). Beef, mutton, chicken, and horses were thus luxury goods afforded by the king and other high officials. Commoners purchased items like salt, cloth, iron, and craft products in markets. Specialist villages close to Kumasi produced craft goods like textiles, pottery, wood carvings, gold and other metal objects. Other skills that were needed by a wider array of people, such as those of blacksmiths and potters, were distributed more widely throughout Asante. Yet others were closely monitored, particularly the production of state regalia (Arhin 1990: 527-528).

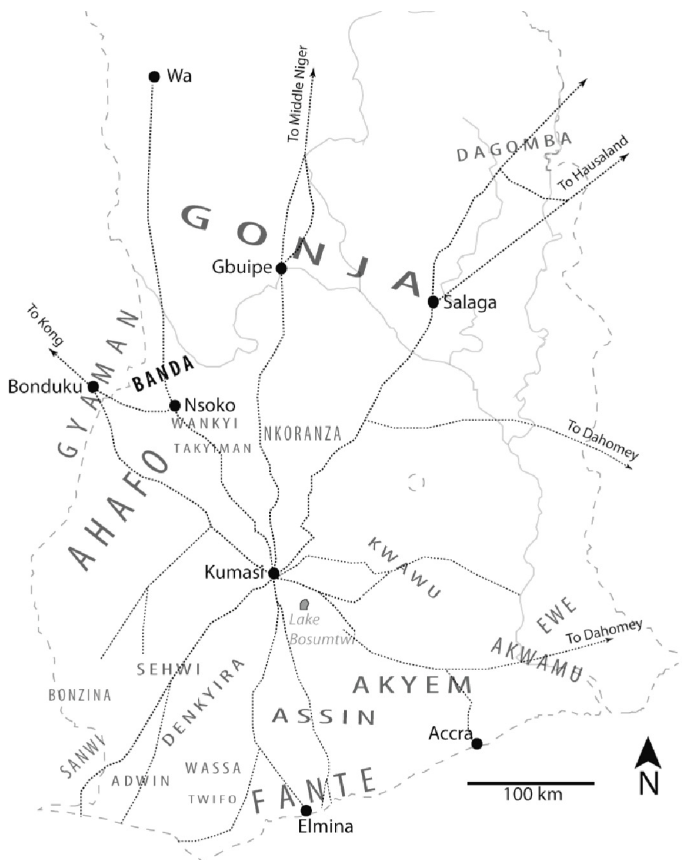

FIGURE 6.1: 19th century polities and Asante roads (after McCaskie 1995: 32, 76, 148)

The medium of exchange in Asante was gold dust instead of the cowries or metal disks that had been used previously, and which continued to be used concurrently in the north (Arhin 1983: 473; Garrard 1980).[7] Gold was central to the Asante state economy as both an export and for consumption in internal markets. From the 16th century onwards gold trade out of Akan lands totaled over 3.6 million troy ounces (~112,000 kg) per

[7] The multiple currencies in use before, after, and during Asante rule are fascinating. Even brass dust may have been used as a currency (Boaten 1970: 50). This cautions us to be careful in interpreting what was actually weighed with figurative weights, especially in pre-Asante times.

century, not including the amount consumed within Ghana. Gold was required internally as currency and for the production of chiefly paraphernalia. Furthermore, the Asante maintained a substantial amount in state coffers—as much as 800,000 oz. (~25,000 kg) by the 19th century (Garrard 1980: 163-165). In the 18th century, the Asante turned from the export of gold to slaves, which were generated by their expansionary tactics and tribute demands (below). After the 1807 British abolition of the slave trade, the gold trade resumed, as gold and ivory exports increased to Europe, and gold trade to the north continued (Garrard 1980: 157-158).

The Asante state was involved in trade on several scales (Arhin 1990; Boaten 1970). Interstate or foreign trade was the most important and lucrative. Asante traders supplied the northern polities of Dagomba, Gonja, and Gyaman with forest-produced kola nuts and European goods, and in exchange obtained slaves, livestock, salt, iron bars, shea butter, and coarse cloths (Arhin 1990: 528; Boaten 1970: 35). Trade with Europeans required gold, ivory, slaves and later on, rubber, in exchange for firearms, lead bars, gunpowder, cloths, alcohol, and salt (Arhin 1990: 528). From the early 19th century, the Asante established a virtual monopoly on northern-focused trade through strict control over the distribution of firearms as well as establishment of customs houses or checkpoints along trade routes, which charged taxes and tolls (Boaten 1970: 37, 40). Commoners were involved in kola and later the rubber trade, but gold, ivory, and slaves were domain of the Asante state. Arhin (1990: 528-529) suggests that more wealth was generated from the northern rather than Atlantic trade since more people were engaged in it and it was based on kola nut. Kola nuts were an ideal trade commodity, since they grew wild near Kumasi and were available to all who were physically able to collect them, yet they were in great demand by Muslims to the north and east (Handloff 1987).

Even though northern-focused trade may have been more important to the average Asante citizen (Arhin 1987, 1990), coastal trade was critical to the state as an outlet of slaves prior to British abolition and a means by which to acquire firearms. The Asante court maintained trade relations with more than one European nation on the coast, balancing them through gift giving and diplomacy, which sometimes turned into rivalries between these foreign powers. As hinted at above, most of these interactions were marked with the exchange of food and drink (both ways; McLeod 1987: 186). The importance of northern and coastal trade is commemorated in much chiefly paraphernalia, including foreign metal vessels, umbrellas, weight systems, and staffs, among other things (McLeod 1987: 184).

Asante Expansion Northwards

It is not surprising that the lucrative nature of northern-focused trade encouraged Asante expansion in this direction. Asante expansion began before 1700 and state influence reached its maximum extent by the early 19th century to include most of modern day Ghana and southeastern Côte d'Ivoire (Figure 6.2; Arhin 1967a; Wilks 1975). Campaigns in the 18th century were directed primarily northward, whereas in the early 19th century the focus was southwards. I focus here on Asante expansion northwards, where they came into contact with Banda some 130 miles (~210 km) to the north/northwest of Kumasi.

In 18th century Asante succession disputes and expansionary military campaigns dominated the royal agenda (Arhin 1967a). Asante expansion northwards began with the conquest of Wenchi in 1711-1712 and Bono/Takyiman in 1722-1723. Begho may have also been invaded at this time, or might have gradually declined in prosperity and succumbed to internal struggles (Wilks 2005: 18) or dispersed to new markets (Stahl 2001: 149-150). Asante armies turned northwards and invaded Gonja and Dagomba in 1744 (Arhin 1967a: 74).

The spatial organization of Greater Asante included the metropolitan area of the political capital, inner provinces, and outer provinces (Figure 6.2). The boundaries of each were marked by control posts along major routes (one such post was in Banda, marking the boundary between inner and outer Asante: Wilks 1975:54). Inner provinces were more tightly integrated with Asante, while control over outer provinces was more akin to indirect rule (Wilks 1975: 62). Inner provinces were considered subject provinces, which had 'Asante law and Asante rights' (Christaller in Wilks 1975: 63), and most were Akan or closely related culturally (Arhin 1967a: 76). Subject provinces may have been forced to pay the same taxes as those in the metropolitan region (i.e., death tax, war tax, and a household tax), often in gold dust. Inner provinces were at a disadvantage, however, in that they could not raise revenue by raiding areas outside of Greater Asante. Instead, they raided other polities in the inner provinces when additional revenues were needed (Wilks 1975: 69-70). Tributaries or outer provinces such as Gonja and Dagomba maintained an even looser relationship with the Asante state. These groups were expected to make a financial contribution in goods or manpower, but the ties were mostly commercial and often of mutual benefit. Asante demanded regular payments from tributaries, at the same time as tributaries maintained political independence from Asante. Outer provinces were not required to participate in military ventures with the Asante (Arhin 1967a: 76-77).

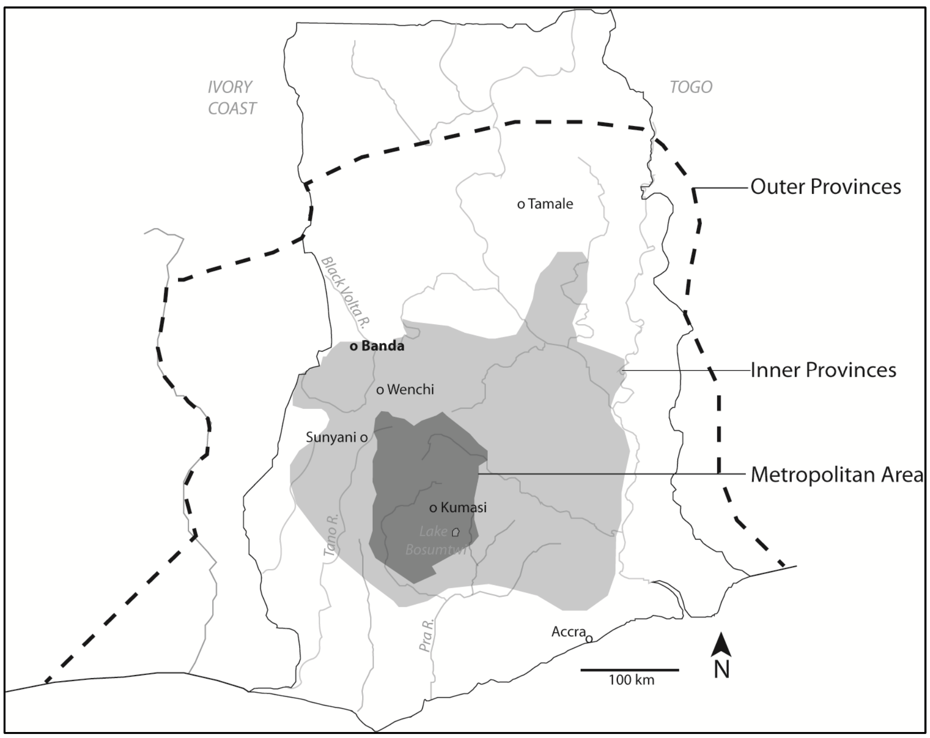

FIGURE 6.2: Geopolitical divisions in Asante in the early 19th century (after Wilks 1975: 62)

The Asante government demanded two kinds of tribute after its conquest of an area. The first was a payment made soon after defeat that was intended to defray the costs of the Asante expedition. The second was an annual tribute requirement. Payment to the state was in money (gold dust, cowries, etc.) or in kind, as slaves or products of the new territory. Products were the norm in areas that relied on cowrie-based rather than gold-based currencies, which included most of northern Ghana (Arhin 1967b: 286-287). Dagomba, for example, paid "500 slaves, 200 cows, 400 sheep, 400 cotton cloths, and 200 cotton and silk cloths," and Takyiman a smaller proportion of the same kind (Bowdich 1819: 269). Yet others, such as the Europeans on the coast, paid 'notes' or a ground rent of sorts that focused more on providing subsistence, i.e., food monies (Arhin 1967b: 287). Tribute demands differed based on the size of the polity and the degree to which they were able to supply gold or other goods. In the pages to follow, I examine Asante expansion into Banda and what influence, if any, they exacted on agricultural production and economic organization in the area.

Daily life under Asante rule in the Early Makala Phase: Makala Kataa, A-212, B-112

Following the Kuulo phase occupation described in Chapter 5, in the Banda region there is a dearth of material remains dating between c. 1650 to 1750 that may reflect a period of instability and population dispersal. It is difficult to determine what this gap means—it may reflect shifts in settlement patterns or migrations in the wake of Begho's decline, or may simply be the result of the limits of archaeological dating techniques (see Stahl 2001:161). Stahl (2001: 161) suggests that populations dispersed, though where they went is unknown (i.e., if they hid in the hills or moved farther afield) (see Ch. 7).

Oral traditions record the arrival of a group of Nafanas from northeastern Côte d'Ivoire in Banda sometime after the fall of Begho and before the arrival of the Asante in the 18th century. The Nafanas encountered the ancestors of the modern day Kuulo (Dumpo) among other ethnic groups such as the Ligby. In ensuing 'negotiations,' the Nafana wrested political control over the area, and the Kuulo retained power over the land in the office of earth priest (Stahl 1991). The Banda polity appears to have emerged before 1751, probably by about 1720 (Stahl 2001:150-151). In the first half of the 18th century, the Asante took control of most of Banda's eastern and southern neighbors (above). Asante invaded Banda in 1733 in retaliation for the killing of an Asante trader (Arhin 1987: 53), but it was not until attacks in the dry season of 1773/4 that the Asante established hegemony over Banda. Oral histories record the traumatic nature of this war

(Ameyaw 1965 in Stahl 2001: 155-158), some even suggesting that the Banda chief blew himself up with gunpowder once it was clear that the Asante had gained the upper hand (Wilks 1975: 246). Negotiations commenced at Dadiase (Banda-Ahenkro) with members of the Muslim Dyula merchant community acting as intermediaries. Banda acknowledged that they were now under the control of the Asante, and agreed to provide a yearly tribute in sheep. To help offset the costs of war, many young men from Banda were taken as captives to Kumasi, where they were trained in service to stools (offices) there (Wilks 1975: 246). Yet other captives from Banda were sent to the coast to be consumed in the Atlantic slave trade (Yarak 1979 in Stahl 2001: 155; Stahl 2008b).

By the early decades of the 19th century, Banda was counted among Asante's inner provinces, and joined the Asante in wars with neighboring polities such as Gyaman (Stahl 1991: 260, 2001: 156-158). Stahl (2007a: 70-71) suggests that incorporation into the Asante empire probably afforded Banda a degree of security and stability. However, this security came at a cost: Banda soldiers were required for Asante's military campaigns, and Asante not only controlled access to many imported goods, but as an inner province, Banda was required to pay taxes (Stahl 2007: 70-71). Many Akan features were adopted in the Banda chieftaincy, though it is unclear how many were adopted before indirect rule was imposed by the British beginning in the late 19th century (Stahl 1991: 263). Today, the Banda chieftaincy is structurally similar to Asante and employs similar chieftaincy terminology and chiefly paraphernalia. In such an ethnically diverse frontier setting, adoption of Asante elements may have helped legitimize the authority of the immigrant Nafana (Stahl 2001: 153). But there are also several differences that hint at the pre-Asante inception of the polity (Stahl 1991: 262-264). For example, Dupuis's (1966) account of visit of a Banda chief to Kumasi in 1820 suggests that Nafana weapons and military organization were different than those of the Asante. The Banda stool still retains a rotational principle which is virtually absent amongst Asante provinces and in Asante itself. Yet other elements, such as rewarding newcomer groups with positions and responsibilities, may have helped the Nafana-based chieftaincy solidify the fledgling polity and increase its population (Stahl 2001: 152-154).

What impact did these shifting allegiances, populations, and demands have on daily life, and more specifically, on food and agriculture in Banda? The material record of daily life resumes in what Stahl calls the Early Makala Phase (or Iron Age 1/IA 1: Stahl 1985a, 2001, 2007), which brackets the period from about 1725 to 1825. Numerous sites tested as part of regional survey contained materials from this phase (Smith 2008; BRP 2002; Stahl 1985a, 2007a)—plant remains from two of these, A-212 and B-112, are analyzed here (Figure 6.3). Previously occupied sites were reused in Makala times, for example Ngre Kataa. But the best information of life during Early Makala times comes from the site of Makala Kataa, where extensive excavations of domestic contexts were conducted in 1989, 1990, and 1994 (Stahl 1999a: 9). According to oral traditions, Makala Kataa was the first settlement of the Nafana people upon their arrival east of the Banda hills. The Early Makala component extends over approximately 18 hectares and coincides with Asante dominion. The site was abandoned sometime around 1825, and later reoccupied in the late 19th century (Ch. 7; Figure 6.3; Stahl 2001: 162-165).

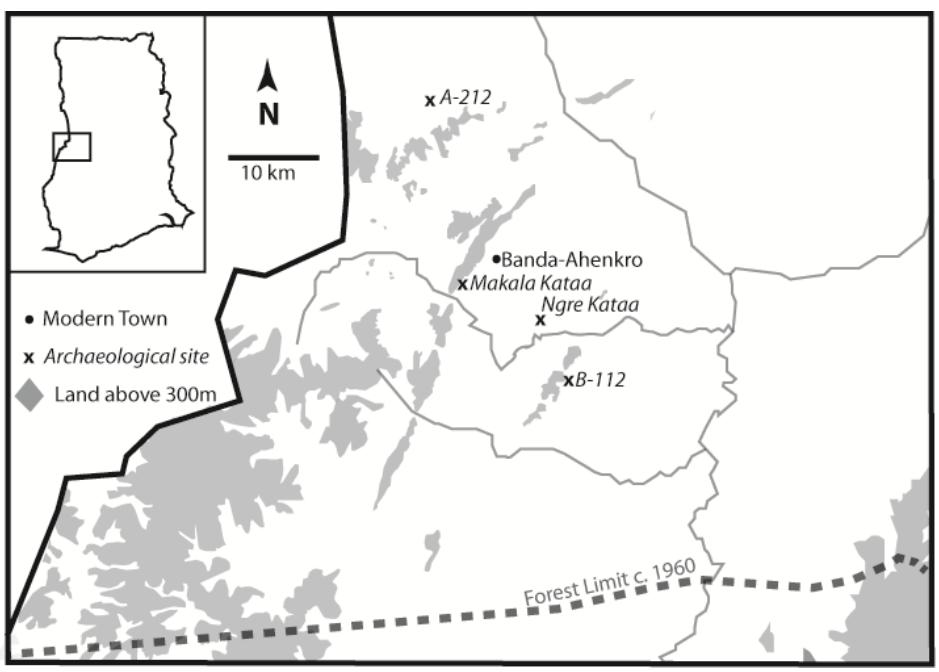

FIGURE 6.3: Early Makala sites analyzed for plant remains in the Banda area

Some discontinuities in material life between the previous Kuulo and Early Makala phases support the oral traditions of population movements and dispersals into a frontier zone (but see Stahl 1991). One of these is pottery. A new decorative technique, maize cob roulette, became prominent, and several Kuulo phase decorative treatments dropped out of the sequence (mica paint, stamped wavy line, carved roulette). Additionally, two vessel forms common in Kuulo Phase contexts (carinated bowls and globular jars) disappeared (Stahl 2001: 159). However, there are continuities in decorative grammar between Kuulo and Early Makala pottery (Stahl 2007a: 68), and some Kuulo decorative techniques that cease in Early Makala pottery continued to be used on pipes (Campbell 2006: 85). This evidence is best interpreted not as the replacement of one ethnic group by another, for studies of modern pottery have illustrated that 'pots are not people' (e.g., Cruz 2011; Stahl 1991). Rather, Banda pottery represents the hybrid dynamic of a frontier landscape, where ideas of what constitutes proper pottery as well as the potters themselves were fluid. Early Makala ceramics are quite similar to those produced in the Late Makala phase as well as recent times (Stahl 2001: 159; see also Cruz 2003; Stahl and Cruz 1998), but production locales and regional trade in ceramics has changed. In the Early Makala Phase, there was a 'robust' exchange in ceramics between the east and west side of the hills. Consumers at Makala Kataa preferred bowls from eastern clay sources and jars from western locales (Stahl et al. 2008: 378).

Depositional and settlement practices seem to vary somewhat as well. Makala Kataa is dominated by low mounds suggesting that people moved horizontally, or built new houses on formerly unoccupied spaces, instead of atop one another in tell-like accumulations. There are also no large midden mounds as were typical in the Ngre and Kuulo phases (Stahl 2001: 163). Domestic architecture also varies between the Makala phase and preceding periods. Laterite floors are common, as today, though these are uncommon in the Kuulo phase. This archaeological observation is supported by the fact that there is no word in the Dumpo (Kuulo) language for the special tool used to beat laterite floors; instead it is known only by its Nafaanra name (*baare*). Based on a 2011 ethnoarchaeological study, I also suggest that the placement of postholes outside of the rooms indicates a wooden and thatch roof superstructure, much like today (see Ch. 5 and

Logan in prep.a). In all phases, coursed earth (*atakwami*) rectangular multi-roomed structures seem to be the norm, and floors appear to have been periodically renewed (Stahl 2001: 165). One such multi-roomed structure was uncovered in MK Mound 6 (Fig. 6.4).

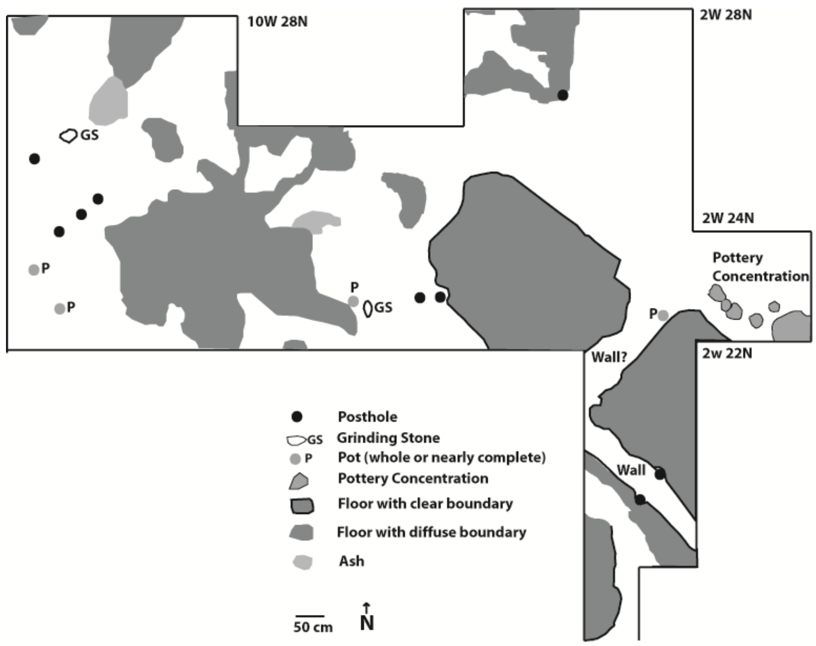

FIGURE 6.4: Makala Kataa Mound 6 Domestic Structure (redrawn from Stahl 2001: 167)

Thread production on a modest, perhaps household, scale is attested to by the presence of spindle whorls, though from historical sources such as Dupuis (1824) we know that foreign cloth was making inroads (Stahl 2001: 172-173; Stahl and Cruz 1998). There is no evidence for iron working at Makala Kataa, but finished iron tools and ornaments were recovered. This suggests iron working occurred off-site or that these objects were obtained through local or regional trade. Ivory production, which was present in Kuulo phase households, is absent at Makala Kataa. Some beads were produced locally and exotic ones are also present (Stahl 2001: 176). Tobacco pipes continue to be manufactured during the Early Makala phase. There are no clear breaks in production of pipes between the Kuulo and Early Makala phases, though more stylistic and morphological variation is found in later assemblages (Campbell 2006: 85). In short, while the available evidence suggests a vigorous regional trade, folks at Makala Kataa were not producing objects for foreign markets on the scale that their predecessors were (Stahl 2001: 177).

Far fewer animal bones were recovered from Makala Kataa than at Kuulo phase sites, and almost 60% of them were mammal. Wild animals were important, but the species profile suggests more opportunistic and garden hunting (i.e., rodents and lizards), and less representation of large and dangerous fauna than in Kuulo phase assemblages. In the Early Makala phase, skilled hunters focused on bovids rather than the diverse array of animals targeted by Kuulo phase hunters (Stahl 2001: 177-178). Dogs are present in only small amounts, in contrast to Kuulo Kataa where they form a significant part of the assemblage and were apparently valued in ritual performance (Stahl 2008a). Folks at Makala Kataa seem to have made greater use of snails (Stahl 1999a:54), an animal product also valued in the Asante heartland (above; McCaskie 1995:29).

I analyzed two areas of the Early Makala occupation of Makala Kataa for plant remains: the structure in Mound 6 pictured above (Fig. 6.4), and Mound 5, an area with what appear to be primary kitchen deposits (Figs. 6.5 & 6.6; described below). These areas probably were settled after the Asante invasion of 1773/4 and occupied until the 1820s or 1830s based on TL dates[8] and datable imports (Stahl 1999a: 13). Additionally, two sites (A-212, B-112) explored as part of a regional testing program (Stahl 2007a) were sampled.

Charred Plant Remains

Seventy-six samples were analyzed for the Early Makala Phase. The charred plant assemblage is variable across contexts, and is particularly dense in a handful of samples from the Makala Kataa Mound 5 ‘kitchen’ area which contain literally thousands of grains of pearl millet and sorghum. The whole mound seems to have been abandoned suddenly due to an accidental conflagration, judging by the large number of whole pots and grinding stones that appear to be *in situ* (Stahl 2001: 169-171). While surely a

[8] There are two TL dates: One from Mound 5, Unit 4E2S, Lev. 3 yielded a date of 190± 15 (AD 1790-1820 at 1σ/1775-1835 at 2σ); another from Mound 6, Unit 0W24N, Lev. 6 yielded a date of 225 ± 30 (AD 1740-1800 at 1σ/1710-1830 at 2σ) (Stahl 1999a: 13).

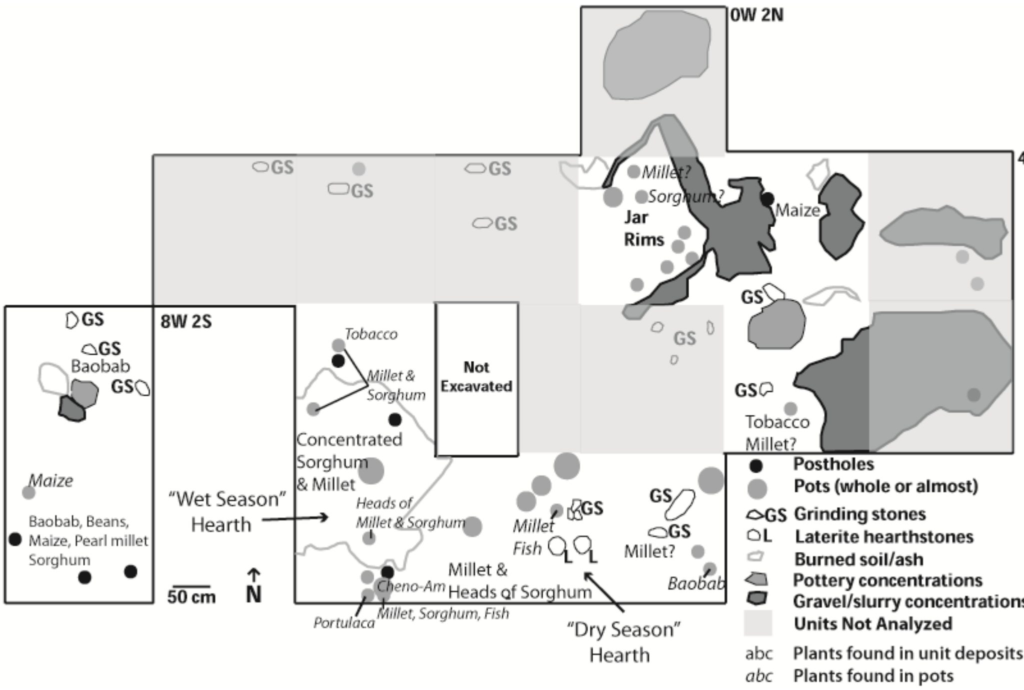

FIGURE 6.5: Plant Remains Identified in Early Makala Kitchen Deposits at Makala Kataa Mound 5 (base map redrawn from Stahl 2001: 170) (for complete list of wild/weedy plants see Table 6.1)

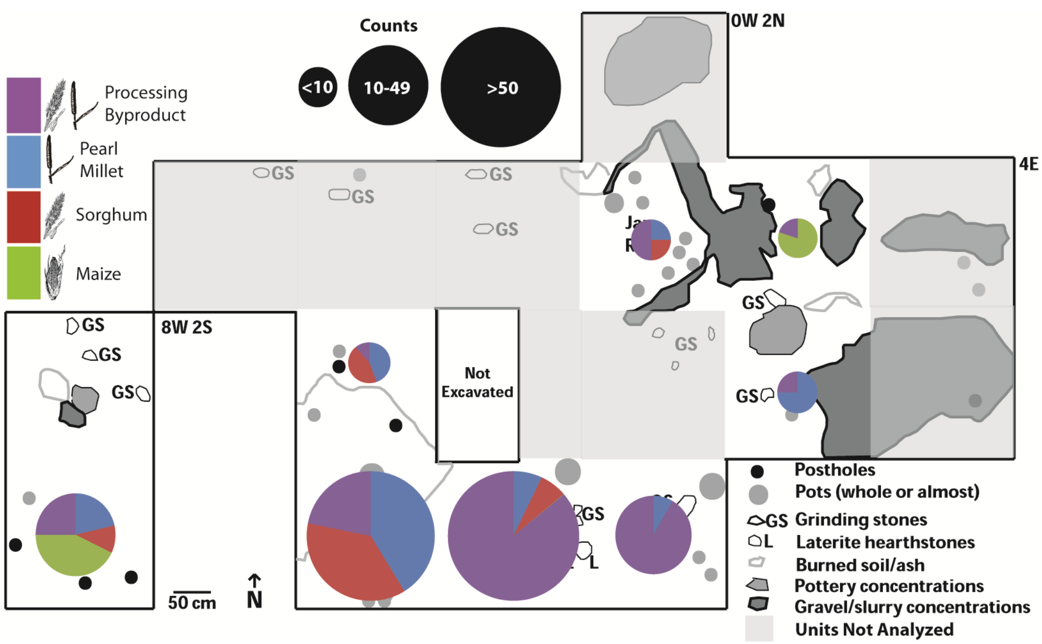

FIGURE 6.6: Distribution of grain crops and their byproducts in Early Makala kitchen deposits at Makala Kataa Mound 5 (base map from Stahl 2001:170)

TABLE 6.1: Charred seed remains from Makala Kataa M5 kitchen

EARLY MAKALA PHASE	Makala Kataa Station 6, M5 'Kitchen'									M5 Total
Unit	0W0S	0W4S	2W4S	4W2S	4W4S	8W2S	8W4S	2E0S	2E2S	
Sample n	6	5	10	2	9	2	7	3	5	49
Grains										
Ubiquity Pearl Millet (%)	17	33	50	100	67		43		40	43
Count Pearl Millet	1	2	87	4	2318+		6		3	2421
Ubiquity Sorghum (%)	17		50	100	67		29			33
Count Sorghum	1		83	4	2076+		3			2167
Ubiquity Maize (%)			10?				29	67		10
Count Maize			1?				12	4		17
Byproduct* Ubiquity (%)	17	17	80	50	67		57	33	20	47
Byproduct Count	2	22	1056	1	1227+		7	1	1	2317
Poaceae (incl. Paniceae) Count	4	4	6		897+			5	2	918
Useful/Weedy Seeds (count)										
Tobacco				1					6	7
Baobab		9				3 unchar.	1			13
Cassia tora									1	1
***Ficus* sp.**	1	2			1					4
***Portulaca* spp.**					4		1		1	6
Other Seeds (count)										
cf. Fabaceae							2			2
Polygonaceae		1								1
cf. Verbenaceae									5	5
Cheno-Am	4				4					8
Cyperaceae/ Polygonaceae								1		1
Euphorbiaceae/ Lamiaceae								1		1
Euphorbiaceae/ Malvaceae							1		1	2

tragedy to the inhabitants, the rapid abandonment and burning of this area has allowed for excellent preservation of daily activities (Figures 6.5, 6.6, Table 6.1). I present a 'thick description' of these results below, as the excellent preservation and sudden abandonment of the area allows for this kind of resolution, followed by a critical discussion of the how we can interpret these remains. This exercise conjures up a 'snapshot' view of daily action, but complicates comparison to other sites and areas where preservation and depositional processes are not as clear. Consequently, I describe the results from the four other areas sampled—a structure at the same site (MK M6), and middens from A-212, B-

112, and Ngre Kataa Mound 8—separately in order to outline regional and temporal trends.

A snapshot of daily life: Makala Kataa Mound 5

It is a late afternoon sometime around 1825, and you are visiting the compound now buried in Mound 5 (Figures 6.5, 6.6; Table 6.1; Stahl 2001: 169-171). You are drawn to the focal point of the courtyard: the hearth, where the family women are busy preparing dinner. The cook looks up and greets you from one of the two hearths—a roofed one if it is raining (excavation unit 4W 4S), or the three-stone laterite hearth nearby (unit 2W 4S) if the sky is clear. She is preparing a sauce of wild greens, selected from nearby pots (4W 4S) which contain the herbaceous *Portulaca*, a favorite throughout West Africa, or one of the many edible species belonging to the Chenopodiaceae or Amaranthaceae.[9] Fish (perhaps dried) stands ready in a pot (2W 4S) nearby to be added to the soup. Carefully hung in the rafters and stacked beneath the pole and thatch roof of the wet season kitchen are piles of harvested sorghum and millet heads[10] and stacks of pots containing ingredients (units 4W 4S and 4W 2S). Just a couple meters away (2W 4S, 0W 4S) grains are being liberated from glumes and stalks[11] as part of their transformation into food. Some of the older daughters are busy processing grains and grinding them on the large grinding stones that ring the fire (0W 4S, 6W 0S to 2E 2S), after which they will be cooked and beaten into a thick porridge.

While some of the women are cooking, other household members are engaged in different activities or simply relaxing in the compound. A few older men and women are luxuriating in smoking a pipeful of tobacco near the bank of rooms to the northeast (0W 0S to 4E 2S).The cook too will get her turn: a pot with tobacco sits ready in the wet season kitchen area (4W 2S). Had you arrived somewhat earlier one of the women would have been busy crafting pots, creating just the right paste mixture on grinding stones in

[9] These taxa may also simply be compound weeds; I base the consumption of green soup upon analogy with the present, but I may be in error doing so. It is possible that regular consumption of soup made from wild herbs and greens developed later during the period of food insecurity that follows, c. 1830-1890.
[10] There are charred chunks of sorghum and millet that are clearly part of articulated heads in these units.
[11] There is a much higher ratio of byproduct to clean grains in these units (see Figure 6.6).

8W 2S,[12] or using specially made convex sherds to smooth and thin pot walls and a maize cob to decorate the outside, stowing these tools in Pot 8 (8W 4S) after she[13] was finished for the day. Another person nearby is busy processing foodstuffs including baobab, beans, maize, pearl millet and sorghum, under a pole and thatch roof (8W 4S). The younger children are already hungry and have managed to hunt down some *Ficus* fruits, spitting out their seeds nearby (0W 0S, 0W 4S, 4W 4S).

Then the worst happens. Whether because of an accident or because warriors from a neighboring polity suddenly exploded into the village, this tranquil scene became enveloped in fire. It probably started in a cooking hearth, ashing most of the ingredients ready to be included in the day's main meal, and charring the carefully harvested nearby piles of sorghum and millet.[14] In a panic, people drop their pipes, their pots, their food and run to safety, perhaps to the large cave in the Banda hills that had sheltered their grandparents 50 or so years earlier during the Asante invasion. Some may have had enough time to carry away the full storage pots or calabashes that were nestled in the carefully arranged jar rims that served as pot stands in the storage area (0W 0S); the lack of preserved plant remains and other heavily burnt materials suggest this area escaped the fierce blaze in the southern part of the compound. Whatever the cause of this sudden abandonment, household members left behind most of their kitchen equipment and stored grains, and were not able to fetch them later. Thus began the next period of violence and dislocation that was to last many decades in the Banda area, a story I resume in Chapter 7.

The scene just described may have happened precisely as I narrated it, or many of these activities, such as smoking or potting, may have taken place earlier or later than the primary cooking or burning event which caused the fire. The bank of rooms to the northeast (0W 0S to 4E 2S) might have been long abandoned before the kitchen area was

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[12] These grindstones may well be associated with food preparation, though it is notable that there are absolutely no seeds recovered from this unit. My ethnographic observations in Dorbour, a potting village west of the Banda hills studied previously by Cruz (2003, 2011), suggests that grinding stones as well as several other bodily logics used in food preparation are used for preparation of pastes.

[13] It is of course always possible that potters were previously male, but all ethnographic and ethnohistorical data suggest that women were potters in this region (Stahl and Cruz 1998).

[14] Based on the observation that plant remains are much better preserved and in large quantities in this area compared to elsewhere, hence this seems to be a locus of the conflagration (also Stahl 2001: 169).

in use (given their more diffuse boundaries: Stahl 2001: 171), though the whole pots left inside suggest otherwise. Regardless, there is evidence for almost all of these activities in this area. Besides providing a glimpse of daily life, what can this Pompeii-like scene tell us about food and agriculture during Early Makala times?

It is striking that space and domestic activities seem to be arranged in a manner similar to contemporary households in the region. Wet and dry season hearths are often close together, and multiple hearths typify most extended family compounds. Rooms seem to be arranged in a roughly linear fashion, though we cannot tell if this was a 'mature' compound, with rooms on all sides of a central courtyard forming a rectangle (the architectural remains in Mound 6 (Fig. 6.4) are suggestive of this type of spatial organization).The rooms were much smaller than those today (Logan in prep.a). The open area nearby contains not only kitchen spaces and grinding stones off to the side, but probably a crafting area in the 8W units, suggesting household level production (Stahl 1999, 2001).

Several edible plants are present that are also eaten today, including *Portulaca* and cheno-ams, though today they are no longer the primary greens consumed. Wild fruits including *Ficus* and baobab are also consumed in modern Banda. In Early Makala times, people were still heavily reliant on pearl millet, as they had been in the earlier phases, something that no longer characterizes diet in the Banda area despite its deep history. For the first time, we have evidence of large quantities of sorghum, which had only appeared in small quantities in the past. Today, people rarely consume sorghum as a starch; instead it is used to make *pito* (beer), a job now performed by a specific ethnic group (the Dagaarti, Ch. 2). Indeed, *pito* may have been the primary product made in our idyllic kitchen scene rather than the family dinner I portrayed. Nafana renderings of the eaten past are insistent that sorghum is not a Nafana food,[15] though a few mention

[15] People today are *very* insistent that they are not sorghum eaters; this is despite the fact that sorghum is now the only grain crop that can be reliably produced in the deteriorating environmental conditions. Due to unpredictability in rainfall pearl millet cultivation has been completely abandoned, and maize harvests are very unreliable. However, it is quite possible (even probable) that sorghum is associated with other ethnic groups such as the Dagaarti, and therefore perhaps viewed in a derogatory light today (i.e., this might be a recent aversion).

receiving sorghum as food aid from neighboring polities during 'the wars' (Ch.7). I return to the importance of sorghum below by evaluating its presence on a regional scale.

Perhaps most surprising is the low representation of maize, which had been introduced to the area about two centuries earlier (Ch. 5). Given the larger-than-life role maize has been accorded by scholars in feeding Asante, it is worth discussing the archaeological evidence in detail. The low presence of maize may be interpreted as low reliance on this crop, but we must recall that the Mound 5 sequence represents a brief snapshot in time. Maize seems to be present in the outer excavation areas—near the western area of grinding stones and in the structure to the east—but it is noticeably absent from the area of heavy burning (Fig. 6.6).[16] This pattern probably represents seasonal variability or culinary preferences. One would expect large quantities of pearl millet and sorghum, but perhaps not maize, in the dry season or early wet season (December-June). Sorghum and millet are both harvested in the early months of the dry season. If the edible greens were brought in as fresh food, a wet season date is suggested (though greens may be dried for later use). The layout of the hearths—one in 2W4S which was swept clean and one in 4W4S that was the epicenter of burning and large amounts of preserved grains was roofed—characterizes dry and wet season kitchens, respectively (Stahl 2001: 169,171). The roofed, wet season kitchen seems to have been in use at the time of the conflagration, suggesting the fire occurred between March and June (or possibly its use for grain storage).

The most 'abundant' concentration of maize consisted of several large pieces of maize cob in a small globular pot (Pot 8) in 8W4S. This pot contained several unusual items, including two trade beads and several convex sherds with pointed ends, and was carefully covered with a sherd lid. Above, I interpret it as a collection of potter's tools, though it may also have been a shrine, as Stahl (2001: 165) suggests. However, the inclusion of maize in such a context is odd; at least today, pearl millet is almost always the 'food of choice' for shrines (Ch. 8), though it is certainly possible that this was different in the past. This collection of odd items may have also been used in trade; at

[16] There might be a few grains in these samples, as some of the smaller maize kernels can overlap with sorghum in size and shape, especially when distorted by fire. Only one cupule was found in unit 4W 2S; if there is any additional maize, it is only in kernel form and in very small quantity.

least some shaped sherds could have been used as weights, though these are usually circular, square, or triangular (Garrard 1980), and Stahl (1999a: 38-40) has questioned the use of rounded sherds as weights in Banda. The most likely explanation is that this assemblage was a collection of potter's tools; convex pieces of sherds may have been used to pull or smooth the clay, just as rounded pieces of calabash, plastic, or metal are today (Cruz 2003: 232-236), and maize cob roulette is one of the most common decorative techniques in Makala times and today (Cruz 2003, 2011). The conspicuous absence of maize seeds confirms that only the cob was stored in the jar.

This leaves open the question of maize's popularity and use; I suggest that it was commonly available, but uncommonly consumed. By the Makala phase, decoration of pottery with a corn cob was common throughout the wider region, having replaced cord roulette as the most commonly employed decorative technique (Stahl 2007a: 68). While only one cob would have been needed per potter as a decorative tool, the ubiquity of maize cob roulette and preserved maize in some archaeological deposits suggests that maize was widely known. Finally, at least in the Early Makala kitchen analyzed, maize was spatially separated from the other grains; this may relate to seasonal differences, but it is telling that only one maize cupule was recovered in the kitchen area full of literally thousands of grains. Based on this evidence, the inhabitants of Makala Kataa do not seem to have been maize eaters, even though it was known. They may have been maize producers, perhaps for export, but the lack of kernel or cupule fragments in any number suggests that this was either not the case or that cobs were traded in whole form. It is worth recalling the brisk trade in pottery between the east and west side of the Banda hills in pottery at this time, and the practice in recent times of bartering pots for grain or other agricultural produce. Maize may very well have been an item of exchange, in which case different patterns of preservation would be expected for the west side of the hills. I review the evidence for patterns on a regional scale next.

Regional and temporal trends: Makala Kataa, A212, B112, Ngre Kataa

In this section, I expand my gaze beyond the kitchen remains of Mound 5 to architectural remains at the same site (Mound 6), and midden remains at Ngre Kataa

Mound 8 (upper levels[17]), and at A-212 Mound 1 and B-112 (Table 6.2; phasing based mostly on Stahl 2007a: 58). Pearl millet was found at every site, present in 20-100% of contexts. Sorghum was present at all sites except B-112 but in fewer contexts (0-50%) than pearl millet. Maize occured in only two sites: at B-112, where it was present in every layer along with pearl millet (though sample size is quite small), and NK M8, where it was present in one context (Lev. 6A). These data support the contention that pearl millet and sorghum were common throughout the region, while maize was only occasionally used. This is in juxtaposition to the Kuulo phase, where pearl millet dominated and sorghum and maize were extremely rare, as well as the following Late Makala phase, where emphasis had shifted to maize, alongside some millet, and sorghum is absent entirely (Ch. 7).

The variation between these sites, which are distributed quite widely across the Banda region (Figure 6.3), may speak to different economic or social configurations at each location. For example, B-112 is far to the southeast of Makala Kataa, and may have been occupied by different social groups. Oral traditions record it as a Mo settlement that Nafanas migrated to, and in time the Mo became disgusted and moved away (BRP 2002: 45). The plant remains recovered reflect the settlement's distinctive history: it is the only site without sorghum, and maize is present in larger amounts (though given the low counts and sample size, this pattern should be considered provisional). While I hesitate to assign these remains any sort of 'ethnic' affiliation, Mo or otherwise (cf. Stahl 1991), varying reliance on staple grains may reflect seasonal or social differences and confirm the hybrid, frontier-like character of the Banda landscape at this time.

The structure at Makala Kataa (M6), located not far from the kitchen area discussed above, has a low concentration of plant remains, much like other domestic areas sampled and described in Chapter 5. This is to be expected given that people regularly sweep and clean their dwellings and that cooking is practiced outside of rooms.

[17] Analysis of this site is ongoing so this phasing is preliminary; I include Levels 8 and above in the Makala phase sample. A direct date on charcoal from Level 9 (cal. AD 1479-1649 at 2σ; AA94095) suggests Kuulo phase affiliation, as with deeper levels (Ch. 5), despite the presence of four maize cob roulette sherds in this level. Maize cob roulette sherds have generally been used as an Early Makala or later phase marker (Stahl pers. comm. 2009), and occur in small amounts in upper levels of NK Mound 8 (Stahl pers. comm. 2012). Sorghum in addition to pearl millet is present in levels 6 and above, which also hints at Early Makala affiliation.

Still, it is instructive that the plant remains generally mirror those in the nearby kitchen; pearl millet is present in slightly higher amounts and is distributed more broadly across contexts than sorghum, but sorghum is present in much higher amounts and is more common than in any other phase. Maize is not represented at all, hinting that, as mentioned above, the inhabitants of Makala Kataa were not primarily maize eaters.

TABLE 6.2: Charred Plant Remains from Early Makala Phase Sites

EARLY MAKALA PHASE	MK M6 'Structure'	A212 M1,U1	B112 M1,U1	NK M8	MK M5 'Kitchen'	Phase Total
Sample n	15	4	3	5	49	76
Grains						
Ubiquity Pearl Millet (%)	20	100	100	60	43	45
Count Pearl Millet	3	12	4	8	2421	2449
Ubiquity Sorghum (%)	13	50	0	20	33	28
Count Sorghum	2	10		1	2167	2180
Ubiquity Maize (%)			100	20	10	12
Count Maize			9	1	17	28
Byproduct* Ubiquity (%)	7	50		20	47	36
Byproduct Count	5	13		8	2317	2347
Poaceae indet. (incl. Paniceae)	5	1	1	2	918	927
Edible and Weedy Plants						
Baobab					13	13
Cassia tora					1	1
Cheno-Ams					8	8
Cowpea			1			1
Ficus sp.				4	4	8
Kapok	24					24
Portulaca spp.					6	6
Shea butter shell			2			2
Tobacco					7	7
Zaleya pentandra				1		1
Other Seeds						
Cyperaceae/Polygonaceae					1	1
Euphorbiaceae/Lamiaceae					1	1
Euphorbiaceae/Malvaceae					2	2
Fabaceae/cf.				4	2	6
Polygonaceae					1	1
cf. Solanaceae	5					5
cf. Verbenaceae					5	5

Though they have not been the emphasis here, several other edible and useful taxa are present. Cowpea appears in one sample, mirroring results in previous phases. Herbaceous plants that may have been consumed as edible greens or medicines (or may simply be weeds; Adams and Baker 1962: 410-415) include *Cassia tora*, Cheno-Ams, at least two *Portulaca* species, and *Zaleya pentandra*. Caches of baobab seeds, which are consumed and made into a drink today, are present in the early Makala kitchen. A cache of kapok seeds (*Ceiba pentandra*), a useful fiber used for bedding and pillows today, is present in a pot just outside the structure in MK Mound 6.[18] Finally, a couple of shea butter shell fragments hint at the use of this important oil in Early Makala times. Preservation constraints do not allow me to analyze the regional distribution of these plants; in all likelihood many (particularly shea butter, baobab, and edible greens) were more important than the charred plant remain record suggests.

Phytoliths and plant processing

We are less well equipped to determine how grains and other plants were prepared, or whether they were destined for consumption by others in the region or further afield. Ideally phytoliths would help us paint this part of the picture by revealing other plant parts like glumes, the locations where plants were processed, and the taxa that otherwise do not preserve well. As described in previous chapters, phytolith identifications in Africa are not yet up to the challenge of species-specific identifications.

Previous analysis of phytoliths from Makala Kataa was undertaken by Deborah Pearsall as part of a pilot study on maize in Banda (Table 6.3).[19] She relied on two forms that are used to identify maize in the Americas: large or extra-large Variant 1 crosses produced in maize leaves, and decorated rondels characteristic of maize cobs. As discussed extensively in Chapter 3, wild grasses that grow in the Banda area also produce large Variant 1 crosses, but we cannot yet determine whether or not they produce the same distinctive rondels found in maize cobs. This prevents definitive identification of maize using these measures alone. Nonetheless, these data hint at the presence of maize

[18] I should caution that caches like this are sometimes made by burrowing animals like rodents.
[19] Pearsall has generously provided the raw data as well as reports submitted to Stahl on this material; while the Kuulo Phase data have been previously published (Stahl 1999a: 36), the Makala Kataa data have not been published.

in Early Makala contexts at Makala Kataa, which is confirmed with macrobotanical remains in the kitchen area, and suggest a wider distribution than indicated through charred remains alone. However, these data should be treated with caution; they may well represent the contribution of wild Panicoid grasses to the soil assemblage, rather than maize itself.

TABLE 6.3: Phytolith types produced in maize in Makala Kataa contexts from Pearsall

Site/Area	Unit	Depth (cm)	Count data	
			Lg. Var. 1 Cross	Cob Body[20]
MK Mound 5	0W2S	0	-	1
		23	-	-
		33	-	4
		43	-	2
		53	-	3
		55	-	1
	2E2S	0	1	1
		15	1	4
		25	-	6
		35	2	6
		45	-	1
		55	1	2
	4E2S	40	-	2
MK Mound 6	0W28N	49-56	1	1
	2W26N	93	-	1
	4W26N	60-64	2	4
	6W26N	96	-	4
	10W28N	?	2	5

My more recent analysis builds on Pearsall's methodology but also incorporates observations of phytolith production in indigenous African grains and wild grasses (Ch. 3). My focus has been trying to disentangle which grain (millet, sorghum, or maize) is present in artifact residues and in soil samples. Preliminary analysis of four soil samples and three artifact residues (from two artifacts, see sampling details in Ch. 3) generally confirm the pattern observed in charred remains: probable presence of pearl millet in every context sampled, with many also containing sorghum, and no strong indication of maize presence (Table 6.4). Two contexts are worth special mention. The first is an area

[20] Includes wavy top rondel and epidermal bodies with irregular (i.e., speculate) projections (Pearsall et al. 2003); I suspect that these are produced in other wild Panicoid grasses in Africa and thus probably do not indicate maize. Unfortunately the ruffle top rondel was not recorded in Pearsall's preliminary study of Banda phytoliths so is not included here, but I expect is probably more unique to maize.

immediately below a grindstone in the MK Mound 6 structure (2W 24N, Lev.8) which contains a very high proportion of sorghum phytoliths, including several types that may be unique to sorghum. There is also a moderate probability that sorghum is present on a spherical hand grinder recovered from the MK kitchen area (0W 2S).

Future phytolith studies will focus on other types of grinding stones and a wider array of functional contexts, but I await the development of definitive identification methods, which require substantial efforts at tracking phytolith production in the inflorescences of African grasses.

TABLE 6.4: Phytolith indicators of domesticated grains in Early Makala Samples

Mound/ Unit	Lev (cmbd)	Description	Sed.	% millet indicators	% sorghum indicators	% maize indicators
Soil Samples						
MK Kitchen 2W0S	4 (52)	Under grindstone		17.6	6.7	0
MK Kitchen 2E2S	6 (70-80)	Below pot support		**24.8**	1.7	5.79
MK Structure 2W24N	8 (113)	Below grindstone		8.9	51.1	4.4
MK Structure 2W20N	4 (82-85)	10x10cm of floor		11.6	5.4	3.9
Artifact Residues						
MK Kitchen 0W0S	3	Spherical hand grinder	2	**26**	**5**	4
MK Kitchen 0W2S	5 (55)	Spherical hand grinder	2	10.3	14.9	6.9
			3	10	23.3	0

Little to no probability	Weak probability	Moderate probability	Strong probability

Bold shows samples with same taxa represented in same or immediately adjacent contexts

Wood Procurement and Environmental Change

Charcoal was identified from four contexts at Makala Kataa (Table 6.5). Most taxa were probably used as firewood, though at least three taxa are not used today in this way. Both *Khaya* and *Berlinia/Isoberlinia* are used in construction, medicine, and technological functions. At least two species of *Pterocarpus* yield a red to dark purple dye that is frequently used to dye textiles (Irvine 1961: 405-407), a fact worth mentioning since spindle whorls indicate household level production of thread in Early Makala times. Interestingly, though few spindle whorls were recovered in the preceding Kuulo phase, *Pterocarpus* is also present, suggesting that dyeing of something, probably textiles, was taking place. *Strychnos* species, also known as 'monkey oranges' produce a common edible fruit (National Research Council 2008: 309-315).

TABLE 6.5: Charcoal identified in Early Makala Phase contexts (n=4) (Bold indicates taxa that are not used as firewood in recent times; shaded taxon from wetter habitats)

Wood Taxa (order of prevalence)	Total Count	Overall Ubiquity (%)	% of assemblage	Modern uses*
Detarieae 2, cf. *Afzelia*	36	100	30	F,M,S,T
Vitellaria paradoxa type	25	75	20.8	F,E,O
***Pterocarpus*-type**	**11**	**100**	**9.2**	**M,T**
Bridelia cf. *micrantha*	9	75	7.5	F,C,E,M,T
Indeterminate	9	75	7.5	
Terminalia	9	50	7.5	F,C,M,O,T
Detarieae 1, cf. *Berlinia/Isoberlinia*	**5**	**50**	**4.2**	**C,M,T**
Anogeissus leiocarpa	4	50	3.3	F,M,T
Combretum molle/nigricans	3	50	2.5	F,M,T
cf. *Prosopis*	3	25	2.5	F,C,E,M,T
Parinari	2	25	1.7	F,C,E,M
***Khaya*, Meliaceae**	**1**	**25**	**0.8**	**C,M,T**
Lophira cf. *lanceolata*	1	25	0.8	F,C,E,M,O
Monotes, Dipterocarpaceae	1	25	0.8	
Pericopsis-type	1	25	0.8	
Strychnos innocua	**1**	**25**	**0.8**	**E,M,T,C**
TOTAL EARLY MAKALA PHASE	120			

*From Irvine 1961. Abbreviations: F=firewood/charcoal; E=Edible fruits or leaves; M=Medicinal; O=Oil; C=Construction, T=Technical processes (i.e., dying, tanning, etc.); S=Sacred

As with wood assemblages in the previous phases, almost all of the taxa present in the Makala phase grow in the savanna woodland or transitional zone, including *Afzelia, Vitellaria paradoxa, Pterocarpus, Bridelia cf. micrantha, Terminalia, Berlina/Isoberlinia, Anogeissus leiocarpa, Combretum molle/nigricans, Prosopis, Parinari, Khaya*, *Pericopsis,* and *Strychnos innocua (madagascarensis)* (White 1983: 105). Only one species that represents the wetter part of the savanna woodland is present (*Lophira* cf. *lanceolata*), and there are no forest trees present at all. This is curious, as wet conditions returned by about 1700 according to precipitation proxy records at Lake Bosumtwi (Figure 4.6; Shanahan et al. 2009). As a result, I would expect that this would be reflected in a higher proportion of wet savanna or forest species, as in the Ngre phase. Perhaps not enough time had elapsed since the long drought that plagued much of Ghana in the preceding phase; many forest trees are slow growing and would take time to recover (Alexa Höhn, 2011 pers. comm), particularly if combined with the regular burning and clearing of the landscape. The diversity of wood species (n=15) is also much lower than expected, mirroring the low diversity of the dry Kuulo phase instead of the wetter and thus more comparable Ngre Phase.

Several additional factors probably contribute to both the low representation of forest or wet savanna species and the low diversity of taxa used overall. The first is that no clear Early Makala phase iron working (especially smelting) contexts were uncovered. Iron production appears to have either substantially declined or moved to off-site locations which have not yet been excavated (Stahl 2007a: 69). Slow-growing trees provide the best fuel for charcoal (Goucher 1981), which is ideal for smelting applications. The absence of forest species may be associated with the lack of iron working (see Ch. 4). Second, most of the contexts analyzed for charcoal identification were domestic, instead of the metalworking and mixed midden contexts, analyzed for the other phases, which might explain the lower diversity of tree taxa.

I suspect that the difference reflected in the makeup of taxa in Early Makala charcoal assemblages reflects an actual difference in strategies used to procure fuel or knowledge about the local environment and specific tree taxa. We know from oral histories that at least one group, the Nafanas, migrated into the area in this period. Originally from considerably drier areas to the north and west, these newcomers may have been unfamiliar with the diversity of trees in the wet savanna and forest fringes as well as those specific to the Banda area. In fact, the low number of species utilized resembles that of the Volta phase, which may also have been a time when new populations trickled into the Banda region. While analysis of additional samples will help determine the strength of this pattern, faunal data also suggest a narrowing in landscape utilization. The Early Makala faunal assemblage is less diverse than that of the Kuulo Phase, and far fewer large and dangerous animals are represented. Instead, hunting appears to have been opportunistic, making use of animals in and around settlements and farms (Stahl 2001: 177-178). The same restricted collection pattern seems to characterize wood procurement strategies as well.

Food and Agriculture in an Inner Province of Asante

In this final section, I focus on deciphering what, if any, impact Asante had on diet and agriculture in Banda, and what the plant assemblages from Banda may indicate about the role of maize and other grains in the wider region. In particular, Early Makala samples are characterized by a much higher amount of sorghum than found in any other phase, and there is far less maize than one would expect in this late phase. Environmental conditions in Early Makala times seem conducive to cultivation of maize and sorghum, with precipitation levels higher than at present and comparable to the Ngre Phase (Figure 4.6). The high quantity and ubiquity of pearl millet suggests that culinary and cultural preference for this grain were still strong, especially as such high precipitation would not have been conducive to millet cultivation. The high proportion of sorghum might reflect an adaptation by farmers to wet conditions, as I have suggested in Chapter 5. Maize can also thrive in wet conditions, though it is not as tolerant of waterlogging as sorghum (Ch.3; Staff Division of Agriculture 1962: 369-372).

Though climatic change surely played a role in farmers' decisions on what to cultivate, sorghum appears in such high quantities and with such regularity that its significance warrants further speculation. It is quite possible that one or more of the many diverse populations that moved into the Banda frontier at this time preferred sorghum, though it is telling that in Banda today, Nafanas express a strong dislike for the taste of sorghum, and claim that it is not and has never been the food of the Nafanas. Recall also that three out of the four villages analyzed had evidence for sorghum, suggesting that its use was more widespread than by a single social or ethnic group. Today, sorghum is primarily used to make *pito* (beer), which may explain its increase in Early Makala times. Interestingly, the pot form (globular jars) that was likely associated with beer brewing in the Kuulo phase (based on interior pitting) drops out of the sequence in Early Makala assemblages[21] (Stahl 2007a: 68). As I alluded to in Chapter 4, a change in the kinds of foods made from sorghum may also lead to higher preservation potential in

[21] More could be done with potential links between changing pot forms and food preparation and consumption; other forms like the pedestalled bowl show up in EM times. Perhaps seeing a shift to T.Z. and fufu, which I consider in Ch. 8.

archaeological sites (i.e., more exposure to fire in whole form), but phytolith evidence suggests that at least some sorghum was ground on stones.

The high quantities of sorghum in this phase contrast markedly with both previous and later phases—not a single grain of sorghum was recovered in Late Makala contexts (Ch. 7), for example. This makes me suspect that the popularity of sorghum had something to do with Asante dominion over and influence in Banda. As an inner province, Banda would have had certain responsibilities to the Asante state. We have already seen that men from Banda joined the Asante in military campaigns; historical sources attest to at least two—against the Fante in 1806, and against Gyaman in 1818-1819 (Stahl 2001: 156). Wilks (1975:50) suggests that considerable food shortages occurred when a large portion of the population was mobilized to go to war. From this perspective, it is possible that increased reliance on sorghum may have been a risk minimizing technique; unlike millet and maize, sorghum produced (and still does produce) a dependable harvest, even if it was not the food of choice.

Sorghum may also have been a preferred food of the Asante, though unfortunately historical records do not tell us which of the grain crops were cultivated in Asante. While many historians have suggested that it was maize (above), metropolitan Asante—the area responsible for provisioning Kumasi—lies within the wet forest zone which, according to precipitation records, was even wetter during the 18th and 19th centuries than it is today. If the inhabitants of Banda, located in a drier zone, supplemented millet crops by recourse to sorghum in wet periods, it makes sense that wetter regions would have had even more motivation to adopt such a practice. Might sorghum have been the grain produced in abundance in Asante that was remarked upon by so many European travelers?[22] Could it have also been the primary provision of soldiers? I think this is quite possible, given the prevailing wet conditions, but until archaeobotanical studies are conducted at sites in the Asante heartland, the relative roles of maize, sorghum, and millet remain conjectural.

[22] I suspect that European travelers may have often confused sorghum and maize in their accounts. Prior to tasseling, the vegetative parts of the plants are practically identical, especially to the untrained eye. By the 19th century, most European commentators would have probably been more familiar with maize.

Asante control over agricultural production in Banda was likely indirect. We do know that after Asante conquered the area in 1773/4, an annual tribute to be paid in sheep was demanded to defray war costs (Wilks 1975: 246). Banda was probably too far from the core metropolitan area to supply crops, but it is quite possible that its produce provisioned soldiers during wars closer to home (such as that with Gyaman in 1818-1819). By the early 19th century, Banda was considered an inner province, thus subject to taxation rather than tribute (Wilks 1975: 70). Taxes were usually paid in gold (often a measure of gold per married man), which some provinces found difficult to obtain (Wilks 1975: 70).

One might hypothesize that this taxation created new demands on the Banda economy to focus on activities that could produce gold. Stahl (1999a, 2001, 2007a; Stahl and Cruz 1998) has documented the presence of textile and pottery production, probably on a household scale, but there is little to no evidence that other more lucrative craft products (ivory, iron, and copper) were produced in the Banda area during Early Makala times. Arhin (1970: 363) suggests that gold dust was obtained from the Banda hills, but it is not clear whether it was being mined there or acquired through trade. Agriculture may have played an important role in regional economies, perhaps in exchange of crops for craft goods like pots (in recent times, pots were exchanged for their volumetric equivalent in grains). Perhaps a more profitable trade was in livestock. Early colonial records suggest that a very active trade in both cattle and kola passed through the Banda area by the early 20th century (see Ch. 7). We also know that livestock, and particularly cattle, were highly valued for their meat and hides and were always in short supply in Kumasi (Arhin 1987: 57). Farm surpluses could be converted into livestock, which was not only a tradable good which could walk to market but a buffer to insecurity in lean years (Hutchinson 1962: 429).

Chapter Summary

At the opening of the 18th century, political and economic organization underwent major reorganization as the Asante state seized control of much of modern day Ghana. Some scholars have hypothesized that it was maize that underwrote the transformation of the forest into a productive agricultural zone and thus fueled the growth of Asante. I argue that indigenous grains and tubers were sufficient to meet this demand, and that the available evidence suggests that maize was rarely consumed in Asante and its northern provinces. Banda was one such province that was incorporated into Asante in 1773/4. Plant evidence from well-preserved kitchen deposits at Makala Kataa, as well as several other villages in the region, suggest that maize was uncommon, and that pearl millet retained importance in diet and agriculture. However, sorghum was also present in high quantities and was more common than in any other period. This may have been an adjustment on the part of Banda farmers to the prevailing wet conditions, due to the high tolerance of sorghum to waterlogging. Asante hegemony in Banda probably did not involve direct demands on agriculture, but it did place demands in terms of warriors and taxes, and controlled Banda's access to foreign goods. Inhabitants of Banda may have responded by developing robust regional trade networks, and perhaps engaging in profitable livestock trading. Asante dominion over the Banda area lasted until the 1890s, when the British took control of the area in order to bring peace and also to surround Asante with British-friendly territories. Unfortunately, our material record of daily life drops off after c.1825. I consider this disjuncture along with the broader forces that shaped it in the next chapter.

Chapter 7

Turbulence and Loss:
Food, Violence, and Early Colonial Encounters to c. 1930

In the 19th century, considerable turbulence was unleashed along the vast trade networks that had for so many centuries defined social and economic interactions from the West African coast to the Sahara. This turbulence resulted from a complex array of sources. The Atlantic slave trade was brought to a close, cutting off polities from a prime source of income. At the same time, economic recession, political maneuvering, and ideological shifts originating a world away led foreign governments to scramble for African land and resources after the trade in her people was outlawed. The friction (cf. Tsing 2005) between these desires produced profound turbulence and local hostilities on the ground, resulting in wars and dislocation over wide swathes of Ghana and beyond. By the end of the twentieth century, the imposition of colonial boundaries had quelled much of this upheaval, but for many areas did little to make up for the losses already suffered. Colonial governments ushered in a new era, one in which the value of commodities was defined in European capitals, which in turn etched 'development' unevenly across African landscapes and social groups.

This chapter explores this particular cycle of "turbulence and loss," as Jane Guyer has described it (Guyer 1999 in Stahl 2004: 258) as these many forces intersected in the specific place of Banda in the 19th and early 20th centuries. I first review some of the conditions that led the British to take control, in various forms, of much of modern day Ghana in the 19th and early 20th centuries. I then take a roughly chronological focus, first describing conditions of unrest that prevailed partially as a result of European incursions, and then zoom in specifically on Banda oral accounts and archaeological remains to paint the lived experience of such traumatic disjuncture. These disjunctures, often violent, severed people from the routines of their day-to-day lives, and removed them to alternate dystopic realities. The daily life of times before could not simply be reproduced; it had to be reinvented. I examine this reinvention in both kitchens and fields as the inhabitants of Banda settled down once again, this time under formal colonial rule, at the village of Makala Kataa in the early 20th century.

Early Colonial Encounters

British involvement on the Gold Coast began in the 17th century, but it was not until the mid to late 19th century that they became directly involved in politics of the interior. In this section, I describe how the British became entrenched in the area through their defeat of the Asante state and annexation of much of modern Ghana into a British colony. This paints the backdrop for the next section, where I consider the violent disjunctures that erupted across much of West Africa at the same time.[1]

Early British interests in the Gold Coast were defined by commerce rather than a desire to rule. But by the mid-19th century, British concepts of race had changed, and a push towards dominance ensued, following similar developments in other European countries at the time (Bassil 2011; Lorimer 1978). In 1868, Britain and the Netherlands swapped some of their holdings to consolidate their respective territories along the Gold Coast. In the same time frame, the Asante state tried to formally establish control over several coastal polities with whom relations had long been contentious, and also began to invade territories protected by the British. The British responded by sacking Kumasi in 1874. With the loss of her southern provinces and access to Atlantic trade, the Asante state was considerably weakened (Gocking 2005: 37-47). Although the Asante state persisted for two more decades, several of its internal provinces and other factions revolted. Asante ignored many of the terms of the 1874 peace treaty and spurned the many British delegations seeking to advise and befriend the state. In response, the British invaded in 1896, subduing Kumasi and demanding a massive fine in gold. Even more unsettling to the Asante population was the British insistence in 1900 that they yield the Golden Stool, which had great ritual significance. In response, the Queen Mother Yaa

[1] I focus on British colonial incursions here, but many other European countries were also involved in the Scramble for Africa, and thus played a role in developing wider insecurities in the area. My review of early relations between Britain and what was to become the Gold Coast Colony is necessarily brief.

Asantewaa led Asante soldiers to sack the British fort in Kumasi. Eventually the British won, and exiled Yaa Asantewaa, the *Asantehene*, and many others to the Seychelles until 1924, when the Asante administration was partly reinstated (Gocking 2005: 45). Ashanti was annexed to the Gold Coast Colony in 1901, and the Northern Territories were annexed as a protectorate in 1902 (Figure 7.1).

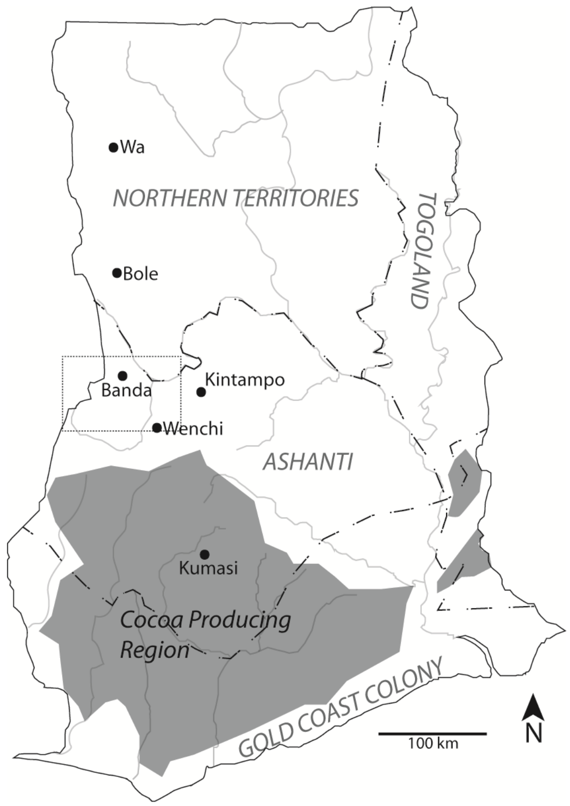

FIGURE 7.1: British Gold Coast and Cocoa Producing Regions, c. 1930

By the late 19th century, European countries were vying for land and power over much of Africa. The Gold Coast interior was of particular interest, for it lay at the intersection of competing British, French, and German claims. In 1892-4, the British dispatched George E. Ferguson, a Fanti geologist, to the far north to obtain treaties of friendship with the polities there (Arhin 1974: ix-x). The rulers of Banda signed a treaty with Ferguson in 1894, two years before Asante formally ceded to British control (Stahl 2001: 95-96). However, these initial British treaties were commercial in nature, and offered no guarantees of British protection (Arhin 1974: 66). This changed as British trade interests became threatened by the movement of Imam Samori and his Sofa army into the area (Stahl 2001: 96-97).

Samori and his forces waged wars of conquest between 1861 and 1898, and established a loose empire that stretched from Guinea to northern Côte d'Ivoire. By 1895, he had settled his base of operations in Bonduku, the center of Gyaman, and began expanding west and northwards into what is today Ghana. Samori succeeded in establishing a line of posts across the Asante hinterland—including in Banda, Bole, and areas northwards. His armies brought great unrest, raiding the surrounding areas for food and captives and scorching much of what was left, and causing widespread food shortage and dislocation (see below; Stahl 2001: 96-98). The greatest impact was felt north of the Black Volta River (Fell 1913; Stahl and Cruz 1998).

In January 1896 the British received word that Samori had occupied Banda; further investigation by a Gold Coast Constabulary suggested that Samori had taken 112 captives as well as foodstuffs from Banda. One report (Henderson) suggested that 500 troops were needed to retake Bole from Samori, though concern was expressed over how to supply so many men with food since "[t]here is practically none between Lawra [Bui] and Buale [Bole] and there is practically none within a 15 mile radius of Buale" (Henderson in Stahl 2001:193). The British army established a base at Bui in Banda just south of the Black Volta River to staunch the flow of trade goods north to Samori. Their efforts eventually expelled Samori and brought peace to the area by 1898. After the dust settled, many towns were left ruined, and grain, cattle, sheep and even wild animals were scarce. Those who were left in the region were drawn into villages that had fared slightly better (Stahl 2001: 96-98, 193-194), a process I describe more fully in the next section.

Violent Disjunctures in the 19th century

The 19th century in the Volta basin and Niger Bend was a period of widespread violence and dislocation as different groups vied for power and battles erupted (Arhin and Ki-Zerbo 1989). This was related in part to the instability of states like Asante, which faced increasing military and economic pressure from the British beginning in the 1820s. The abolition of the slave trade in 1807 dealt a major blow to Asante economic power given its central role in Gold Coast trade at the time (Arhin and KiZerbo 1989: 687). As centralized power weakened, so too did Asante's authority over the margins of its empire, leaving its outer territories vulnerable (Arhin and Ki-Zerbo 1989: 663-671).

A major source of unrest in areas to the north of the forested region was slave raiding for the internal market, which, despite the British abolition of the slave trade in 1807, continued into the early 20th century in some places. Samori—mentioned above—was one of the more famous examples of slave raiders, but was by no means the only threat. This was related to the strong domestic demand for slaves as tribute payments or as laborers, in part to fuel the increasing production of cash crops and gold mines, and as payment for firearms (Austin 1995; Arhin 1967b: 76, 1977: 4; Arhin and KiZerbo 1989: 686). Slaves were captured either through specific slave catching (i.e., kidnapping) missions or as a byproduct of violent conflict. 'Decentralized' or stateless societies were often the target of slave catching and raiding, but they too had developed strategies for dealing with this threat. Though the 19th century saw intensification in slaving activities over much of the Volta basin, in earlier times stronger polities had regularly demanded captives from weaker ones, especially to meet tribute obligations (i.e., Asante demands from Gonja and Dagomba, Ch. 6). To avoid capture, people could migrate, develop defensive settlements and strategies, and/or participate in the trade by capturing others (Swanepoel 2005: 274-278). Migratory movements were very common in the 19th century, and in many places underwrites the present-day map of the distribution of ethnic groups (Arhin and Ki-Zerbo 1989: 662).

The pressures brought on by the slave trade and the new ways of living it engendered had impacts on subsistence. Based on historical sources, Cordell (2003: 40-42) outlined the subsistence strategies of early 19th-century central African societies. He pointed out that monocrop grain fields were particularly vulnerable during raiding: not only were they highly visible as distinct from nearby vegetation, they required the presence of a farmer at very specific times of year for care and harvest. One adaptation, recounted in numerous historical sources, was to rely more strongly on hunting and gathering, which would leave few signs to hostile marauders. Another possibility was to switch to the cultivation of cassava, which blended in with the surrounding vegetation, required little care, and could be left in the ground for several years and be harvested at any time of year (see also Ferme 2001; Stahl 2008b: 40).

Oral Historical Accounts

The story I tell in this section is unique to Banda in its specificities, but is common to much of West Africa during the turmoil of the 19th century. I am primarily concerned with how unstable conditions affected people's abilities to reproduce the practices of daily life, especially food and agriculture, and how those practices were reinvented as a result (cf. Stahl 2008b). Oral histories of the Banda region recorded at numerous points (Ameyaw 1965; Fell 1913; Owusuh 1976; Stahl and Anane 1989; Stahl 2001) and told to me in 2009 record the consequences of such instability on daily life.

The major period of dislocation seems to have begun after the Banda people joined Asante in war against the neighboring polity of Gyaman (Figure 6.1) in 1818-1819. Sources conflict as to whether the Banda polity was rewarded by Asante for loyal service (Dupuis 1966: 76-83) or was accused of cowardice (Ameyaw 1965 in Stahl 2001: 190). Ameyaw's version suggests that Banda was subject to large fine in gold, and that people fled to neighboring Bona, in present day Côte d'Ivoire. Quarrels and eventually conflict resulted, at which point the people of Banda sought refuge in Gyaman, and with their aid launched retaliation against Bona. Asante entreated the Banda peoples to return to their present day location once again, but Gyaman soon attacked, leading Banda peoples to flee the area, this time moving to Mo/Nkoranza territory north of the Black Volta River. Disagreements once again erupted with their hosts, and Banda peoples dispersed to various locations, including Bui (below), a town just south of the Black Volta. Banda again joined the Asante in an 1893 war against the Nkoranza, and the Nkoranza in turn terrorized Banda villages (Arhin 1974: 113; Stahl 2001: 190). Under the new chief Sie Yaw, Banda peoples eventually recongregated at Bui and near modern day Banda-Ahenkro, after re-gaining possession of their land which had fallen into the hands of Gyaman. Although Banda gained British protection in 1894, they faced a new threat as Imam Samori invaded from the west in the mid-1890s, causing further dislocation (Stahl 2001: 190). I pick up this story below, as British soldiers helped diffuse this danger, and people finally returned to their former villages in the mid to late 1890s.

Documentary sources hint at the devastation of the Banda area during this time frame. The British Captain R. Lonsdale visited the area in 1882, when Banda was involved in conflicts with Gyaman, and reported ruined villages all along the southern fringes of the area (Stahl 2001: 191). George Ekem Ferguson traveled through the area in 1892, and also referred to the 'ruined villages of Banda' (Arhin 1974: 101, 113). Several reports dating slightly later recount devastation and food shortages throughout the area (see below).

Oral historical sources characterize these times in tragic terms (though perhaps exaggerated; Ameyaw 1965 in Stahl 2001: 155). They suggest that food was in short supply, and people often too mobile to farm. Most individuals who remembered the stories passed down from their older relatives tell tales of starvation and people left behind. There is a sense of haste and motion in the stories, of running and quick decisions, of people and places abandoned in flight. While this highly mobile state surely did not characterize the entirety of the decades-long gap in settlement that we see archaeologically, the moments of flight were traumatic enough to become etched onto cultural memory.

On the move, people hunted wild animals and ate leaves from the bush, along with whatever they were able to grab as they fled their homes (see MK Mound 5 description, Ch. 6), or could take from farms encountered in their journeys. Interestingly, maize, millet, sorghum, or yams are not mentioned. This may not be accidental. All of these crops would have required a certain amount of seasonal maintenance, and probably would have withered quickly once their human caretakers departed. Plucking cassava tubers from abandoned farms is mentioned, however, which also makes sense as this is a low input, hardy crop that can be grown in almost any conditions and at any time of year (see below; cf. Cordell 2003; Ohadike 1981).

However, the major contribution to diet seems to have been wild leaves. Some individuals recall stories of experimentation, where one member of the group would try a new leaf, and if it did not kill them, others would also eat it. Wild leaves remain an important part of diets today, though the diversity of species used is declining in favor of leaves of crops like cassava and cowpeas, and herbs that are common weeds in crop fields. For example, two of the leaves reportedly used during the 19^{th}-century dislocation, *kalameshia* and *kemeshiama,*[2] which literally translate as "out of need," are no longer collected. This narrowing of exploited plants may be tied up in changing demands on women's labor.[3] The diversity of edible leaves recalled also differs between villages. In Banda-Ahenkro, the number of named leaves used was much higher than elsewhere (n=33, compared to 8-24 in others), even though the number of interviews I conducted was lower (n=11) than in other villages (n=15-34). Before my interviews, I had assumed that the higher availability of amenities and processed foods in Banda-Ahenkro would have eroded traditional knowledge about wild plant use. I was wrong: the density of old and original settler families or diversity of social groups seems to have been higher here, as was the knowledge of wild plant use.

This relation between family history and knowledge of wild plant use is especially evident in the case of Dorbour, a village on the west side of the hills (see Cruz 2003), where people do not recall more than one or two wild species of leaf used (a pattern that at first frustrated my research assistant!). Those few individuals who recalled a higher number were all from the east side of the hills. Curiously, from what I could tell, Dorbour oral traditions do not record the same movements in the 19^{th} century as those of people living east of the hills; no one recounted the stories of fleeing, starvation, and resorting to wild leaves. Oral histories of this area have not been systematically recorded (as those east of the hills have been), so I hesitate to draw any firm conclusions, but the little I did collect suggested that communities/individuals on the west side of the hills differentially participated in the wars of the 19^{th} century. In this context, their variable 'leaf memories' may speak to a divergent history.[4]

[2] I realize that these may be referring to the same plant, though I was not able to collect it to check, since it is no longer used and cannot be found.

[3] For example, in the last 30 or so years women are increasingly running their own farms separate from those of their husbands, changing gender dynamics and also leaving them less time for household chores.

[4] For the sake of brevity I will end my discussion of Dorbour here, but suffice it to say that foodways and food memories there were the most divergent of any of the villages I interviewed, despite a claim to Nafana culinary homogeneity. This was also the only village west of the hills in which I conducted interviews. But in addition to this geographic distance, I should also point out that the major difference is that most of the middle aged and elderly women are potters, placing further demands on their time than the individuals east of the hills. Fewer leaves used may simply speak to the long standing demands of potting on women's labor, where the collection of a more diverse array of leaves may have been too time consuming.

Soup made of leaves, usually from crop and weed plants, remains an important part of diet today, especially in the wet season. It also remains an important coping strategy in times of more common seasonal shortage as well as more prolonged ones. The most severe food shortage in recent memory was in 1982/3, when widespread drought and political instability severely curtailed the supply of food. At that time, people returned to the foods of their ancestors: wild leaves and cassava. Some people recounted stories of eating cassava before it was detoxified, or eating scraps of cassava skin left after others had finished their meals. The majority of people I interviewed simply said they only ate soup made of leaves and slept a lot. Such coping strategies have been recorded elsewhere (Dei 1988). My brief historical examination suggests that they are practices rooted in cultural memories of difficult times past.

Archaeological Perspectives on Life in Turmoil: Banda Cave (B-2) and Bui Kataa

While we can trace dislocation in the archaeological record, it is much harder to speak to the daily lives of people caught up in cycles of turbulence and loss, for they leave only ephemeral material traces. Places of refuge provide one of the few glimpses we have of life in these moments of disjuncture. In Banda, the best documented refuges are a large rock shelter high atop one of the Banda hills and facing towards the west (called Banda Cave or B-2; BRP 2002), and Bui Kataa, a village where people recongregated immediately after Samori's raids and as the British took control. I discuss archaeological and archaeobotanical evidence from each site here, and then resume the story of how colonial rule impacted daily life in the next section.

Banda Cave

According to oral histories, Banda peoples fled to Banda Cave during conflicts with Asante (Stahl 2001: 157-158), and at other times of conflict, such as with Gyaman after 1819.[5] Food shortage is explicitly referred to in both contexts. Famine reportedly

[5] It is difficult to date when the cave was actually used. The pottery is sufficiently generic to the Makala phase, and prevents defining any specific Early or Late associations (Stahl pers. comm. 2012). Stahl (2001: 157-158) reiterates the association in oral histories with the cave and hiding from the Asante, but we do not know if this refers to initial conflicts (1773/4) or later ones during the 19th century. We may also not be dealing with Banda people at all; Stahl (2001:150) cites Agbodeka 1971 who mentioned that Nkoranza people hid in the Banda hills during a dispute with Asante in 1893, though it is unclear if it was this

forced those hiding in the cave to surrender to Asante (Ameyaw 1965 in Stahl and Cruz 1998: 214), and oral histories stress a return to hunting and gathering during the 19th century wars. Though it is impossible to determine the specific conflict to which the material remains in the cave belong, they can speak to activities and strategies adopted during periods of distress. Two (1x2 m) units were excavated in this rock shelter by Leith Smith as part of a regional testing program (BRP 2002). Preliminary analysis of the ceramics suggests there is only one component (with maize cob and cord decorative treatments), which may date to before or after the abandonment of Makala Kataa as described in Chapter 6. The only other artifacts are a single ceramic bead and locally manufactured pipe and porcupine quills (BRP 2002).

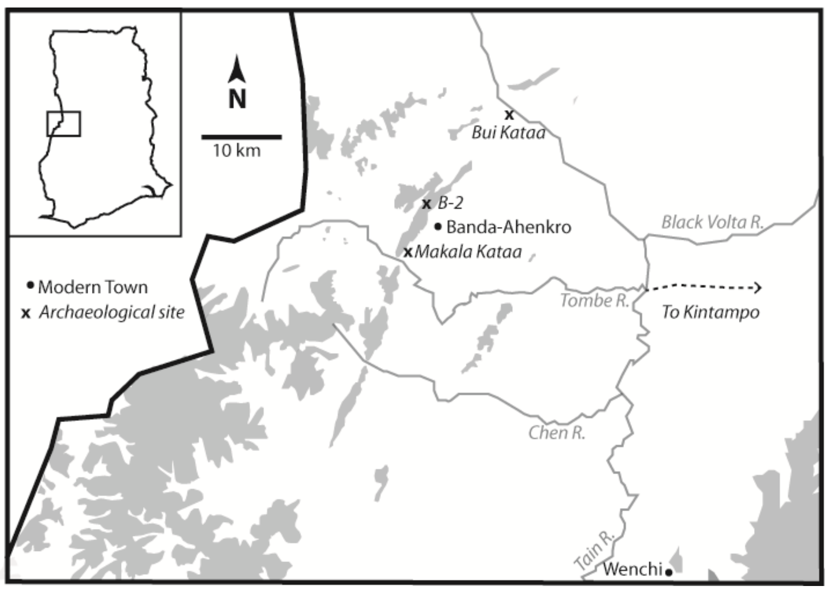

FIGURE 7.2: Late Makala Sites analyzed for plant remains in the Banda area

Botanical remains were likewise scarce, although I examined every available sample (n=9); even charcoal was present in only limited amounts. Two maize cupules are present, as is one cowpea and one possible grain of pearl millet (Table 7.2 below). Several different wild seed taxa were discovered, though most could not be identified due to their fragmentary and distorted nature (n=4 types). Two types were provisionally

specific cave. However the pottery is similar to that at Makala Kataa (Stahl 2001:157)—while we wouldn't want to assign a modern ethnic label to this it seems most parsimonious that it represents people who were associated with Makala Kataa.

identified as Apocynaceae and Malvaceae. None of the types represented were found from earlier phases.

Though these data are meager, they conjure an image of privation in a dark dank place where use of fire was probably minimal for fear of being discovered. The presence of maize, millet, and cowpea is consistent with diets in Early Makala times, but sorghum is notably absent, and the presence of maize, rare during Early Makala times, is surprising. Though impossible to trace, it seems plausible that cassava was also eaten at this time, especially given its prominence in oral historical accounts. Finally, although it is not possible to narrow down which wild foods were eaten, they clearly differ from foods consumed during the heyday of the Early Makala occupation of Makala Kataa. This blurry image comes into focus more in the next section, when I consider the long-term impacts of such a disjuncture on foodways.

Bui Kataa

In 2008, the Banda Research Project embarked on brief salvage[6] excavations of Bui Kataa (Figure 7.2), the site where Banda peoples congregated in the late 19th century and where the British based their operations. The site had been previously probed by York (1965) in preparation for the planned construction of Bui dam which was not realized until much later. Four of the mounds that York tested contained laterite floors with rectangular rooms, as well as imported pipes, glazed ceramics, bullets, and gunflints, and local materials including copper alloy objects, iron knives, beads, and pipes, suggesting a post-18th century date. Another five mounds contained similar materials in upper layers, while below there was evidence of ash, charcoal, and collapsed daub walls with local pipes, celts, and spindle whorls. A skeleton that showed signs of a violent death was interred in one of these mounds (York 1965: 18-19).

Though BRP excavations were not extensive, they too yielded evidence for imported goods (white ware ceramics, ball clay pipes, glass beads, and glass bottle fragments), cowrie shells, metal objects, and spindle whorls, consistent with a late 19th-century date. A metal shell casing, as well as the bullets and gunflints recovered by York,

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[6] The site was soon to be flooded by the reservoir of the Bui hydroelectric dam, as was the current village of Bui nearby; see Epilogue.

reveal the presence of guns, and intimate the upheaval that brought people—Banda and British—together at this site (BRP 2008).

Botanical remains can speak to the specific ways that people coped with food shortages in the late 19th century. Samples were analyzed from two of the three units excavated at Bui Kataa (Table 7.2, below). The most abrupt change, hinted at in the Banda Cave samples, is the complete absence of the indigenous grains pearl millet and sorghum. Only maize is present in some quantity, taking into account the low sample size. Given what we know of adaptations to dislocation in other areas (i.e., Cordell 2003 above), it seems likely that cassava was also present; oral historical accounts recounted to me in 2009 also suggest this.[7] The odd collection of wild plants that were present at Banda Cave seem to be absent at Bui Kataa, where they are replaced by familiar ones also recovered in the Early Makala kitchen described in Chapter 6. These include *Ficus, Sida*, and *Zaleya pentandra*, and cheno-ams, although these may represent weedy ruderals instead of food plants. Another familiar plant—tobacco—is also attested to as seeds and pipes. Three new taxa appear—*Capsicum* pepper, a Curcurbitaceae shell fragment, and *Celtis integrifolia*—a common wild fruit.

Two artifacts from upper and lower layers of Unit 3 at Bui Kataa were sampled and analyzed for phytoliths (Table 7.1). The first, a flat (top) hand grinder,[8] contained phytoliths that have only weak probability as representing any grains, though the score for maize is fairly high, and it is present in the form of charred macrobotanical remains. The second, a grindstone fragment, has slightly higher scores as to probability of the presence of any of the grains, but importantly, contained five ruffle top rondels which are thought to be diagnostic to maize (Pearsall et al. 2003; Ch. 3). Though meager, taken together, these data point to the likely processing of maize, with little evidence for pearl millet or sorghum, and support the macrobotanical record. They also suggest that maize is perhaps best tracked by the use of a diagnostic method (i.e., a phytolith form such as

[7] I think this is probably the case, but caution that people may simply be replacing their ideas of what foods they have fallen upon in recent times of shortage and then made the logical leap that of course their ancestors would have taken the same tack under similar circumstances.
[8] Analyze more of this type to see which grains were processed on it in pre-maize times. At least gives a hint at genealogies of plant processing practices…

the ruffle top rondel) that is unique to maize, rather than an assemblage method, given the overlap in cells produced in maize and other Andropogonae.

TABLE 7.1: Phytolith results from Bui Kataa

Bui Kataa	Level	Description	Sed.	% millet indicators	% sorghum indicators	% maize indicators
Artifact Residues						
Unit 3	4	Flat hand grinder	2	6.7	0	**0**
			3	2.5	7.5	**12.5**
	8	Grindstone fragment	2	18.3	1.2	5.33
			3	17.4	8.7	4.4

Little to no probability	Weak probability	Moderate probability	Strong probability

Bold shows samples with same taxa represented in same or immediately adjacent contexts

Life in the British Gold Coast, c. 1897-1930s

The British extended formal rule to the Gold Coast Colony beginning in 1897, just after soldiers had dispelled Samori's threat. They quickly set upon developing the economic resources of their new acquisition. One main thrust was in expanding trade in commodities already of interest, such as gold, and a second thrust was the production of profitable export crops to fuel the machines and tastes of Europe. The production of palm oil for export was one of the earliest and most profitable readjustments to legitimate trade, beginning in the early 19th century. However, by the 1860s, alternate sources of oil were found for European cosmetics and industrial applications and caused a depression in the price of palm oil. Rubber served as a substitute export crop in the 1880s and 1890s, followed briefly by coffee, but it was cocoa that became the dominant export crop in the early 20th century (Grier 1981: 32).

Cocoa exports grew very rapidly from their meager beginnings in 1891, when exports were worth just ₤4, to account for half of the colony's exports by 1911, with Ghana becoming the world's largest producer by 1919 (Gocking 2005: 47; Grier 1981: 32). The rapid expansion of cocoa production was to have dramatic implications for the nature of land tenure, labor migration, and geography of economic development in Ghana. The push for cocoa production was so great that many farmers reduced or abandoned the cultivation of food crops in southern Ghana, so that they came to rely on imported European foods in the early 20th century. This was to have major implications when cocoa prices declined, leaving smallholder farmers open to considerable risk (Grier 1981: 32-34).

By 1900, cocoa production had expanded to such a degree that acute labor shortages resulted. The colonial government found a solution by declaring the newly annexed Northern Territories—the land north of the Black Volta River—a labor reserve for both Ashanti and the Gold Coast Colony (Figure 7.1). The outmigration of able bodied men to work in cocoa farms and gold fields in the south diminished agricultural production in the north. The rise of this migrant labor force also helped facilitate another central goal of the British colonial administration: penetration of the Northern Territories with goods from the metropole. This had the dual effect of eroding self-sufficiency of subsistence farmers in this area and making it necessary to earn wages through migrant labor to support their families in the north. The import of British manufactured goods also led to the collapse of many native industries, such as iron, ceramic, and cloth production (Grier 1981: 24, 37-38).

As part of the development of markets for British goods, colonial officers sought to monetize their colony under a uniform currency. Adoption of a new British currency instead of local cowries would presumably pave the way for acquisition of British goods. One way in which this was accomplished was the requirement that taxes, fees, and fines be paid in British currency. While the adoption of such currencies, as well as their accumulations, was slow and uneven across the territory, it had major impacts on socioeconomic organization and agricultural production (Guyer 1995, 2004; Stahl 2001: 99-101). One of the simplest ways for rural people to gain access to cash was through the sale of local products: surplus agricultural products or cash crops, and craft goods like pottery (below; Stahl and Cruz 1998). Over the long-term, as imported goods transitioned from the realm of desired goods to necessities, this had major impacts on agriculture and food security. The selling off of agricultural surplus, instead of storing extra grain for use later in the year, probably played a major role in creating the ‘hungry season gap’ that is now so widespread throughout the continent. Again, to return to the themes of Chapters 5 and 6, we cannot assume that the ‘hungry season gap’ has infected African subsistence systems everywhere and for all of time; in some areas it may very well be a creation of modern monetized economies.

While the Gold Coast Colony and Ashanti were undergoing rapid development, particularly in transport networks (such as a railroad from the coast to Kumasi), little effort was expended on extension of transportation networks to the northern half of the country. Though colonial officers experimented with the production of cotton, shea butter, and other locally grown commodities in the north, most of these ventures failed because of the high transport costs to the coast. A visit by W. Tudhope, the Director of Agriculture, to the Northern Territories in 1912 recorded local production of cotton, and determined that the price growers obtained locally could not be matched if cotton was to be exported to London. Though improved varieties and methods could be utilized to improve yield, prohibitive transport costs prevented export of low value, high bulk commodities. For example, Tudhope recommended canoe transport as a cheaper means of transport to Kumasi (instead of head loading which was over twice the cost per ton). At a cost of ₤12.10 per ton, canoe transport from the north to the coast (Tamale to Ada) was still over five times that from Ada to Liverpool. Tudhope's assessment concluded that "[u]ntil a satisfactory system of transport is evolved the profitable development of almost every purely agricultural product is doomed to failure" (ADM 56/1/153).

The opposite was true of the forested southern half of the Gold Coast, where the natural distribution of valuable raw materials like gold and kola coincided with the humid conditions needed to produce the most valuable export crops (i.e., cocoa, oil palm, and rubber). The area also benefited from close proximity to the coast and more developed transport networks (Cardinall 1931: 82). Colonial agricultural policy was likewise directed at exportable commodities in the south. This resulted in the underdevelopment of the northern half of the country, which was effectively cut off from production of the most lucrative goods or too far distant to make a profit, given the high transport costs to the coast (Plange 1979; Sutton 1989).

Besides subsistence agriculture, the primary productive activities of people in the northern half of the country in pre-colonial times had been as trade intermediaries, particularly in livestock and kola nuts. Indeed, caravan tolls and market dues were the primary sources of income for the British in these areas in the beginning of their tenure there. However, the colonial administration soon sought to redirect trade through their own newly established administrative centers, such as Kintampo (below), in part by closing local markets. This, along with the coerced outmigration of men, had the effect of closing off market access to many who had formerly produced cash crops like peanuts, cotton, and rice for local sale (Plange 1979: 8-9). Though the British made some attempts to stimulate trade, such as abolition of the caravan toll in 1908, they showed little interest in the commodities actually being traded in the north after several failed experiments indicated that their international export would not be profitable. Thus, the cycle of non-development of the north was constructed, where transport networks were not developed because there were no low bulk/high value goods, effectively preventing export of high bulk goods since effective means of transport were lacking (Sutton 1989).

Foodways in the Gold Coast Interior

What impact did these changes brought on by the colonial government have on daily life and especially foodways? The colonial government seemed little concerned with the actual production of subsistence crops, so long as supply requirements to British soldiers and commissioners were met, and there were no obvious famines.[9] But these demands – for food and labor – were being made of districts that suffered from low population densities, which probably had a significant negative impact on agricultural production. At the same time, the British were actively pushing the consumption of goods from the metropole and tightening their control over trade networks—one of the few sources of income available to the residents of places like Banda. Records of foodways from two areas not so far removed from Banda—Kintampo and the homelands of the Tallensi people in northern Ghana—help paint the variegated local responses to these changes and fill in some of the blanks left by the vagaries of archaeological preservation. I review these in detail and then add Banda as a third case study, below.

[9] In the early 1930s vast swarms of locusts swept through northern Ghana and Banda, which was of great concern to colonial officers. They tried to stop the locusts to the degree possible—no easy task—but also imported quantities of food from Nigeria in order to stave off famine in the worst affected areas.

In 1902, Kintampo had just been established as the seat of the Kintampo District, and the District Commissioner and several other officers were stationed there. A Dr. W. Graham was among them, and wrote a detailed report on the foodstuffs in use at Kintampo and their preparation (Appendix E). Interestingly, he noted the diversity of food practices between different ethnic groups resident in the town, particularly between the Hausa,[10] who appear to have been soldiers for the British, and the Fantus (not to be mistaken with the coastal Fante)[11] who were the local inhabitants of Kintampo. The Hausa apparently relied mostly on grains grown above ground and made into 'kanki' (*kenkey*), while the Fantu relied on underground staples like yams made into *fufu*. In European terms, he says, "The Fantu eat potatoes & the Hausa eat bread." (ADM 56/1/458).

The staple grain of the Hausa was maize and was apparently grown all over town, producing two harvests per season. It was eaten raw, roasted, boiled, or as kenkey (described in detail in Appendix E). Prepared kenkey was sold at the market, and Graham notes that, as a rule, the Fantus disliked its sour (fermented) taste. Interestingly—he does not note the preparation of maize into porridge or *tuo zaafe*, a common food in the north today. The Hausa also commonly consumed sorghum, which was interplanted with maize and made into both gruel and beer. While grains were important to the Hausa, yams were important to Europeans, Fantus, and Hausa alike. They were grown locally and also supplied from nearby villages. The Fantu made yams into fufu, a dish which was also made with plantain, koko (cocoyam), or cassava. Cassava was eaten both dried and fresh. To be made into fufu, it was detoxified through grating and fermentation, after which it was pounded and boiled, demonstrating that knowledge of detoxification practices were

[10] Based on the way Graham writes his account, and also the fact that the Hausa were employed by the British, I suspect most of his information came from Hausa informants. For example, there is considerable effort expended to explain the differences in what the Hausas vs. the local Fantus ate, yet there was surely diversity amongst the many groups amalgamated under the term 'Fantu'. An 1892 map of Kintampo, for example, clearly delineates sections of town that housed Hausa, Asante, Dagomba and Mossi, Dendawa, Mande and Ligby peoples (Figure 25.2 in Arhin and KiZerbo 1989).

[11] Graham is using a name I am not familiar with here, but I do not think he is referring to the Fantes. First, he is clearly using the term Fantu, not Fante, a group from the coast of Ghana. The foodways he described for the Fantu are not Fante—Fantes, like the Hausa, rely primarily on maize kenkey at this time. It also makes no sense that the Fantes would be the dominant group in Kintampo.

widespread by this time. However, cassava was only used when yams, the preferred staple, ran out, and was considered "poor, coarse food at Kintampo" (ADM 56/1/458).

Several local tubers and fruits were also consumed, along with multiple varieties of beans which included cowpea and bambara bean. Groundnuts (peanuts), an American crop, had made inroads by 1902; they were roasted and prepared into soup and were apparently highly desired by all groups at Kintampo. Soups were also flavored with *gabu*, balls of pulverized local onions, *kuka* made from baobab pods, *dawadawa* balls, and *yakwah* and *yarangwoi*, both herbaceous leafy greens (the latter most likely a Brassicaceae). Okra was eaten as a vegetable or dried to thicken soups. Shea butter appears to have been the primary oil used, though palm oil was also available in the market. Spices included ginger, several varieties of chilies, black pepper, cloves, and melegueta pepper. Fruits were often brought for sale at market from surrounding villages, and included pineapples, limes, oranges, mangoes, bananas, and papaya (pawpaw). Eggplant and tomato were also available. Tobacco was commonly grown near natives' houses, and was braided into bands which were rolled up for sale or shaped into conical cylinders with cow dung (ADM 56/1/458).

Kintampo was not only a district seat but a market town, thus would have had a large variety of foods available as they came in from the surrounding villages. In north central Ghana, conditions were less kind. Meyer and Sonia Fortes conducted an early study of foodways among the Tallensi in the 1930s. The primary foods were pearl millet (early and late maturing varieties), sorghum, and sometimes rice. The emphasis was on crops that matured at different times of year so as to insure the food supply year round. Two types of land were available for cultivation: compound farms, located close to settlements and benefiting from frequent inputs of ash and garbage, and bush fields, which were farther away. Groundnuts were frequently cultivated and often sold. Other crops included bambara beans, cowpeas, Kersting's groundnut (*Kerstingiella geocarpa*), frafra potatoes (*Coleus dystenericus*) and sweet potatoes. Vegetables were the domain of women, and included *naŋgena* (*Gyandropsis pentaphylla*), okra, *bɛt* (*Hibiscus sabdariffa*), *bɛris* (*H. cannibus*), and *neri* seeds (*Cucumis melo*) (Fortes and Fortes 1936: 242-245).

Food shortage was not uncommon, especially if the rains were ill-timed or locusts decimated crops. When this happened, the most common responses were to sell or barter livestock for grain available at the market or to dispense rations frugally. Women often traveled some distance to barter for grain, which was then sold locally (raw and prepared). At other times, household fowls or vegetables were sold at market to eke out a supply of grain. Members of the same household or kin group (which were comprised differently) sometimes helped less fortunate members by sharing grain. Wild foods, like shea butter tree fruits, dawadawa, baobab, and *Celtis integrifolia,* were also important supplements (Fortes and Fortes 1936: 246-247).

Meat consumption was limited and unpredictable, even if almost all households possessed fowls, most had sheep and or goats, and a few of the more wealthy households kept a cow or two. The animals were slaughtered rarely, particularly in the case of cattle which served as bride wealth. Animals were thus viewed as mobile wealth rather than as providing a steady supply of meat, eggs, or milk.[12] Shea butter was the only oil. Flavorings included dawadawa balls, red pepper (often imported), rock salt from the south, as well as ashes prepared from grasses and used as a salt substitute (Fortes and Fortes 1936: 248-251).

Food preparation among the Tallensi was different than what Graham recorded at Kintampo. Maize was only used in times of shortage, and then only if it was the only grain available at neighboring markets. Hard porridge (i.e., *tuo zaafe*) was considered 'the food' of the Tallensi, and was usually made of pearl millet or sorghum, and on occasion maize, cowpeas, or rice.[13] A soup of fresh or dried vegetables always accompanied this

[12] Plange (1979: 7-8) suggests that this ritual or special view of cattle was a relatively recent development at the time; that northern cattle traders had been terminated by the colonial system, making cattle more of a special than everyday thing.

[13] The description of how this porridge is made is very similar to how *tuo zaafe* is made in Banda today, with the exception that flours of two different crops are usually mixed in the same porridge in Banda (e.g., cassava and maize): "Flour is not preserved from day to day, but is usually ground fresh whenever required. When her flour is ready, the woman puts some water on to boil in the porridge pot (sayarok). Sitting on the flat stone in front of the fire-place she then mixes some flour with cold water, stirring it to a thin paste with her hand, in an old calabash kept for this purpose. When the water boils she pours the paste in, stirring all the while with the stirring-stick. It is left to boil for a few minutes until it thickens and assumes a gluey appearance. With a ladle she pours off about a third of the contents into the old calabash, and puts it aside. She sprinkles a few handfuls of flour into the porridge in the pot, stirring it swiftly with her stick until it becomes quite thick. Every now and again she dips her hand into cold water and with a brisk movement

porridge. There were two types of soup—'slippery' and 'smooth'. The slippery kind had a viscous quality due to the mucilage present in the vegetables used, such as okra, but also several wild plants. The coarse variety required more swallowing—it didn't just slide right down—and was usually made of groundnuts and other leaves. Meat was used in soups in very sparing amounts to flavor it.

Fortes and Fortes provide great detail about the many foods prepared by the Tallensi; here I have highlighted the main ones, in part because they are very similar to the foods of the 'olden days' described by my elderly informants in Banda. *Tuo zaafe* (T.Z.) figures prominently as one of the primary foods in Banda today, and is always accompanied by a soup, made of a diverse set of wild plants and spices. Much of this variety is no longer used, as women's time has become more valuable for earning cash and new industrial substitutes such as Maggi cubes have been introduced. I save much of this story for a later work, as most food memories postdate 1930, the end date for the period that concerns this chapter. However, what I have tried to show is that there is great regional diversity in foodways—the Tallensi rely strongly on grains and porridge, while those living at Kintampo prefer fufu or, in the case of the Hausa, kenkey. Much of this dietary diversity persists in modern Ghana, though local foodways have also undergone considerable change as they have adapted to the incursion of processed foods and changing environmental and economic conditions. My point here is to emphasize the diversity of food traditions to which people living in Banda in the early 20th century would have had access; not only those of nearby groups at Kintampo or in the north, but wholly different food traditions from hundreds of kilometers away in Nigeria.[14] Though colonial policies did not have a direct impact on subsistence agriculture at this time, they did put groups in contact with each other on a regular basis who might not have been otherwise—facilitating greater interregional exchange of foods and ideas.

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sweeps the porridge adhering to the stick into the pot. The half-cooked contents of the calabash is then added to the porridge and stirred again. When it is thick enough for the stick to stand in it the porridge is ready" (Fortes and Fortes 1936: 266).

[14] I have omitted here discussion of what colonial officials ate because it seems to have had little to no impact on Banda foodways. Colonial officials do, however, write of their vegetable gardens in some detail wherever they are stationed.

Daily Life in Banda in the Early Colonial Period

Following the British-led expulsion of Samori, and after many years on the move, Banda peoples resettled their former villages, including that of Makala (Kataa), a period referred to archaeologically as the Late Makala phase from roughly 1897 to the 1920s (Stahl 2001: 189). British officials who visited the area in the early 1900s remarked on the low population density and generally inferior standard of living in the area. A 1907 tour of inspection by F. Fuller, the Chief Commissioner of Ashanti, to the Banda area describes the general conditions at the time:

> The country is generally open and undulating; population scarce and of a lower standard from the Ashantis (if judged by their material surroundings), but more genial and docile than the Ashantis proper…the tribe was unfortunately situated and suffered long from the slave raids of the Ashantis as well as from the more recent, and more thoroughly destructive expeditions of the Freebooter Samori—No wonder therefore that their numbers are comparatively few for the land they occupy and their villages small, ill-kept and generally inferior. The Pax Britannica has, however, already produced a universally beneficial effect and if the number and the condition of the children may be considered a criterion of the future condition of the race, it can be confidently asserted that the Bandas will rapidly attain prosperity. (ARG 1/20/7)[15]

Colonial sources suggest that even in 1926 population densities were still quite low in Banda and the wider region (Stahl 2001: 198); a 1931 census puts population density in the wider region at 0-10 persons per square kilometer, among the lowest in the country (Cardinall 1931: 157). In a culture where wealth was very likely in people and the diverse skill sets they possessed (Guyer and Belinga 1995), this must have had a major impact on social and political life.

Family histories suggest that one strategy Banda families adopted to ameliorate their low numbers was to incorporate refugees and captives. For example, four of the seven families that founded Banda-Ahenkro, now the seat of the paramount chief, originated in different ethnolinguistic groups (i.e., Gonja, Gyaman). Although the chieftaincy in Banda was Nafana, in practice it comprised individuals from several different groups who adopted Nafana customs (Stahl and Anane 1989; Stahl 1991; Stahl 2001: 198-199). The push towards homogeneity is evident in material culture, where ceramics show little variation in decorative treatment (Stahl 1991, 1999a: 64), even today

[15] Several archival sources mention low population density and social and economic 'backwardness' in Banda in the early 20th century; for the sake of brevity I do not include a discussion of this here.

(Cruz 2011). While difficult to evaluate for the past, the women I spoke to were adamant that there is no variation in foodways across the Banda area, signaling perhaps another way in which the diverse populations of the late 19th century formed a homogeneous identity (Ch. 8). As discussed in Chapter 6, the Nafana had established their chieftaincy in the frontier left in the wake of Begho's demise some 250 or more years earlier, but they had to reinvent it from the scattered groups left in the frontier after the wars of the 19th century.

Banda lay just inside the Ashanti portion of the British colony, right at the border with the Northern Territories (Figure 7.1). Since Banda was a bit too far north to engage in cocoa production, colonial policy and investment in the area was, like the Northern Territories, minimal. Banda was under British administration as part of the Kintampo District from 1902 onwards, under control of the headquarters at Kintampo. The Kintampo District was incorporated into Ashanti beginning in 1906. By 1932, Kintampo and Wenchi districts were amalgamated and Banda was administered by the much closer headquarters at Wenchi. There were few British officers in the Northern Territories—18 in 1905—and little was known of the Banda area. A complete village inventory, for example, was not accomplished until 1917 (Stahl 2001: 195).

The lack of officers on the ground as well as their focus on non-subsistence goods might be taken to mean that colonial impact on food and agriculture was minimal in areas like Banda. This is not necessarily the case. As Stahl (2001: 196) details, colonial officials placed demands for food as well as laborers to be sent to Kintampo (though Banda did not always fulfill them). For example, at the opening of the 20th century, Banda was required to supply the district with 42 to 80 carriers per month. In 1902, the Banda chief complained that such duty carried men away from their farms and returned them tired and haggard. Demands for food may have increased over time; for example, in 1926 Banda was expected to help provision a considerable number of soldiers at Bui (Stahl 2001: 196). Like areas farther north, British presence was also felt in trade. The Kintampo District itself produced little for export (shea butter, fish, a little cloth and ivory, and a bit of rubber; ADM 56/1/423), but important trade routes ran right through the Banda region. In the early 20th century, despite some effort to redirect trade through

Kintampo, a central north-south trade route ran through Bole-Banda-Wenchi, along an old Asante route (see Fig. 6.1). Such trade was apparently quite active in Banda in 1906, and some residents engaged in cattle and horse breeding as well (ADM 56/1/421).

By the end of the early colonial period, the British delved much more deeply into daily life, establishing Sanitary Committees in order to improve the sanitation and health of native villages. One of the more drastic measures was the replanning and relocation of entire villages. The new "improved" villages were laid out on a grid of streets at right angles.[16] By 1926, the Kintampo District Commissioner visited Banda to initiate the new village layouts, which were apparently complete by 1931. The British official(s) responsible for this move was known locally as the "breaker of walls." Few people born in the old villages are still alive, but the stories are still remembered by some (Stahl 2001: 196-197).

Archaeological Perspectives: Late Makala Occupation of Makala Kataa

Archaeological investigations at Makala Kataa (Figure 7.2) provide texture to our views of everyday life in this period of recovery. The Late Makala phase occupation was smaller than the previous one, at about 7.5 ha. Five mounds were sampled and contained evidence for domestic structures (Stahl 1999a: 58). Excavations uncovered several collapsed buildings, but these were "smaller, less durably constructed units" (Stahl 2001: 200) when compared to the previous Early Makala phase. Floors were made of packed gravel that was covered in thin white-grey slurry, but there was no evidence for reflooring, or reapplication of slurry, as was documented in Kuulo and Early Makala houses. Little overburden from collapsed walls plus the presence of numerous postholes suggest that a different construction technique—perhaps wattle-and-daub or pole-and-daga—was used.[17] Refuse deposition practices had also changed; trash deposits were now

[16] I'm also convinced that this affected the size of rooms and compounds, something I will explore more in a later paper.
[17] Stahl (2001: 200) gives three possible explanations for this shift: rapid raising of houses after leaving Bui, hesitancy to invest in house construction until a prolonged period of peace was observed, or perhaps that people did not occupy Late Makala MK long enough to go through the typical accretionary life cycle of a house compound.

present as thin sheet refuse across the site and as fill in pits—in contrast to midden mounds found at earlier sites (Stahl 1999a: 58-61, 2001: 200, 203).

Evidence for craft production shows important shifts from the Early Makala phase. Spindle whorls are present in small amounts, but oral and archival sources suggest textile production was ubiquitous, with women spinning thread and men weaving cloths (Stahl and Cruz 1998). There is no evidence of on-site iron manufacture, though iron scraps are present (Stahl 1999a: 64). Pottery is much more homogeneous and decorations more sparse than in previous phases. Sourcing studies indicate that it was also coming from a wider array of locations—while pottery production was still probably in the hands of specialists, pots from many sources both east and west of the hills were consumed. The most abrupt change is a shift away from acquiring vessels made on the west side of the hills and increasing consumption of vessels from the east side. This may be due to continued risks and uncertainty in travelling to and from the west, or to the influx of new refugee potters (Stahl 2001: 205-206). Pottery production may have also provided women east of the hills with a means to obtain other goods through barter or cash. Potting may have thus subsidized household reproduction as increasing numbers of men were drawn south as migrant laborers on cocoa farms (Stahl and Cruz 1998: 221; Stahl et al. 2008: 378). In addition, very small amounts of imported white ware and a metal enamel vessel hint that manufactured goods were beginning to make inroads (Stahl 1999a: 64).

One craft that suffered from European substitutes was local pipe manufacture. By the Late Makala phase, the pipe assemblage consists mostly of imported European made ball pipes (Stahl 1999a: 63). This is curious, as pipes are among the first imports to be used regularly (Stahl 2001: 206). One wonders if this is due to their low cost, or to a desire for novelty as was expressed with the rapid adoption of the practice of smoking itself centuries earlier. Pipes may have also been obtained through barter—perhaps of tobacco which we know Banda exchanged at the Kintampo market (below) (Stahl 1999a: 70). The ubiquitous presence of smoking in the archaeological record (surprisingly—or perhaps not!—in times of trouble, such as in B-2 and Bui Kataa)—and in oral accounts of the past, which emphasize how common smoking was among both men and women (Figure 7.3)—challenge us to consider what social role(s) it played. Was tobacco proffered as a gift, much like kola nut, or was it cultivated so commonly as to be readily available to anyone who wanted it (Ch. 8)? Today, the practice of smoking has been almost completely abandoned.

FIGURE 7.3: Afua Nimena, born just after 'the breaker of walls' came (~ 80 years old), insistent that most women used to smoke in the olden days, by way of illustration

In addition to pipes, other imports such as brass and iron objects, gunflints, and most numerous of all—glass bottles—were present (Stahl 1999a: 70). Green bottle glass was present in some quantity, and probably derives from vessels for bottled spirits. A smaller quantity of milky, clear, and blue glass likely came from the packaging of medicines and pomades, even including a Vaseline jar manufactured in New York. These objects stress the global connectedness of places like Banda, probably mediated through the market at Kintampo. These items further suggest that Banda villagers were able to obtain petty cash, probably through trade of local produce such as tobacco, groundnuts, or cotton. They also suggest elaboration on existing tastes—for body oils like Vaseline that may have been a stand in for local shea butter, for new medicines to cure constant ails of the elderly, and finally, for alcohol, a substance that was taken up with gusto for reifying chiefly authority (Akyeampong 1996; Stahl 2001: 209-211; Stahl 2002).

The profile of animal bones recovered loosely resembles those from Early Makala deposits: birds, turtle/tortoise, and domestic artiodactyls (cow and sheep/goat) occur in similar proportions. However, the habitats represented are more limited. One specimen of domestic pig was encountered. Lizard and large rodents increase as compared to earlier times, suggesting that garden hunting became more common. This makes sense in the context of labor shortages brought on as male labor was siphoned off to carry British goods or work in cocoa fields (Stahl 1999a: 66, 2001: 207).

Plant foods of the Banda area are mentioned in a handful of archival sources. By 1902, just a few years after resettling at Makala Kataa, Banda villagers occasionally brought foodstuffs to Kintampo market to trade (ADM 56/1/458). Many of the imports evidenced in the archaeological record may have been acquired at the Kintampo market; a 1901 report suggests that the following were available: cloths, basins, pans, knives, fezzes, wooden pipes, towels, pomade, snake beads, looking glasses, combs, matches, sugar, brass and copper rods, lead bars, and soap (ADM 56/1/415). A visit of the acting District Commissioner A.C. Russell to the Banda area in 1931 records the array of crops grown there at the time, including yams, grain(s), and cassava. In addition, tobacco was commonly grown and sold at Kintampo and groundnut cultivation was on the increase. Cash crops like tobacco may have provided one of the few local means by which Banda peoples could gain access to cash. Little trade passed directly through Banda, but young men could obtain cash through migrant work on cocoa fields around Kumasi (BRG 28/2/5; Stahl 2001: 208). Beer brewed of a (unspecified) grain was also made locally according to reports of the 1906 trial of Adjua of Banda, who was charged with poisoning her brew to murder another woman (ADM 56/1/421).[18]

Numerous sources attest to the growing of cotton in the Banda area beginning in 1904 (ADM 56/1/421), though the antiquity of its cultivation was probably much older. In 1928, colonial officials evaluated Banda and areas west for the production of cotton as a cash crop, but were sorely disappointed in yields since cotton was intercropped.

[18] *Pito* is today made out of sorghum, but sorghum disappears from the plant repertoire in Late Makala deposits. This may simply be a preservation issue, or beer may have instead been made from millet or maize, as is done elsewhere. Stahl (1999: 69) suggests that the intrusion of foreign beer and spirits may have eroded local beer production, though Adjua's story suggests that it was still common enough. One would expect that foreign alcohol was beyond the means of most farmers.

Farmers were resistant to growing monocrops of cotton, and the British soon abandoned the idea. Instead, they favored the production of groundnuts, which were produced in enough quantity to be sold at market (BRG 28/2/5). Other than encouragement of these two crops, as well as urging to supply the Kintampo market with foodstuffs, there seems to have been very little colonial intervention in agriculture in Banda before 1930.[19]

Late Makala deposits presented a particular challenge for archaeological plant remains, for there were no midden mounds and domestic structures were shallowly buried (Stahl 2001: 200). Excavations at Station 10 at the site of Makala Kataa uncovered the remains of one such household, but only one grain of pearl millet was recovered (Table 7.2). Tobacco, several wild leafy greens or weedy species, and one fruit species were also recovered. The recovery of non-grain species may hint that perhaps the lack of grain seeds is a real pattern, and that other staples like cassava and yams may have been the main staples.

A large pit at Makala Kataa Station 9 provides a better record of culinary and economic activities. This rectangular shaped bit was about a meter deep, suggesting it was excavated for building material (clay and sand mixture for house construction), and filled in with refuse (Stahl 2001: 203). While pearl millet counts remained low, there was more maize present and in more samples. Okra was also present, as were wild leafy greens/ruderals (Table 7.2). One seed that is likely indigo was also recovered, which, along with evidence for spindle whorls, suggests local spinning and dying of cloth was taking place despite the increasing availability of imported cloth.

In summary, the food evidence recovered from Late Makala contexts in concert with the documentary sources presented above suggest that culinary habits were quite similar to recent times. That is, people relied on maize and millet, and probably cassava and yams. Domestic stock was supplemented by wild animals encountered in the course of farm work. This dietary pattern—with its focus on high yielding and lower labor

[19] Around 1930 swarms of locusts decimated grains throughout Banda and the Northern Territories. I save the full recounting of this story for a later date, but suffice it to say that colonial officials viewed the natives as lazy, since they did little to stop the plague. But from oral renderings, people say that the tuber crops were little affected, and the impacts of locusts variable—one field might be completely eaten, while one next door might not be affected at all. Furthermore, almost every elderly person who remembered these plagues smiled and talked about how delicious locust meat was.

crops—departed from Early Makala times, when people relied on pearl millet, sorghum, and probably yams, and were not yet reliant on maize and probably not cassava either. Several decades of turmoil resulted in low populations and extractive colonial policies placed even greater demands on labor. It is not surprising then that many of the food habits developed during a time of great distress persisted for much of the 20th century.

TABLE 7.2: Late Makala Phase Macrobotanical Remains

LATE MAKALA PHASE	B-2 (EM/LM)	Bui Kataa	**MK Station 9**	**MK Station 10**	Phase Total (+B2)	Phase Total (-B2)
n	8	6	**8**	**8**	30	22
Grains						
Ubiquity Pearl Millet (%)	13	0	**13**	**13**	10	9
Count Pearl Millet	1	0	**1**	**1**	3	2
Ubiquity Maize (%)	25	33	**38**	**0**	23	27
Count Maize	2	11	**4**	**0**	17	17
Byproduct Ubiquity (%)	13	0	**13**	**0**	7	5
Byproduct Count	1	0	**4**	**0**	5	4
Poaceae Count	0	0	**3**	**1**	4	4
Useful/Weedy Seeds (count)						
cf. *Abelmoschus esculentus*			**2**		2	2
Cassia occidentalis				**1**	1	1
Cassia tora			**7**		7	7
Ficus sp.		5		**2**	7	7
cf. *Indigofera tinctoria*			**1**		1	1
cf. *Nicotiana rustica*				**1**	1	1
Portulaca foliosa				**5**	5	5
Portulaca sp.			**1**		1	1
Sida sp.		2			2	2
Zaleya pentandra			**1**		1	1
Other Seeds (count)						
Apocynaceae	3				3	0
Cucurbitaceae			**5**		5	5
Fabaceae	1		**1**		2	1
cf. Malvaceae	1				1	0
Polygonaceae				**1**	1	1
cf. Solanaceae				**2**	2	2
Cheno-Ams			**14**	**1**	15	15
Unknown Type 58	1				1	0

There are also some differences in wood procurement practices from earlier phases (Table 7.3). Four different levels were sampled from the Station 9 pit. At least 22 taxa were recovered; many of the same taxa were found in earlier phases, but 5 new taxa were identified as well. One of these (*Shirakopsis elliptica/Sapium ellipticum*), along with another species that occurred earlier in the sequence (*Canarium/Dacryodes*), are found in wetter rainforests, not the Sudanian woodland (White 1981: 74), and suggest more humid conditions in Late Makala times. Compared to the other phases, the Late Makala assemblage is the second most diverse and has the second highest diversity of forest species represented, after the Ngre Phase. This nicely matches the rainfall proxy records from Lake Bosumtwi, which record a return to wetter conditions beginning in 1700-1750, and continuing until recent times (Figure 4.5) (Shanahan et al. 2009). While the Early Makala record does not show a particularly wet or diverse assemblage, this may be related to the slow recovery time of the forest after a centuries long drought, or the arrival of the immigrant Nafana into a new landscape (Ch. 6). Overall, this phase was just as wet as the Ngre Phase, but people were not actively engaged in iron smelting, which requires large amounts of forest hardwoods, and this may account for the somewhat lower diversity of the Late Makala wood assemblage.

Given these wet conditions, one would expect higher percentages of sorghum, as the sequence overall shows an increase in moisture tolerant sorghum in the wetter Ngre and Early Makala phases. But by the Late Makala phase, people had mostly abandoned sorghum in favor of maize. This suggests that at least agronomically, maize replaced sorghum, not millet. This maize for sorghum substitution has been suggested elsewhere (McCann 2005), though there has been little direct evidence. We still do not know if maize also replaced sorghum in culinary niches (i.e., was it prepared into the same foods?); the phytolith evidence above suggests it was ground, perhaps for transformation into porridge/T.Z.

TABLE 7.3: Charcoal identified in Late Makala Phase contexts (n=4); Bold indicates taxa that are not used for firewood today; Shaded taxa are from wetter zones

Wood Taxa (order of prevalence)	**Total Count**	**Overall Ubiquity (%)**	**% of assemblage**	**Modern Uses***
Terminalia	34	100	22.7	F,C,M,O,T
Detarieae 2, cf. *Afzelia*	30	100	20	F,M,S,T
***Pterocarpus*-type**	**15**	**100**	**10**	**M,T**
Indeterminate	12	100	8	
Bridelia cf. *micrantha*	10	50	6.7	F,C,E,M,T
Detarieae 1, cf. *Berlinia/Isoberlinia*	7	75	4.7	C,M,T
Pericopsis-type	7	25	4.7	
Uapaca	5	50	3.3	F,C,E,M
Daniellia	4	50	2.7	F,E,M,T
Monotes, Dipterocarpaceae	4	50	2.7	
Lophira cf. *lanceolata*	4	25	2.7	F,C,E,M,O
Diospyros	3	50	2	F,C,E,M
Combretum molle/nigricans	3	25	2	F,M,T
Detarium	**2**	**50**	**1.3**	**E,C,M**
Detarieae 4*, cf. Didelotia, Gilbertiodendron, Guibourtia* type	2	25	1.3	
Anogeissus leiocarpa	1	25	0.7	F,M,T
Canarium/Dacryodes type	1	25	0.7	F,E,M,O
Detarieae 3, cf. *Parkia*	**1**	**25**	**0.7**	**E,C,M,T**
cf. *Lannea*	1	25	0.7	F,E,M,T
Monocot, probably palm	1	25	0.7	
Rubiaceae II, cf. Crossopetryx/Mitragyna	1	25	0.7	
Shirakiopsis elliptica (Sapium ellipticum)	**1**	**25**	**0.7**	**T,M**
cf. *Trichilia*, Meliaceae	1	25	0.7	F,C,T,M
TOTAL LATE MAKALA PHASE	150			

*From Irvine 1961. Abbreviations: F=firewood/charcoal; E=Edible fruits or leaves; M=Medicinal; O=Oil; C=Construction, T=Technical processes (i.e., dying, tanning, etc.); S=Sacred

Two of the new wood taxa hint at a shift in plant processing activities. *Diospyros*, one of the genera unique to this phase, is a very hard wood that is difficult to chop. It has many medicinal and construction uses, and is also used to make wooden mortars and pestles. Another species unique to this phase, *Sapium ellipticum*, is frequently used to make mortars. Neither are described as firewood species (Irvine 1961). Curiously, Late Makala contexts at Station 9 and 10 are virtually devoid of grinding stones; only handheld quartz spheroids, which probably were used to grind small quantities of spices and vegetables, are present (and then in small quantity, n=1) (BRP 1989, 1990). This is in sharp juxtaposition to household contexts in Kuulo and Early Makala phases, where several morphotypes of grindstones were recovered (quartz spheroids, angular and cylindrical top stones, and saddle querns).

It is possible that this simply reflects the nature of site abandonment; people left the site to move to their new village redesigned by the British that was located nearby at the modern town of Makala, and may have taken their grindstones with them, along with many other usable objects (Stahl 1999a: 62). The Late Makala component is also short in duration (30 or so years), which may have not been enough time to exhaust and discard grindstones. But it is also worth noting that today and in recent memory, wooden mortars and pestles are the dominant processing technology for maize, cassava, and yams; pearl millet and sorghum were usually ground on stones. Today wooden mortars are prevalent, while stones have been almost completely replaced by diesel powered grinding mills, or have fallen out of use since millet is no longer cultivated.[20] The stones that are still in use are used exclusively to grind spices or peanuts or sorghum for the production of beer. Though the evidence is scarce, the lack of grinding stones and the possible appearance of wooden mortars/pestles does agree with the macrobotanical record suggesting a focus on maize, and documentary evidence which suggests the prevalence of cassava.

One other genus—*Pterocarpus*—attests to non-fuel use of trees. As described in Chapter 6, the bark of this tree is used to make a red-purple dye for textiles. It also appears in other phases, but not in the quantity observed in the Station 9 pit, where 15 fragments were recovered (particularly in Level 5, where n=11). Recall that an indigo seed was also recovered in this pit. Both lines of evidence suggest that dying of thread or textiles was practiced on site.

Overall, the wood charcoal record is consistent with a relatively low population returning to carve new homes and fields for themselves into an environment that had

[20] I should mention that in my interviews about processing technologies, many women were insistent that it was not the grinding mill that caused grinding stones to no longer be used, but the fact that millet was no longer grown.

been left to rest for some time. Archival sources suggested that Samori's hordes denuded the landscape of animals through overhunting (Stahl 2001: 207), but the presence of a diverse set of wood taxa, a few of which are from wet forest, suggests that this impact was not so strong on the plant vegetation. In fact, the opposite may be the case. The cessation of farming for much of the mid to late 19th century allowed for what was an unintentionally long period of fallow.

Turbulence and the Loss of Food Security

In this chapter, I have described a cycle of turbulence and loss as Banda peoples first fled from their homes and fields and subsequently reinvented daily life and social boundaries as they resettled many years later. Many returned to the villages of their grandparents, bringing with them stories of loss—of young children and elderly people abandoned, of men lost in war, of family members captured as slaves or given in barter for food. In a society where wealth was likely defined in people and the composition of the varied skills and knowledges they possessed (Guyer and Belinga 1995), this loss of people had profound impacts on all aspects of life. In Banda, this loss was partially staunched by grafting exogenous groups into family lineages and village life (Stahl 1991). But some daily practices, including foodways, had to be renegotiated.

What oral histories are less skilled at recording are the diverse forms of knowledge that may also have been lost, as population numbers diminished and people adopted new ways of life. While we are hard pressed to trace intangible forms of knowledge, there are some indications of this in the material record. Pottery, for example, becomes much more homogeneous in the Late Makala Phase (Cruz 2003, 2011), and the diversity of crafts produced diminishes. Might the repertoire of agricultural and culinary skills also have contracted during this time? The archaeological record is silent on this, but does suggest considerable innovation in foodways.

One such innovation was a shift in staple crops. The archaeobotanical, oral, and documentary records suggest that the American crops maize and cassava became new staple foods, perhaps replacing sorghum. The timing and motivation behind this shift was associated with a period of violence and dislocation followed by what were likely severe labor shortages. Importantly, these conditions were not created until fairly late—in the late 19th and early 20th century—suggesting that the image of Africa as chronically food insecure since time immemorial is in error (see Chs. 5 & 6). Instead, archaeological and historical data grounded in a firm chronology allow for exploration of when and under what conditions people were forced to adopt crops like maize, that produced a harvest quickly, as well as crops like cassava, that produced under just about any conditions with minimal outlays of labor.

The oral historical and to a lesser degree the archaeobotanical data also hint that another truism about West African foodways may need to be revisited; namely, that wild foods have always formed an important supplement from the Late Stone Age to today (e.g., Neumann 2005). Oral histories associate the use of a wide diversity of wild leaves specifically with a time of dislocation that forced people to become hunters and gatherers; they stress the role of experimentation with many different species. In this case, this was not knowledge passed down from the dawn of agriculture many millennia before, but the discovery of edible plant foods in a relatively recent time of severe distress. Given how widespread these conditions of turbulence were in West Africa in the 19th century and before (Arhin and KiZerbo 1989), it begs the question—is the widespread use of wild plants today a function of this relatively recent shared history or a survival from millennia ago? As Stahl (1993) has warned, we must be cautious in interpreting similarity in modern practices as representing ancient adaptations; instead, and as my data suggest, they may represent similar responses to much more recent shared histories. Until archaeologists and archaeobotanists take seriously the challenge to reconstruct recent food histories, instead of relying on documentary evidence alone, the answer to this question, and to the more important one of when food insecurity emerged across the region, will remain unresolved.

At least in Banda, the use of wild leaves and adoption of maize and cassava were critical in meeting food security needs during the violent upheavals of the 19th century, and became encoded as a permanent shift in subsistence in the early colonial period. At this time, low populations in the Banda area combined with pressures for migrant labor to meet colonial requirements and access the cash economy acted to decrease the availability of able-bodied people for agricultural pursuits. Ohadike (1981) found that such low labor conditions due to war and disease in Nigeria in the early 20th century also coincided with the adoption of cassava. It is reasonable to suggest that the low population levels in Banda at the turn of the century, combined with economic pressures, led people there to adopt cassava (Stahl 1999: 68). Oral evidence suggests that cassava use returned to (or perhaps persisted at) low levels in the mid-20th century. Over the last several decades, its use and cultivation has expanded rapidly, so that it is now forms the major starch component of people's diets (to the chagrin of elderly women throughout the area, who dislike how it tastes). Based on what we now know of the past, it is now possible to explore precisely what conditions led to the increasing consumption of cassava—something to be addressed in a future work.

Finally, I return to maize, a crop that was adopted in Banda several centuries earlier, in c. 1600-1660, but did not automatically or even rapidly become a staple. The evidence from the three sites reviewed in this chapter suggests that it was only during this trying period that people switched to maize as a staple food. Though it is hard to evaluate the relative roles of maize versus other foods in diet, it is more ubiquitous than in previous phases. With its short growing season, maize probably played a key role in allowing people to produce food in as little time as possible—something the inhabitants of Bui Kataa and Makala Kataa, who had just settled down, would have needed. Low populations and high labor requirements in the early colonial period may have created just the right conditions for the permanent adoption of this crop, since it can produce much higher yields than the indigenous grains millet and sorghum. The unstable conditions that led to the adoption of maize and cassava thus occurred rather late in time, in the late 19th and early 20th centuries; they were not, as some scholars have portrayed, a permanent or fixed shortfall in African agricultural systems and village life.

Chapter Summary

In many ways, this chapter tells the story of how Banda became food insecure in the late 19th century and of the conditions which both created and prolonged economic insecurity throughout the region. Considerable turbulence was experienced as a power a world away—in Britain—redefined the terms of trade in the early 19th century, by abolishing the Atlantic slave trade. Internal slavery persisted, in part to supply the production of new commodities considered 'legitimate' trade items, and to expand the exploitation of old and long valued ones like gold. The resulting instability led to widespread turmoil as conflict arose in Asante and between polities formerly under its control. By the 1820s, Banda peoples had fled their homes as a result of conflict, ushering in a 70 year period of dislocation and migration. Oral traditions tell the story of how people hunted and gathered to survive. Archaeological remains confirm the use of wild plants and a switch away from sorghum to maize, millet, and probably cassava at both a cave used as a refuge and the first site people resettled when they returned to the Banda area. The incursion of the British meant peace was reestablished in Banda, and people once again returned to their former village of Makala. But the British redirected flows of trade and focused on cocoa and gold, found only in the south, cutting off the northern half of the country from development and access to cash. Areas like Banda, where population densities were low, had to supply migrant labor and produce surplus crops and crafts in order to access the world around them and meet British demands for taxes and fees. It was under these conditions of duress that people radically altered their foodways, and now relied on the American crops maize and cassava, which produced higher yields and required less labor.

In this chapter, I've tried to capture the contours of what is a sad ending to my telling of the history of food in Banda. Of course, it is not the end, but only the historical conditions that underlay foodways in Banda of today and of the future. In the Epilogue that follows, I look towards the future of food and agriculture in Banda and reflect on the lessons of this turbulent past.

Chapter 8

Food, History, and Practice in a Global Africa

In the last four chapters, I have explored the history of foodways in Banda over the last millennium. Banda is just one of many places that experienced immense changes in economic and social organization as well as cycles of drought and increased rainfall over recent centuries. In this chapter, I reflect on the main changes that resulted from these fluctuations, but also some of the continuities that have been vigilantly maintained in food and agricultural practices in Banda. This allows me to tease apart the diverse strands of Banda's food history that I suspect apply more widely to other regions of West Africa. In so doing, I return to the themes introduced in the first chapter of reconsidering Africa's culinary past in social and global terms.

A Millennium of Culinary History in Banda

In this section, I focus particularly on two aspects of food change that I touched on in my first chapter: the impact of environmental change on African foodways, and shifts in food preparation over time. This brief review serves as a first course of sorts to the more theoretical exploration that follows in the next two sections.

Over the last millennium, the crop that persisted in common use the longest was pearl millet. It occurred in every phase and, with the exception of the Late Makala phase, was the most ubiquitous and prevalent of any of the food crops. Pearl millet is a crop with great antiquity—the earliest domesticate in sub-Saharan Africa—and is remarkably adaptable to depauperate conditions. Millennia of selection have made pearl millet drought tolerant and hardy, ideal characteristics for many West African environments. However, pearl millet fares poorly in areas with too much moisture. Banda lies along the southern, wet edge of the productive pearl millet zone, and at many points in the past harvests were probably diminished by too much water. Pearl millet was desired by people in even more humid zones, for example the coast of southern Ghana where the crop was cultivated in the early 17th century (De Marees 1601 [1987]), and even in the middle of tropical rainforest in Cameroon millennia earlier (Kahlheber et al. 2009). The geographical reach of this crop is curious given that it is not adapted to cultivation in tropical forest; in these instances, cultural demand for pearl millet may have outweighed the risk factors inherent in its production in these less than optimal areas.

Enter sorghum, a crop capable of withstanding water logging and excessive moisture. In Banda, farmers appear to have adjusted sorghum cultivation to the prevailing environmental conditions suggested by the fact that more sorghum was recovered from sites occupied in wet periods (Ngre and Makala phases) and very little from those inhabited during dry periods (Volta and Kuulo phases) (Figure 8.1). Sorghum, like millet, is capable of withstanding drought, so it seems that the difficulty for Banda farmers was too much rain at the wrong time rather than drought. This is not to say that sorghum was used interchangeably with millet, a question I address below. For now, it seems that sorghum served an important role of producing yields under conditions too wet for millet. It is instructive that sorghum virtually disappeared during dry periods—when it would have also done well—suggesting that it was considered a second rate food compared to pearl millet.

The fluctuations in sorghum cultivation provide a supporting line of evidence for shifts in rainfall observed at both Lake Bosumtwi and consistent with the profile of identified Banda charcoal (Figure 8.1). These data indicate the fluctuation of wet and dry periods over the last millennium, with a severe drought observed between about 1400-1650, straddling the Kuulo Phase. The preceding Ngre phase is the most humid, which coincides with the earliest evidence for intensive iron smelting and smithing as well as copper alloy working. In Chapter 4, I suggested that these wet conditions in central Ghana between c. 1200-1450 put Banda and surrounds in a very favorable location for smelting, which consumes large amounts of hardwood fuel. Areas further north appear to have been experiencing an opposite trend towards drying at the same time, perhaps giving Banda an additional edge. The production of iron, then, may have provided capital necessary for acquiring goods from farther afield, like copper and beads.

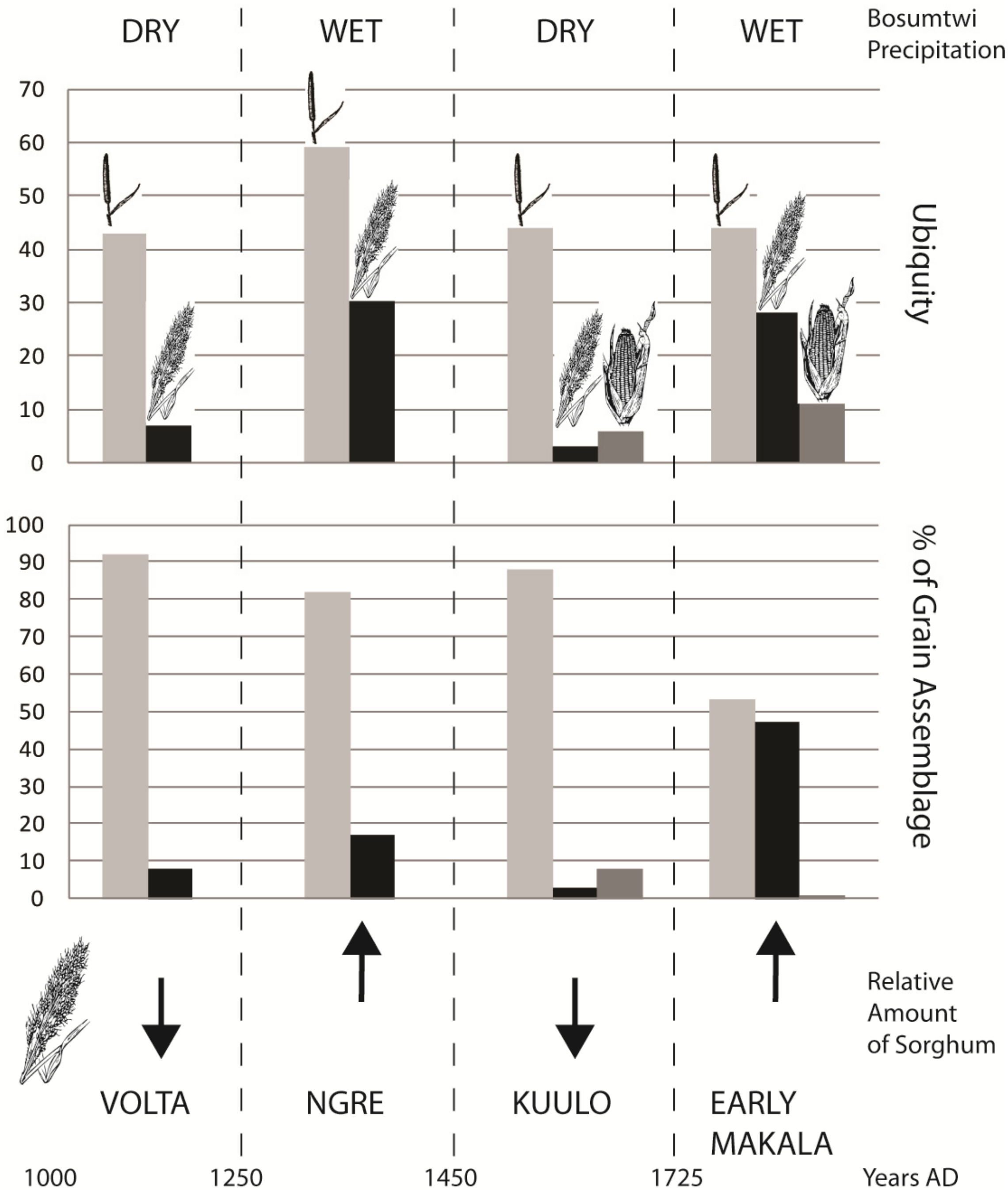

FIGURE 8.1: Climatic conditions and grain ubiquity and frequency by phase, with special attention to sorghum

However, some of the most surprising developments occurred during the severe, centuries-long drought that characterized the Kuulo phase—surprising because they are unexpected given the constraints of Africa at present. At this time, Banda continued to produce metal crafts, but added ivory working to the repertoire. People may have been organized into specialist craft-producing groups. The evidence hints at the possibility that each of these groups participated differentially in agricultural production and the exchange of foodstuffs. Banda's access to foreign markets and goods was probably mediated through nearby entrepôts (e.g., Begho and Bima). Eventually two new American crops from a world away trickled in as part of these networks (see below). But there were no signs that people were experiencing hardship due to deteriorating environmental conditions *during* this phase. The archaeological record does not attest an increase in wild plant use, nor was maize adopted as a means to quell food shortage. Engagement in economic activities above the level of subsistence appears to be the norm, and people were engaging in a more diverse array of crafting practices than in any other phase. By c. 1650, however, the material record drops off, suggesting that people disaggregated and perhaps left the area. Whether or not this was due to unsustainable production levels during drought remains to be determined.

The area was resettled by the 1720s Makala phase, when wet conditions had also returned. Charcoal records suggest that it took the landscape some time to recover. Human use of the landscape also appears to have changed, as Nafanas filtered in from the northwest and negotiated new livelihoods on the Banda frontier. This is also evident in foodways. There is a sharp increase in sorghum, for example, which for the first time was present in almost equal amounts to pearl millet. The production of metals and ivory goods seems to have disappeared. At this time, the Asante conquered the area, and Banda became an inner province of their state. As such, Banda provided soldiers in times of war, and had to adjust to Asante state control over trade networks. It is not clear what effect (if any) this had on agricultural production, but available evidence suggests that it did not lead to an increase in maize production as so many authors have claimed for Asante.

Turmoil associated with the internal slave trade led to violent conflicts and dislocation in the broader region between the 1820s and 1890s. Oral histories recount food shortage as people were forced to flee their farms, and instead had to make do to with wild leaves, fruits, and animals from the bush. Archaeobotanical remains document the appearance of new wild taxa, along with maize and pearl millet. By the time people resettled their former villages—coincident with the the British moving into the area in the 1890s—foodways had changed considerably. Maize may have become a staple crop, alongside millet and probably cassava and yams. Maize provided higher and quicker yields in times of need, and cassava demanded very little labor. Both would have been important in the early colonial period, when the British made demands for both labor and taxes in an already impoverished area. These shifts, the most significant in the sequence, had little to nothing to do with environmental change. Instead, political unrest played more of a direct role in what farmers and cooks decided to grow and eat.

How were these staple foods prepared and used to mark distinctions between people? Food preparation techniques are harder to trace than the actual crops present, particularly since phytolith and starch grain analysis are not yet up to the challenge. Documentary records provide some hints as to the food communities surrounding Banda. Before about 1650, documentary evidence suggests that the preparation of flatbreads and steaming were common in the wider sub region. Arab documents suggest that flatbreads were made in the Niger bend (Lewicki 1974), and De Marees (1987 [1602]) mentions this as a preparation method found on the Ghanaian coast in the early 17th century. McIntosh (1995c: 160) suggests that the presence of grinding stones and small burnt patches may indicate this preparation method at Jenne-jeno. The preparation of flatbreads may have been practiced in Banda, based on the prevalence of similar burnt patches of about the right size in domestic contexts (particularly NK M7). Steaming, possibly a technique developed in areas of the Niger bend where rice was predominant, was also prevalent at sites like Gao and Jenne-jeno. Pearl millet seems to have been steamed into couscous by the time of the Asante, based on documentary evidence (Bowdich 1873 [1819]). The presence of perforated pots in the Banda sequence also suggests the method was used locally, though the small number of such pots may indicate that it was not a common preparation method (Stahl pers. comm. 2012).

The arrival of the Nafana from northeastern Côte d'Ivoire after 1700 may have introduced a new food preparation—*tuo zaafe* (T.Z.), a hard porridge made of grains, cassava, or both. I suggest that this is the case because the Nafana strongly identify with T.Z., and because the word for T.Z. in Dumpo/Kuulo (*kakɔɔ*) closely resembles that in Nafana (*kambɔ*), suggesting a common origin—or perhaps codification of an old one—that postdates the arrival of the Nafana in the early 18th century. Just as the *chaîne opératoire* of T.Z. preparation homogenizes a diverse set of staple ingredients (see below) into a common cuisine, the making and consumption of this dish also unites diverse populations in the Banda area. For example, an overwhelming majority of women from six different villages on both the east and west side of the Banda hills[1] insisted that there were no distinctions in food preparation between them. It is not hard to see how foodways could have served as a bridge between different ethnolinguistic groups in the frontier zone that Banda came to occupy in the 18th century. I suspect that constructing a common identity through mundane acts of eating and preparing similar foods and making similar pots (Cruz 2011) became even more important in the late 19th century, as remnant populations united in the Banda area after decades of turmoil. Food—or the lack thereof—was a central part of this experience. The emphasis on T.Z. as the staple of the area allowed consumption of any number of different staple crops, including two new ones, in a culturally acceptable way. The preparation and consumption of this common food were bodily practices that may have helped glue different ethnic and social groups together by minimizing social difference (see Logan in prep.b).[2]

One place where diverse staple foods become homogenized into something culturally recognizeable is in the mortar. Through pounding any number of starchy staples—from millet or maize to cassava and yams—into flour, these ingredients are transformed into a similar substance. The mortar's use goes beyond pounding starches into flour, and is used in a wide array of tasks, from dehusking grains, pulverizing leafy

[1] The main differences are in the quality of ingredients available or whether or not people can afford convenience foods like rice. There are greater differences between the east and west side of the hills, particularly in practices of grinding and food preparation.
[2] This is an argument I will develop more in a forthcoming paper. I interviewed women who self-identified as Nafana, Kuulo/Dumpo, Mo, and Dagaarti, and found the subject of differences between groups (ethnic or otherwise) to be a most unpopular subject. Nearly every woman issued a quick reply, "there is no difference, we eat the same thing."

greens, deshelling shea nuts, to non-food applications such as the preparation of clay for the production of pottery. It is intriguing that our first archaeological indication of this kind of technology is in the form of two wood charcoal taxa (*Diospyros* and *Sapium ellipticum*), found in Late Makala phase contexts, that are commonly used today for mortars instead of for fuel. Linguistic data may point at a much earlier introduction, for the Kuulo words for mortar and pestle (*pne* and *pnepoo*) are quite different from their equivalent in Nafaanra (*shua* and *sukaan*), suggesting that knowledge of this technology may predate the 17th/18th-century arrival of the Nafana.

FIGURE 8.2: Pounding in tall (left) and short (right) mortars in Banda, 2009
(photos by author)

Not all mortars and pestles are the same. Today, large, tall sided forms predominate in Banda and the north, and squat, very short varieties are more common in the south, especially in the Kumasi area. These forms entail different bodily logics for pounding; one or often several people pound vigorously and rhythmically in the tall forms, while usually one person pounds while another turns the fufu in the short forms (Fig. 8.2). Clearly the short formed mortars would be of little use for the variety of tasks that the tall ones are used for, particularly pounding or dehusking of grains. But there may also be a social difference expressed in these alternate forms; all individuals contribute equally to pounding in tall forms, each taking their turn as notes in the thudding melody of this daily chore. In the short forms, one individual pounds, while the other accepts the somewhat diminuitive (and dangerous, depending on skill level!) task of turning the fufu in between each thumping stroke of the pestle. Many women in Banda commented on the monotony of this style of pounding when they went to Kumasi to seek wage labor in 'chop bars' or food stands. It is temping to read this practice as one embedded with concepts of hierarchy, a social and culinary order that I suggest below may have emerged with Asante.

The brewing of *pito* or beer from grains seems to have been common throughout much of the sequence. The vessel forms that beer may have been brewed and stored in may have changed considerably over time. Recall that Leith Smith, based on ethnographic examples in central Africa, noticed heavy pitting in the interior of vessels that had been used for beer brewing/storage or as chamber pots (Smith in Stahl 2001: 125). In the Kuulo phase such pitting is found in globular jars,[3] but this form drops out in the Makala phase (Stahl 2007a: 60), so it is unclear what kind of vessels were used to brew beer later. However, we do know from archival evidence that beer was definitely brewed in Banda in the early 20th century.

Food traditions in Banda may also have differed in important ways from those in areas that are better documented like the Sahel and the coast. One very important difference was probably yams (*Dioscorea* spp.), which today are the most valued of all crops. Unfortunately, we cannot recover them archaeologically at this point in time. The earliest evidence for yams in Ghana is thus late, on the coast in the early 17th century (De Marees 1602 (1987]), and in association with 19th-century Asante (Bowdich 1819: 267; McCaskie 1995: 34). Documentary sources suggest yams were highly regarded, along with plantains and meat, as the food of the *Asantehene*. Meat from domestic livestock was expensive in Kumasi, restricting its consumption to those able to afford it. Imported European foods along with more rare wild game were also valued and restricted in use. Grains, on the other hand, seem to be absent from the meals of the *Asantehene*, and relegated to the end of massive trains of food gifts offered to visitors. The inferior or low

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[3] I speculate in Chapter 4 that globular jars may have been functionally similar to recurved rim jars found in the Ngre Phase, though it is hard to evaluate this as few whole examples of the recurved forms have been uncovered, making it difficult to determine whether or not there is interior pitting. However, there does seem to be a more rapid rate of change in the vessel forms used for beer.

class status of grains is also suggested by their use as fare for common soldiers (see Ch. 5).

It is difficult to evaluate *when* these wealth and class based distinctions in foodstuffs developed. Goody (1982) links the emergence of a *haute cuisine* with a strongly hierarchical society. Using this reasoning, it may be that the development of stratified society of the Asante state may have led to increasing differentiation in foodways. The question is to what degree this affected provinces like Banda. The Early Makala record is full of pearl millet and sorghum, though we are hard pressed to trace yams in the archaeological record. Today yams are king among crops in Banda, fetching a high value at market and also preferred locally in terms of taste. Might this high value have developed under Asante rule, along with the adoption of other Asante elite and chiefly paraphernalia and practices?

It seems likely that taste-making practices underwent significant revision in Early Makala times, as Banda was drawn into the Asante state and the immigrant Nafana carved out a chieftaincy. Like the adoption of Asante chiefly regalia, the adoption or creation of elite foods may have helped legitimize the fledgling Nafana chieftaincy. It may be that the Yam Festival was adopted at this time. We do know that other ritual practices associated with exogenous shrines were adopted in Banda. For example, *Yualie* celebrates the harvest of sorghum and millet. *Pito* made of each grain was offered by a specific family or *katoo* to the Jafun shrine.[4] This shrine and festival have their origins in the north, and are the only ones to incorporate sorghum into ritual performance (Stahl 2001: 68).

However, for most rituals, it is pearl millet that is the offering of choice. Millet and especially 'all-millet T.Z.' is a critical part of coming of age and marriage ceremonies, and is offered to Wurache, the baobab that grows on the site where the Kuulo ancestress sank into the ground. The ritual importance of millet may extend into the deeper past. Pearl millet was found in two of the pots in Ngre Kataa Mound 6, a workshop area characterized with both ritual and metalworking activity. Millet was also

[4] I use past tense here since as of 2011 some people claim that they had let the Jafun shrine 'die' since it was no longer fed, i.e., the associated rituals were no longer being performed.

found inside two carefully covered pots placed beneath the wall foundations in Mound 7 at the same site, as well as a similarly placed pot in Kuulo Kataa Mound 101.

Millet is the only crop with specific taboos today. Many people cited these taboos as reasons why millet is no longer cultivated in the Banda region. For example, if two people argue while they are planting millet, they will die. Also, pearl millet processing (removing the grain from the husk), is considered a difficult (and itchy) job; all of those who help were thus entitled to a share. Many people complained that this extended even to the unborn fetuses of pregnant women. Consequently, the cessation of millet cultivation was explained in social terms: people today had simply gotten too selfish and argumentative, so of course millet farming stopped. Despite the fact that it is no longer grown, millet is still acquired from the market at Techiman specifically for ritual performances.

There are also some important differences in agricultural and pastoral strategies in Banda as compared to areas farther north. Wild grasses and sedges are important components of archaeobotanical assemblages in the Sahara and Sahel (e.g., Bigga and Kahlheber 2011; Kahlheber 1999; McIntosh 1995a; Murray 2005), but are virtually absent in Banda. These taxa become incorporated into charred assemblages as weeds in agricultural fields, as collected foods, as weeds on habitation sites, and as components of animal dung. Their absence in Banda samples may be explained by the very different agricultural strategies practiced today that revolve around mound-based cultivation of tuber crops. Individual grains are planted in the mounds after tubers are planted, and plants harvested individually, reducing the likelihood that agricultural weeds or mimetic grasses will be accidentally incorporated, as is the case with grain mono- or multi-cropping (cf. D’Andrea and Casey 2002). The other possibility relates to Banda’s proximity to the tsetse fly belt, which minimizes the year round availability of livestock and their dung. Wild grasses and sedges consumed by livestock may become incorporated into archaeological deposits through the burning of dung, and this rather than human consumption may in part account for their high representation in archaeological sites in the drier reaches of West Africa.

In summary, comparison of remains from more humid areas like Banda to sites in drier northern locales reveals important differences in agricultural production, fuel use, and culinary practices. But the many similarities observed between these broad regions, particularly in staple crops and possibly in food preparation techniques, speak to wider food traditions throughout the area. Shared food practices may relate to shared identities, but they also operate at a level much larger in scale. Below I consider the role of history and memory in food conservatism, but first I consider the ways in which incorporation into global systems shaped food habits.

Globalizing African Foodways

I now turn to how increasingly global spheres of interaction brought novel foods and new pressures to bear on everyday food production, preparation, and consumption. In this section I consider the ways in which specific foods were incorporated into daily practice, particularly at the moment of their introduction. Were they slotted into existing practices and value systems, as Thomas (1991) documents for black bottles in the Pacific? Or were new foods part of heterodoxic moments, used to create novel practices and distinctions (cf. Thomas 1999)? Are questions of new and old, global and local, continuity and change one in the same (Silliman 2009)?

We can hypothesize some of these trajectories based on ethnographic studies that document mechanisms of incorporation in modern times, as well as the end points of the adoption of some foods like maize, and try and anchor these processes in time with the historical data that is available. Wilk (2006b) provides the terminology for this type of study. Namely, he sees new foods as being incorporated through blending, submersion (or hiding), substitution, and alternation/promotion, among others (Wilk 2006b: 114-125). To these I would add two mechanisms that emphasize the temporal dimension of crop adoption: habituation (building off Appadurai 1996) and experimentation.

Many of these processes are actively underway in Banda now, as new foods trickle in from far away factories and fields. Blending is observed in the use of cassava flour along with maize flour in the making of T.Z., which is now the most common form of a food that reportedly was composed of all pearl millet in the past. We might hypothesize that there were many transitional forms, such as pearl millet blended with maize flour. Indeed, this particular blend of maize and millet seems to have been occurring on the Ghanaian coast around 1600, very soon after the introduction of maize (De Marees 1602 [1987]). The submersion or hiding of certain ingredients is evident with the use of boullion Maggi cubes today—also a common practice in many other parts of the world (Wilk 2006b: 115). Maggi cubes provide the flavor of meat without requiring that actual meat be used in the soup. They are ubiquitous in rural West Africa today. In Banda, they are a way of making soups quickly, but also substitute for meat. Meat is highly prized and considered to be healthful, but it is expensive. Maggi cubes are an invisible ingredient, one that is submerged in the character of the soup, but gives the impression and taste of more desired ingredients.

Substitution—replacing like with like—is a very common mechanism of incorporation. McCann (2005) suggested that maize supplanted and replaced sorghum in much of Africa. However, there seems to have been considerable local variation in this process. For example, maize often replaced pearl millet, and agronomically speaking, would have occupied a niche much more similar to early-maturing pearl millet rather than late forms of the same grain or sorghum, which take twice as long to mature. In Banda today, leaves of domesticated crops, particularly cassava, are substitutes for the diversity of wild leaves formerly used in soups. In the past, we might imagine that American chili peppers replaced local peppers or spices like melegueta pepper. For example, though melegueta pepper seeds are found in Kuulo phase deposits, they disappear thereafter, coinciding with the introduction of American chili peppers.

Alternation plays on the rhythms and ordering of food preparation and consumption. New foods are often first incorporated by their introduction into less formal meals. In Banda, new foods are almost always vetted first in the midday 'lunch' slot particularly for feeding children. Children may be given money to buy street food from vendors at 'lunch' time, and their guardians at home often end up cooking some of the very same foods. There is substantial experimentation in this more informal food slot, whereas the end of the day meal is invariably fufu or T.Z. One food that is gaining popularity now is *acheke*, a fermented cassava dish from Côte d'Ivoire that is nearly black in color[5] and has a coarse crumb texture. It is more common on the west side of the hills and is rapidly diffusing to the east side. *Acheke* started off as a food made by street vendors, but eventually women started making it at home for lunch. *Acheke* is particularly interesting because it requires a different pot form for cooking—one with perforations or a large opening in the very bottom, and with otherwise solid sides (Fig. 8.3). Many women buy these pots when they can find them, but otherwise create their own improvised versions at home. It is tempting to imagine that maize, prepared in whatever form, was experimented with in this way by one household (M118) at Kuulo Kataa at its first introduction.

FIGURE 8.3: Unfired *acheke* pot in Dorbour, 2009 (opening in base is 10-12 cm in diameter; photo by author)

All of these mechanisms of food adoption are integral to understanding food globalization. They point to the many possible pathways by which global foods become localized or habituated. If a focus on globalization has been rejected by some prominent Africanists like Fred Cooper (2001), it is because of its perceived homogeneity. Cooper wants us instead to tease apart the many different processes that contribute to increased connectivity and homogeneity on a global scale. As I've just shown, processes of food globalization are anything but homogeneous, and are instead a complex interplay of bodily practice, local norms, and any number of external economic and trade relations.

[5] The dark color comes from using cassava that is dried at a certain time of year; when dried under optimal conditions it is light in color, but most poor people harvest and dry it throughout the year, creating a class distinction in food color.

The only thing ‘homogeneous’ about food globalization are the actual foods involved. The challenge that remains is to fold in temporality to this complexity, and trace the multiple pathways by which new foods became incorporated over time.

Ann Stahl’s (2002) “turn to taste” provides one way of dealing with this complex issue. Building on Bourdieu’s (1984) concept of taste as embodied preference, she suggests we track the adoption of new objects through 1) tracing divergences from preexisting customary paths (in other words, what came before: Appadurai 1986) and 2) considering what advantages were gained by adoption of new objects (Stahl 2002: 834). Explanations of the adoptions of American crops in Africa (i.e., McCann 2005, 2009) and elsewhere (e.g., Crosby 2003) have focused almost exclusively on advantages. What existed before the moment of contact is inexorably drawn from what came after, in other words, the ethnographic present (cf. Stahl 1993; 2002: 834). Where my work diverges is in providing an explicit temporal grounding to what came before.

One important ‘customary path’ in Banda was the desire for and use of objects and substances that marked distinction, broadly conceived.[6] Beads from great distances as well as copper to be made into ornaments were among the first exotic objects adopted and eventually demanded by the inhabitants of Banda, beginning in the Ngre phase (Ch. 4; Stahl 2007a). This customary path may have shaped the reception of cotton cloth slightly later in time, as attested to by the large numbers of spindle whorls at Begho and demand for cloth on the coast in the 17th century. Spindle whorls are rare at Kuulo Kataa, suggesting that cotton cloth was probably an object of distinction as well as connection to Niger value worlds (Stahl 2002: 836-837). In other words, by the time maize and tobacco were adopted, c. 1600-1660, many objects of distinction with exotic origins were already in use and circulation.

Two pieces of evidence suggest that tobacco was more closely bound up in distinction-making practices than maize. The first is that tobacco likely arrived in Banda via the Niger bend and ultimately Senegambia (Ch. 5). This provenance alone would have given the crop a more ‘distinctive weight’ through association with the Niger bend,

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[6] We must not automatically assume that practices of distinction marks class, rather as Stahl (2002: 833) points out, this should be a matter of empirical investigation. Many of the objects mentioned here may have been more salient markers of ritual power than any ‘class’ divisions.

much like the other objects just discussed. Second, stimulant use was a customary path already established through the kola nut. Kola nut was much less accessible than tobacco, which could be grown locally, and this may account for its extremely rapid spread. Much like cotton cloth (Stahl 2002: 837-838), tobacco seems to have lost its role as a marker of distinction at least by Early Makala times, as production of both probably occurred at the household level. Holtzman (2009:184-188) noted a similar form of substitution and then extensification in the case of tea among the Samburu of Kenya. At its introduction, tea was perceived as similar to tobacco, both visually and socially, and limited to certain segments of the population. In time, the use of tea was expanded as milk availability declined. The adoption of sugar among all social classes in Britain shows a similar phenomena, where the increased availability of sugar allowed for rapid spread among all social classes (Mintz 1985).

In contrast, there appear to have been few customary paths for maize to follow. There is almost no evidence for new food adoptions in Banda prior to maize—with the exception of melegueta pepper. Maize also arrived through a different trade network, to the Ghanaian coast and ultimately the Atlantic Ocean. It is curious that the only household with evidence for maize during the Kuulo phase was also the one with firm evidence for production of ivory objects. Ivory may have acted as a key link to the Atlantic trade networks, as I suggested in Chapter 5. Maize appears in such small quantity and restricted distribution that it seems likely that people were experimenting with a new curiosity. Maize too may have been bound up in practices of distinction, if perhaps the consumption of novel foods were valued. But this use was not sustained. By the Early Makala phase, maize appears to have been present in more contexts but still used at a very low level. None of the Asante records suggest that maize had any special status. This is particularly the case when we consider the high status afforded to yams and the focus on root crops in central and southern Ghana, compared to that of grains, which seem to have been less valued in 19th-century Asante. In both Banda and Asante, there was no preexisting customary path by which new grains became valued. In Banda it was the food of the ancestors—pearl millet—that retained a prominent role in both ritual and cuisine.

In the case of maize, it was the advantages that the crop conferred that led to its acceptance—just not immediately. Even though many of these advantages, such as quick maturity and high yields, were probably obvious to Banda farmers from about 1600 onwards, people chose to continue eating the same grains they always had. Orthodoxy—the maintenance of tradition—was the path chosen. It was only several centuries later, when needs were high in the violent upheaval of the 19th century and immediately thereafter, that people chose to make a radical change in what they ate. The experimentation phase had long passed, and instead involved simply producing and consuming more of an already familiar crop. In this instance, habituation collided with unstable circumstances, and maize seems to have become a staple food in Banda.

Tracing the use history of maize challenges us to consider the role of continuity and conservatism in food practices. Conservatism in foodways is something that has to be actively maintained. It is work. At times it may be a form of resistance to colonialism and globalization, while at other times there is very little 'choice' involved (Wilk 2006b). This is particularly the case when a variety of new crops and tastes filtered into Banda under the aegis of long-distance trade networks. While it is difficult to argue based on evidence of absence, it is worth mentioning that there were no significant food adoptions (i.e., a change in staple foods) until the 19th century. This is not to say that new foods were unavailable—Banda's connection into Niger worlds would have potentially involved exposure to a host of new foods, as Chapter 4 suggests. Instead, people favored the familiar. The pervasive presence of pearl millet not only throughout the Banda sequence but other West African sites is telling of the cultural importance of this crop. Like Banda, many of the sites where millet is found are far too wet; pearl millet cultivation would have been a risky endeavor. This alone suggests pearl millet retained a cultural importance greater than is acknowledged in studies with an environmental focus. This cultural importance is attested in the use of pearl millet foods in most rituals in Banda. But, as I argue below, conservatism in foodways may play an additional and important role in ensuring food security. Food practices encode history but they also make possible the future. I turn now to investigate how foodways act as embodied memory and have an agency of their own in insuring that dietary needs are met.

History, Memory, and the Making of Food Insecurity

In this section, I expand on the issue of conservatism in foodways through an exploration of Banda's more recent history. I also explore the emergence of food insecurity over the same time period in wider context. Both topics coax out 'why history matters' to understanding foodways and food insecurity in the present.

At first glance, conservatism or continuity in foodways may seem the opposite of globalization and the themes I've emphasized in this dissertation. But as Wilk (2006b) illustrates, extant traditions are essential in the creation of hybrid or creole cuisine, which is never developed in a vacuum devoid of experience or taste preferences. Conservatism should not be assumed (cf. Levi-Strauss 1983; Simoons 1994), nor interpreted as an example of the backwardness of rural life. Neither should the appearance of new things necessarily be taken as a sure sign of acculturation (Silliman 2009). Rather, conservatism may result from the active encoding of the past in bodily and discursive practice. Recording memories of food change was a primary focus of my interviews in 2009, but I came to realize the most important memory of all was one of continuity. It was encoded in the pounding, sieving, and beating of T.Z. just as much as the collection of wild leaves for soup. I explore some of the differences and similarities in conscious vs. unconscious ways of remembering by discussing T.Z. and leaf soup, and reflect on how these bodily memories interact with food security over time.

The preparation of T.Z., as illustrated in Chapter 2, is a time consuming process that involves several steps. Grains or cassava must first be ground into a flour, which is subsequently sieved (this may be an adaptation to diesel mills), made into a thin porridge, and beat for some time over a hot fire using special strokes. T.Z. is considered an integral part of Nafana identity, and knowledge of how to make it properly is an essential part of becoming a Nafana woman. T.Z. preparation is not easy to learn, speaking both from personal experience and from conversations with women who had moved into Banda as adults who claim it took several years to master. Young girls are apprenticed to their mothers or grandmothers from age 10 or 12 onwards, and only move into the position of primary T.Z. maker many years later.

The palates of men and women alike critically discern the textural and taste qualities of any given T.Z.; the experience and effort of the cook is very much transmitted via these kinds of details. This vigilance around the making of T.Z. serves an important role: the proper transmission of a bodily skill and *chaîne opératoire* that serve to transform a wide array of staples into a familiar dish. This makes T.Z. an incredibly versatile staple. For example, one of the biggest changes in recent times is the substitution of cassava for maize or millet in the preparation of T.Z. A small amount of a grain must be used to prepare the thin porridge at the beginning of the process, but much of the added flour is cassava. Cassava has been an increasing focus of farmers in recent years as it is a low risk crop that can be sold, stored, and transformed into familiar foods. While there is still some resistance to its flavor, this is masked by making it into a familiar and culturally acceptable dish in terms of texture.

As my second food example, I use leaf soup, which is commonly eaten in the wet season with T.Z. This combination is another example of continuity, one which women claim has been around since the days of their mothers and grandmothers if not before. Some elderly individuals recall the lore surrounding the use of wild leaves during the 19th century when people were forced from their homes and farms. Desperate for things to eat, people experimented with new leaves to test their edibility—sometimes with fatal results. They were cooked into a soup and drunk, and eaten with bush meat or cassava plucked from abandoned farms. Fast forward a hundred years to 1982/3, a time when drought and political instability again challenged food security. Critical to survival was wild leaf soup, often consumed on its own without a starchy staple. Cassava was also widely used, sometimes before it was detoxified. This similarity in coping mechanisms for food insecurity suggests that the maintenance of food traditions—something achieved through everyday practice—may insure against future shortfalls. It is perhaps a way of remembering how to get by in hard times, even if the original story behind it was lost.[7]

[7] Most work on food and memory (e.g., Sutton 2001) has focused on how sensuous experiences like taste and texture of certain foods recall fond memories of better or different times. As Holtzman (2009: 61) points out, this literature is highly biased towards Euro-American concepts of the sensual and the memorable. Holtzman (2009) evaluates the role of memory in food among the Samburu that attempts to get past these biases, though he interprets this role differently than I do here.

But both T.Z. preparation and leaf soup are subject to different kinds of memory, and thus change in different ways. Both Giddens (1984) and Connerton (1989) have emphasized the difference between discursive or inscribing memory, which involves conscious transmission of information through speech or writing, and practical or incorporating memory, which is a more unconscious, embodied way of knowing and remembering. T.Z. preparation and consumption is a form of practical or incorporating memory, one that is habitual, bodily, and almost unconscious. Knowledge of wild leaves and their use in preparing soup is a much more conscious process. Leaf soup thus also falls into the realm of discursive memory through the transmission of verbal knowledge. In the case of Banda, it is the latter discursive memory that is actively challenged. Knowledge of wild leaves varies considerably over space and by family, some of whom actively maintained this knowledge. But most women today do not have a wide knowledge of wild leaves, and prefer the easier to obtain alternative of leaves of crop plants (cassava and bean leaves are the most common). The significance of wild leaves in keeping their ancestors alive has been lost to most. They look to the future, not the past.[8]

My point in this brief foray into a wet season meal in Banda is to illustrate that conservatism in foodways plays an important role in ensuring that the next generation has something to eat. But some food traditions are unconsciously maintained; others are consciously remembered; and yet others are actively forgotten. This is not a directed or straightforward process; it varies along gender, age, class, and family lines. It is particularly susceptible to shifts in how women spend their days, and how much time they have to devote to collecting foods for cooking. Many of these wild ingredients have been replaced by those easy to obtain, oftentimes by cash. While this eases up labor requirements of women, it winds them more tightly into the realm of the global food economy, something I return to briefly in the Epilogue.

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[8] There is a lot more that could be said here, particularly in regards to how traumatic events like famine and severe food shortages are remembered in the practices of food acquisition and preparation. I hope to address this in future work which will analyze my interview data in more detail, and build on insights of those engaged in the work of memory and the body (i.e., Comaroff and Comaroff 1992; Shaw 2002; Stoler 1995).

In Chapters 5 and 6, I critiqued the notion that Africans have always been food insecure and its pervasiveness in scholarly explanations of food change. This is not to say that food security was not an issue in the past—it certainly was, for some areas and segments of the population more than others. My point is that assuming past food insecurity *a priori* obscures our ability to trace *when* and *under what circumstances* it emerged. The most potent illustration of this is in comparing the Kuulo phase and the events leading up to British colonial domination and increased globalization in the 19th and 20th centuries. This transition documents at least partially the shift from a time when people had considerable choice in what they consumed, to a time when simply meeting dietary needs was paramount. While I do not aim to reify the problematic concept of a 'Golden Age' (Stahl 2001: 145-147), such a cross-period approach puts our assumptions about African foodways into perspective.

Take for example the 'hungry season gap', a time in the early wet season before crops are mature. Such shortfalls in food supply have been assumed to characterize the African past as well, without taking into account the *modernity* of strategies employed by African farmers in order to feed their families and access cash economies. The existence of a hungry season gap is closely tied to the need to sell a portion of subsistence crops rather than store all that is needed to make it through the year. This particular shortfall in food supply is not a constant feature of the limitations of African agricultural production and environments, but is instead situated in shared historical and economic trajectories (cf. Mandala 2005; Stahl 1993).

In contrast, during the Kuulo phase in Banda, we have evidence for significant involvement in long-distance trade, and multiple specialist groups that produced several different crafts (Ch. 5). Compared to life at other times, it is realistic to speculate that quality of life and economic resilience, at least in Banda, was higher than in any other phase. This is born out when we consider that in the same time frame there was a severe, centuries-long drought. While Banda farmers focused more on pearl millet, and less on sorghum, there are no other signs of food insecurity. In fact, our evidence suggests quite the opposite. People were free to experiment with new crops like maize and tobacco, because they had the luxury of choice—not because they required more calories. These same dynamics may have played out differently across the landscape, perhaps impacting other regions more severely and making them vulnerable to the predations of others. But we will not know this unless archaeologists begin to take seriously the study of foodways in Africa in recent centuries.

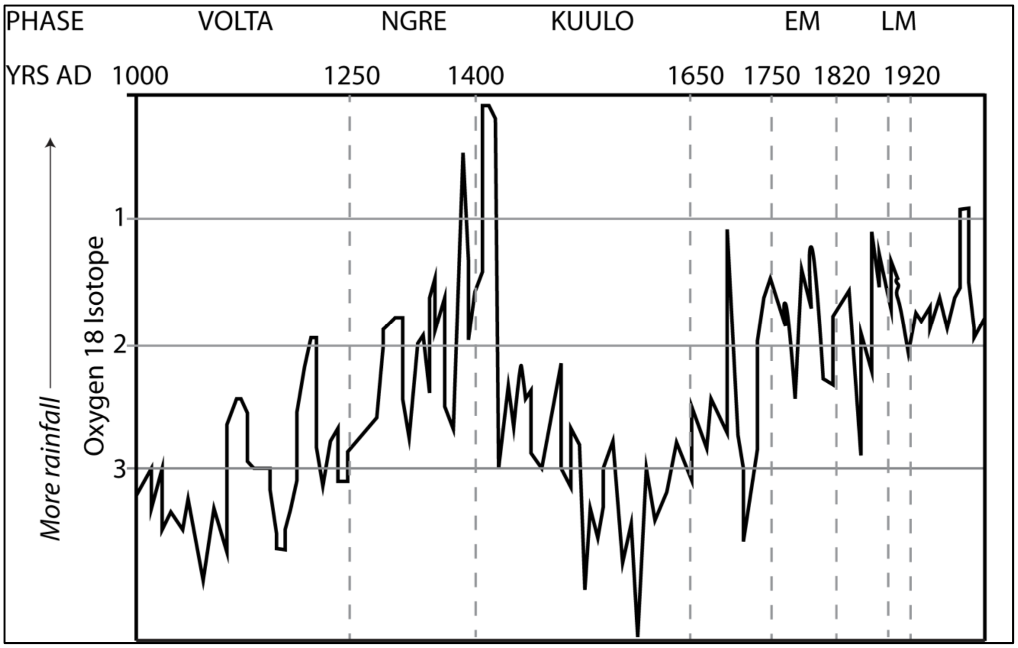

FIGURE 8.4: Precipitation record from Lake Bosumtwi (Shanahan et al. 2009: 379)

To put this drought into perspective, I consider how farmers respond to increasing aridity today compared to Kuulo times. Figure 8.4 shows the variation in relative precipitation over the last millennium. In living memory, precipitation took a nose dive in what has been called the Sahel drought of the 1970s which resulted in famine and suffering throughout much of the area. Rainfall has been on the decline ever since. Farmers in Banda are extremely cognizant of this, and frequently remark on the negative impacts it has had on yield. They have responded by changing what is grown; pearl millet has been abandoned, maize is on the decline, and even yams are producing less and less. Consequently farmers focus more and more on cassava, with major economic and dietary implications. But if we move back in time a half millennium to the Kuulo Phase, we see that the drought that plagued people then was an order of magnitude more severe and more enduring. Yet at least at the resolution that archaeological data provides we see no such hardships. I speculate that resilience was much higher in the Kuulo phase than at present. Life then was quite different than it is today, and so too were the motivations and strategies employed in agricultural production and adoption of new foods.

Banda was not the only locale to witness this major shift in resilience to environmental perturbations. Davis (2001) poignantly argues that colonialism and capitalism set the stage for the widespread famines during climatic shifts associated with El Niño events in the late 19th century. Watts (1983) documented how resilience to environmental amelioration was much higher in northern Nigeria in the 19th century, when the area was subsumed under the Sokoto Caliphate. He argues that the social networks in place acted to ensure food security in a 'moral economy'. "Moral economy," popularized by James Scott (1976), is essentially a precapitalist form that involved community mechanisms such as sharing and redistribution to ensure household reproduction for the majority. In other words, there was a community ethic that everybody had a moral right to access food. Thus social and political structures were bound up in this "subsistence ethic" that provided welfare and insurance against shortfalls in foodstuffs in times of need (Scott 1976: 40). These social structures acted to minimize risk, particularly environmental variations, over the long-term.

This is juxtaposed with a market or capitalist economy that commoditizes labor as well as foodstuffs and other agricultural products. The emphasis for smallholder farmers shifted from ensuring community well being to accumulating wealth as an individual or household unit. As part of incorporation into the market economy, and under direct influence of colonial governments, many peasants opted for (or were coerced) into cash crop production. Income generated by cash crops was then used to purchase the foodstuffs needed for household survival. This shift in focus, however, subjected peasants to the "horrors and moodiness of markets without the benefits of transformed forces of production. The tissues of the moral economy were stripped away, making peasants vulnerable to both market forces and a capricious climate" (Watts 1983: xxiii) and led to famine crises of 20th century (cf. Davis 2001).

In terms of food specifically, the shift from moral to market economies involves not only the commodification of food but often the end of food sharing (cf. Mandala

2005). Holtzman (2009: 242-248) documents this process among the formerly pastoral Samburu who blame both money and increased population for increasing selfishness and hesitancy to share food. Folks in Banda also complain that people have become more selfish and share less, whereas in the imagined past they would not have hesitated to share. One major shift is in the organization of agricultural production. In times past—and as recently even as the 1970s—men first helped work the farms of the senior male family member before their own. Now this is done on a mostly individual or nuclear family basis. However, sharing is not completely lost in Banda—one form of sharing, to the elderly and particularly a woman's mother-in-law, is rigorously maintained.

While the shift from moral to market economic organization provides a convenient heuristic tool, it packs in several assumptions and is considerably messier in reality. 'Moral economies', for example, did not lie completely outside the market in precolonial times. During the Atlantic trade, people responded to demands for craft production and trade on the Ghanaian coast by shifting their settlements to better maximize both (Ch. 5; DeCorse 2005). As Jane Guyer (2004) has demonstrated, the production of goods in order to access currencies has occurred for many centuries. African currencies have included cowrie shells, iron objects, and gold dust, among other things, extending back a millennium or more in some regions. In Banda, iron and copper currencies may have existed as early as the Ngre phase, and the presence of figurative 'gold' weights as well as cowrie shells in the Kuulo phase suggests such currencies were firmly embedded by that time. In other words, ideas of material wealth clearly existed alongside wealth in knowledge and people (Guyer 1995; Guyer and Belinga 1995). Maintenance of a moral economy may have helped accumulate wealth in people; assurances of welfare during times of need helped to ensure community well being and underwrote the diverse assemblages of people and skills in a given community. Ideally, entitlements or access to food was thus ensured by community membership. However it would be a mistake to assume that 'moral economies' (or Golden Ages) assured everyone equal or even adequate access to food.

Local variation in political economic formulations as well as the timing of and response to colonialism and capitalism played a major role in determining the nature and severity of their impact. As I illustrate in Chapter 7, Banda's food insecurity problems began somewhat earlier, amidst a milieu of violence and dislocation in the 19th century. Colonialism and incorporation into market economy may have extended and codified underdevelopment in Banda, but these were processes that began beforehand. For example, a periodic drain on labor occurred when Banda was part of the Asante state as soldiers were sent to Asante wars. Extraction of resources for the gain of a centralized authority may also have begun then, though this is more difficult to trace. And at least initially, colonial authorities had very little direct impact in Banda, which seems to have been mostly ignored until the 1920s. Colonial officers certainly did not demand a change in which crops were grown and consumed. But the indirect effects of colonialism were substantial. The entire trade landscape was reorganized to be more easily drained into British coffers. Banda's lack of saleable cash crops or natural resources, as defined by the British, cut it off from further development. Fulfilling desires for exotic goods or engaging in long distance trade, customary paths that had long existed in Banda, were placed just out of reach. It is only with the development of Bui dam over the last 5 years that they are becoming visible once again. It is in this hopeful note that I consider Banda's future in the Epilogue.

Obama's Kenkey Revisited

Over the course of this dissertation, I have shown how a food as mundane as Obama's kenkey has an important story to tell. Wrapped in simple banana leaves, the fermented maize dough may appear undifferentiated and unremarkable. But historical entanglements permeate every granule, as if steamed in during the process of cooking. Maize was but one of many foreign foods adopted over the last 500 years, and it is one of the most important. It arrived on the shores of a much different Africa than today, and was adopted in variable ways by different coastal and inland groups. Many people, including those in Banda, resisted maize's charms for centuries, preferring instead familiar grains like pearl millet and sorghum. It was only when tragedy befell the area in the 19th century that farmers did what circumstances required—adopted the fastest producing and best yielding crop they could.

Today maize is one of the most commonly consumed crops in Ghana and Africa more broadly. It has been touted as Africa's savior, since it can produce higher yields per unit of land compared to indigenous grains. In the decades since Ghana's independence there has been strong government support of maize breeding and improvement programs. From 1975-1995, the land planted to maize doubled, and yields increased by 50% (McCann 2005: 51-52). Maize package programs that push the use of fertilizers, herbicides, and new maize types were implemented beginning in the late 1990s. However there is considerable pressure on farmers to keep production costs low; imported maize is often cheaper, due to subsidized agriculture in the country of production—especially the United States—underselling Ghanaian farmers. The market for foodstuffs like maize is also volatile, as the price of maize fluctuates with changes in the world market, particularly demand for biofuels (e.g., Babcock 2011; Katz 2008). Viewed through this highly globalized lens, Obama's consumption of kenkey takes on an added layer of significance, since the very maize it was made from was probably grown in, or its price at least determined by, the United States.

There are also many stories that kenkey does not tell, such as the widespread tradition of flatbread preparation that has all but disappeared. We are reminded of the very modernity of food practices of the present, which can reflect rich histories but silence others (cf. Trouillot 1995). Breaking the silence requires removing the 'shoehorn' that guides most researchers to assume that food practices of the past closely fit the mold of the present (cf. David and Sterner 1999). As Maclean and Insoll (1999: 79) suggested in the quote that introduced this dissertation, archaeology and ethnography are the primary methods by which we can uncover this largely unwritten history. It is captured in material and bodily archives of food history that have gone largely unexplored, despite their relevance to very real concerns in the global present. Africa has not, since time immemorial, been plagued with food insecurity, and it is important to understand how it came to be that way. By asking different questions and unearthing these silent pasts, we can begin to give voice to histories of foods and the people who made them.

Chapter 9

Epilogue: Looking into the Future from the Past

In April 2011, I was driving northwards towards Banda, returning for a final season of dissertation fieldwork. As I approached Wenchi, the last big town before the turn off to Banda, I became more and more intrigued to see how things had changed and stayed the same since my last visit two years earlier, when I had spent almost six months living in Banda-Ahenkro. Two years is normally no time at all—but my time frame of working in Banda happened to coincide with the construction of Bui Hydroelectric Dam on the Black Volta River, near to the town of Bui where we conducted salvage excavations in 2008. Main construction on the dam began in 2009. The project had been the subject of talks for some 90 years—being shelved and reinvigorated multiple times. These pulses of interest in the area brought uneven developments—like the paving of a short stretch of road from Bungasi towards the dam site by the Soviets in the 1950s or 60s, and the demarcation of a National Park in 1972—but Banda had mostly remained a forgotten periphery throughout much of the 20th century.

In 2009, things had already changed for many Banda residents. The availability of wage labor at the dam site lured many young men from Banda and farther afield from their farms, even if the hours were long and the wages poor. Disputes over these poor working conditions periodically broke out. Much of the area had been electrified only within the last decade, appropriate in a region soon to host the generation of such power. Electronic gadgets—especially tools of communication like cell phones and radios—quickly slithered into town. Some replaced earlier versions that were previously run on generators—like the ubiquitous blaring speakers—but others like cell phones were relatively new tastes that could finally be satiated. Two and then three new cell phone towers sprang up like oil geysers on the outskirts of town, the first one switched on in mid-2009.

By 2011, the benefits were accruing, but so too were the costs. A documentary and photo project by Devin Tepleski and Ann Stahl documented many of these tensions in detail. Several villages had to be resettled to avoid the waters building up behind the dam, soon to flow over their homes and livelihoods. From the perspective of food the sacrifices were clear: out of the six villages I interviewed, the one that was to be resettled was facing the most severe challenges to food security. For years before people were actually resettled, government and dam officials had advised them not to plant crops for the next year. Many farmers stopped investing in cash crops like cashew, which requires many years before it is productive, but this also cut them off from a supply of cash. Most farmers continued to cultivate subsistence crops, but compared to the surrounding villages, life was harder here, and food in shorter supply. In the beginning, people were willing to sacrifice for the greater good of Ghana and their grandchildrens' futures. It eventually escalated into a contentious situation. One village was forcibly resettled by the Ghanaian military in 2011. The costs were even higher to some—at least one dam worker plunged to his death during construction in 2011.

But the benefits were also manifold, something I realized immediately as I made my turnoff to Banda from the Wenchi-Bamboi road in 2011. In the place of what had formerly been a narrow dirt road, prone to pot holes and wash outs during the wet season, was a smooth, well-paved road, complete with painted lines—a Banda superhighway (Fig. 9.1)! The superhighway unleashed the flow of goods and transportation to and from Banda and markets like Wenchi, and new entepreneurs and goods sprung up like mushrooms after rain. In many ways this phenomenon is nothing new—our archaeological and historical data suggest that the inhabitants of Banda have long been engaged in both regional and long-distance trade, and were quick to seize new opportunities and savvy about future possibilities. Elderly women, for example, recount stories of how, as young women, they made the trip on foot to Dorbour, on the east side of the hills, to acquire pottery. They carried the pottery ~70 km to Wenchi market and sold it there in order to buy valued goods like cloth for their own use and to exchange back home.

FIGURE 9.1: Banda superhighway (photo by author)

The hydroelectric dam is due to go online in 2012—as this dissertation goes to the binders—and thus it seems as fitting a time as ever to reflect on the future of the past, and what the past intimates about the future. What role can the past play in this risky and unpredictable future? How does a long-term view, particularly on foodways, put these changes into perspective?

The first contribution is in thinking about sustainability. Consider the paradoxical situation in regards to maize and sorghum today. Maize is now highly preferred in terms of taste, even if only a century ago people only resorted to this grain in times of need. Yet rapid shifts in precipitation and uneven relations in global food commodity markets mean that maize production in Banda is no longer sufficient. Judging from Banda's past, sorghum typically made up the shortfall in agricultural production in times of environmental stress, and, along with cassava, is still the most reliable producer today. We see how farmers grew more sorghum as precipitation increased, perhaps as a risk reducing measure for much of the last millennium. Farmers in modern Banda are quite aware of sorghum's reliable track record within their own shorter-term memories. One topic of great interest among Banda residents in 2009 was the opportunities that the dam would bring for intensified agricultural production, particularly irrigation. They envisioned a massive increase in the scale of production, and sorghum was one of the primary targets. Like other cash crops that are either of little use locally, or too profitable to eat regularly, the large scale production of sorghum will only be sustainable if stable external markets exist to support it. Fortunately, West African Guinness brewers make extensive use of sorghum for malt, an interesting example of a hybridized global product. Sorghum may thus provide an entry into regional exchange markets that are perhaps less subject to rapid shifts in global demand. But intensive agriculture is only really an option for those with the financial and social capital required for such a large scale endeavor, and could lead to further inequalities in economic development. Such projects also act to further entrench cash economies into household food supply, particularly if production is focused on crops like sorghum that are considered culturally inedible.

It is tempting to support a course of action that is much different, one that cautions against increasingly risky engagement with a cash-based economy. This 'keeping peasants safely out of the global economy' view is problematic, however. The people of Banda have been and continue to be deeply involved in global economic systems, even if 80% of them are still farmers. Such a trajectory is far from reversible. This transition to global modernity is and has been fueled by a strong desire to become connected to a global world through cash, goods, migration, and cell phones—one that has erased much of what the elderly experienced in their youth, like age groups and nubility rites. The momentum and pull of this desire hangs thick in Banda today, even more so with the ongoing construction of the Bui hydroelectric dam.

The second contribution is best illustrated by a vignette of an experience I had while we were conducting excavations at Ngre Kataa in 2009. The village chief and elders came by the site to see and hear about what we were doing. I proceeded to give them a tour of Mound 7, which I was excavating at the time. I explained that what they saw were the remains of two houses, one older than the other, and we had evidence for trade and craft production, dating to 500 or 600 years ago. Surprise registered across many of their faces. The chief, translating for the other elders, said—you mean to say that we were here, doing things like that, before Europeans came?! (It was my turn to be surprised.)

As archaeologists who always have an eye toward the long-term, it is easy to forget that most other people do not. But we are uniquely qualified to tell stories of a rich and very different past, just out of the reach of conscious memory, particularly in places where life is not so kind—at least in the present. This of course is dependent on whether or not we ask questions of the past that are of interest to people beyond the academy. Some of us are lucky that the past speaks loudly enough to correct our assumptions. Although we cannot predict the future, our long-term gaze can at least demonstrate that other alternatives are possible. While my narrative reveals a sad story—one of the development of food insecurity—it also exposes an alternate one, of a resilient, connected, and food secure Africa. One can only hope that that past plays a part in imagining Banda's future.

APPENDICES

APPENDIX A: IRB Exemption for 2009 Study

UNIVERSITY OF MICHIGAN
eResearch.umich.edu

Behavioral Sciences Institutional Review Board • 540 East Liberty Street, Suite 202, Ann Arbor, MI 48104-2210 • phone (734) 936-0933 • fax (734) 998-9171 • irbhsbs@umich.edu

To: Amanda Logan

Subject: Notice of Exemption for [HUM00029327]

SUBMISSION INFORMATION:
Title: Negotiating Food Security and Change in west-central Ghana, AD 1000-present
Full Study Title (if applicable):
Study eResearch ID: HUM00029327
Date of this Notification from IRB: 5/26/2009
Date of IRB Exempt Determination: 5/26/2009
UM Federalwide Assurance: FWA00004969 expiring on 4/18/2011
OHRP IRB Registration Number(s): IRB00000246

IRB EXEMPTION STATUS:
The IRB Behavioral Sciences has reviewed the study referenced above and determined that, as currently described, it is exempt from ongoing IRB review, per the following federal exemption category:

EXEMPTION #2 of the 45 CFR 46.101.(b):
Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Note that the study is considered exempt as long as any changes to the use of human subjects (including their data) remain within the scope of the exemption category above. Any proposed changes that may exceed the scope of this category, or the approval conditions of any other non-IRB reviewing committees, must be submitted as an amendment through eResearch.

Although an exemption determination eliminates the need for ongoing IRB review and approval, you still have an obligation to understand and abide by generally accepted principles of responsible and ethical conduct of research. Examples of these principles can be found in the Belmont Report as well as in guidance from professional societies and scientific organizations.

SUBMITTING AMENDMENTS VIA eRESEARCH:
You can access the online forms for amendments in the eResearch workspace for this exempt study, referenced above.

ACCESSING EXEMPT STUDIES IN eRESEARCH:
Click the "Exempt and Not Regulated" tab in your eResearch home workspace to access this exempt study.

James Sayer
Co-chair, IRB Behavioral Sciences

Colleen Seifert
Co-chair, IRB Behavioral Sciences

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: VOLTA PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Vigna unguiculata*	*Butyrospermum parkii*	Fabaceae	cf. Fabaceae	Poaceae	**Total Identified Seeds/Shell**	Glumes and other connective	Millet and sorghum embryos	Poaceae/Cyperaceae spikelet	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Bone and Shell	Total Sample Weight	Liters Floated	
BANDA 13																											
B1309-F42	10N0W	5		100-110	Mi									0				1		89	0.92	11	0.11	15	14.2	5	
B1309-F46	10N0W	6		110-120	Mi	2								2					3	189	3.04	35	0.38		17.7	5	Burned bone
B1309-F29	10N0W	7		120-130	Mi									0					4	293	5.17	32	0.3	2	10.4	5	
B1309-F43	10N0W	9		140-150	Mi	1							1	2					2	413	6.54	2	0	81	14	5	
B1309-F44	10N0W	10		150-160	Mi	4			1					5		1			15	174	5	9	0.1	87	14.7	5	
B1309-F45	10N0W	11		160-170	Mi		1							1					51	298	7.29	5	0.08	18	15.8	5	
B1309-F31	20N4W	4		80-90	Do/Mi		1						2	3					10	144	2.76	14	0.13	19	8.13	5	
B1309-F32	20N4W	5		90-100	Do/Mi		2							2					6	87	1.39			21	5.65	5	
B1309-F6	24N4W	5		80-90	Do/Mi									0					5	197	3.38	4	0.03	30	11.4	5	
B1309-F34	24N4W			100-110	Do/Mi									0						5	0.05				1.26	5	possible floor
B1309-F8	28N2W	3		70-80	Do/Mi									0					4	226	5.74	4	0.08	42	13	5	
B1309-F15	28N2W	4		80-90	Do/Mi	5	1							6				1	7	492	11.40	9	0.1	40	22.1	5	
B1309-F9	28N2W	4		80-90	Do/Mi	2								2					1	218	5.03	9	0.09	31	9.31	5	
B1309-F16	28N2W	6		100-110	Do/Mi	8		1			1			10	2				6	510	12.2	13	0.12	41	26.1	5	
B1309-F17	28N2W	7		110-120	Do/Mi	4							2	6	2				31	445	11.4	4	0.06	18	20.6	5	
B1309-F18	28N2W	7	A	110-120	Do/Mi									0					1	50	1.52			5	3.03	5	
B1309-F19	28N2W	8		120-130	Do/Mi									0			1		22	328	12	8	0.09	7	15.9	5	subsampled
B1309-F20	28N2W	8	A	120-130	Do/Mi									0			1			32	?	3	0.04	5	2.44	5	
B1309-F21	28N2W	8	B	120-130	Do/Mi									0		1			14	255	9.32	14	0.08		12.4	5	
B1309-F22	28N2W	8	C	120-130	Do/Mi	2	1							3		1			5	59	0.63	2	0.01	4	5.77	5	
B1309-F23	28N2W	9	E 1/2	130-140	Do/Mi									0					1	12	0.15			1	0.99	5	
B1309-F41	28N2W	Posthole		135-145	Do/Ar									0			1		1						1.65	?	153-168S/139-156W
Banda 13 Totals						**28**	**6**	**1**	**1**	**0**	**1**	**0**	**5**	**42**	**4**	**3**	**3**	**2**	**189**	**4516**	**105**	**178**	**1.8**	**467**	**246**	**105**	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: VOLTA PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Vigna unguiculata*	*Butyrospermum parkii*	Fabaceae	cf. Fabaceae	Poaceae	**Total Identified Seeds/Shell**	Glumes and other connective	Millet and sorghum embryos	Poaceae/Cyperaceae spikelet	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Bone and Shell	Total Sample Weight	Liters Floated
BANDA 27																										
	M2, U1	3		30-40	Mi					2				2						24	0.23	7	0.09	1	3.95	5
	M2, U1	7		70-80	Mi					3				3						8	0.06	3	nil		3.27	5
	M2, U1	9		90-100	Mi							1		1						265	4.01	3	0.01		5.32	5
	M2, U1	12		120-130	Mi	2		2						4					3	67	0.81	16	0.21	1	3.23	5
	M2, U1	15		150-160	Mi					1		1		2					8	64	1.02	7	0.1	3	3.64	5
	M2, U1	20		200-210	Mi									0						17	0.18	4	0.02		1.5	5
Banda 27 Totals						**2**	**0**	**2**	**0**	**6**	**0**	**2**	**0**	**12**	**0**	**0**	**0**	**0**	**11**	**445**	**6.31**	**40**	**0.43**	**5**	**20.9**	**30**
TOTAL VOLTA PHASE						**58**	**12**	**4**	**2**	**6**	**2**	**2**	**10**	**96**	**8**	**6**	**6**	**4**	**389**	**9477**	**216**	**396**	**4.03**	**939**	**514**	**240**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: NGRE AND EARLY KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*cf. Digitaria sp.*	TOTAL INDIGENOUS GRAINS	*cf. Abelmoschus esculentus*	*Butyrospermum parkii (shell)*	*Ficus* sp.	*Zaleya pentandra*	*cf. Cucurbitaceae*	Fabaceae	cf. Fabaceae	Lamiaceae (?Cassia/Ocimum)	Poaceae	Euphorbiaceae/Lamiaceae	TOTAL EDIBLE & WEEDY	**Total Identified Seeds**	Glumes and other connective	Sorghum and/or millet embryos	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Approx. Liters Floated	Notes
NGRE KATAA																																						
Mound 3																																						
NK08-F65	42N32W	6		70-80	Mi	9	7				16				2					3		5	**21**			0		8	271	4.7	109	1.4	2			16	5	
NK08-F77	42N32W	9	Pit	100-110	Mi	3			2		5				2			1		3		6	**11**	2		2		10	575	9.3	105	1.2	3	5		20	5	
NK08-F42	42N30W	7		80-90	Mi	11			1		12									7	1	8	**20**			0		5	615	11	191	2.2	6	12		23	5	Subsampled
Mound 3 Totals						*23*	*7*	*0*	*3*	*0*	*33*	*0*	*0*	*0*	*4*	*0*	*0*	*1*	*0*	*13*	*1*	*19*	*52*	*2*	*0*	*2*	*0*	*23*	*1461*	*25*	*405*	*5*	*11*	*17*	*0*	*59*	*15*	
Mound 4																																						
F01-74	1	3		20-30	Mi						0											0	**0**			0		4	63	1	6	0		2		7.8	5	
F01-76	1	5		40-50	Mi						0		1									1	**1**			0			149	2.7	8	0		11		6.5	5	
F01-78	1	7		60-70	Mi	1					1											0	**1**			0	5		150	2.6	13	0.1		4		7.4	5	
F01-80	1	9		80-90	Mi			1			1											0	**1**			0		3	209	3.1	7	0.5		5		9.5	5	
F01-81	1	10		90-100	Mi			1			1											0	**1**			0			204	2.8	22	0.1		3		8.3	5	
F01-86	1	15		140-150	Mi	2	2	7	1		12											0	**12**	3	1	4		6	595	6.6	43	0.4	P	6		10	5	fused mass of sorghum
F01-88	1	17		160-170	Mi	2	2				4					1						1	**5**	1		1		3	266	4.1	44	0.5		3		9.6	5	
F01-90	1	19		180-190	Mi	2		2			4									1		1	**5**			0		2	264	4.3	10	0.1		2		7.9	5	
F01-97	1	25		240-250	Mi	1					1											0	**1**	1		1		2	464	10	19	0.4				14	5	
F01-99	1	27		260-270	Mi	2				1	3	1										1	**4**			0	1		519	12	8	0.1		1		16	5	Subsampled
F01-106	1	33		320-330	Mi	1					1											0	**1**			0	9	1	467	8.4	11	0.1				13	5	
Mound 4 Totals						*11*	*4*	*11*	*1*	*1*	*28*	*1*	*1*	*0*	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*4*	*32*	*5*	*1*	*6*	*15*	*21*	*3350*	*58*	*191*	*2*	*0*	*37*	*0*	*###*	*55*	
Mound 8																																						
NK08-F48	8N127E	23		250-260	Mi	4					4			1								1	**5**			0		9	378	4	72	0.8	8			74	5	
NK08-F60	8N127E	29		320-330	Mi/Ri						0						1			4		5	**5**		1	1		6	367	5.5	53	0.4	9	2		12	5	Assoc w/child burial
Mound 8 Totals						*4*	*0*	*0*	*0*	*0*	*4*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*4*	*0*	*6*	*10*	*0*	*1*	*1*	*0*	*15*	*745*	*10*	*125*	*1*	*17*	*2*	*0*	*86*	*10*	
Ngre Kataa NP/EKP Totals						**38**	**11**	**11**	**4**	**1**	**65**	**1**	**1**	**1**	**4**	**1**	**1**	**1**	**0**	**18**	**1**	**29**	**94**	**7**	**2**	**9**	**15**	**59**	**5556**	**92**	**721**	**8.3**	**28**	**56**	**0**	**256**	**80**	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: NGRE AND EARLY KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*cf. Digitaria sp.*	*TOTAL INDIGENOUS GRAINS*	*cf. Abelmoschus esculentus*	*Butyrospermum parkii (shell)*	*Ficus* sp.	*Zaleya pentandra*	*cf. Cucurbitaceae*	Fabaceae	cf. Fabaceae	Lamiaceae (?Cassia/Ocimum)	Poaceae	Euphorbiaceae/Lamiaceae	TOTAL EDIBLE & WEEDY	**Total Identified Seeds**	Glumes and other connective	Sorghum and/or millet embryos	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Approx. Liters Floated	Notes
KUULO KATAA																																						
Mound 101																																						
F95-20	2W2S	20		250-260	Mi/Me	6	2	1			9								1	2		3	**12**			0		7	414	13	157	1.7		4		25	5	Subsampled
F95-21	2W2S	21		260-270	Mi/Me	4					4								1	7		8	**12**			0		4	573	16	95	1.5				24	5	Subsampled
F95-23	2W2S	23		280-290	Mi/Me	10					10									29		29	**39**	2		2		6	704	13	56	1.2				20	5	Subsampled
F95-24	2W2S	24		290-200	Mi/Me	15					15									7		7	**22**	2	1	3		28	854	16	70	1.1		2		26	5	
F95-25	2W2S	24,25		290-310	Mi/Me	2					2											0	**2**			0			247	2.4	8	0				3.6	?	Vessel KK-95-531 contents
F95-26	2W2S	25		300-310	Mi/Me	3	2				5											0	**5**			0		3	277	3.4	11	0.1				5.2	5	
Mound101 Totals						*40*	*4*	*1*	*0*	*0*	*45*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*2*	*45*	*0*	*47*	*92*	*4*	*1*	*5*	*0*	*48*	*3069*	*63*	*397*	*6*	*0*	*6*	*0*	*###*	*25*	
Mound 138																																						
F95-207	126W22S	5	B	60-70	Me						0											0	**0**			0			470	8.7	10	0.1				16	5	
F95-210	126W24S	2		40-50	Me						0		3									3	**3**			0			21	0.2						2.6	?	Vessel contents
F95-224	130W24S	4		50-60	Me						0											0	**0**			0			74	1.4					1	4.7	5	
F95-225	130W24S	5		60-70	Me						0		9									9	**9**			0			192	3.7						9.3	5	Poss shea
Mound 138 Totals						*0*	*0*	*0*	*0*	*0*	*0*	*0*	*12*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*12*	*12*	*0*	*0*	*0*	*0*	*0*	*757*	*14*	*10*	*0*	*0*	*0*	*1*	*33*	*15*	
Kuulo Kataa NP/EKP Totals						**40**	**4**	**1**	**0**	**0**	**45**	**0**	**12**	**0**	**0**	**0**	**0**	**0**	**2**	**45**	**0**	**59**	**104**	**4**	**1**	**5**	**0**	**48**	**3826**	**77**	**407**	**5.7**	**0**	**6**	**1**	**136**	**40**	
BANDA 41																																						
	M1, U1	6		60-70	Mi	1		1	1				1										**0**	1				12	95	1.5	10	0.3		8		5.5	5	
	M1, U1	12		120-130	Mi																		**0**						85	1.7	16	0.1		2		4.3	5	
	M1, U1	19		190-200	Mi			1												7			**0**						213	6.2	29	0.3		2		9.5	5	
Banda 41 Totals						**1**	**0**	**2**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**12**	**393**	**9.3**	**55**	**0.7**	**0**	**12**	**0**	**19**	**15**	
NGRE/EARLY KUULO PHASE TOTALS						**79**	**15**	**14**	**5**	**1**	**110**	**1**	**14**	**1**	**4**	**1**	**1**	**1**	**2**	**70**	**1**	**88**	**198**	**12**	**3**	**14**	**15**	**119**	**9775**	**179**	**1183**	**15**	**28**	**74**	**1**	**411**	**135**	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	TOTAL INDIGENOUS GRAINS	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Zea mays*	*Aframomum melegueta*	*Nicotiana cf. rustica*	TOTAL TRADE PLANTS	*Butyrospermum parkii (shell)*	*Cassia tora*	*Dactylonium aegypticum*	*Elaeis guineensis (shell)*	*cf. Euphorbia sp.*	*Ficus sp.*	*Hyocyamus sp.*	*cf. Laportea aestivans*	*Zaleya pentandra*	"*Yomaa*"	*cf. Vigna unguiculata*	Boraginaceae	Boraginaceae/Euphorbiaceae	Fabaceae	cf. Fabaceae	Malvaceae indeter. (cf. Sida sp.)	Cheno-Am	Euphorbiaceae/Lamiaceae	cf. Asteraceae	TOTAL EDIBLE & WEEDY	Poaceae	cf. Poaceae	TOTAL INDET. GRASS	**Total Identified Seeds**
NGRE KATAA																																								
Mound 7																																								
NK09-F52	10N30E	8	B	90-100	Do	1	4			5						0																				0			0	**5**
NK09-F151	12N24E	8	D	100-110	Ar					0						0																				0	2		2	**2**
NK09-F254	12N24E	9	G	110-120	Do/Fe					0						0																				0			0	**0**
NK09-F155	12N24E	9	H	110-120	Do/Fl					0						0																				0			0	**0**
NK09-F154	12N24E	9	I	110-120	Do	2	1			3						0																		1		1			0	**4**
NK09-F156	12N24E	10	H	120-130	Do/Fl	3				3						0																		1		1	1		1	**5**
NK09-F157	12N24E	10	H	120-130	Do/Fl					0						0							1											2		3			0	**3**
NK09-F175	12N24E	10	H	120-130	Do/Fl	1				1						0																		1		1			0	**2**
NK09-F176	12N24E	10	H	128	Do/Fl					0						0																				0			0	**0**
NK09-F257	12N24E			128-141	Pot		1			1						0																	1			1			0	**2**
NK09-F252	12N24E			141-155	Pot	2				2						0																				0			0	**2**
NK09-F217	12N24E	14	N	160-170	Do/Fe	3				3						0																				0			0	**3**
NK09-F220	12N24E	14	O	163-170	Do	16				16						0								1										3		4			0	**20**
NK09-F219	12N24E	14	P	160-170	Fe					0						0					1															1			0	**1**
NK09-F276	12N24E		BF1	163-165	Fe					0						0																				0			0	**0**
NK09-F277	12N24E	15	BF2	170-185	Fe					0						0						1														1			0	**1**
NK09-F281	12N24E		BF4	175-185	Fe					0						0																				0	1		1	**1**
NK09-F283	12N24E	15	BF5	175-185	Fe					0						0														1						1			0	**1**
NK09-F282	12N24E	16		185-190	Fe					0						0						1												3		4			0	**4**
NK09-F88	14N22E	3		60-70	Mi					0						0																				0	4		4	**4**
NK09-F158	14N22E	7		104-110	Do/Fl					0						0																				0			0	**0**
NK09-F140	14N22E	7	H	100-110	Do/Ar					0						0																				0	2		2	**2**
NK09-F246	14N22E	13	CC2	160-170	Fe		1			1						0																		4		4			0	**5**
NK09-F321	14N22E			171-190	Fe					0						0																				0			0	**0**
NK09-F319	14N22E	14	BF4	170-180	Fe					0						0																				0			0	**0**
NK09-F315	14N22E		BF6,7	174-187	Fe				2	2						0									8											8			0	**10**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Glumes and other connective	Sorghum and/or millet embryos	Poaceae/Cyperaceae spikelet	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Liters Floated	Notes
NGRE KATAA																				
Mound 7																				
NK09-F52	10N30E	8	B	90-100				0		7	194	3.2	55	0.6	5			11	5	
NK09-F151	12N24E	8	D	100-110		1		1		24	271	3.2	12	0.1		2		8.1	5	Under Stone 2
NK09-F254	12N24E	9	G	110-120				0			8	0.1				6		0.5	?	Burnt area around pot stand
NK09-F155	12N24E	9	H	110-120	1	1		2		5	139	2.2	6	0.1	3	18		13	5	
NK09-F154	12N24E	9	I	110-120	1		1	2		4	64	0.7				2		5.8	5	
NK09-F156	12N24E	10	H	120-130	1			1		3	41	0.7	3	0		19		6.2	5	just above floor
NK09-F157	12N24E	10	H	120-130				0		2	5	0.1				2		1.4	5	Floor and just below
NK09-F175	12N24E	10	H	120-130		1		1		1	9	0.2							5	Lower Floor
NK09-F176	12N24E	10	H	128		1		1		4	35	0.2	1	0				0.7	5?	Burn feature atop floor
NK09-F257	12N24E			128-141				0			15	0.2				58		0.6	?	Whole pot contents
NK09-F252	12N24E			141-155				0		2	8	0				31		0.4	?	Whole pot contents NK09-653
NK09-F217	12N24E	14	N	160-170				0		5	45	0.5	7	0.1		2		3.4	5	
NK09-F220	12N24E	14	O	163-170		2		2		8	187	2.2	3	0.1		7		9.4	5	
NK09-F219	12N24E	14	P	160-170				0		1	35	0.3						2.1	5	
NK09-F276	12N24E		BF1	163-165				0		2	30	0.3				2		2	5	
NK09-F277	12N24E	15	BF2	170-185				0		2	12	0.1				1		2.3	5	Microspatter (n=1)
NK09-F281	12N24E		BF4	175-185		1		1		4	112	1	14	0.1				5	5	
NK09-F283	12N24E	15	BF5	175-185				0		1	33	0.3						1.2	5	
NK09-F282	12N24E	16		185-190				0		2	14	0.2				3		1.3	5	
NK09-F88	14N22E	3		60-70				0			35	0.6	8	0.1				5.4	5	Dirty sample; HF charcoal incl.
NK09-F158	14N22E	7		104-110				0		3	19	0.2	13	0.1				3.8	5	Floor area; HF charcoal & UCPR incl.
NK09-F140	14N22E	7	H	100-110				0		6	4	0	6	0				2.3	5	
NK09-F246	14N22E	13	CC2	160-170				0		2	485	5.2	122	0.7	8			15	5	Subsampled; Charcoal Concentration 2
NK09-F321	14N22E			171-190				0		1	8	0.1	6	0.1				2.5	5	Ashy area in NW
NK09-F319	14N22E	14	BF4	170-180				0		1	22	1.2	13	0.3				3.5	?	Burn Feature 4
NK09-F315	14N22E		BF6,7	174-187		1		1		19	462	6.4	96	1.7	72			11	?	HF Charcoal and UCPR incl.

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd		*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	TOTAL INDIGENOUS GRAINS	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Zea mays*	*Aframomum melegueta*	*Nicotiana cf. rustica*	TOTAL TRADE PLANTS	*Butyrospermum parkii (shell)*	*Cassia tora*	*Dactylonium aegypticum*	*Elaeis guineensis (shell)*	*cf. Euphorbia sp.*	*Ficus sp.*	*Hyocyamus sp.*	*cf. Laportea aestivans*	*Zaleya pentandra*	*"Yoma"*	*cf. Vigna unguiculata*	Boraginaceae	Boraginaceae/Euphorbiaceae	Fabaceae	cf. Fabaceae	Malvaceae indeter. (cf. Sida sp.)	Cheno-Am	Euphorbiaceae/Lamiaceae	cf. Asteraceae	TOTAL EDIBLE & WEEDY	Poaceae	cf. Poaceae	TOTAL INDET. GRASS	**Total Identified Seeds**
NGRE KATAA																																								
Mound 7																																								
NK08-F105	14N24E	3		50-60	Mi					0						0																				0	1		1	**1**
NK08-F129	14N24E	8	D	100-110	Do/Ar					0						0												1								1	2		2	**3**
NK08-F149	14N24E	8	E	100-110	Do/Ar	1				1						0																				0			0	**1**
NK08-F130	14N24E	8	F	100-110	Do/Ar		2			2						0																				0			0	**2**
NK08-F141	14N24E	9	G	110-120	Do/Fl					0						0																				0			0	**0**
NK08-F152	14N24E	9	BF	116-120	Do/Fe					0						0																				0			0	**0**
NK08-F151	14N24E	10	I	120-130	Do	2				2						0				1																1	1		1	**4**
NK08-F153	14N24E	10	J	120-130	Do	4				4						0																				0	3		3	**7**
NK08-F169	14N24E	11	M	130-131	Do					0						0																				0			0	**0**
NK08-F155	14N24E	11		130-140	Do/Ar?	1				1						0																				0		4	4	**5**
NK09-F249	14N24E	?	Q	148-166						0						0											1									1			0	**1**
NK09-F50	14N24E	14	S	150-160	Fe					0						0									1											1			0	**1**
NK09-F51	14N24E	15	T	160-170	Fl		3			3						0																				0			0	**3**
NK09-F58	14N24E	15	U	160-170	Fl					0						0																				0			0	**0**
NK09-F232	14N24E	15	V	160-170			1			1						0																				0	4		4	**5**
NK09-F250	14N24E	16	U	160-170?	Fl/Fe					0						0																				0	1		1	**1**
NK09-F233	14N24E	16	U	170-180	Fl/Fe					0						0																				0			0	**0**
NK09-F296	14N24E	16	U	170-180	Fl/Fe					0						0																				0			0	**0**
NK09-F295	14N24E	16	V	170-180						0						0																				0			0	**0**
NK09-F119	14N26E	10	Cl C	100-104	Do/Fe		2			2						0																				0			0	**2**
NK09-F215	14N26E	16	P	160-164						0						0																				0	2		2	**2**
NK09-F210	14N26E	16,17	R	160-172	Fl					0						0																				0	1		1	**1**
NK09-F211	14N26E	16,17	R	165-174	Fl					0						0																				0			0	**0**
NK09-F212	14N26E	16,17	R	166-175	Fl					0						0																				0	2		2	**2**
NK09-F234	14N26E	16,17		160-175	Ar					0						0																				0			0	**0**
Mound 7 Totals						*36*	*15*	*0*	*2*	53	*0*	*0*	*0*	*0*	*0*	0	*0*	*0*	*0*	*1*	*1*	*2*	*1*	*1*	*9*	*0*	*1*	*1*	*0*	*1*	*0*	*0*	*1*	*15*	*0*	34	*27*	*4*	31	**118**
Mound 8																																								
NK08-F19	8N127E	10		130-140	Mi	2	2			4				1		1						1			1		1									3		2	2	**10**
NK08-F22	8N127E	12	E	150-160	Mi	11				11						0																				0	1		1	**12**
NK08-F37	8N127E	14	E	170-180	Mi	10				10						0									9											9	10		10	**29**
NK08-89	8N127E	17		200-210	Mi	1				1						0																				0	1		1	**2**
NK08-F45	8N127E	19		220-230	Mi	2				2						0															1					1	2		2	**5**
NK08-F46	8N127E	20		230-240	Mi	2				2						0						1														1			0	**3**
Mound 8 KP Totals						*28*	*2*	*0*	*0*	30	*0*	*0*	*0*	*1*	*0*	1	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*10*	*0*	*1*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	14	*14*	*2*	16	**61**
Ngre Kataa KP Totals						**64**	**17**	**0**	**2**	**83**	**0**	**0**	**0**	**1**	**0**	1	**0**	**0**	**0**	**1**	**1**	**4**	**1**	**1**	**19**	**0**	**2**	**1**	**0**	**1**	**1**	**0**	**1**	**15**	**0**	48	**41**	**6**	47	**179**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Glumes and other connective	Sorghum and/or millet embryos	Poaceae/Cyperaceae spikelet	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Liters Floated	Notes
NGRE KATAA																				
Mound 7																				
NK08-F105	14N24E	3		50-60				0		4	34	1	20	0.9		3		5	5	
NK08-F129	14N24E	8	D	100-110				0		7	43	1.1	27	0.9	7			3	5	
NK08-F149	14N24E	8	E	100-110				0		1	10	0.2	4	0				1.4	5	
NK08-F130	14N24E	8	F	100-110				0		1	38	0.4	17	0.1	2			4.8	5	outside wall; dirty sample
NK08-F141	14N24E	9	G	110-120				0										0.5	5	
NK08-F152	14N24E	9	BF	116-120				0		1	2	nil						0.8	?	Burn Feature
NK08-F151	14N24E	10	I	120-130		1		1		4	23	0.3	12	0.1	1			2.1	5	Below floor?
NK08-F153	14N24E	10	J	120-130				0		5	79	1.1	29	0	17			4.1	5	
NK08-F169	14N24E	11	M	130-131				0		3	26	0.2	6	0				1.1	?	Burn Feature 4
NK08-F155	14N24E	11		130-140	1	2		3		1	116	2.1	49	0.4	11			6.2	5	Contents of cluster in NE corner
NK09-F249	14N24E	?	Q	148-166				0		6	17	0.2	2	0				1.2	5	HF Charcoal incl.
NK09-F50	14N24E	14	S	150-160				0		1	16	0.3	15	0.2				2.1	5	Above fire feature; Charcoal and UCPR from
NK09-F51	14N24E	15	T	160-170				0		2	18	0.3	2	0				1.9	5	
NK09-F58	14N24E	15	U	160-170				0		3	5	0						1.6	5	HF charcoal incl.
NK09-F232	14N24E	15	V	160-170		2		2		6	36	-0	11	0.1	10			3.2	5	HF charcoal and UCPR incl.
NK09-F250	14N24E	16	U	160-170?				0		2	53	0.6	2	0				2	5	floors and fill; HF charcoal incl.
NK09-F233	14N24E	16	U	170-180				0		2	25	0.3	5	0	7			1.2	5	floors and fill; Hfcharcoal and UCPR incl.
NK09-F296	14N24E	16	U	170-180				0			16	0.1						0.3	5	HF charcoal incl.
NK09-F295	14N24E	16	V	170-180				0		3	8	0.1						0.9	5	
NK09-F119	14N26E	10	Cl C	100-104				0		5	118	1.7	44	0.5				5.5	5	
NK09-F215	14N26E	16	P	160-164				0		1	54	0.6	22	0.2	8			4	5	just above floor; full of gravel
NK09-F210	14N26E	16,17	R	160-172				0		6	24	0.2	7	0	2			1	5	Floor A; HF charcoal incl.
NK09-F211	14N26E	16,17	R	165-174				0			19	0						0.1	5	Floor B; HF charcoal incl.
NK09-F212	14N26E	16,17	R	166-175				0		3	43	0.4	8	0.1				1	5	Floor C; HF charcoal and UCPR incl.
NK09-F234	14N26E	16,17		160-175				0		1	26	0.5	5	0				0.9	5	Wall baulk of lower structure; HF charcoal ir
Mound 7 Totals					*4*	*13*	*1*	18	*0*	*##*	*3141*	*40*	*652*	*8*	*##*	*##*	*0*	*174*	*215*	
Mound 8																				
NK08-F19	8N127E	10		130-140				0		10	233	4.6	51	0.6	6			11	5	
NK08-F22	8N127E	12	E	150-160		1		1		4	198	2.3	64	0.7	1			7.2	5	
NK08-F37	8N127E	14	E	170-180	8			8		10	420	5.9	94	0.9			P	15	5	
NK08-89	8N127E	17		200-210				0	2		43	0.7	13	0.1				2.3	5	
NK08-F45	8N127E	19		220-230				0		9	297	6	193	3.1	4	3		18	5	
NK08-F46	8N127E	20		230-240				0		6	123	1	21	0.2	1			5.8	5	
Mound 8 KP Totals					*8*	*1*	*0*	*9*	*2*	*39*	*1314*	*21*	*436*	*5*	*12*	*3*	*0*	*59*	*30*	
Ngre Kataa KP Totals					**12**	**14**	**1**	**27**	**2**	**216**	**4455**	**61**	**1088**	**13**	**165**	**159**	**0**	**233**	**245**	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*TOTAL INDIGENOUS GRAINS*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Zea mays*	*Aframomum melegueta*	*Nicotiana cf. rustica*	TOTAL TRADE PLANTS	*Butyrospermum parkii (shell)*	*Cassia tora*	*Dactylonium aegypticum*	*Elaeis guineensis (shell)*	*cf. Euphorbia sp.*	*Ficus sp.*	*Hyocyamus sp.*	*cf. Laportea aestivans*	*Zaleya pentandra*	*"Yomaa"*	*cf. Vigna unguiculata*	Boraginaceae	Boraginaceae/Euphorbiaceae	Fabaceae	cf. Fabaceae	Malvaceae indeter. (cf. Sida sp.)	Cheno-Am	Euphorbiaceae/Lamiaceae	cf. Asteraceae	TOTAL EDIBLE & WEEDY	Poaceae	cf. Poaceae	TOTAL INDET. GRASS	**Total Identified Seeds**
KUULO KATAA																																								
Mound 101																																								
F95-2	2W2S	3		50-60	Mi	7				7						0									1											1	2		2	**10**
F95-3	2W2S	4		60-70	Mi	3				3						0																				0			0	**3**
F95-4	2W2S	5		70-80	Mi	2	1			3						0																				0			0	**3**
F95-7	2W2S	7		90-100	Mi					0						0																				0			0	**0**
F95-31	2W2S	8?		219-234?	Mi	4				4						0																				0			0	**4**
F95-8	2W2S	8		100-110	Mi	1				1						0		1																		1			0	**2**
F95-29	2W2S	9		110-120	Mi	2				2						0											1									1	3		3	**6**
F95-10	2W2S	11		130-140	Mi					0				1		1																				0			0	**1**
F95-11	2W2S	12		140-150	Mi		2			2						0						1														1			0	**3**
F95-12	2W2S	13		150-160	Mi	1				1						0																				0	2		2	**3**
F95-14	2W2S	15		170-180	Mi	3				3						0																				0			0	**3**
F95-15	2W2S	16		180-190	Mi	8				8						0																				0			0	**8**
F95-16	2W2S	17		190-200	Mi		2			2						0																				0			0	**2**
F95-18	2W2S	18			Mi	1				1						0														1						1	1		1	**3**
F95-19	2W2S	19		240-280	Mi		3			3						0											1			2						3			0	**6**
Mound 101 KP Totals						32	8	0	0	40	0	0	0	1	0	1	0	1	0	0	0	1	0	0	1	0	2	0	0	3	0	0	0	0	0	8	8	0	8	**57**
Mound 118																																								
F95-62	*62W4N*			*53-72*	*Pot*					0	*1*	*1*				2																					*1*		1	**3**
F95-63	*62W4N*				*Pot*					0						0																				0			0	**0**
F95-65	62W4N	5	A	80-90	Do					0						0																				0			0	**0**
F95-66	62W4N	5	B	80-90	Do	1				1						0																				0	1		1	**2**
F95-67	62W4N	6		90-100	DoFl		1			1						0																				0			0	**1**
F95-68	62W4N	7	A	100-110	Do/Fl					0						0																				0			0	**0**
F95-69	62W4N	7	B	100-110	Do/Ar?					0						0																				0			0	**0**
F95-74	62W12N	5	B	50-60	Do					0						0																			1	1			0	**1**
F95-75	62W12N	5	C	50-60	Do					0						0																				0	1		1	**1**
F95-76	62W12N	6		60-70	Do					0						0										1										1			0	**1**
F95-77	62W12N	7		70-80	Do					0	5	2	2			9																				0			0	**9**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Glumes and other connective	Sorghum and/or millet embryos	Poaceae/Cyperaceae spikelet	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Liters Floated	Notes
KUULO KATAA																				
Mound 101																				
F95-2	2W2S	3		50-60				0		2	115	2.3	81	1.1			2	5.5	5	
F95-3	2W2S	4		60-70				0			419	8.3	21	0.4				13	5	
F95-4	2W2S	5		70-80				0		1	326	6.7	112	1.8			1	15	5	
F95-7	2W2S	7		90-100				0		7	377	8.3	90	1.3				12	5	
F95-31	2W2S	8?		219-234?	1			1		2	490	4.6	8	0.4		P		9	5	
F95-8	2W2S	8		100-110	2			2	1	3	700	9	13	0.1				12	?	Vessel KK95-403
F95-29	2W2S	9		110-120				0		3	495	9.9	140	1.9			8	24	5	
F95-10	2W2S	11		130-140				0	2		464	8.9	93	1.6		1		21	5	
F95-11	2W2S	12		140-150		1		1		5	681	8.5	56	0.9	P			22	5	
F95-12	2W2S	13		150-160				0		1	772	12	97	1.3				25	5	
F95-14	2W2S	15		170-180				0		2	609	13	87	1.5				19	5	
F95-15	2W2S	16		180-190	1			1		3	942	14	22	0.1				20	5	Subsampled
F95-16	2W2S	17		190-200				0		2	689	12	144	2				28	5	Subsampled
F95-18	2W2S	18						0		9	731	9.4	13	0.1				21	?	Subsampled; Vessel KK95-350 contents
F95-19	2W2S	19		240-280				0		6	1216	19	25	0.2				26	5	Subsampled; N and S Sections
Mound 101 KP Totals					4	1	0	5	3	46	9026	146	1002	15	0	1	11	273	65	
Mound 118																				
F95-62	*62W4N*			*53-72*				0			*QUICK SCAN*							*7.9*	*?*	*inside of vessel*
F95-63	*62W4N*							0			*QUICK SCAN*							*0.6*	*?*	*from around N wall vessel*
F95-65	62W4N	5	A	80-90				0		2	96	1.2	14	0.2				4.5	5	
F95-66	62W4N	5	B	80-90				0		3	77	1.1	9	0.1				2.4	5	
F95-67	62W4N	6		90-100				0		3	122	1.3	9	0.4				3.8	5	
F95-68	62W4N	7	A	100-110				0		3	60	1.2	3	0				2.2	5	
F95-69	62W4N	7	B	100-110				0		3	40	0.6	1	nil		1		2.3	5	
F95-74	62W12N	5	B	50-60				0		1	129	1.1	13	0.2		9		6.1	5	Floor
F95-75	62W12N	5	C	50-60				0			105	1.3	25	0.2		2		5.4	5	1 fish vertebra
F95-76	62W12N	6		60-70				0			171	1.8	44	0.7				5.9	5	
F95-77	62W12N	7		70-80				0		15	197	2.5	5	0.1	P		1	7.2	5	Rodent disturbance nearby

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd		*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	TOTAL INDIGENOUS GRAINS	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Zea mays*	*Aframomum melegueta*	*Nicotiana cf. rustica*	TOTAL TRADE PLANTS	*Butyrospermum parkii (shell)*	*Cassia tora*	*Dactylonium aegypticum*	*Elaeis guineensis (shell)*	*cf. Euphorbia sp.*	*Ficus sp.*	*Hyocyamus sp.*	*cf. Laportea aestivans*	*Zaleya pentandra*	"Yomaa"	*cf. Vigna unguiculata*	Boraginaceae	Boraginaceae/Euphorbiaceae	Fabaceae	cf. Fabaceae	Malvaceae indeter. (cf. Sida sp.)	Cheno-Am	Euphorbiaceae/Lamiaceae	cf. Asteraceae	TOTAL EDIBLE & WEEDY	Poaceae	cf. Poaceae	TOTAL INDET. GRASS	**Total Identified Seeds**
KUULO KATAA																																								
Mound 118																																								
F95-84	64W4N	4		60-70	Do				1	1						0																				0			0	**1**
F95-85	64W4N	5	C	70-80	Do/Fl		1			1						0																				0			0	**1**
F95-86	64W4N	6	D	80-90	Do/Fl					0						0																				0			0	**0**
F95-87	64W4N	7	B	90-100	Do/Fl/Ar	3				3					4	4																				0			0	**7**
F95-88	64W4N	7	D	90-100	Do					0						0																				0			0	**0**
F95-89	64W4N	7	D lf	90-100	Do/Fl	7	1			8						0																				0	1		1	**9**
F95-91	64W4N	8		100-110	Do	1				1						0																				0			0	**1**
F95-90	64W4N	8	D	100-110	Do/Fl	9				9						0																				0			0	**9**
F95-92	*64W4N*	*8*		*110-120*	*Do/Ar*	*2*				2						0																				0			0	**2**
F95-99	*66W0N*	*7*	*B*	*100-110*	*Do/Ar/Fl*	*1*				1						0																				0	*1*		1	**2**
F95-105	*66W0N*	*9*		*120-130*	*Do*	*1*		*1*		2						0																				0			0	**2**
F95-103	*66W0N*	*9*	*B*	*120-130*	*Do*					0		*1*			*cf.1*	1																				0			0	**1**
F95-104	*66W0N*	*9*	*C*	*120-130*	*Do/Mi*			*2*		2	*1*					1																				0			0	**3**
F95-106	*66W0N*	*10*		*130-140*	*Do*	*1*				1						0																				0			0	**1**
F95-111	*66W6N*	*6*		*80-90*	*Do*	*1*				1	*1*					1																				0			0	**2**
F95-114	*66W6N*	*7*		*90-100*	*Do/Mi*					0						0																				0			0	**0**
F95-131	66W10N	7		80-90	Do/Fl/Ar	2				2						0			2																	2	1		1	**5**
F95-100	66W10N	7	C	90-136	Do					0	1		1			2																				0			0	**2**
F95-102	66W10N	8	A	100-110	Do	2				2						0																				0			0	**2**
F95-134	66W10N	9		110-120	Do					0						0																				0			0	**0**
F95-136	66W10N	10		120-130	Do					0						0																cf.1				0			0	**0**
F95-143	66W12N	6	A	70-80	Do					0						0																				0			0	**0**
F95-144	*66W12N*	*6*	*B*	*70-80*	*Do*					0						0																				0			0	**0**
F95-145	*66W12N*	*6*	*C*	*70-80*	*Do/Ar/Fl*					0						0																				0			0	**0**
F95-146	*66W12N*	*7*	*A*	*80-90*	*Do*					0						0																				0			0	**0**
F950147	*66W12N*	*7*	*B*	*80-90*	*Do*					0						0																				0			0	**0**
F95-148	*66W12N*	*7*	*C*	*80-90*	*Do/Ar/Fl*					0						0																				0			0	**0**
F95-150	*66W12N*	*8*		*90-100*	*Do*					0						0																				0			0	**0**
F95-149	*66W12N*	*8*	*A*	*90-100*	*Do*					0						0																				0			0	**0**
F95-151	*66W12N*	*8*	*C*	*90-100*	*Do/Ar/Fl*					0	*1*	*1*				2																				0			0	**2**
F95-152	*66W12N*	*9*		*100-110*	*Do*					0						0																				0			0	**0**
F95-153	*66W12N*	*10*		*110-120*	*Do*					0						0																				0			0	**0**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Glumes and other connective	Sorghum and/or millet embryos	Poaceae/Cyperaceae spikelet	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Liters Floated	Notes
KUULO KATAA																				
Mound 118																				
F95-84	64W4N	4		60-70				0		2	111	2	86	1.1				6.5	5	
F95-85	64W4N	5	C	70-80				0		2	101	1	101	1.4				8	5	
F95-86	64W4N	6	D	80-90				0			63	0.6	3	0		5		2.8	5	
F95-87	64W4N	7	B	90-100	1	1		2		2	98	1.5	7	0.1		5		7.8	5	
F95-88	64W4N	7	D	90-100				0		1	34	0.4	8	0				2	5	
F95-89	64W4N	7	D lf	90-100				0		7	53	0.4	9	0.1				1.1	5	
F95-91	64W4N	8		100-110				0			33	0.4	3	0		1		2.4	5	
F95-90	64W4N	8	D	100-110		1		1		5	148	1.4	37	0.2		1		6.3	5	
F95-92	*64W4N*	*8*		*110-120*				0			*QUICK SCAN*							*3.7*	*5*	
F95-99	*66W0N*	*7*	*B*	*100-110*				0			*QUICK SCAN*							*4.5*	*5*	
F95-105	*66W0N*	*9*		*120-130*				0			*QUICK SCAN*							*6.9*	*5*	
F95-103	*66W0N*	*9*	*B*	*120-130*				0			*QUICK SCAN*							*2.2*	*5*	
F95-104	*66W0N*	*9*	*C*	*120-130*		*3*		3			*QUICK SCAN*							*20*	*5*	
F95-106	*66W0N*	*10*		*130-140*				0			*QUICK SCAN*							*29*	*5*	
F95-111	*66W6N*	*6*		*80-90*				0			*QUICK SCAN*							*7.8*	*5*	*NE 2/3*
F95-114	*66W6N*	*7*		*90-100*				0			*QUICK SCAN*							*5.5*	*5*	*NE 2/3*
F95-131	66W10N	7		80-90				0			52	0.6	2	0			5	3.2	5	Poss floor surface and wall melt; poss. Distu
F95-100	66W10N	7	C	90-136				0		3	277	4.9	23	0.2		8	5	14	5	
F95-102	66W10N	8	A	100-110				0		2	167	1.5	6	0.1		16		6	5	
F95-134	66W10N	9		110-120				0			15	0.2	2	0		1	3	1.7	5	
F95-136	66W10N	10		120-130				0			41	0.4	7	0		2		1.5	5	
F95-143	66W12N	6	A	70-80				0			*QUICK SCAN*							4.1	5	
F95-144	*66W12N*	*6*	*B*	*70-80*				0			*QUICK SCAN*							*3.6*	*5*	
F95-145	*66W12N*	*6*	*C*	*70-80*				0			*QUICK SCAN*							*1.7*	*5*	*Lots parenchyma*
F95-146	*66W12N*	*7*	*A*	*80-90*				0			*QUICK SCAN*							*3.2*	*5*	
F950147	*66W12N*	*7*	*B*	*80-90*				0			*QUICK SCAN*							*1.7*	*5*	
F95-148	*66W12N*	*7*	*C*	*80-90*				0			*QUICK SCAN*							*1.7*	*5*	
F95-150	*66W12N*	*8*		*90-100*				0			*QUICK SCAN*							*0.5*	*5*	
F95-149	*66W12N*	*8*	*A*	*90-100*				0			*QUICK SCAN*							*3.8*	*5*	
F95-151	*66W12N*	*8*	*C*	*90-100*				0			*QUICK SCAN*							*3.2*	*5*	
F95-152	*66W12N*	*9*		*100-110*				0			*QUICK SCAN*							*0.9*	*5*	
F95-153	*66W12N*	*10*		*110-120*				0			*QUICK SCAN*							*1.6*	*5*	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd		*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*TOTAL INDIGENOUS GRAINS*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Zea mays*	*Aframomum melegueta*	*Nicotiana cf. rustica*	TOTAL TRADE PLANTS	*Butyrospermum parkii (shell)*	*Cassia tora*	*Dactylonium aegypticum*	*Elaeis guineensis (shell)*	*cf. Euphorbia sp.*	*Ficus sp.*	*Hyocyamus sp.*	*cf. Laportea aestivans*	*Zaleya pentandra*	*"Yomaa"*	*cf. Vigna unguiculata*	Boraginaceae	Boraginaceae/Euphorbiaceae	Fabaceae	cf. Fabaceae	Malvaceae indeter. (cf. Sida sp.)	Cheno-Am	Euphorbiaceae/Lamiaceae	cf. Asteraceae	TOTAL EDIBLE & WEEDY	Poaceae	cf. Poaceae	TOTAL INDET. GRASS	**Total Identified Seeds**
KUULO KATAA																																								
Mound 118																																								
F95-161	*66W14N*	*7*	*A*	*80-90*	*Do*					0						0																				0			0	**0**
F95-163	*66W14N*	*8*		*90-100*	*Do*					0						0																				0			0	**0**
F95-167	*66W16N*	*5*	*N1/2*	*60-70*	*Do/Fe?*					0						0													*1*							1			0	**1**
F95-168	*66W16N*	*5*	*S1/2*	*60-70*	*Do/Fe?*	*4*				4						0																				0			0	**4**
F95-169	*66W16N*	*6*		*70-80*	*Do*		*1*			1	*1*					1																				0			0	**2**
F95-190	70W4N	6	A	80-90	Do		1			1						0																				0			0	**1**
F95-194	70W4N	8	B	100-110	Do					0						0																				0	1		1	**1**
F95-195	70W4N	9		100-110	Do	2				2						0																	1			1		1	1	**4**
F95-196	70W4N	9	A	110-120	Do					0						0																				0			0	**0**
F95-197	70W4N	9	C	110-120	Do					0						0																				0			0	**0**
F95-200	70W4N	11	A	130-140	Do					0						0																				0			0	**0**
F95-201	70W4N	12	B	140-150	Do					0						0																				0			0	**0**
Mound 118 Totals						*37*	*5*	*3*	*1*	*46*	*10*	*4*	*3*	*0*	*5*	*22*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*0*	*0*	*1*	*1*	*0*	*1*	*6*	*6*	*1*	*7*	*80*
Mound 148																																								
	68E52N	7	B	70-80	Do		2			2						0																				0			0	**2**
	68E52N	8	B	80-90	Do/Fl	5	1			6						0																				0			0	**6**
	68E52N	9	B	90-100	Do/Fl	1	1			2						0	1																			1			0	**3**
	68E54N	9		90-100	Do/Fl					0						0									1											1			0	**1**
	68E56N	7	A	70-80	Do/Fe					0						0																				0			0	**0**
	70E48N		F1		Fe					0						0																				0			0	**0**
	70E48N		F1		Fe	2				2					cf.1	0																				0	2		2	**4**
	74E50N	5		70-80	Do/Fl	1				1						0												2								2	1		1	**4**
	74E50N	5	A	70-80	Do/Fl	2				2						0																				0			0	**2**
Mound 148 Totals						*11*	*4*	*0*	*0*	15	*0*	*0*	*0*	*0*	*1*	1	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	4	*3*	*0*	3	**23**
Kuulo Kataa KP Totals						**80**	**17**	**3**	**1**	**101**	**10**	**4**	**3**	**1**	**6**	24	**1**	**1**	**2**	**0**	**0**	**1**	**0**	**0**	**2**	**1**	**2**	**2**	**1**	**3**	**0**	**1**	**1**	**0**	**1**	19	**17**	**1**	18	**162**
A-212																																								
	M7,U1	4		30-40	Mi?	4																														0	2		2	**2**
	M7,U1	6		50-60	Mi?																															0			0	**0**
A-212 Totals						4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
KUULO PHASE TOTALS						**148**	**34**	**3**	**3**	**188**	**10**	**4**	**3**	**2**	**6**	25	**1**	**1**	**2**	**1**	**1**	**5**	**1**	**1**	**21**	**1**	**4**	**3**	**1**	**4**	**1**	**1**	**2**	**15**	**1**	**67**	**60**	**7**	**67**	**343**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: KUULO PHASE

Flot #	Unit	Level	Zone	cmbd	Glumes and other connective	Sorghum and/or millet embryos	Poaceae/Cyperaceae spikelet	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	Liters Floated	Notes
KUULO KATAA																				
Mound 118																				
F95-161	*66W14N*	*7*	*A*	*80-90*				0			*QUICK SCAN*							*6.7*	*5*	
F95-163	*66W14N*	*8*		*90-100*				0			*QUICK SCAN*							*1.2*	*5*	
F95-167	*66W16N*	*5*	*N1/2*	*60-70*				0		*1*	*QUICK SCAN*							*5.2*	*5*	
F95-168	*66W16N*	*5*	*S1/2*	*60-70*				0		*1*	*QUICK SCAN*							*8.5*	*5*	
F95-169	*66W16N*	*6*		*70-80*				0		*2*	*QUICK SCAN*							*14*	*5*	
F95-190	70W4N	6	A	80-90				0			761	13	22	0.2		7		19	5	
F95-194	70W4N	8	B	100-110				0		2	571	14	19	0.3		2		25	5	
F95-195	70W4N	9		100-110				0		2	489	7.9	21	0.3		6			5	
F95-196	70W4N	9	A	110-120				0			249	3.3				3		7.9	5	
F95-197	70W4N	9	C	110-120				0			463	19						22	5	Subsampled
F95-200	70W4N	11	A	130-140				0			35	0.3	9	0.1				3.8	5	
F95-201	70W4N	12	B	140-150				0		2	74	1				5		4.7	5	
Mound 118 Totals					*1*	*5*	*0*	*6*	*0*	*64*	*4832*	*85*	*488*	*6*	*0*	*74*	*14*	*327*	*265*	
Mound 148																				
	68E52N	7	B	70-80	3			3		4	50	0.6	3	0			1	3.5	5	
	68E52N	8	B	80-90	10	1		11		7	178	2.6	12	0.7		7	2	8.2	5	
	68E52N	9	B	90-100		1		1		3	30	0.3	2	0				1.8	5	
	68E54N	9		90-100				0			3	0						1	5	
	68E56N	7	A	70-80				0		3	25	0.2	2	0				1	5	
	70E48N		F1					0	2	2	548	7.7	13	0.2		2		14	?	Feature 1 fill W portion; subsampled
	70E48N		F1					0	4	5	537	7.4	26	0.2		2	2	14	?	Feature 1 fill W portion dark soil
	74E50N	5		70-80	2			2			67	0.9				1		2.5	5	
	74E50N	5	A	70-80				0			104	1.8	6	0.3				5.6	5	
Mound 148 Totals					*15*	*2*	*0*	*17*	*6*	*24*	*1542*	*21*	*64*	*1*	*0*	*12*	*5*	*52*	*35*	
Kuulo Kataa KP Totals					**20**	**8**	**0**	**28**	**9**	**134**	**15400**	**253**	**1554**	**22**	**0**	**87**	**30**	**652**	**365**	
A-212																				
	M7,U1	4		30-40	3						382	5.4	13	0.1		9		11	5	
	M7,U1	6		50-60						1	27	0.3						2.9	5	
A-212 Totals					3	0	0	0	0	1	409	5.7	13	0.1	0	9	0	14	10	
KUULO PHASE TOTALS					**35**	**22**	**1**	**58**	**11**	**351**	**20264**	**319**	**2655**	**35**	**165**	**255**	**30**	**898**	**620**	

APPENDIX B: BANDA MACROBOTANICAL REMAINS: NGRE KATAA MOUND 7 UPPER STRUCTURE

Flot #	Unit	Leve	Zon	cmbd	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*TOTAL INDIGENOUS GRAINS*	*Elaeis guineensis (shell)*	Boraginaceae	Malvaceae indeter. (cf. Sida sp.)	Cheno-Am	Euphorbiaceae/Lamiaceae	TOTAL EDIBLE & WEEDY	Poaceae	cf. Poaceae	TOTAL INDET. GRASS	**Total Identified Seeds**	Glumes and other connective	Sorghum and/or millet embryos	Poaceae/Cyperaceae spikelet	GRAIN PROCESSING BYPRODUCTS	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	Notes
NK09-F52	10N30E	8	B	90-100	1	4	5						0			0	**5**				0	7	194	3.2	55	0.6	5		11	5	
NK09-F151	12N24E	8	D	100-110			0						0	2		2	**2**		1		1	24	271	3.2	12	0.1		2	8.1	5	Under Stone 2
NK09-F254	12N24E	9	G	110-120			0						0			0	**0**				0		8	0.1				6	0.5	?	Burnt area around pot stand
NK09-F155	12N24E	9	H	110-120			0						0			0	**0**	1	1		2	5	139	2.2	6	0.1	3	18	13	5	
NK09-F154	12N24E	9	I	110-120	2	1	3					1	1			0	**4**	1		1	2	4	64	0.7				2	5.8	5	
NK09-F156	12N24E	10	H	120-130	3		3					1	1	1		1	**5**	1			1	3	41	0.7	3	0		19	6.2	5	just above floor
NK09-F157	12N24E	10	H	120-130			0					2	2			0	**2**				0	2	5	0.1				2	1.4	5	Floor and just below
NK09-F175	12N24E	10	H	120-130	1		1					1	1			0	**2**		1		1	1	9	0.2						5	Lower Floor
NK09-F176	12N24E	10	H	128			0						0			0	**0**		1		1	4	35	0.2	1	0			0.7	5?	Burn feature atop floor
NK09-F257	12N24E			128-141		1	1				1		1			0	**2**				0		15	0.2				58	0.6	?	Whole pot contents
NK09-F252	12N24E			141-155	2		2						0			0	**2**				0	2	8	0				31	0.4	?	Whole pot contents NK09-653
NK09-F88	14N22E	3		60-70			0						0	4		4	**4**				0		35	0.6	8	0.1			5.4	5	Dirty sample; HF charcoal incl.
NK09-F158	14N22E	7		104-110			0						0			0	**0**				0	3	19	0.2	13	0.1			3.8	5	Floor area; HF charcoal & UCPR incl.
NK09-F140	14N22E	7	H	100-110			0						0	2		2	**2**				0	6	4	0	6	0			2.3	5	
NK08-F105	14N24E	3		50-60			0						0	1		1	**1**				0	4	34	1	20	0.9		3	5	5	
NK08-F129	14N24E	8	D	100-110			0		1				1	2		2	**3**				0	7	43	1.1	27	0.9	7		3	5	
NK08-F149	14N24E	8	E	100-110	1		1						0			0	**1**				0	1	10	0.2	4	0			1.4	5	
NK08-F130	14N24E	8	F	100-110		2	2						0			0	**2**				0	1	38	0.4	17	0.1	2		4.8	5	outside wall; dirty sample
NK08-F141	14N24E	9	G	110-120			0						0			0	**0**				0								0.5	5	
NK08-F152	14N24E	9	BF	116-120			0			1			1			0	**1**				0	1	2	nil					0.8	?	Burn Feature
NK08-F151	14N24E	10	I	120-130	2		2	1					1	1		1	**4**		1		1	4	23	0.3	12	0.1	1		2.1	5	Below floor?
NK08-F153	14N24E	10	J	120-130	4		4						0	3		3	**7**				0	5	79	1.1	29	0	17		4.1	5	
NK08-F169	14N24E	11	M	130-131			0						0			0	**0**				0	3	26	0.2	6	0			1.1	?	Burn Feature 4
NK08-F155	14N24E	11		130-140	1		1						0		4	4	**5**	1	2		3	1	116	2.1	49	0.4	11		6.2	5	Contents of cluster in NE corner
NK09-F119	14N26E	10	Cl C	100-104		2	2						0			0	**2**				0	5	118	1.7	44	0.5			5.5	5	Cluster C
NK Upper Structure Totals					*17*	*10*	*27*	*1*	*1*	*1*	*1*	*5*	*9*	*16*	*4*	*20*	***56***	*4*	*7*	*1*	*12*	*93*	*1336*	*20*	*312*	*4*	*46*	*141*	*94*	*95*	

APPENDIX B: BANDA MACROBOTANICAL REMAINS: NGRE KATAA MOUND 7 LOWER STRUCTURE

Flot #	Unit	Level	Zone	cmbd	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*cf. Sorghum bicolor*	*TOTAL INDIGENOUS GRAINS*	*cf. Euphorbia sp.*	*Ficus* sp.	*cf. Laportea aestivans*	*Zaleya pentandra*	*cf. Vigna unguiculata*	Fabaceae	Euphorbiaceae/Lamiaceae	TOTAL EDIBLE & WEEDY	Poaceae	**Total Identified Seeds**	Sorghum and/or millet embryos	GRAIN PROCESSING BYPRODUCTS	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	Notes
NK09-F217	12N24E	14	N	160-170	3			3								0		**3**		0	5	45	0.5	7	0.1		2	3.4	5	
NK09-F220	12N24E	14	O	163-170	16			16			1				3	4		**20**	2	2	8	187	2.2	3	0.1		7	9.4	5	
NK09-F219	12N24E	14	P	160-170				0	1							1		**1**		0	1	35	0.3					2.1	5	
NK09-F276	12N24E		BF1	163-165				0								0		**0**		0	2	30	0.3				2	2	5	
NK09-F277	12N24E	15	BF2	170-185				0		1						1		**1**		0	2	12	0.1				1	2.3	5	Microspatter (n=1)
NK09-F281	12N24E		BF4	175-185				0								0	1	**1**	1	1	4	112	1	14	0.1			5	5	
NK09-F283	12N24E	15	BF5	175-185				0						1		1		**1**		0	1	33	0.3					1.2	5	
NK09-F282	12N24E	16		185-190				0		1					3	4		**4**		0	2	14	0.2				3	1.3	5	
NK09-F246	14N22E	13	CC2	160-170		1		1							4	4		**5**		0	2	485	5.2	122	0.7	8		15	5	Subsampled; Charcoal Concentration 2
NK09-F321	14N22E			171-190				0								0		**0**		0	1	8	0.1	6	0.1			2.5	5	Ashy area in NW
NK09-F319	14N22E	14	BF4	170-180				0								0		**0**		0	1	22	1.2	13	0.3			3.5	?	Burn Feature 4
NK09-F315	14N22E		BF6,7	174-187			2	2				8				8		**10**	1	1	19	462	6.4	96	1.7	72		11	?	HF Charcoal and UCPR incl.
NK09-F249	14N24E	?	Q	148-166				0					1			1		**1**		0	6	17	0.2	2	0			1.2	5	HF Charcoal incl.
NK09-F50	14N24E	14	S	150-160				0				1				1		**1**		0	1	16	0.3	15	0.2			2.1	5	Above fire feature; Charcoal and UCPR from HF incl
NK09-F51	14N24E	15	T	160-170		3		3								0		**3**		0	2	18	0.3	2	0			1.9	5	
NK09-F58	14N24E	15	U	160-170				0								0		**0**		0	3	5	0					1.6	5	HF charcoal incl.
NK09-F232	14N24E	15	V	160-170		1		1								0	4	**5**	2	2	6	36	-0	11	0.1	10		3.2	5	HF charcoal and UCPR incl.
NK09-F250	14N24E	16	U	160-170?				0								0	1	**1**		0	2	53	0.6	2	0			2	5	floors and fill; HF charcoal incl.
NK09-F233	14N24E	16	U	170-180				0								0		**0**		0	2	25	0.3	5	0	7		1.2	5	floors and fill; Hfcharcoal and UCPR incl.
NK09-F296	14N24E	16	U	170-180				0								0		**0**		0		16	0.1					0.3	5	HF charcoal incl.
NK09-F295	14N24E	16	V	170-180				0								0		**0**		0	3	8	0.1					0.9	5	
NK09-F215	14N26E	16	P	160-164				0								0	2	**2**		0	1	54	0.6	22	0.2	8		4	5	just above floor; full of gravel
NK09-F210	14N26E	16,17	R	160-172				0								0	1	**1**		0	6	24	0.2	7	0	2		1	5	Floor A; HF charcoal incl.
NK09-F211	14N26E	16,17	R	165-174				0								0		**0**		0		19	0					0.1	5	Floor B; HF charcoal incl.
NK09-F212	14N26E	16,17	R	166-175				0								0	2	**2**		0	3	43	0.4	8	0.1			1	5	Floor C; HF charcoal and UCPR incl.
NK09-F234	14N26E	16,17		160-175				0								0		**0**		0	1	26	0.5	5	0			0.9	5	Wall baulk of lower structure; HF charcoal incl.
NK LOWER STRUCTURE TOTALS					*19*	*5*	*2*	*26*	*1*	*2*	*1*	*9*	*1*	*1*	*10*	*25*	*11*	***62***	*6*	*6*	*84*	*1805*	*21*	*340*	*4*	*107*	*15*	*80*	*120*	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: EARLY MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*Large sorghum or maize*	*TOTAL INDIGENOUS GRAINS*	*Zea mays cob*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Nicotiana rustica*	*TOTAL TRADE PLANTS*	*cf. Abelmoschus esculentus*	*Adansonia digitata*	*Butyrospermum parkii*	*Cassia tora*	*Ceiba pentandra*	*Ficus* sp.	*Portulaca foliosa*	*Portulaca sp.*	*Zaleya pentandra*	*Fabaceae*	TOTAL USEFUL/WEEDY PLANTS
MAKALA KATAA STATION 6																											
Mound 5--Kitchen																											
F94-121	0W0S	4		60-70	Do/Fe						0					0						1					1
F94-123	0W0S	6		80-90	Do/Fe						0					0											0
F94-124	0W0S	7		90-100	Do/Fl						0					0											0
F94-125	0W0S	7		90-100	Pot		1				1					0											0
F94-127	0W0S	7		90-100	Pot				1		1					0											0
F94-129	0W0S	7		90-100	Pot						0					0											0
F89-2	0W4S	4			Do		1				1					0											0
F89-3	0W4S	5			Do						0					0						2					2
F89-4	0W4S	6			Do		1				1					0											0
F89-8	0W4S				Pot						0					0											0
F89-9	0W4S				Pot						0					0		9									9
F89-58	2W4S	4			Do/Fe			7			7					0											0
F89-59	2W4S	4			Pot						0					0											0
F89-60	2W4S	5	floor		Do/Fl	5		2			7					0											0
F89-61	2W4S	5			Pot	1					1		1?			1											0
F89-62	2W4S	6			Do						0					0											0
F89-63	2W4S	7			Do/Fe	5		10			15					0											0
F89-65	2W4S	7	hearth		Do/Fe						0					0											0
F89-64	2W4S	7			Pot						0					0											0
F89-66	2W4S	8			Do	69		61			130					0											0
F89-67	2W4S	9			Do/Fe	1	6	3			10					0											0
F89-27	4W2S	5			Pot	1		1			2					0											0
F89-28	4W2S	5			Pot	3		3			6				1	1											0
F89-75	4W4S	5			Pot						0					0											0
F89-76	4W4S	5			Pot						0					0								4			4
F89-78	4W4S	6			Do/Fe						0					0											0
F89-80	4W4S	7	NE/SE		Do/Fe	64		63			127					0											0
F89-84	4W4S	7	hearth		Do/Fe	500+		500+			1000					0											0
F89-82	4W4S	7			Pot	500+		500+			1000					0											0
F89-83	4W4S	7			Pot	14		10			24					0											0
F89-86	4W4S	7,8		95	Do/Fe	953		421	12	30	1416					0											0
F89-88	4W4S	8			Do	500+		500+			1000					0						1					1

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: EARLY MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	cf. Fabaceae	Poaceae	Paniceae (Poaceae)	Polygonaceae	cf. Solanaceae	cf. Verbenaceae	Chenopodiaceae/Amaranthaceae	Cyperaceae/Polygonaceae	Euphorbiaceae/Lamiaceae	Euphorbiaceae/Malvaceae	**Total Identified Seeds**	Glumes and other connective	Millet and sorghum embryos	Unidentified fruit or nut shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	
MAKALA KATAA STATION 6																												
Mound 5--Kitchen																												
F94-121	0W0S	4		60-70							4				**5**					36	0.42	4	0			2.1	5	
F94-123	0W0S	6		80-90		2									**2**					38	0.27	3	0.1			4.8	10	
F94-124	0W0S	7		90-100											**0**					38	0.37	2	0			2.8	10	
F94-125	0W0S	7		90-100											**1**					13	0.19	4	0			1.4	?	Pot A Contents
F94-127	0W0S	7		90-100		2									**3**	2	1			29	0.49	5	0.1			13	?	Pot C Contents
F94-129	0W0S	7		90-100											**0**					15	0.19	4	0			2	?	Pot E Contents
F89-2	0W4S	4						1							**2**	22	1		2	237	4	9	0.4		14	13	?	
F89-3	0W4S	5													**2**				5	92	1.9					6.3	?	
F89-4	0W4S	6				4									**5**					53	1.82	3	0			3.5	?	
F89-8	0W4S														**0**				2	5	0.02							Pot 12 Contents
F89-9	0W4S														**9**					15	0.48							Pot 13 Contents
F89-58	2W4S	4													**7**		3		9	63	0.84	10	0.1			6.6	?	
F89-59	2W4S	4													**0**	1			2	22	0.24					5.4	?	Pnt Pot 16 Contents
F89-60	2W4S	5	floor			2									**9**	11	2		4	73	0.59	11	0.1			14	?	
F89-61	2W4S	5													**2**	2	1			142	2.67	4	0.1	38		11	?	Pot 17 Contents, fish bone
F89-62	2W4S	6													**0**					76	1.54	11	0.8	1		9.8	?	
F89-63	2W4S	7													**15**	41	5			31	0.46	48	0.7	2		6.6	?	slag; clumps of sorghum
F89-65	2W4S	7	hearth												**0**	6				15	0.12			1		4.7	?	
F89-64	2W4S	7													**0**	3	9		13	42	0.63	7	0.1	1		6.8	?	Interior Pot 19
F89-66	2W4S	8													**130**	986	137		177	70	0.99		13			36	?	Subsampled; whole heads sorghum
F89-67	2W4S	9				4									**14**	6	6		16	184	4.36	29	0.2			18	?	
F89-27	4W2S	5													**2**				5	48	1.41				3	4.5	?	Pot 14
F89-28	4W2S	5													**7**	1			14	90	1.32				3	7.1	?	Pot 15
F89-75	4W4S	5									4				**4**					53	0.88	10	0.1			11	5	Interior Pot 2
F89-76	4W4S	5													**4**					17	0.1	4	0			2	5	Interior Pot 4
F89-78	4W4S	6													**0**				7	27	0.15				4	1.8	?	Pot 5
F89-80	4W4S	7	NE/SE			19									**146**	37			93	377	7.65	5	0.1		1	16	10	Fish vert.; sorghum stalk frags
F89-84	4W4S	7	hearth												**1000**	330			2	29	0.39	18	0.2			12	?	sorghum and millet conglomerate
F89-82	4W4S	7													**1000**	500+	4+		7	17	0.12	45	0.2			25	?	Pot 6; rachis; sorghum and millet heads
F89-83	4W4S	7													**24**	17	2		13	115	1.38	6	0.4		7	7.1	?	Pot 7; fish or bird bone
F89-86	4W4S	7,8		95		408	420								**2244**	143			many	2						16	2	Burn Concentr.; Subsampled
F89-88	4W4S	8				50+									**1001**	200+				16	0.47					23	10	Subsampled

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: EARLY MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*Large sorghum or maize*	*TOTAL INDIGENOUS GRAINS*	*Zea mays cob*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Nicotiana rustica*	*TOTAL TRADE PLANTS*	*cf. Abelmoschus esculentus*	*Adansonia digitata*	*Butyrospermum parkii*	*Cassia tora*	*Ceiba pentandra*	*Ficus* sp.	*Portulaca foliosa*	*Portulaca sp.*	*Zaleya pentandra*	*Fabaceae*	TOTAL USEFUL/WEEDY PLANTS
MAKALA KATAA STATION 6																											
Mound 5--Kitchen																											
F94-70	8W2S	5		70-80	Do						0					0		3									3
F94-71	8W2S	6		80-90	Do						0					0											0
F89-15	8W4S	4			Do	3		3			6	4				4							1				1
F89-16	8W4S	5			Do	2					2					0											0
F89-17	8W4S	6			Do						0					0											0
F89-18	8W4S	7			Do			1			1					0											0
F89-19	8W4S	8	HF		Do		1				1					0		1									1
F89-20	8W4S	Pot 8			Pot						0	8				8											0
F89-21	8W4S	Pot 9			Pot						0					0											0
F94-175	2E0S	6		80-90	Do/Fl						0		1			1											0
F94-176	2E0S	7		90-100	Do/Fl						0					0											0
F94-177	2E0S	7		100	Do/Fe						0		3			3											0
F94-165	2E2S	4,5			Do/Fe		1				1					0				1				1			2
F94-166	2E2S	5		60-70	Do/Fe						0				3	3											0
F94-168	2E2S	7		80-90	Do						0					0											0
F94-169	2E2S	8	W1/2	90-100	Do		2				2				3	3											0
F94-170	2E2S	8		90-100	Do/Fe						0					0											0
Mound 5 Kitchen Totals						*####*	*13*	*2085*	*13*	*30*	*4729*	*12*	*5?*		*7*	24	*0*	*13*		*1*	*0*	*4*	*1*	*5*			24
Mound 6--Structure																											
F94-108	0W24N	5		80-90	Do/Fl						0					0											0
F94-111	0W24N	5		80-90	Pot						0					0											0
F94-113	0W24N	5,6		90-110	Pot						0					0											0
F94-112	0W24N	6		90-100	Do/Fl						0					0					24						24
F94-257	4W24N	4		70-80	Do/Fl						0					0											0
F94-265	4W26N	5		80-90	Do/Fl						0					0											0
F94-266	4W26N	5		80	Do/Fl		1				1					0											0
F94-267	4W26N	6		90-100	Do			1			1					0											0
F94-80	8W26N	3		70-80	Do/Fl	1					1					0											0
F94-81	8W26N	4		80-90	Do/Fl	1					1					0											0
F94-82	8W26N	5		90-100	Do			1			1					0											0
F94-83	8W26N	6		100-110	Do/Fl						0					0											0
F94-144	12W28N	6		100-110	Do/Fl						0					0											0
F94-145	12W28N	6	SE	100-110	Do/Fe						0					0											0
F94-149	12W28N	8	SE		Do/Fe						0					0											0
Mound 6 Structure Totals						*2*	*1*	*2*	*0*	*0*	5	*0*	*0*	*0*	*0*	0	*0*	*0*	*0*	*0*	*24*	*0*	*0*	*0*	*0*	*0*	24
Station 6 Totals						***####***	***14***	***2087***	***13***	***30***	**4764**	***12***	***5***	***5***	***7***	**29**	***0***	***13***	***5***	***1***	***24***	***4***	***1***	***5***	***5***	***5***	**53**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: EARLY MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	cf. Fabaceae	Poaceae	Paniceae (Poaceae)	Polygonaceae	cf. Solanaceae	cf. Verbenaceae	Chenopodiaceae/Amaranthaceae	Cyperaceae/Polygonaceae	Euphorbiaceae/Lamiaceae	Euphorbiaceae/Malvaceae	**Total Identified Seeds**	Glumes and other connective	Millet and sorghum embryos	Unidentified fruit or nut shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	
MAKALA KATAA STATION 6																												
Mound 5--Kitchen																												
F94-70	8W2S	5		70-80										1	**4**				1	271	5.34	43	0.5			17	10	Subsampled
F94-71	8W2S	6		80-90											**0**				3	476	13.2	118	2.4			22	10	Subsampled
F89-15	8W4S	4			1										**12**	1	3		8	361	9.52	34	0.6		7	17	?	Subsampled
F89-16	8W4S	5													**2**		2			93	3.25	2	0		3	4.7	?	
F89-17	8W4S	6													**0**	4	2		2	114	2.68					7.6	?	
F89-18	8W4S	7													**1**	1				34	1.11					2.2	?	
F89-19	8W4S	8	HF												**2**					4	0.04					2.8		
F89-20	8W4S	Pot 8													**8**	1				88	2.69	5	0.1			6.6		Fused mass; lg frags of corn cob/cupule
F89-21	8W4S	Pot 9			1										**1**				5	13	0.14					5.3	3?	
F94-175	2E0S	6		80-90									1		**2**	1	1		7	28	0.2	2	0			3.2	5	
F94-176	2E0S	7		90-100		5						1			**6**		1		12	26	0.19				1	4.2	5	
F94-177	2E0S	7		100											**3**			1	3	93	13.4	1	0			2.6	1	Pt sample; ash area
F94-165	2E2S	4,5								3				1	**7**				9	59	0.8	62	0.5			5.8	?	Vessel A
F94-166	2E2S	5		60-70		1									**4**				9	75	1.06	10	0.1			5.2		
F94-168	2E2S	7		80-90		1									**1**				1	54	2.83	14	0.2		1	4.6	?	
F94-169	2E2S	8	W1/2	90-100						2					**7**	1	3		11	39	0.49					4.3	5	
F94-170	2E2S	8		90-100											**0**					2	0.02					0.7	?	Pot 1
Mound 5 Kitchen Totals					*2*	*448*	*420*	*1*	*0*	*5*	*8*	*1*	*1*	*2*	**5665**	*2321*	*179*	*1*	*442*	*3910*	*93*	*533*	*21*	*43*	*44*	*410*	*93*	
Mound 6--Structure																												
F94-108	0W24N	5		80-90											**0**				1	38	0.48	7	0.1			5.5	10	
F94-111	0W24N	5		80-90											**0**				1	33	0.48	401	5.6			14	10	Vessel C (94-38) Contents
F94-113	0W24N	5,6		90-110											**0**					5	0.04	56	1.2			2.9	0.3	Vessel C (94-38) 'food residue'
F94-112	0W24N	6		90-100		1									**25**					50	0.82	18	0.1			9.4		
F94-257	4W24N	4		70-80											**0**				1	10	0.25	2	nil			1.2	10	
F94-265	4W26N	5		80-90											**0**					20	0.17	10	0.1			1.2	5	
F94-266	4W26N	5		80											**1**					34	0.41	4	0.1			3	5	soil above floor
F94-267	4W26N	6		90-100		1			1						**3**	5			3	94	1.16	9	0.1			7.1		
F94-80	8W26N	3		70-80		3			4						**8**				1	21	0.19	4	0.1			9.7	5	
F94-81	8W26N	4		80-90											**1**					31	33	6	0.1			1.6		
F94-82	8W26N	5		90-100											**1**		1			43	0.47	12	0.1			2.7	10	
F94-83	8W26N	6		100-110											**0**				2	78	1.14	22	0.1			3.2		
F94-144	12W28N	6		100-110											**0**					27	0.23	5	0		6	1.8		
F94-145	12W28N	6	SE	100-110											**0**					10	0.1	4	0			2.6		Ashy area SE Corner
F94-149	12W28N	8	SE												**0**				2	29	0.38	15	0.2			3.7	5	Ashy area SE Corner
Mound 6 Structure Totals					*0*	*5*	*0*	*0*	*5*	*0*	*0*	*0*	*0*	*0*	*39*	*5*	*1*	*0*	*11*	*523*	*39*	*575*	*8*	*0*	*6*	*69*	*60*	
Station 6 Totals					***2***	***453***	***420***	***1***	***5***	***5***	***8***	***1***	***1***	***2***	***5704***	***2326***	***180***	***1***	***453***	***4433***	***133***	***1108***	***29***	***43***	***50***	***479***	***153***	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: EARLY MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	Context Type	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*Large sorghum or maize*	*TOTAL INDIGENOUS GRAINS*	*Zea mays cob*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Nicotiana rustica*	*TOTAL TRADE PLANTS*	*cf. Abelmoschus esculentus*	*Adansonia digitata*	*Butyrospermum parkii*	*Cassia tora*	*Ceiba pentandra*	*Ficus sp.*	*Portulaca foliosa*	*Portulaca sp.*	*Zaleya pentandra*	*Fabaceae*	TOTAL USEFUL/WEEDY PLANTS
NGRE KATAA																											
Mound 8																											
NK08-F3	8N127E	2		50-60	Mi						0					0						1					1
NK08-F9	8N127E	4		70-80	Mi						0					0						1					1
NK08-F11	8N127E	6	A	90-100	Mi		2				2	1				1						3				1	4
NK08-F12	8N127E	6	B	90-100	Mi	4		1			5					0									1		1
NK08-F16	8N127E	8	C	110-120	Mi		2																				
Mound 8 Totals						***4***	***4***	***1***	***0***	***0***	***7***	***1***	***0***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***0***	***5***	***0***	***0***	***1***	***1***	***7***
A-212																											
	M1,U1	4		30-40	Mi?	1		1			*2*					*0*											*0*
	M1,U1	7		60-70	Mi?	7		9			*16*					*0*											*0*
	M1,U1	9		80-90	Mi?	3					*3*					*0*											*0*
	M1,U1	11		100-110	Mi?		1				*1*					*0*											*0*
A-212 Totals						***11***	***1***	***10***	***0***	***0***	***22***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***
B-112																											
	M1,U1	4		30-40		1					1		1	1		2											0
	M1,U1	6		50-60		1					1		1			1			2								2
	M1,U1	8	Ash	70-80		2					2		6			6											0
B-112 Totals						**4**	**0**	**0**	**0**	**0**	**4**	**0**	**8**	**1**	**0**	**9**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
EARLY MAKALA PHASE TOTALS						**2639**	**19**	**2098**	**13**	**30**	**4797**	**13**	**13**	**6**	**7**	**39**	**0**	**13**	**7**	**1**	**24**	**9**	**1**	**5**	**6**	**6**	**62**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: EARLY MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	cf. Fabaceae	Poaceae	Paniceae (Poaceae)	Polygonaceae	cf. Solanaceae	cf. Verbenaceae	Chenopodiaceae/Amaranthaceae	Cyperaceae/Polygonaceae	Euphorbiaceae/Lamiaceae	Euphorbiaceae/Malvaceae	**Total Identified Seeds**	Glumes and other connective	Millet and sorghum embyros	Unidentified fruit or nut shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated
NGRE KATAA																											
Mound 8																											
NK08-F3	8N127E	2		50-60											**1**				3	83	1.4	45	0.3	2		11	5
NK08-F9	8N127E	4		70-80	1	2									**4**	8			14	150	2.5	39	0.2	1		11	5
NK08-F11	8N127E	6	A	90-100											**7**				2	563	12	27		11		26	5
NK08-F12	8N127E	6	B	90-100	2										**8**				1	419	7.8	86	1.2	11		18	5
NK08-F16	8N127E	8	C	110-120															1	110	1.69	29	0.4			8.4	5
Mound 8 Totals					***3***	***2***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***20***	***8***	***0***	***0***	***21***	***1325***	***25***	***226***	***2***	***25***	***0***	***74***	***25***
A-212																											
	M1,U1	4		30-40											**2**				*3*	*89*	*2.6*	*9*	*0*		*2*	*7.3*	*5*
	M1,U1	7		60-70											**16**	*9*			*18*	*451*	*11*	*33*	*0*		*2*	*16*	*5*
	M1,U1	9		80-90		*1*									**4**				*3*	*321*	*7.3*	*34*	*0*		*1*	*11*	*5*
	M1,U1	11		100-110											**1**	*4*			*9*	*260*	*7*	*21*	*0*		*1*	*11*	*5*
A-212 Totals					***0***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***23***	***13***	***0***	***0***	***33***	***1121***	***28***	***97***	***1***	***0***	***6***	***45***	***20***
B-112																											
	M1,U1	4		30-40											**3**				12	365	5.31	14	0.2		11	11	5
	M1,U1	6		50-60											**4**					653	13.2	47	0.9		12	20	5
	M1,U1	8	Ash	70-80		1									**9**					545	13	25	0.3		3	13	5
B-112 Totals					***0***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***16***	***0***	***0***	***0***	***12***	***1563***	***32***	***86***	***1***	***0***	***26***	***44***	***15***
EARLY MAKALA PHASE TOTALS					**5**	**457**	**420**	**1**	**5**	**5**	**8**	**1**	**1**	**2**	**5763**	**2347**	**180**	**1**	**519**	**8442**	**218**	**1517**	**34**	**68**	**82**	**642**	**213**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: LATE MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*TOTAL INDIGENOUS GRAINS*	*Zea mays cob*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Capsicum sp.*	*cf. Nicotiana rustica*	*Nicotiana rustica or spore*	*TOTAL TRADE PLANTS*	*cf. Abelmoschus esculentus*	*cf. Cassia occidentalis*	*Cassia tora*	*Celtis integrifolia*	*Ficus sp.*	*cf. Indigofera tinctoria*	*Portulaca foliosa*	*Portulaca sp.*	*Sida sp.*	*Vigna unguiculata*	*Zaleya pentandra*	TOTAL USEFUL/WEEDY PLANTS
BUI KATAA																										
BK08-F9	3	2		30-40			0		3	3				6				2	2						1	5
BK08-F11	3	4		50-60			0	2	5				1	8					1							1
BK08-F13	3	6		70-80			0							0												0
BK08-F5	2	3		45-50			0				1			1					2						6	8
BK08-F3	2	5		60-70			0							0				3					2		8	13
BK08-F8	2	6	B	70-80			0							0				10								10
Bui Kataa Totals					0	0	0	2	8	3	1	0	1	15	0	0	0	15	5	0	0	0	2		15	37
BANDA ROCKSHELTER																										
	1	2		10,20			0		*1*					1										*1*		1
	1	3		20,30			0							0												0
	1	4		30-40			0							0												0
	1	5		40-50			0							0												0
	1	6		50-60			0							0												0
	2	2		20-30		*1*	1							0												0
2 samples	2	2		20-30			0							0												0
	2	3		30-40			0		*1*					1												0
Banda Rockshelter Totals					*0*	*1*	1	*0*	*2*	*0*	*0*	*0*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: LATE MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	Cucurbitaceae	Fabaceae	cf. Fabaceae	Poaceae	cf. Poaceae	Polygonaceae	cf. Solanaceae	Chenopodiaceae/Amaranthaceae	**Total Identified Seeds**	Glumes and other connective	Unidentified fruit or nut shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	
BUI KATAA																									
BK08-F9	3	2		30-40								3	**14**			14	461	7.7	127	2.1			17	5	Subsampled
BK08-F11	3	4		50-60		2						7	**18**			9	604	8.2	94	0.7	3		20	5	Subsampled
BK08-F13	3	6		70-80									**0**			2	21	0.9	3	nil			2.2	5	
BK08-F5	2	3		45-50			1						**10**		3	5	978	16	159	1.5			31	5	Subsampled
BK08-F3	2	5		60-70				1					**14**		15	35	748	24	168	2.4			35	5	Subsampled
BK08-F8	2	6	B	70-80	1								**11**			9	868	12	149	1.5			21	5	
Bui Kataa Totals					1	2	1	1	0	0	0	10	**67**	0	18	74	3680	68.8	700	8.2	3	0	126	30	
BANDA ROCKSHELTER																									
	1	2		10,20									**2**			3	50	1.2	1	0.1			4.2	5	
	1	3		20,30									**0**				32	0.4	2	nil			5.3	5	
	1	4		30-40									**0**				2	0	1	nil			0.6	5	
	1	5		40-50									**0**	1			40	0.6	2	nil			3	5	
	1	6		50-60		1							**1**			1	4	0	1	0.1			0.9	5	
	2	2		20-30									**1**				27	0.3	2	nil			0.7	5	
2 samples	2	2		20-30									**0**			2	9	0.1					1.6	5	
	2	3		30-40									**1**			6	48	0.6					1.9	5	
Banda Rockshelter Totals					*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	***5***	*1*	*0*	*12*	*212*	*3.2*	*9*	*0*	*0*	*0*	*18*	*40*	

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: LATE MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	TOTAL INDIGENOUS GRAINS	*Zea mays cob*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Capsicum sp.*	*cf. Nicotiana rustica*	*Nicotiana rustica or spore*	TOTAL TRADE PLANTS	*cf. Abelmoschus esculentus*	*cf. Cassia occidentalis*	*Cassia tora*	*Celtis integrifolia*	*Ficus sp.*	*cf. Indigofera tinctoria*	*Portulaca foliosa*	*Portulaca sp.*	*Sida sp.*	*Vigna unguiculata*	*Zaleya pentandra*	TOTAL USEFUL/WEEDY PLANTS
MAKALA KATAA																										
Station 9																										
F90-39	6W6S	2	Pit	25-35			0							0												0
F90-40	6W6S	3	Pit	35-45			0	1						1			7								1	8
F90-42	6W6S	4	Pit	45-55	1		1							0												0
F90-44	6W6S	5	Pit	55-65			0		1					1	2							1				3
F90-45	6W6S	6	Pit	65-75			0							0												0
F90-46	6W6S	7	Pit	75-85			0							0												0
F90-47	6W6S	8	Pit	85-95			0							0						1						1
F90-48	6W6S	9	Pit	95-132			0		1	1				2												0
Station 9 Totals					*1*	*0*	*1*	*1*	*2*	*1*	*0*	*0*	*0*	*4*	*2*	*0*	*7*	*0*	*0*	*1*	*0*	*1*	*0*	*0*	*1*	*12*
Station 10																										
F94-330	54W6N	1,2					0							0												0
F94-331	54W6N	2					0							0		1					5					6
F94-360	56W8N	2		50-60			0							0												0
F94-361	56W8N	3		60-70			0							0												0
F94-379	58W8N	2					0							0												0
F94-381	58W8N	3		60-70			0							0												0
F94-396	60W8N	2		60-70			0					1		1					2							2
F94-399	60W8N	4	Pit?	80-90		1	1							0												0
Station 10 Totals					*0*	*1*	*1*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*0*	*2*	*0*	*5*	*0*	*0*	*0*	*0*	*8*
Station 9 & 10 Totals					*1*	*1*	*2*	*1*	*2*	*1*	*0*	*1*	*0*	*5*	*2*	*1*	*7*	*0*	*2*	*1*	*5*	*1*	*0*	*0*	*1*	*20*
LATE MAKALA TOTALS					**1**	**2**	**3**	**3**	**12**	**4**	**1**	**1**	**1**	**22**	**2**	**1**	**7**	**15**	**7**	**1**	**5**	**1**	**2**	**1**	**16**	**58**

APPENDIX B: BANDA MACROBOTANICAL REMAINS BY PHASE: LATE MAKALA PHASE

Flot #	Unit	Level	Zone	cmbd	Cucurbitaceae	Fabaceae	cf. Fabaceae	Poaceae	cf. Poaceae	Polygonaceae	cf. Solanaceae	Chenopodiaceae/Amaranthaceae	**Total Identified Seeds**	Glumes and other connective	Unidentified fruit or nut shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	
MAKALA KATAA																									
Station 9																									
F90-39	6W6S	2	Pit	25-35				1					**1**	4		7	353	7.02	20	0.4			12	?	SW Quad Pit
F90-40	6W6S	3	Pit	35-45	3							3	**15**			4	424	11.5	49	0.6			20		Subsampled
F90-42	6W6S	4	Pit	45-55								7	**8**			5	477	10.3	27	0.3			18	?	
F90-44	6W6S	5	Pit	55-65	1								**5**			4	397	14	39	0.5			20		Subsampled
F90-45	6W6S	6	Pit	65-75								2	**2**			5	448	9.93	12	0.3		5	15		Subsampled
F90-46	6W6S	7	Pit	75-85	1								**1**			2	438	12	58	0.7			19		Subsampled
F90-47	6W6S	8	Pit	85-95		1			3			2	**7**			5	736	20.4	8	0.1			33	5	Subsampled
F90-48	6W6S	9	Pit	95-132									**2**			1	613	16.6	58	0.6			24		Subsampled
Station 9 Totals					*5*	*1*	*0*	*0*	*3*	*0*	*0*	*14*	***40***	*4*	*0*	*33*	*3886*	*102*	*271*	*3*	*0*	*5*	*160*	*5*	
Station 10																									
F94-330	54W6N	1,2											**0**			1	22	0.25	7	0.1			2.4	2	Inside Vessel B
F94-331	54W6N	2								1		1	**8**			9	720	11.4	50	0.6			21	10	
F94-360	56W8N	2		50-60									**0**			2	264	3.64	14	0.2	2		9.2	10	under floor
F94-361	56W8N	3		60-70									**0**			3	753	10.6	35	0.3			20	10	
F94-379	58W8N	2											**0**			1	26	0.17	14	0.1			5.9	10	
F94-381	58W8N	3		60-70									**0**			4	32	0.21	10	0.1			2.3	5	ashy area
F94-396	60W8N	2		60-70				1			2		**6**				16	0.2	2	0.1			8.6	10	
F94-399	60W8N	4	Pit?	80-90									**1**			3	440	10.5	70	1.3			18	10	Subsampled
Station 10 Totals					*0*	*0*	*0*	*1*	*0*	*1*	*2*	*1*	***15***	*0*	*0*	*23*	*2273*	*37*	*202*	*3*	*2*	*0*	*88*	*67*	
Station 9 & 10 Totals					*5*	*1*	*0*	*1*	*3*	*1*	*2*	*15*	***55***	*4*	*0*	*56*	*6159*	*139*	*473*	*6*	*2*	*5*	*247*	*72*	
LATE MAKALA TOTALS					**6**	**4**	**1**	**2**	**3**	**1**	**2**	**25**	**127**	**5**	**18**	**142**	**10051**	**211**	**1182**	**15**	**5**	**5**	**392**	**142**	

APPENDIX B: BANDA MACROBOTANICAL REMAINS, NGRE KATAA, MOUND 6 (MULTIPLE PHASES)

Flot #	Unit	Level	Zone	cmbd	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*TOTAL INDIGENOUS GRAINS*	*Butyrospermum parkii (shell)*	*Celtis integrifolia*	*Ficus* sp.	Boraginaceae	Malvaceae indeter. (cf. Sida sp.)	Poaceae	Euphorbiaceae/Lamiaceae	TOTAL EDIBLE & WEEDY	**Total Identified Seeds**	Sorghum and/or millet embryos	GRAIN PROCESSING BYPRODUCTS	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Total Sample Weight	Liters Floated	Notes
NGRE KATAA																													***see pot contents data for**
Mound 6																													**context and bag nos. of pots**
NK09-F1	42N4W			63.5-74				0								0	**0**		0		32	0.4	13	0.2			4.1	?	Half pot contents
NK09-F305	46N2W			114-133				0					1	1		2	**2**		0		8	0.1					1.2	?	Perforated pot; many insects;microspatter
NK09-F2	46N6W			67				0								0	**0**		0		2						0.2	?	Small pot contents
NK09-F4	46N8W			39-55				0								0	**0**		0	1			3	0			17	?	Large pot contents
NK09-F239	46N10W	9, 10		158-170	1	1		2								0	**4**		0	3	17	0.2	4	0			1.8	?	Pot contents
NK09-F3	48N8W			32-58				0			1					1	**1**		0		15	0.3	1	nil			0.8	?	Pot cluster 4
NK09-F81	48N8W	3	baulk	80-90				0		1						1	**1**		0		16	0.2	8	0.1			5.5	5	
NK09-F122	48N8W	4		90-100	1			1								0	**2**		0		30	0.4	19	0.1			2.8	5	
NK09-F279	48N8W	6		105-120				0								0	**0**		0	2	50	0.7	30	0.2			4	5	
NK09-F299	48N8W	7		120-130	5			5								0			0		47	0.4	3	0			3.3	5	
NK09-F298	48N8W	8		130-140	3			3								0	**6**		0	2	143	1.7	35	0.6	4		8.9	5	microspatter
NK09-F311	48N8W	9		140-150	3	1		4						4		4	**12**		0	2	217	3.5	34	0.5	5		10	5	Microspatter present
NK09-F123	48N8W							0								0	**0**		0		2	0					0.5	?	Inside Pot Cluster 10
NK09-F328	48N8W	10		137-146				0								0	**0**		0		266	3.4	32	0.4	1		7	?	Pot contents below oxidized clay
NK09-F324	48N8W	10		150-160	1		2	3							1	1		1	1	9	67	1.2	7	0.1		25	3.8	5	
NK09-F326	48N8W			142-170	15			15						2		2	**32**		0	3	120	2.6	55	0.1	2	8	8.1	?	Pot contents; hand bones and phalanges
NK09-F306	50N0W			102-117				0								0	**0**		0	2	2	0	5	0.1			2.3	?	Whole pot contents; microspatter
NK09-F131	50N4W	4		100-110				0								0			0		31	0.3	2	0			1.6	5	
NK09-F129	50N4W	7		110-120	2			2	2			1				3			0		42	0.4				1	3.6	5	
NK09-F132	50N4W	8		120-130	1			1								0			0		26	0.3				1	1.6	5	
NK09-F230	50N4W	9		130-140	1			1								0			0	9	46	0.7	1	nil			3.2	5	
Mound 6 Totals					*33*	*2*	*2*	*37*	*2*	*1*	*1*	*1*	*1*	*7*	*1*	*14*	*60*	*1*	*1*	*33*	*1179*	*17*	*252*	*3*	*12*	*35*	*92*	*55*	

APPENDIX B: BANDA MACROBOTANICAL REMAINS, POT CONTENTS (MULTIPLE PHASES & SITES)

Phase	Site	Bag #	Flot #	Mound	Unit	Level	cmbd	Provenience	*Pennisetum glaucum*	*cf. Pennisetum glaucum*	*Sorghum bicolor*	*cf. Sorghum bicolor*	*TOTAL INDIGENOUS GRAINS*	*Zea mays (cob)*	*Zea mays (cupule)*	*Zea mays (kernel)*	*cf. Zea mays*	TOTAL TRADE PLANTS	*Adansonia digitata*	*Butyrospermum parkii (shell)*	*Cassia tora*	*Portulaca sp.*	Fabaceae	Malvaceae indeter. (cf. Sida sp.)	Euphorbiaceae/Malvaceae	cf. Verbenaceae	Cheno-Am	TOTAL EDIBLE & WEEDY	Poaceae	**Total Identified Seeds**
NGRE	KK	95-531	F95-25	101	2W2S	24,25	290-310		2				2					0										0		2
PHASE	KK	95-604	F95-210	138	126W24S	2	40-50						0					0		3								3		3
NGRE OR	NK	08-521	NK09-F1	6	42N4W		63.5-74	40w,24s					0					0										0		0
KUULO	NK	09-789	NK09-F305	6	46N2W		114-133	33-59s, 166-192w					0					0						1				1	1	2
PHASE	NK	08-515	NK09-F2	6	46N6W		67	120-130s, 137-147w					0					0										0		0
	NK	08-522	NK09-F4	6	46N8W		39-55	25-64s, 116-151w					0					0										0		0
	NK	09-651	NK09-F239	6	46N10W	9, 10	158-170	36-46e, 24-38w	1	1			2					0										0		2
	NK	08-388	NK09-F3	6	48N8W		32-58						0					0										0		0
	NK	09-411?	NK09-F123	6	48N8W								0					0										0		0
	NK	09-859	NK09-F328	6	48N8W	10	137-146						0					0										0		0
	NK	09-860	NK09-F326	6	48N8W		142-170	166-124s, 83-11w	15				15					0										0	2	17
	NK	09-790	NK09-F306	6	50N0W		102-117	88-104s, 84-105w					0					0										0		0
KUULO	KK	95-403	F95-8	101	2W2S	8	100-110		1				1					0			1							1		2
PHASE	KK	95-350	F95-18	101	2W2S	18			1				1					0					1					1	1	3
	KK	95-451	F95-62	118	62W4N		53-72						0		*1*	*1*		2										0	*1*	3
	NK	09-652	NK09-F257	7	12N24E		128-141			1			1					0									1	1		2
	NK	09-653	NK09-F252	7	12N24E		141-155		2				2					0										0		2
EARLY			F94-125	5	0W0S	7	90-100	Pot A		1			1					0										0		1
MAKALA			F94-127	5	0W0S	7	90-100	Pot C				1	1					0										0	2	3
PHASE			F94-129	5	0W0S	7	90-100	Pot E					0					0										0		0
			F89-8	5	0W4S			Pot 12					0					0										0		0
			F89-9	5	0W4S			Pot 13					0					0	9									9		9
			F89-59	5	2W4S	4		Pot 16					0					0										0		0
			F89-61	5	2W4S	5		Pot 17	1				1				1	1										0		2
			F89-64	5	2W4S	7		Pot 19					0					0										0		0
			F89-27	5	4W2S	5		Pot 14					0					0										0		0
			F89-28	5	4W2S	5		Pot 15					0					0										0		0
			F89-75	5	4W4S	5		Pot 2					0					0									4	4		4
			F89-76	5	4W4S	5		Pot 4					0					0				4						4		4
			F89-78	5	4W4S	6		Pot 5					0					0										0		0
			F89-82	5	4W4S	7		Pot 6	500+		500+		1000					0										0		1000
			F89-83	5	4W4S	7		Pot 7	14		10		24					0										0		24
			F89-20		8W4S			Pot 8					0	8				8										0		8
			F89-21		8W4S			Pot 9					0					0					1					1		1
			F94-165	5	2E2S	4,5		Vessel A		1			1					0			1	1			1	3		6		7
			F94-170	5	2E2S	8	90-100	Pot 1					0					0										0		0
		94-38	F94-111	6	0W24N	5	80-90	Vessel C					0					0										0		0
		94-38	F94-113	6	0W24N	5,6	90-110	Vessel C					0					0										0		0
TOTALS									**537**	**4**	**510**	**1**	**1052**	**8**	**1**	**1**	**1**	**11**	**9**	**3**	**2**	**5**	**2**	**1**	**1**	**3**	**5**	**31**	**7**	**1101**

APPENDIX B: BANDA MACROBOTANICAL REMAINS, POT CONTENTS (MULTIPLE PHASES & SITES)

Site	Bag #	Flot #	Mound	Unit	Level	cmbd	Glumes and other connective	Sorghum and/or millet embryos	GRAIN PROCESSING BYPRODUCTS	Unidentified nut or fruit shell	Unidentifiable Seed Fragments	Charcoal (count)	Charcoal (weight)	Unid. Char. Plant Remains (ct)	Unid. Char. Plant Remains (wt)	Parenchyma (ct)	Bone and Shell	Slag	Total Sample Weight	
KK	95-531	F95-25	101	2W2S	24,25	290-310			0			247	2.4	8	0				3.6	
KK	95-604	F95-210	138	126W24S	2	40-50			0			21	0.2						2.6	
NK	08-521	NK09-F1	6	42N4W		63.5-74			0			32	0.4	13	0.2				4.1	half pot
NK	09-789	NK09-F305	6	46N2W		114-133			0			8	0.1						1.2	perforated shrine pot; lots of insects; microspatter
NK	08-515	NK09-F2	6	46N6W		67			0			2							0.2	small pot
NK	08-522	NK09-F4	6	46N8W		39-55			0		1			3	0				17	large pot
NK	09-651	NK09-F239	6	46N10W	9, 10	158-170			0		3	17	0.2	4	0				1.8	
NK	08-388	NK09-F3	6	48N8W		32-58			0			15	0.3	1	nil				0.8	
NK	09-411?	NK09-F123	6	48N8W					0			2	0						0.5	Inside Pot Cluster 10
NK	09-859	NK09-F328	6	48N8W	10	137-146			0			266	3.4	32	0.4	1			7	Pot contents below oxidized clay
NK	09-860	NK09-F326	6	48N8W		142-170			0		3	120	2.6	55	0.1		2	8	8.1	tiny hand bones?; need ID
NK	09-790	NK09-F306	6	50N0W		102-117			0		2	2	0	5	0.1				2.3	microspatter
KK	95-403	F95-8	101	2W2S	8	100-110	2		2	1	3	700	9	13	0				12	
KK	95-350	F95-18	101	2W2S	18				0		9	731	9.4	13	0.1				21	
KK	95-451	F95-62	118	62W4N		53-72			0			*QUICK SCAN*							*8*	
NK	09-652	NK09-F257	7	12N24E		128-141			0			15	0.2				58		0.6	
NK	09-653	NK09-F252	7	12N24E		141-155			0		2	8	0				31		0.4	
		F94-125	5	0W0S	7	90-100			0			13	0.2	4	0				1.4	
		F94-127	5	0W0S	7	90-100	2	1	3			29	0.5	5	0.1				13	
		F94-129	5	0W0S	7	90-100			0			15	0.2	4	0				2	
		F89-8	5	0W4S					0		2	5	0							
		F89-9	5	0W4S					0			15	0.5							
		F89-59	5	2W4S	4		1		1			2	22	0.2					5.4	
		F89-61	5	2W4S	5		2	1	3			142	2.7	4	0.1	38			11	fish bone
		F89-64	5	2W4S	7		3	9	12		13	42	0.6	7	0.1	1			6.8	
		F89-27	5	4W2S	5				0		5	48	1.4				3		4.5	
		F89-28	5	4W2S	5		1		1		14	90	1.3				3		7.1	
		F89-75	5	4W4S	5				0			53	0.9	10	0.1				11	
		F89-76	5	4W4S	5				0			17	0.1	4	0				2	
		F89-78	5	4W4S	6				0		7	27	0.2				4		1.8	
		F89-82	5	4W4S	7		500+	4+	0		7	17	0.1	45	0.2				25	rachis; sorghum and millet heads
		F89-83	5	4W4S	7		17	2	19		13	115	1.4	6	0.4		7		7.1	fish or bird bone
		F89-20		8W4S		Pot 8	1		1			88	2.7	5	0.1				6.6	
		F89-21		8W4S		Pot 9			0		5	13	0.1						5.3	
		F94-165	5	2E2S	4,5				0		9	59	0.8	62	0.5				5.8	
		F94-170	5	2E2S	8	90-100			0			2	0						0.7	
		F94-111	6	0W24N	5	80-90			0		1	33	0.5	401	5.6				14	Contents
		F94-113	6	0W24N	5,6	90-110			0			5	0	56	1.2				2.9	food residue'
							29	**13**	**42**	**1**	**99**	**3016**	**64**	**760**	**9.4**	**40**	**108**	**8**	**224**	

APPENDIX C: BANDA PHYTOLITH DATA: ARTIFACT RESIDUES BASIC COUNT

						SPHERES			SHORT CELLS										LONG CELLS			ENVIRONMENTAL INDICATORS												
Lab #	Site	Unit	Level	Description	Sed.	Nodular	Smooth	Echinate	Bilobate	Saddle	Saddle Sm	Rondel	Irregular rondel	Cross	Cross Lg Var 1	Polylobate	Complex Rondel*	Tiny short cells	Sorghum-like long cell	Other long cell		Bulliform	Trichome + General Hairs	Diatom	Epid. Non-quad.	Commelina cf. diffusa epidermal	Dicot tissue	Other	Count Total	Rows Scanned	Nodular: Short Cells Ratio	Complex:Simple Short Cells	Long Cells+Complex SC/Simple Short Cells	Sorghum long cell+Complex Rondel/(Tiny SC+Sm Saddl
ALL 34	NK	42N30W	3	Lg cylinder GS	3	8												9	1					4				Poss	22	5	0.89	NA	NA	0.11
ALL 47	BK	3	8	GS frag	2	146	69	6	89	15		5		4	2	2	12	32		11		7	9	10	5		1		425	5	0.62	0.1	0.47	0.38
ALL 39	B13	10N0W	1&2	Narrow basin	2	68	19		57	2		3		2			15	13		8		2	2	12	3				206	1	0.61	0.23	0.56	1.15
ALL 39				outside of count				3	P						1		P		4						4					5				
ALL 41	B13	24N4W	6	Spherical HG	2	86	47		16	5		3		1		1	10	3	3	13		2	3	2			1		196	5	1	0.38	1.12	4.33
ALL 48	BK	3	8	GS frag	3	29	13		13	2		2		2			3							15	1		3		83	5	0.83	0.16	0.16	NA
ALL 49	BK	3	4	Flat HG	2	107	46	1	32	6			2				2	2		2		1	1	3	1				206	1	1.18	0.05	0.15	1
ALL 49				outside of count													4	11		1														
ALL 50	BK	3	4	Flat HG	3	137	19		23	4		1				1	9		1	2			2			2			201	1	2.4	0.31	0.41	NA
ALL 50				outside of count													1	1	1	1						1			5	2				
ALL 45	MK	0W2S	5-55cm	Spherical HG	2	56	6	2	41	11	2	1		3		2	19	5		6		3	4	2	8				171	1.5	0.61	0.32	0.5	2.71
ALL 46	MK	0W2S	5-55cm	Spherical HG	3	22	6	3	14	6				2			5	1		1		1		2	1		2		66	5	0.59	0.23	0.32	5

APPENDIX C: BANDA PHYTOLITH DATA: SOIL SAMPLES BASIC COUNT

							SPHERES				SHORT CELLS										LONG CELLS			ENVIRONMENTAL INDICATORS										
Lab #	Site	Md	Unit	Lev/Zon	cmbd	Description	Nodular	Smooth	Echinate	Faceted	Bilobate	Saddle	Saddle Sm	Rondel	Irregular rondel	Cross	Cross Lg Var 1	Polylobate	Complex Rondels & Bilobates*	Tiny short cells	Sorghum-like long cell	Other long cell	Commen/Marant Seed Bodies	Bulliform	Trichome+Non-Diag Hairs	Diatom	Epid. Non-quad.	Dicot tissue	Count Total	Rows Scanned	Nod:Short Cells	Complex: Simple Short Cells	Long Cells+ComplexShortCell/Simple Short Cell	Long cells+Complex/Tiny SC+Sm Saddle*
ALL 51	MK	6	2W0S	4	52	Under GS	62	11	1	1	56	18	1	6	3	2			11	20	1	3		2	2		8		208	1	0.53	0.13	0.41	0.57
ALL 51						outside of count													1	6		6					4		17	2				
ALL 53	MK	6	2W24N	8	113	Below GS	82	34	3	1	29	5		2		4			22	1	3	14		4	2	3		1	210	1	1.3	0.55	1	25
ALL 53						outside of count													7		4		1				1		13	5				
ALL 54	MK	6	2E2S	6	70-80	Soil below pot support	47	19	1		55	10	5	5	3	2	1		5	25	1	8		1	1	3	6		198	1	0.42	0.06	0.48	0.2
ALL 54						outside of count														4		10					7		21	3				
ALL 57	MK	6	2W20N	4	82-85	10x10cm of Floor	49	12	1		64	18		5	2	1		1	13	14	2	9	1	1	4		7		204	2	0.42	0.14	0.42	1.07
ALL 59	NK	8	8N127E	9	120-130		102	14	3		35	2	9	3		6	2	2	3	3	1	5			4	1	1		196	1	1.57	0.05	0.2	0.33
ALL 60	NK	8	8N127E	18	210-220		87	17			55	3	7	1		9	1		3	6	1	4			4	1		1	200	1	1.02	0.04	0.18	0.31
ALL 61	NK	8	8N127E	29	320-330		107	21			42	4	1	2		6		1	2	8	3	3			3				203	1	1.62	0.04	0.29	0.56
ALL 64	NK	7	14N22E	7G	100-110	Floor?	75	29			41	10		10		1	2	1	24	16	2	5			2	3	9	2	232	1	0.71	0.37	0.72	1.63
ALL 64						outside of count											1		2		1		1			3	6		14	5				
ALL 65	NK	7	14N22E	14	174-187	BF 6&7	64	120	1		9	1	1						4	4	2					2	1		209	1	3.37	0.36	0.91	1.2
ALL 65						outside of count					15	6			3				7		5	4							40	3				
ALL 66	NK	7	14N24E	9G	110-120	BF contents	92	18			53	7	6	1		4		1	5	6	2	4		2		4			205	1.5	1.11	0.07	0.24	0.58
ALL 67	NK	7	14N26E	10	100-110	Cluster C	63	38	1	1	29	9	5	2		6	1	1	9	20	1	6			9	2	1		204	1	0.77	0.17	0.68	0.4
ALL 67						outside of count					P								9	14		14							37	2				
ALL 69	NK	7	14N26E		166-175	Floor C	77	49	2		25	10	1	3		2			9	15	1	4				1			199	1	1.18	0.22	0.71	0.63
ALL 69						outside of count													6	10	5	10							31	2				
ALL 63	NK	7	12N24E	14Q	163-170		71	44	1		28	7	1	1	1	2			15	16	3	7		1	1	1			200	1	1	0.38	1.03	1.06
ALL 63						outside of count													6	13	3	10					2		34	2				
ALL 62	NK	7	12N24E	10H	120-130	Floor?	82	28	1		30	7	6	2		1		1	8	31		1			1	2	1		202	1	0.95	0.17	0.85	0.22
ALL 62						outside of count													R	C		1					3		4	2				

APPENDIX C: BANDA PHYTOLITH DATA: SHORT CELLS IN ARTIFACT RESIDUES

(P=Pearl millet indicator, S=Sorghum indicator, M=Maize indicator)

							Simple													Complex																					
Lab #	Site	Md	Unit	Level/Zone	Description	Sed.	Bilobate (all)	Bilobate Lg (>10µm)	Bilobate Sm (<10µm) **(P)**	Saddle (all)	Saddle Lg (>10µm)	Saddle Sm (<10µm) **(P)**	Rondel	Irreg. Rondel **(S,M)**	Cross Med, Lg (>10µm) **(S)**	Var. 1 Cross Lg (>15µm) **(M)**	Cross Sm (<10µm) **(P)**	Polylobate	Other small SCs (<10µm) **(P)**	2-3 Spike Bilobate Sm (>10µm) **(P)**	Tall squared variable top, rondel base **(S)**	Tall squared variable top, lobed base **(S)**	Tall squared variable top, keeled	Saddle-like top with lobed to rondel base **(S)**	Wavy top rondel **(M)**	Ruffle Top Rondel **(M)**	Narrow Elongate Rondel **(M,S)**	Ephemeral Top Rondel **(M)**	Conical tower, decorated	Conical tower, undecorated	Elongate plateau rondel	Elongate plateau bilobate	Long cells (all)	Long cells lightly silificed **(P,S)**	Long cells lightly silificied Pearl millet type **(P)**	Long cells Sorghum Type 1 **(S)**	Long cells Sorghum Type 2 **(S)**	TOTAL grass cells	%millet indicators	%sorghum indicators	%maize indicators
ALL 39	B13		10N0W	1&2	Narrow basin	2	57			2			3		2				13	3	9							3					8	2				100	16	9	3
ALL 39					outside of count			P								1					P							1					4								
ALL 40	B13		10N0W	1&2	Narrow basin	3	66	58	8	10	9	1	6	2			6	2		4	5		2			2		1			9	1	9					125	15.2	4	9.6
ALL 41	B13		24N4W	6	Spherical HG	2	16			5			3		1			1	3		7	1						3					16				3	56	5.36	17.9	5.36
ALL 42	B13		24N4W	6	Spherical HG	3	4	4		1	1			1							1												3				2	10	0	30	0
ALL 34	NK	3	42N30W	3	Lg cylinder GS	3													9														1				1	10	90	10	0
ALL 38	NK	7	14N26E	10	Cylinder GS	3	3	3										1		1													2					7	14.3	0	0
ALL 43	MK	6	0W0S	3	Spherical HG	2	45	43	2	11	8	3	1	4	1		8		11	1	3			1				1		3	3	1	6	1	1		1	100	26	5	4
ALL 45	MK	6	0W2S	5-55cmbd	Spherical HG	2	41	39	2	13	11	2	1					2	2	3	8			5			3	3					6	1				87	10.3	14.9	6.9
ALL 46	MK	6	0W2S	5-55cmbd	Spherical HG	3	14			8	6	2							1		4			3														30	10	23.3	0
ALL 47	BK		3	8	GS frag	2	89			15			5		3	2		2	31		2	1				4	3						12	5				169	18.3	1.18	5.33
ALL 48	BK		3	8	GS frag	3	13	11	2	2	2		3				2				2					1												23	17.4	8.7	4.35
ALL 49	BK		3	4	Flat HG	2	32	32		6	6			2					2	1													2					45	6.67	0	0
ALL 49					outside of count														11					2			2						1								
ALL 50	BK		3	4	Flat HG	3	23	22	1	4	4		1					1			2	1		1	2		2	1					2	1			cf.1	40	2.5	7.5	12.5
					outside of count				1															1									2				1				

APPENDIX C: BANDA PHYTOLITH DATA: SHORT CELLS IN SOIL SAMPLES

(P=Pearl millet indicator, S=Sorghum indicator, M=Maize

							Simple													Complex																	
Lab #	Site	Md	Unit	Level	cmbd	Description	Bilobate (all)	Bilobate Lg (>10µm)	Bilobate Sm (<10µm) **(P)**	Saddle (all)	Saddle Lg (>10µm)	Saddle Sm (<10µm) **(P)**	Rondel	Irreg. Rondel **(S,M)**	Cross Med, Lg (>10µm) **(S)**	Var. 1 Cross Lg (>15µm) **(M)**	Cross Sm (<10µm) **(P)**	Polylobate	Other small SCs (<10µm) **(P)**	2-3 Spike Bilobate Sm (>10µm) **(P)**	Tall squared variable top, rondel base **(S)**	Tall squared variable top, lobed base **(S)**	Tall squared variable top, keeled	Saddle-like top with lobed to rondel base **(S)**	Wavy top rondel **(M)**	Ruffle Top Rondel **(M)**	Narrow Elongate Rondel **(M,S)**	Ephemeral Top Rondel **(M)**	Long cells (all)	Long cells lightly silificed **(P,S)**	Long cells lightly silificied Pearl millet type **(P)**	Long cells Sorghum Type 1 **(S)**	Long cells Sorghum Type 2 **(S)**	TOTAL grass cells	% millet indicators	%sorghum indicators	%maize indicators
ALL 59	NK	8	8N127E	9	120-130		37	32	5	11	2	9	3		1	2	5	2	3		3			1					6		1	1	1	74	31.1	8.11	2.7
ALL 60	NK	8	8N127E	18	210-220		55	44	11	10	3	7	1		1		9		4	2	1			1				1	3	1			1	88	37.5	3.41	1.14
ALL 61	NK	8	8N127E	29	320-330		42	37	5	5	4	1	2		1		5	1	6	2	1			1				1	6		1		3	73	27.4	6.85	2.74
ALL 64	NK	7	14N22E	7G	100-110	Floor?	9			10			10		1	2		1	16	3	8			2	cf.1		9		7				2	59	32.2	20.3	20.3
ALL 64						outside of count										1										2						1		3			
ALL 65	NK	7	14N22E	14	174-187	BF 6&7	9	9		2	1	1							5		1	1	1				1						2	20	30	15	15
ALL 65						outside of count		C			P			3							2						1		9				5	15			
ALL 66	NK	7	14N24E	9G	110-120	BF contents	53	46	7	12	7	6	1		2		2	1	4	2	3	1						1	6				2	89	23.6	5.62	2.25
ALL 67	NK	7	14N26E	10	100-110	Cluster C	29			14	9	5	2			1	6	1	21	2	6								7				1	60	56.7	11.7	3.33
ALL 67						outside of count	P														3			6					15				1	24			
ALL 69	NK	7	14N26E		166-175	Floor C	25	24	1	11	10	1	3				2		12	3	6		1				2		6				1	71	26.8	9.86	2.82
ALL 69						outside of count													8	2	5						1		15				5	31			
ALL 63	NK	7	12N24E	14Q	163-170		28	28		8	7	1	1	1			2		16	4	7	1	1	3	cf.1				13	3			3	85	27.1	15.3	1.18
ALL 63						outside of count	P						P						13	2				1					13	1			3	29			
ALL 62	NK	7	12N24E	10H	120-130	Floor?	30	30		13	7	6	2				1	1	29	2	5	2					3		1					89	42.7	5.62	3.37
ALL 62						outside of count													C	R									1					1			
ALL 51	MK	6	2W0S	4	52	Under GS	56	56		19	18	1	6	3	2				10	10	5	2		2					4				1	119	17.6	6.72	0
ALL 51						outside of count													6								1		6					13			
ALL 53	MK	6	2W24N	8	113	Below GS	29		1	5			2		1		3				20						1		17				3	45	8.89	51.1	4.44
ALL 53						outside of count															3						3		4	1			3	10			
ALL 54	MK	6	2E2S	6	70-80	Soil below pot support	55	55		15	10	5	5	3	2	1			17	8	1	1	1				2	1	9	3			1	121	24.8	1.65	5.79
ALL 54						outside of count													4										10	7				14			
ALL 57	MK	6	2W20N	4	82-85	10x10cm of Floor		64			18		5	2	1			1	11	4	2	2		3			1	4	11				2	129	11.6	5.43	3.88

APPENDIX D: BANDA CHARCOAL DATA: VOLTA PHASE: CAL AD 1000-1280 (identified by Alexa Hoehn)

Wood Taxa	**Banda 13 B1309 - F8** Mound 1, L.3, 70-80 cm	**Banda 13 B1309 - F16** Mound 1, L.6, 100-110cm	**Banda 13 B1309 - F19** Mound 1, L.8, 120-130 cm	**Banda 27** Mound 2, Unit 1, Level 9, 90-100 cm	**Banda 27** Mound 2, Unit 1, Level 15, 150-160 cm	**Count Total**	**% Total**
Terminalia	1	6	8	6	1	22	15.1
Detarieae 2, cf. *Afzelia*, but others cannot be excluded like eg. *Gilbertiodendron, Guibourtia, Julbernardia,*	12	13	25	22	4	76	52.1
Bridelia cf. *Micrantha*, Phyllantaceae	2	2				4	2.7
Vitellaria paradoxa type, Sapotaceae		2			1	3	2.1
Pterocarpus type	2				1	3	2.1
Anogeissus leiocarpa	2	2				4	2.7
Detarium sp.	2	2	4			8	5.5
Combretum molle/nigricans		1			2	3	2.1
Rubiaceae II, cf. *Crossopetryx/Mitragyna*	2	.	1			3	2.1
Pericopsis-type, *Disthemonanthus* cannot be excluded	2	2	3			7	4.8
Lophira cf. *lanceolata* (rather for distribution reasons than wood anatomically)		1				1	0.7
Ziziphus	1					1	0.7
cf. *Carapa procera,* Meliaceae		1				1	0.7
Indet.	4	4		2		10	6.8
TOTALS	**30**	**36**	**41**	**30**	**9**	146	

APPENDIX D: BANDA CHARCOAL DATA: NGRE AND EARLY KUULO PHASE: CAL AD 1210-1450 (identified by Alexa Hoehn)

Wood Taxa	**Ngre Kataa NK09-F324** Mound 6, 48N8W, L. 10, 150-160cm	**Ngre Kataa NK09-F298** Mound 6, 48N8W, L. 8, 130-140 cm	**Ngre Kataa NK08-F60** Mound 8, L. 29, 320-330 cm	**Ngre Kataa NK08-F48** Mound 8, L. 23, 250-260 cm	**Kuulo Kataa F95-23** Mound 101, 2W2S, L. 23, 280-290cm	**Kuulo Kataa F95-21** Mound 101, 2W2S L. 21, 260-270 cm	**Count Total**	**% Total**
Terminalia	5		10	8	2	12	37	21.4
Detarieae 2, cf. *Afzelia*, but others cannot be excluded like eg. *Gilbertiodendron, Guibourtia, Julbernardia,*			3	5	4	4	16	9.2
Bridelia cf. *Micrantha*, Phyllantaceae			1	3	1	1	6	3.5
Vitellaria paradoxa type, Sapotaceae	1		2	1		8	12	6.9
Pterocarpus type		1		2	1	1	5	2.9
Detarieae 1 type cf. Berlinia/Isoberlinia type, Bikinia (and others) cannot be excluded	1				4	4	9	5.2
Anogeissus leiocarpa				2	1	2	5	2.9
Detarium sp.			4		1	5	10	5.8
Combretum molle/nigricans			2			2	4	2.3
Rubiaceae II, cf. *Crossopetryx/Mitragyna*			2	1		5	8	4.6
Monotes, Dipterocarpaceae						2	2	1.2
cf. *Prosopis*				1	1		2	1.2
Uapaca					1	2	3	1.7
Pericopsis-type, *Disthemonanthus* cannot be excluded			1				1	0.6
Khaya, Meliaceae				2			2	1.2
Lophira cf. *lanceolata* (rather for distribution reasons than wood anatomically)	1						1	0.6
Daniellia					1	2	3	1.7
Piliostigma					2		2	1.2
Parinari					3		3	1.7
Celtis cf. *integrifolia*, syn. Toka	1						1	0.6
Grewia cf. *mollis*		2					2	1.2
cf. *Pteleopsis*	2						2	1.2
Sapotaceae, dendritic, *Synsepalum* type					1		1	0.6
Sapotaceae, banded		1					1	0.6
cf. *Carapa procera*, Meliaceae			1				1	0.6
Microdesmis, Pandaceae					1		1	0.6
Triplochiton scleroxylon	2						2	1.2
cf *Klainedoxa*						2	2	1.2
Canarium/Dacryodes type					1		1	0.6
Petersianthus macrocarpum	1					2	3	1.7
Ongokea gore, Olacaceae	1						1	0.6
Indet.	4	1	4	5	4	6	24	13.9
TOTALS	**19**	**5**	**30**	**30**	**29**	**60**	**173**	

APPENDIX D: BANDA CHARCOAL DATA: MID-LATE KUULO PHASE: CAL AD 1450-1650 (Identified by Alexa Hoehn)

Wood Taxa	**Ngre Kataa NK09-F155** Mound 7, 12N24E, L9, 110-120 cm, 2.H	**Ngre Kataa NK09-F315** Mound 7, Burnt Feature 6+7, 174-187cmbd	**Ngre Kataa NK08-F46** Mound 8, Level 20, 8N127E, 230-240 cm	**Ngre Kataa NK08-F45** Mound 8, Level 19, 220-230cm	**Ngre Kataa NK08-F37** Mound 8, level 14, 170-180 cm	**Ngre Kataa NK08-F11** Mound 8, Level 6, 90-100 cm	**Kuulo Kataa F95-19** **Mound 101, 2W2S, L 19, 240-250 cm**	**Kuulo Kataa F95-14** **Mound 101, 2W2S, L 15, E 1/2, 170-180 cm**	**Kuulo Kataa F95-194** Mound 118, 70W4N, L 8, zone B, 100-110 cm	**Kuulo Kataa F95-90** Mound 118, 64W 4N, Lev 8, Zone D, 100-110 cm	**Kuulo Kataa 70 E 48 N** Mound 148, Feature 1 Fill, W portion, drk soil	**Count Total**	**% Total**
Terminalia		23	1	1	9	10	3	4	6	1	10	68	26.0
Detarieae 2, cf. *Afzelia*, but others cannot be excluded like eg. *Gilbertiodendron, Guibourtia, Julbernardia,*	1		5	7	4	4	16	6	2	7		52	19.8
Bridelia cf. *Micrantha*, Phyllantaceae	1		4	2	2			3	3	1		16	6.1
Vitellaria paradoxa type, Sapotaceae				1	6	3	2	3	2	1	8	26	9.9
Pterocarpus type			1			5			1			7	2.7
Detarieae 1 type cf. *Berlinia/Isoberlinia* type, *Bikinia* (and others) cannot be excluded	1	2			2		1	1	1			8	3.1
Anogeissus leiocarpa				2		2		1	4			9	3.4
Detarium sp.		1			2							3	1.1
Combretum molle/nigricans	1					3	1					5	1.9
Rubiaceae II, cf. *Crossopetryx/Mitragyna*					1			2				3	1.1
Monotes, Dipterocarpaceae							1	5	1		10	17	6.5
cf. *Prosopis*	1			1	1		2				1	6	2.3
Uapaca								2	3	1		6	2.3
Khaya, Meliaceae					1				1			2	0.8
Lophira cf. *lanceolata* (rather for distribution reasons than wood anatomically)							1		1			2	0.8
Piliostigma				2								2	0.8
Detarieae 3, cf. Parkia									2			2	0.8
Ongokea gore, Olacaceae								1				1	0.4
aliform with 5celled and >10celled homocellular rays	2											2	0.8
Indet.	1	3		5	4	3	3	2	3		1	25	9.5
TOTALS	**8**	**29**	**11**	**21**	**32**	**30**	**30**	**30**	**30**	**11**	**30**	**262**	

APPENDIX D: BANDA CHARCOAL DATA: EARLY MAKALA PHASE: C. 1770s-1820s (identified by Alexa Hoehn)

Wood Taxa	**Makala Kataa F94-71** Station 6, 8W2S, Lev6, 80-90cm	**Makala Kataa F89-80** Station 6, 4W 4S, L.7, NE/SE	**LF A-212 (Regional Test) F01-10** Mound 1, Unit 1, Lev 11, 100-110 cm	**LF A-212 (Regional Test) F01-6** Mound 1, Unit 1, Lev 7, 60-70cm	**Count Total**	**% Total**
Terminalia	7	2			9	7.5
Detarieae 2, cf. *Afzelia*, but others cannot be excluded like eg. *Gilbertiodendron, Guibourtia, Julbernardia,*	8	24	2	2	36	30.0
Bridelia cf. *Micrantha*, Phyllantaceae		1	5	3	9	7.5
Vitellaria paradoxa type, Sapotaceae	2		10	13	25	20.8
Pterocarpus type	3	3	3	2	11	9.2
Detarieae 1 type cf. *Berlinia/Isoberlinia* type, *Bikinia* (and others) cannot be excluded	4		1		5	4.2
Anogeissus leiocarpa			1	3	4	3.3
Combretum molle/nigricans			2	1	3	2.5
Monotes, Dipterocarpaceae	1				1	0.8
cf. *Prosopis*			3		3	2.5
Pericopsis-type, *Disthemonanthus* cannot be excluded				1	1	0.8
Khaya, Meliaceae	1				1	0.8
Parinari				2	2	1.7
Strychnos innocua				1	1	0.8
Indet.	4		3	2	9	7.5
TOTALS	**30**	**30**	**30**	**30**	**120**	

APPENDIX D: CHARCOAL DATA: LATE MAKALA PHASE: C. 1890s-1920s (identified by Alexa Hoehn)

Wood Taxa	**Makala Kataa F90-40** Station 9, 6W6S Pit, Lev 3, 35-45 cmbd	**Makala Kataa F90-44** Station9 9, 6W6S, Pit, Lev 5, 55-65	**Makala Kataa F90-46** Sation 9, 6W6S, Pit, Lev 7, 75-85 cm	**Makala Kataa F90-48** Station 9, 6W6S, Pit, Lev 9, 95-132 cm	**Count Total**	**% Total**
Terminalia	9	11	8	6	34	22.7
Detarieae 2, cf. *Afzelia*, but others cannot be excluded like eg. *Gilbertiodendron, Guibourtia, Julbernardia,*	2	14	10	4	30	20.0
Bridelia cf. *Micrantha*, Phyllantaceae		5	5		10	6.7
Vitellaria paradoxa type, Sapotaceae						
Pterocarpus type	1	11	1	2	15	10.0
Detarieae 1 type cf. *Berlinia/Isoberlinia* type, *Bikinia* (and others) cannot be excluded	1	3		3	7	4.7
Anogeissus leiocarpa	1				1	0.7
Detarium sp.	1	1			2	1.3
Combretum molle/nigricans	3				3	2.0
Rubiaceae II, cf. *Crossopetryx/Mitragyna*		1			1	0.7
Monotes, Dipterocarpaceae		2	2		4	2.7
Uapaca	3	2			5	3.3
Pericopsis -type, *Disthemonanthus* cannot be excluded				7	7	4.7
Lophira cf. lanceolata (rather for distribution reasons than wood anatomically)	4				4	2.7
Daniellia			1	3	4	2.7
Diospyros	2	1			3	2.0
Detarieae 3, cf. *Parkia*				1	1	0.7
cf. *Trichilia*, Meliaceae				1	1	0.7
Detarieae 4, cf *Didelotia,Gilbertiodendron,Guibourtia* Typ		2			2	1.3
cf. *Lannea* (mit RadK.)				1	1	0.7
Shirakiopsis elliptica (Sapium ellipticum)		1			1	0.7
Canarium/Dacryodes type		1			1	0.7
Monocot, probably palm	1				1	0.7
Indet.	2	5	3	2	12	8.0
TOTALS	**30**	**60**	**30**	**30**	**150**	

APPENDIX E

Report on the Vegetable Foodstuffs in Use at Kintampo, N.T.
By [illeg] W. Graham, M.D.[?], A.C.S.
In GNA ADM 56/1/458, Annual Report Kintampo District for 1902.

List of Foodstuffs in Use at Kintampo N.T.

1. Maize
2. Guinea corn
3. Yams
4. Koko
5. Plantain
6. Cassada
7. Rice
8. Sweet potatoes
9. Gwaya
10. Lisga
11. Tumuku
12. Beans
13. Ground Nut
14. Kwalulu
15. Gabu
16. Kuka
17. Yakwah
18. Yarangwoi
19. Kwabia
20. Pumpkin
21. Dawa-dawa
22. Shea butter
23. Palm oil
24. Ginger
25. Chillies
26. Black pepper
27. Cloves
28. Guinea grain
29. Pineapples
30. Limes
31. Oranges
32. Mango
33. Banana
34. Papaw
35. Eggplant
36. Tomato
37. Honey

38. Sugar cane
39. Tobacco
40. Palm wine

Meatstuffs

1. Ox
2. Sheep
3. Goat
4. Bush Cow
5. Domestic Fowl
6. Guinea Fowl
7. Duck
8. Pigeon
9. Wild pigeon
10. Bush fowl
11. Korkor
12. Deer
13. Dried Fish
14. Hippo

Food

Food besides its purely chemical aspect as the source of energy, or work, has also what may be called a psychophysical aspect as a distinction of race.

All who have in Europe observed races other than his own must have remarked that the dietary differed [sic], often very widely, among neighboring races & that this difference was distinction of race.

The same observation & distinction may also be made among the negro races living side by side on the West Coast of Africa.

This of course always necessary to bear in mind the differences in dietary that may be caused by the acceptance of a religious cult, but in West Africa religious profession seems to have very little effect on dietary for the Mohammedanism proferred there is corrupted by being grafted on the Fetish stock & its dietetic prohibitions are rarely observed. [Thus] if Mohammedan Hausa soldiers on occasion of scarcity eat pork, & alcoholic drink is a temptation rarely refused by any negro, Mohammedan or otherwise, who has once learned its charm.

Omitting then religious distinction and generalising roughly it may be said that: The Fantu[1] speaking races grow their staple foods underground; the Hausa speaking races grow it above ground.

[1] The term 'Fantu' does not seem to refer to 'Fante', a group based on the Ghanaian coast, based on the foodways Graham describes for them (based on fufu and yams). However to my knowledge there are/were no groups inhabiting Kintampo that are called 'Fantu'. I assume that he refers to the local inhabitants of Kintampo.

The Fantu staple food is Fufu, the Hausa staple is Kanki & this may be translated into European dietary by saying that: The Fantu eats potatoes & the Hausa eat bread. The Fantu is better adapted for handicrafts, or clerk work; the Hausa for severe physical exertion or enterprises demanding endurance & courage.
That the difference of food has induced the different physical & mental characteristics of the two races seems extremely unlikely. No doubt the differences are hereditary & are both induced by the same cause—a difference of race.

Maize
This grain affords the staple food of the Hausa population & is grown on every suitable piece of land in or about the town. The seed is sown in April in small mounds made by drawing together the surface soil with a hoe.

Three seeds are usually planted slightly apart in each mound.

The crop requires three month to become ripe & as soon as it is harvested a second similar crop is sown on the same ground which also becomes ripe in again another three months. Thus two crops of this grain are raised here yearly during the season of the rains.

The grain is eaten; raw, roasted in the hot ashes of a fire, boiled, or in the form of Kanki.
Kanki—This food of the Hausa dietary replaces the bread of the European dietary which it much resembles in constituents & preparation. It is thus made.

1. Corn removed from cob
2. Grain steeped in water
3. Water strained off
4. Damp grain placed in wooden mortar & beaten to flour with a heavy stick
5. Flour winnowed on a concave mat tray.
6. Water added and mixture boiled about ¼ hour
7. Removed from pot & rubbed to a paste between two flat stones
8. Water added to make a thick paste
9. Paste divided into balls, wrapped in plantain leaves & allowed to stand (i.e ferment) for about one hour.
10. The balls still wrapped in plantain leaves are boiled for about half an hour.
11. The food removed from its leaf envelope is eaten hot or cold.

From this description it will be readily seen that Kanki is really a fermented bread that has been boiled instead of being baked.

The prepared food, Kanki, is an article of commerce here & daily on sale in the native market. As a rule it is not appreciated by the Fantu-speaking people who pronounce it sour & prefer fufu.

Guinea corn (millet)
Guinea corn called Dawo by the Hausa is very largely grown at Kintampo.

The grain is borne in a pointed mass on the top of a long stalk, resembling a maize stalk growing to [illeg] 12 feet high.

The grain is a nearly circular disc & in form much resembles the lentil of European markets. Guinea Corn is thus grown… When the second crop of maize is about 2 feet high the guinea corn is sowed among the young maize plants. It then takes about 7 months to become ripe, becoming fit for use therefore [illeg] 4 months after the last crop of maize has been harvested i.e. in the month of December.

The grain in the ear forms an excellent food for cattle or horses.

For human consumption this grain is beaten into flour in a native mortar.
Of this flour the negro makes two dietary articles

1. Gruel
2. Beer

The Beer, which is described by the native Hausa is sweeter than Palm wine, is thus made.

1. The Guinea Corn is placed in a wooden mortar & beaten to a coarse flour.
2. The flour is washed in water to get rid of the pericarp particles (husk).
3. The washed flour is placed in a large pot of water & boiled for 2 or 3 hours.
4. The pot & its boiled contents are placed aside, covered with leaves for 3 days, i.e. to undergo fermentation.
5. The supernatant fluid is then ready to be used as beer.

Yams
Yams afford a very large part of the food of the people of Kintampo & are eaten by Hausa Fantus and European alike.

The tubers are grown in & around the town & a still larger supply is brought in for sale daily from the surrounding villages.

The yam is a climbing plant of the genus Dioscorea & it resembles somewhat in its growth the bean called scarlet-runner in Europe.

When mature its produces a large almost cylindrical tuber, one to one and a half feet long & 3, 4, or 5 inches in diameter. The growing extremity tapers to a very blunt point.

The flesh is white, somewhat fibrous, & consists almost wholly of starch. It forms when boiled or fried an excellent substitute for potatoe.

This crop is planted early in January & it becomes ripe late in July or early in August when a celebration, or harvest [illeg], called by Europeans the Yam Custom is held by the negroes.

The planting is done as follows: A mature tuber is divided horizontally into two parts. The blunt pointed growing part is laid aside for food & the upper or stem bearing part is divided longitudinally into two parts & each division is placed to grow in a prepared hole apart. When later[?] on the thin climbing stem appears it is trained up a stick or upon a neighboring tree.

From the Yam is prepared Fufu which forms the staple food of the Fante speaking people. Fufu is prepared as follows—

1. The yam is cut in slices & placed in a pot of water

2. It is boiled
3. Water is strained off.
4. Hot yam pieces placed in a wooden mortar.
5. Beaten with a heavy stuck to a gelatinous mass for half an hour.
6. Eaten warm as it is removed from the mortar.

Fufu can be prepared from yams, plantain, koko, or cassada but that prepared from Yams is very much preferred.

Koko
This plant is called Aminkeni by the Fante remsembles very much a [illeg] Lily (Arum) in its growth & appearance.

It is very little grown at Kintampo where the population is so largely Mohammedan but it is a favorite crop in all the N'Koranza villages for its use appears to be a race distinction which is almost confined to the Fante[u?] speaking peoples.

It is a slow growing plant taking a full year to become mature.

It affords a parsnip-shaped tuber with a white flesh consisting almost wholly of starch.

When boiled the flour has commonly a pink color & a peculiar odour.

This tuber is used by the negro as a substitute for Yams in the making of Fufu, or it is roasted in the ashes of a fire & so eaten.

When roasted it has a pleasing flavour much resembling that of the European potatoe.
Boiled its flavor is coarser & its odour heavy & somewhat offensive.

The Plantain
This crop is grown at Kintampo, not so largely as in the N'Koranza villages, for it is chiefly grown & used by the Fantes or Ashanti in the preparation of their staple food--Fufu. The plantain is easily propagated by the division of the crowns of old plants & it can be planted out at any season.

It is universally cultivated by the Fantes[?] speaking peoples & its appearance always heralds the approach to one of their villages. The fruit is used in the unripe green state before it becomes sweet. It then consists almost entirely of starch & is used to make fufu in the place of yams. This fufu is made in the same manner as Yam fufu. Besides being made into Fufu the plantain is boiled or is roasted in the hot ashes of a fire.

Roasted thus in hot ashes, scraped, & taken with butter it makes a useful substitute for potatoes & is pleasing to the Europeean palate.

On ripening the fruit becomes yellow and sweet but it is larger, denser, less sweet, & of coarser flavour than the banana it somewhat resembles. The juice of the unripe green plantain is intensely astringent.

Cassada (Cassava or Manioc)
There are two varieties of Cassada usually seen Wild Cassada & Cultivated Cassada

The tuber of the wild Cassada is said to be the poisonous & is little used for food.

The cultivated variety is a herbaceous plant with a brown knotty stem crowned by a head of long stalked deeply digitate leaves. It is easily propagated by cuttings of the stem and produces a brown cylindrical tuber one to one and a half foot long.

The flesh is white, brittle & of a pleasant nutty flavour. It is composed almost wholly of starch & is considered poor coarse food at Kintampo.

It is sold here in two forms—the fresh tuber and the dried tuber.

The dried tuber bears a curious resemblance to bleached bones. It is prepared by dividing the fresh tuber longitudinally & drying it in the sun. In this form it keeps well & can be stored for months.

It is from the tuber of Cassada that the subsistence, known as Tapioca in European dietaries, is made & probably the negro could be easily taught to produce a saleable tapioca.

When yams are scarce or out of season the Cassada tuber is used to make Fufu.

Cassada Fufu is thus made—
1. Tuber cleaned & scraped
2. Tuber grated on a tin grater
3. Grated mass placed in calabash, covered with leaves & allowed to stand 2 or 3 days
4. Removed from calabash, placed in mortar and beaten for about ¼ of an hour
5. The mass removed from mortar, placed in a pot of water & boiled
6. Cut into pieces & eaten hot or cold

Cassada fufu is whiter & more gelatinous than fufu made from Yam or Plantain

Rice
Rice I am told has been grow here on some low lying land near the water supply which is inundated every year.

The grain is not much in regards as food for its use seems also to be distinction of race. Its use is almost confined to the labourers imported from Sierra Leone. There it is the favorite food of both ?Femme & ?Mendi but it is the red rice with its adherent pericarp that they eat. The white imported rice is considered ?more wholesome in S. Leone.

This crop could be readily grown on the land on the banks of the Volta which are inundated yearly in the season of the rains; but then a taste for it would have to be created among the native population before it could form a profitable crop for local consumption.

Sweet Potatoes (Ipomea Batatas) H. Dawkali
This plant grows here like a weed covering pieces of worked ground with its trailing stems & ?prostrate Leaves.

It produces a tuber of a ?prolale spheroidal shape much pointed at each end.

The flesh is white & has a [illeg] sweet flavour when boiled.

The leaves when boiled make a good substitute for spinach.

Gwaya (H)
This is said to be like a large black potatoe but I have been unable to see it.

Lisga (H)
This is said to resemble Gwaya but I have not seen it.

Tumuku (H)
This is a [illeg] white tuber very closely resembling a European potatoe in delicacy of flavour. It is about the size of a medium sized potatoe but is soapy in consistency & does not become floury when boiled. This is little grown here.

Beans
There are several varieties of beans cultivated at Kintampo

1. A small white kidney shaped bean of delicate flavour greatly resembling the white haricot of Europe.
2. A purple kidney shaped bean resembling the bean of the scarlet runner.
3. A very small purple kidney shaped bean
4. A large white or cream coloured spherical form like a very large pea, of good flavour.

All of these varieties form a favoured food of the Hausa especially & are doubtless very nourishing diet.

A case of supposed poisoning by eating beans purchased in the native market here is on record, but I have never seen such a case [two words illeg]. I suffered any inconvenience though I have eaten all the varieties procurable here. [two words illeg] to say the lentil does not appear to be known here though it would no doubt it would be readily cultivated if introduced.

Ground Nut
Ground Nut is largely grown here chiefly by the Fantu speaking people.

This is a low growing plant about a foot high with rather stiff green leaves.

The nut is formed underground in a white wrinkled envelope that usually contains two nuts placed end to end.

To prepare it for food the nut is roasted, as coffee is, to a light brown colour.

It then possesses a very pleasant nutty flavour & aroma.

When roasted it is a favoured food of the Fantes and Accrra from negro [??]

When roasted & beaten to flour it makes an excellent soup appreciated by European and negro alike.

Kwalulu (H)
This is a low growing plant greatly resembling groundnut in appearance & much grown here. The fruit is born underground in a white thick capsule which differs from that of ground nut in being thicker & more bulky and containing one nut only.

The nut is nearly spherical, white with a purpose marked hilum [?] & it is larger than groundnut. When boiled it has a pleasant flavour somewhat resembling that of roast chestnuts & is easily digested.

I am not aware that this plant has a European name so the Hausa name is given alone.

Substances Used in Soup
There are a large number of substances used here in the making of native soup, whether to flavour, colour, or thicken it.

Most of them have it appears no European name & the name given in this list is the local Hausa one.

1. *Gabu*
   This is sold in the form of a dark coloured ball the size of a large apple.
   It is compound of the leaves & stalks of the native onion beaten to a mass in a mortar & pressed into balls.
2. *Kuka*
   This is an olive green powder made by finely grinding the green velvety pile that covers the fruit capsules of the native Baobab tree (Adansonia Digitata).
3. *Yakwah*
   These are the green leaves of a herbaceous plant growing 2 or 3 feet high
   When uncooked the leaves taste exactly like European sorel. They are greatly in request & are sold at the native market.
4. *Yarangwoi*
   These are the green leaves of a plant of smaller size than Yakwah & they have not the sorel flavour. The seeds are borne in long tapering capsules & are numerous and minute.

Kwobia (Ohkra)
This is the curiously shaped longitudinally ribbed fruit of a herbaceous plant standing 3 or 4 feet high & bearing very handsome bell shaped yellow flowers with a purple centre.

The fruit is a capsule 3 to 6 inches long and contains numerous seeds embedded in a mucilaginous substances in its loculi.

This fruit when boiled furnished a vegetable palatable to Europeans.

By the negro It is used in two forms' the fresh fruit or the dried fruit, to thicken soup.

There is still another variety of Kwobia grown here. It is a vine like climbing plant, its fruit is much larger than that described above & resembles a longitudinally ribbed & pointed cucumber.

Pumpkin
A large green pumpkin with orange coloured flesh is extensively grown here. It is used in the making of soup.

The flavour is coarse & rough.

Dawa-Dawa
This substance is sold in the native market in the form of large black balls having a rather disagreeable odour.

It is made from the seeds of a plant bearing a long podlike fruit called by the Hausa (Doduah?) The seeds are oval & about half an inch long in their longest diameter. They are covered by a hard black shining testa but the seed itself is of a pale yellow colour.

Dawa Dawa is thus made—

1. Seeds boiled.
2. Seeds placed in wooden mortar & beaten to a pulp.
3. The pulp is washed in water.
4. Washed pulp is placed in calabash, covered with leaves & allowed to stand for three days.
5. The fermented pulp made into balls for sale.

Shea Butter
The tree from this nut of which shea butter is made does not grow at Kintampo but large yam tubers of shea butter are brought for sale by the native traders going South to the Coast.
It is very largely used in native cooking being practically the only fat available for frying food.
It is also use [sic] as a source of light being thus burned.—A square open tin tray about one inch deep is filled with the butter, in which a piece of cotton rag is imbedded to serve as a wick. This lamp furnishes a poor light & requires constant attention to prevent its becoming extinguished.

Palm Oil
The nuts from which this oil is procured are frequently for sale in the native market. The oil is made thus-- the [scarlet?] nuts are thrown into a large pot of water & boiled. The oil contained in the scarlet covering of the nuts is extracted & rises to the surface of the boiling water when it is skimmed off for use or for sale.

The oil is a thick, bright red, semi-liquid substance with an aromatic odour.

It is used in native cooking to flavour or to enrich food but not to fry it.

It is used as a source of light in the manner described above for shea butter.

Native Spices

1. *Ginger*—This crop is said to have been grown here but I have not seen it in the green state.
2. *Chillis*
   There are three common native varieties
   A. The large red chilli
   B. The large yellow chilli
   C. The small red chilli
   These chillis are very largely used in the preparation of most native dishes & grow readily anywhere in & about Kintampo.
3. *Black pepper*
   This spice is always for sale in the native market.
4. *Cloves*
   These are sold in the native market but are used rather as a [illeg] or a charm than as a seasoning. Cloves are commonly made into necklaces & hung about the neck of native children as a charm.
5. *Guinea grain*
   This spice is called in Hausa Kita has a flavour of coriander seed mixed with black pepper. By the natives it is used as a [illeg—same word as in cloves above—m??ium (medium?)] rather than as a spice.

Native Fruit

1. *Pineapple*
   This plant grows readily in the sandy soil characteristic of Kintampo & is easily propagated by planting the leafy head romoved from the fruit, in a shady place.
   Ther are two common varieties.
   A. The red pineapple
   B. The yellow pineapple.
   The yellow variety bears the finer fruit with the more delicate flavour.
2. *Limes*
   This fruit grows plentifully here both in the town & on the surrounding farms. The tree is difficult to propogate & requires much attention to transplant successfully. The fruit is valued by the natives chiefly because it is salable to the Europeans. The enpressed juice mixed with sugar & water makes a pleasant drink & its addition to raw papaw fruit or cooked banana much impoves the flavour of these articles.
3. *Oranges*
   This fruit is not grown at Kpo but is brought in from the N'Koranza villages about 2 days journey distant.
   The fruit is the green African variety.
4. *Mango*
   This fruit is not grown here but is occasionally brought in for sale. I have successfully reared? 3 young trees from seed brought from the Coast & planted during my residence here two years ago. They are now fair sized trees. Unfortunately trees grown from seed don't come into bearing for 7 years & the fruit is of inferior size & quality to that produced by grafted trees.
5. *Banana*
   This plant grows everywhere at Kintampo & the fruit can be bought in the market almost all year round.

There are two common varieties.

1. The large banana
2. The small banana

The small variety is more luscious & of more delicate flavour than the commonest large banana.

Papaw

The papaw, (Carica papaya) grows readily anywhere at Kintampo. The plant is raised from seed & rapidly attains the size of a tree. It bears in umbels carried on a long talk a multitude of cream coloured male flowers affording a delicious perfume. The single bulky female flower is borne in the axil? of a leaf springing from the trunk & has an acrid odour.

After six months of growth the plant begins to furnish a melon-like fruit with orange coloured flesh of an agreeable flavour, which contains a digestive ferment known as papain which is largely used in European medicine. The enclosed seeds are small spheres dark brown in colour & very numerous. Ther are several varieties grown here differeing greatly in the shape of the fruit & only slightly in the colour & flavour of the flesh.

When ripe the fruit is eaten uncooked. When green & unripe it is boiled as a vegetable and very much resembles the vegetable marrow of English dietary.

It seems to us that a delicious perfume might readily be made from the male flowers for sale in Europea & their rapid growth would make multiplication of the plants an easy matter.

The Eggplant

The Eggplant is grown here in shady spots & the fruit is very frequently for sale in the native market.

The natives plant & fruit resembles closely the plant & fruit of European gardens.

The Tomatoe

This fruit when grown by the native is very small & tasteless. I do not think the plant is indigenous but that it is a degenerated foreign plant the product of an unsuitable climate for in the second or third year plants produced on generally from English seed produce the same marble sized tasteless fruits as does the native variety.

Honey

Honey is the only native sweetening substance for the negro is unable to obtain sugar from the native grown Sugar Cane.

The honey obtained at Kintampo is always the produce of wild bees, for the hive bee of Europe is unknown. As there are few flowers of the annual or the herbaceous perennial type available, this wild honey must be collected by the bees from the flowers of forest trees. For it is characteristic of the African bush that there are few flowers on the ground but that most of the forest trees are in their season covered with flowers borne 50 to 200 feet above the surface ground-level. Honey is commonly eaten by the native with Kanki or with pancakes.

Sugar Cane
Sugar Cane is grown here in small quantity but is not an article of daily dietary. It is eaten or rather chewed by the native for its sweet juice only.

Tobacco
This crop is grown in small patches usually near the native houses. It grows readily & appears to be little attacked by insects. The native does not understand how to cure tobacco & that it produces is very inferior to the cheapest American leaf.

Native tobacco is made up into plaited bands about an inch broad, spirally would so as to form rolls or discs, the bands being secured together by pegs of cane.

The leaf is also made up into conical shaped cylinders with cow dung. This is smoked in pipes or being finely ground between stones is inhaled as snuff.

Palm Wine
Palm wine is the sap of various species of palm trees. It is collected by the negro by tapping the tree with a vertical incision cut high up near the crown of leaves. Into this incision is fixed the neck of a large bottle secured to the trunk by string. The sap escaping from the incision rapidly fills the vessel & is then removed for sale. A method frequently use[d] here is to lop off the top of the tree but this is a wasteful method as it kills the tree.

The wine is collected in the early morning & is then a semi-opaque, [illeg.], sweet, liquid. It rapidly ferments, becomes covered with a white froth & changes to a milky white colour. Towards evening it has become highly alcoholic & then readily induces a drowsy drunken condition in the drinker. It is almost always for sale in the market here & it is very largely consumed by the Fantu & Hausa alike.

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