

## Societal repercussions of the rise of large-scale traditional iron production: a West African example

PHILIP DE BARROS

### Abstract

Numerous scholars have outlined what they believed to be the consequences of the advent of iron technology in sub-Saharan Africa: increased food production using more efficient bush clearing tools; increased population densities; larger and more stable communities; increased trade, specialization and social differentiation; and the 'embryonic rise' of modern politics. (Davidson 1974.) However, little has been demonstrated in the field.

A regional study of the Bassar iron industry of northern Togo has shown that the rise of large-scale iron production may lead to higher population densities, larger and more stable communities, a more aggregated settlement pattern in the ore zone, and increased craft specialization and trade. However, it does not necessarily result in a significant increase in the degree of political centralization. The Bassar data also suggest that even the appearance of relatively small scale iron production may generate similar trends, albeit at more modest levels.

### Résumé

De nombreux auteurs ont décrit ce qu'ils proposent d'avoir été les conséquences de l'adoption de la technologie de fer dans l'Afrique au sud du Sahara: augmentation de la production de nourriture à l'aide des outils plus efficaces pour débroussailler le paysage; augmentation des densités de population; communautés plus grandes et plus stables; croissance de la commerce, de la spécialisation artisanale et de la différenciation sociale; et 'naissance embryonnaire' de la politique moderne (Davidson 1974). Cependant il n'y a que très peu de ce schéma qui a été validé par les recherches sur le terrain.

Une étude régionale de l'industrie du fer des Bassar du nord de Togo a montré que l'essor de la production de fer à grande échelle peut aboutir à des densités de population plus hautes, des communautés plus grandes et plus stables, une répartition de l'habitat plus agrégée dans la zone des minerais de fer, et l'augmentation de la spécialisation artisanale et du commerce. Cependant il n'aboutit pas obligatoirement à une centralisation importante au niveau politique. Les résultats fournis par cette étude des Bassar nous amènent à proposer aussi que même l'apparition de la production modeste de fer peut donner naissance à des développements comparables, mais d'un ampleur plus restreint.

### Introduction

Several African historians and archaeologists have stressed the important consequences of the inception of iron tool technology in sub-Saharan Africa: increased food production due to more efficient bush clearance and the ability to clear forest (Posnansky 1981:542; McIntosh and McIntosh 1983:244; Shaw 1982:69; Davidson 1974:15–16, 73), increased population densities, larger and more permanent communities due to food surpluses and the development of craft specialization and associated trade (see especially Davidson 1974:17–18; Anquandah 1982: 73–5), increased social differentiation of ironworking classes or castes, and the ‘embryonic rise’ of modern ‘politics of class differentiation’ (Davidson 1974:72).

While increased specialization may seem self-evident, other consequences of the development of iron technology, especially regarding demography and settlement patterns, have not been demonstrated through regional field studies. This is not surprising since such studies are difficult in Europe where modern development has destroyed much of the evidence. In Africa, however, such evidence is relatively untouched. The area chosen for study was the Bassar region of northern Togo in West Africa.

The original goals of the Bassar Project were: to determine the spatial and temporal extent of the Bassar iron industry; to trace the rise of large-scale iron production and exchange; and to investigate its effects upon settlement patterns, demography, and the degree of specialization, social differentiation and political centralization. The absence of previous archaeological research in the region, however, led the author to concentrate primarily on the industry’s effects on demography and settlement patterns with only limited emphasis on specialization and political centralization. Although research focused on the rise of large-scale iron production, results also suggest important trends associated with the introduction of even small-scale ironworking.

As discussed below, the Bassar research tends to confirm many of the predictions noted above except in the area of political centralization. To my knowledge, this is the first study to document such societal trends in the context of traditional African ironworking.

### The Bassar region and its iron industry

The Bassar region is situated in northern Togo about 360 km from the coast. It has alternating rainy (April–October) and dry (November–March) seasons with an average annual rainfall of about 1350 mm. The original savanna-woodland vegetation has been reduced to a basically savanna landscape due to extensive charcoal making for the iron industry and increasingly short periods of agricultural fallow. The region is situated just west of the Togo Hills (Atakora Mountains) and its physical landscape is characterized by two mountain chains oriented north–south and separated by the Katcha River peneplain (Fig. 1). The Bassar’s name for themselves is *Bi-tchambe* or those who speak *Tcham*, a language belonging to the Voltaic language group (Greenberg 1970). The name Bassar (Bassari in German or French) is derived from a deity associated with the 750 m Mount Bassar. Most Bassar live in the four centres of Bassar (18,000 inhabitants), Kabu, Bitchabe and Bandjeli.

The Bassar iron industry was based on relatively rich haematite ore hills and mountains located along the two north–south axes of Bandjeli–Bitchabe–Dimuri and Kabu–Bassar (Fig. 2). The ores near Bandjeli were the richest (over 60% iron; Koert 1906), but important

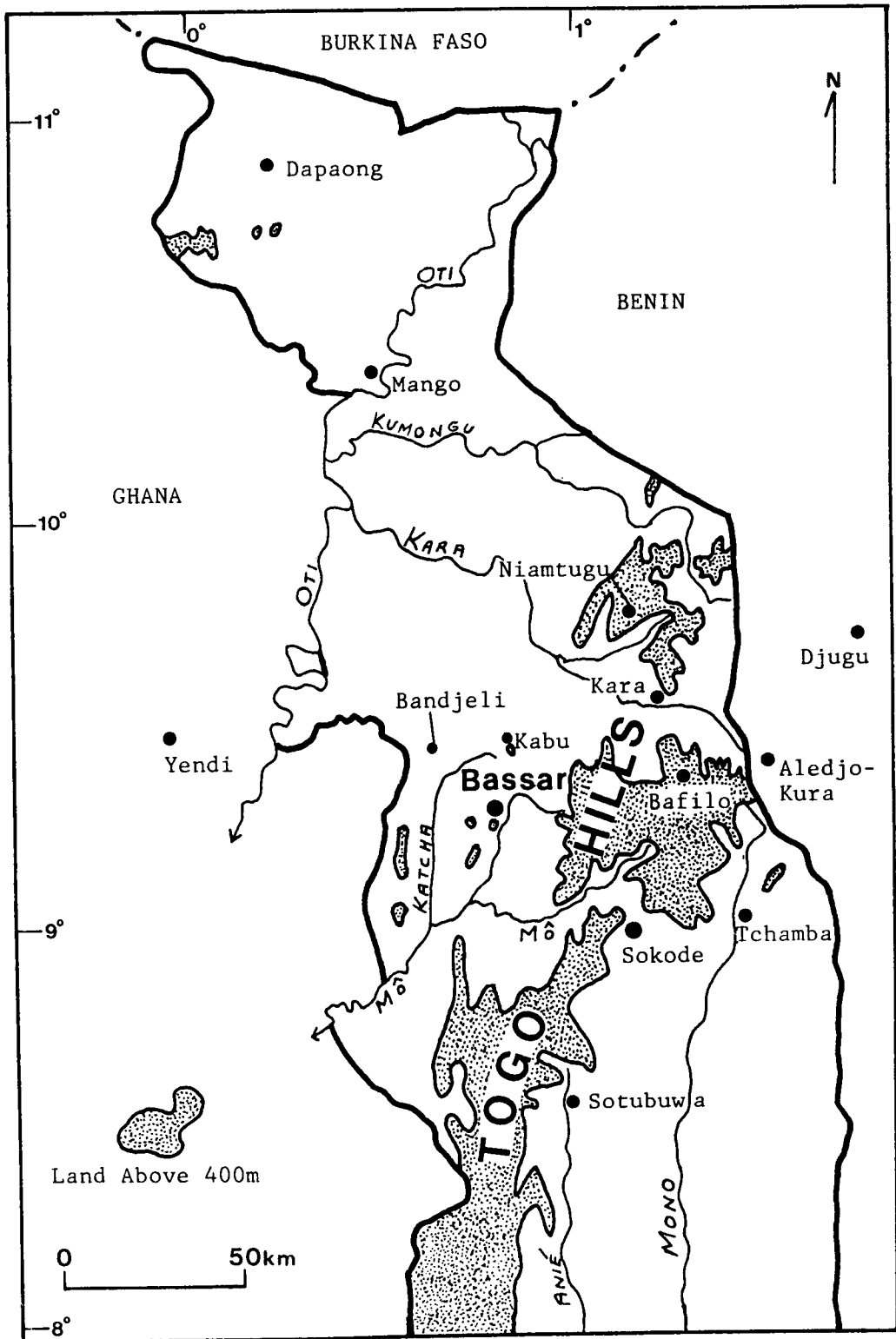


Figure 1 The Bassar region.



deposits were located near Kabu, Nababun–Kikpayu and Bassar. These deposits, as well as the haematite outcrops in the Bitchabe–Dimuri region, contained more impurities (silica, phosphorus) and less iron (35–45%; Simpara 1978; Lawson 1972). Major iron-production centres developed around all of these deposits, except for the Bitchabe–Dimuri zone which eventually specialized in smithing and charcoal making.

Ore was surface-mined and smelted in tall, induced-draft furnaces ranging from 2 m to 4 m in height, using wood charcoal fuel. Using 80–110 kg of haematite ore, the smaller Bandjeli furnaces produced a >30 kg iron bloom which contained about 17–20 kg of iron. The larger furnaces along the Kabu–Bassar axis produced similar blooms, but used proportionately more of their lower grade ores (90–160 kg; de Barros 1985: Chapter 10).

The Bassar iron industry probably originated during the second half of the first millennium AD, and served basically local needs until the fourteenth century when it began producing enough iron for trade with adjacent regions (de Barros 1985, 1986). The growth of the neighbouring Middle Volta states of Dagomba, Mamprusi and Gonja during the fifteenth and sixteenth centuries helped stimulate the development of long distance trade; and increased population densities due to the introduction of the American food crops maize (*Zea mays*), cassava (*Manihot utilissima*), and groundnuts (*Arachis hypogaea*) led to increased demand for iron hoes and weapons. As a result, Bassar's iron industry underwent a dramatic period of growth which saw its output increase by 400–600% between the fourteenth and early seventeenth centuries (*ibid.*).

This growth continued through the nineteenth and early twentieth centuries, stimulated by the rise of a major Hausa kola route through Bassar to Salaga in the Middle Volta Basin and the subsequent development of the Bassar chiefdom during the late eighteenth century. This continued growth is further explained by the decline in wood fuel supplies in neighbouring regions, combined with the richness of the Bandjeli ores which permitted more ready competition with imported European iron. Nineteenth-century production was disrupted by extensive slave raiding by the Tyokossi from Mango to the north and by the Dagomba to the west, but this simply resulted in the movement of production closer to large mountains where populations could take refuge. Thus did Bassar become a major production centre that replaced those once located near Kabu and Nababun (Fig. 2). Production was only seriously disrupted between 1873 and 1895 as a result of a three-year siege of the town of Bassar by the Dagomba followed by a period of relative anarchy. Thereafter, iron production regained and surpassed its old levels following the colonial peace established by the Germans in 1895.

An analysis of oral traditions and ethnohistorical accounts indicates that by about 1900 Bassar iron was being traded throughout most of Togo, eastern Ghana and part of western Benin (roughly 100,000 km<sup>2</sup>), serving as many as 600,000 people, primarily with iron hoe blades. Total Bassar iron production since the industry's inception in the late first millennium AD has been conservatively estimated at between 14,000 and 32,500 tonnes, placing Bassar among the top iron production centres of Africa (de Barros 1986). Bassar's total iron production surpasses that of the Babungo chiefdom of the Cameroon Grasslands (Warnier and Fowler 1979), while its total slag volume exceeds that present at the Mema sites in Mali investigated by Haaland (1980), and rivals or surpasses that found at Meroe (de Barros 1985:308–16).

Production at Bandjeli continued at high levels until the First World War, whereas it

declined dramatically along the Kabu–Bassar axis after 1905 due to inferior ores. Eventually, even Bandjeli iron production succumbed to the presence of cheap scrap iron from vehicles and from the colonial railway system completed in 1911. Nonetheless, iron production continued at low levels until 1951, when it was forbidden by the French as a deforestation control measure.

The evolution of Bassar iron production can be summarized in terms of four time-periods whose basic characteristics regarding iron output, major production centres, specialist villages and iron trade are presented in Table 1 (see also de Barros 1986).

Table 1 Some characteristics of Bassar iron production periods.

Annual output (tonnes)	Smelting centres	Smithing centres	Other village specialities	Iron trade
<i>Period 1: Small-scale production for local needs</i> <i>late first millennium AD?–AD 1300/1350</i>				
low	Bandjeli? multiple?	Dekpassanware others?	?	Intra-regional
<i>Period 2: Significant regional iron production</i> <i>AD 1300/1350 – 1550/1600</i>				
7–20	Bandjeli, Kabu, Bassar, Nababun, Bitchabe	?	?	with adjacent regions
<i>Period 3: Large-scale production for supra-regional export</i> <i>AD 1550/1600 – ca AD 1800</i>				
28–81	Bandjeli, Kabu, Nababun	Bitchabe– Natchamba zone	charcoal- making?	supra-regional
<i>Period 4: Expanding production, disruption and eventual decline</i> <i>ca AD 1800 – 1905 (Kabu-Bassar axis)</i> <i>– 1925 (Bandjeli)</i>				
60–135 (150–200 after AD 1900)	Bandjeli, Bassar, Kabu (Sara)	Bitchabe– Natchamba, Bassar, Kabu (Sara)	charcoal- making, potting, tanning	supra-regional
TOTAL IRON PRODUCTION: 14,000–32,500 tonnes (equals 16–36 million Bassar hoe blades) (all periods)				

### Introduction and early expansion of ironworking (Periods 1 and 2)

In the text that follows, the effects of ironworking will be examined in the context of demography and settlement, specialization, trade, and political centralization. Although Period 1 data are not as complete and lack the relatively good chronological control of later periods, some interesting trends are clearly apparent.

After an extensive, regional survey that identified the industry's spatial distribution and

chief production centres (see Fig. 2), a major component of the Bassar Project consisted of an intensive survey within one of the main production zones (de Barros 1985, 1986:155). Time and financial constraints made it impossible to complete an in-depth study of all major production zones. The purpose of this survey was three-fold: the development of a regional ceramic sequence (de Barros 1985); a chronologically controlled evaluation of changes in iron production levels (de Barros 1986); and an investigation of the effects of the industry's growth on demography and settlement patterns. The Nababun–Kikpayu zone was chosen primarily because of the presence of temporally discrete smelting sites from all major time periods and its easy divisibility into an ore zone (Bidjilib–Wawa–Liba deposits) and a non-ore zone (the peneplain east of the Katcha River; see Fig. 2). The region was cluster-sampled using 1 km<sup>2</sup> units. The ore zone was sampled more intensively because it was assumed that most smelting took place within 1 or 2 km of the localized ore deposits, as subsequent data confirmed (de Barros 1986; Fig. 2).

During this survey, data on site location, size, and sherd densities were collected. When combined with the results of a partially dated ceramic seriation, radiometric dates and oral traditions, it was possible to examine demographic and settlement trends. Chronological control is relatively good for Periods 2–4 (fourteenth–twentieth centuries, see Tab. 2), but is limited primarily to the ceramic seriation sequence for Period 1. While the seriation results for the later periods are reasonably firm (de Barros 1985), absolute time control is limited to a single thermoluminescence date (Alpha-567) of AD 770±236 for ceramic Group V. Seriation data and the TL date suggest that ceramic Group V dates to the late first millennium AD. Variation within Group V assemblages permits its division into early (Va) and late (Vb) phases.

#### *Population densities*

Evidence for changes in population densities were examined using two sets of data: total habitation site area and average surface sherd density for sites from successive time periods. If there is a significant increase in total site area from one period to the next, it makes intuitive sense to speak of a probable population increase. This assumes, of course, that the two sets of sites were each contemporaneous during their respective time periods and that intrasite population densities remained unchanged. The first assumption requires good chronological control. As noted above, except for the late first millennium AD, such control is lacking prior to the fourteenth century AD. The second assumption is a problematic one due to the lack of surface and, generally, sub-surface architecture. Changes in surface sherd densities may provide a rough indicator, but the interpretation of such data is difficult (see below). In short, changes in total site area should be relatively marked before we may safely speak of a significant change in population density.

The intensive survey data indicate that the earliest settlements associated with the significant use of ceramics (Ceramic Group I in Tab. 2) were single nuclear or extended family residences whose areas averaged about 0.1 ha. Most of these sites were located close to permanent springs or water holes. It is speculated that these Late Stone Age inhabitants practised a combination of hunting and gathering and rudimentary horticulture, the latter suggested by groundstone material. During the time encompassed by Ceramic Groups II–IV, single residence sites were replaced by hamlet-sized settlements of 1–3 ha. Without

Table 2 Habitation site data (intensive survey zone)

Ceramic Group	Age	No. of recorded sites <sup>a</sup>	Mean site area (ha.)	Total area all sites (ha.)	Adjusted mean site sherd density (/m <sup>2</sup> ) <sup>b</sup>	
I	Late Stone Age to beginning of Iron Age	{	16	0.13	2.12	0.25
II			20	1.15	19.61 <sup>c</sup>	0.43
III			12	0.79 <sup>d</sup>	8-15?	0.49
IV			7	1.44	10.10	0.48
<b>Production Period 1</b>						
Va	Late first millennium AD	{	6	2.94	11.75	0.41
Vb			2	7.85 <sup>e</sup>	15.70+	0.98
VI	Early second millennium AD	{	5	1.5-2?	4-7?	0.66?
VII			3	1?	2-4	0.97
<b>Production Period 2</b>						
VIII	1300-1450/1500	4	2.92	9.05	2.73	
IX	1450/1500-1550/1600	7	1.51	10.57	1.17	
<b>Production Period 3</b>						
X	1550/1600-	10	2.91	29.10	2.33	
X <sup>f</sup>	ca. 1800	8	2.56	20.49	2.75	
<b>Production Period 4</b>						
XI	1800-1850	1	0.40+	0.40+	0.15?	

<sup>a</sup> Site sample for sherd density figures; sample sizes for mean site size and total site area figures were somewhat less for several periods due to site boundary definition problems or because a site was in the survey zone but outside sample units.

<sup>b</sup> Densities adjusted for differences in average sherd size. Raw densities based on the mean of site means. Site means based on several collection units (midden samples excluded).

<sup>c</sup> It is highly unlikely that these sites are contemporaneous.

<sup>d</sup> This is a minimum figure.

<sup>e</sup> Figure somewhat inflated due to small sample size of sites.

<sup>f</sup> Subset whose ceramic assemblages are most homogeneous.

additional research one can only speculate, but this change may reflect a shift to a more sedentary, primarily horticultural economy<sup>1</sup>. Chipped stone debris is present at nearly all sites of Ceramic Groups I-IV.

While the limited use of iron tools may have begun at an earlier date, the first artifactual evidence for ironworking in the intensive survey zone occurs in the form of extensive smithing debris at sites with Group V ceramics. From this time onwards chipped stone debris effectively disappears from site surfaces. Table 2 shows that total habitation site area increases from about 10 ha for sites with Group IV ceramics to almost 16 ha on the appearance of ironworking. While the lack of good chronological control greatly reduces the value of this data, a population increase is suggested.

Dense vegetation and multicomponent sites resulted in incomplete boundary data for sites with Group VI and VII ceramics, but the total absence of smelting or smithing debris

suggests that ironworking ceased within the intensive survey zone. Why this occurred is not yet clear, but the correlation between the absence of ironworking and the apparent sharp drop in total site area is presumably significant.

Changes in surface sherd densities are also provocative. After the very low figure for Ceramic Group I, mean sherd densities remain remarkably stable throughout the period of 600–1000 years represented by Ceramic Groups II–Va. It is surely no coincidence that sherd densities more than double as ironworking became firmly entrenched in the Bassar region (Ceramic Group Vb in Tab. 2). Even more striking is the subsequent tripling of sherd densities at sites of Ceramic Group VIII when Bassar iron production began to take on interregional significance and when smelting became a major activity within the intensive survey zone at the beginning of Production Period 2.

What do such increases mean? Differences in site sherd densities may reflect changes through time in one or more of the following factors: site population density, site longevity, per capita pottery consumption (including those due to differences in average vessel uselife), the state of cultivation or how recently the land has been cultivated, and the average size of sherds after breakage.<sup>2</sup> The last two factors were effectively neutralized for all periods by standardizing sherd densities for differences in sherd size and by excluding sherd collections from uncultivated areas and from cultivated areas with little ground visibility (de Barros 1985:Appendix 1B).

If one assumes that per capita pottery consumption was not significantly different at Group Va and Vb sites, inadequate temporal control still makes it difficult to distinguish between changes in intrasite population density and site longevity. However, other evidence suggests that the latter may have been a major factor. The surface of Ceramic Group IV (pre-ironworking) sites are characterized by alternating zones of high and low sherd density. This suggests areas of habitation structures swept clean by their inhabitants and non-habitation zones which were more likely to collect debris. The longer a site is inhabited, the more likely it is that gradual shifts in the location of structures will result in a more even sherd cover (Binford 1972:178; McIntosh 1975), which is in fact typical of later periods. This suggests increased site longevity after the introduction of ironworking.

The sharp rise in sherd densities at Ceramic Group VIII sites may reflect both increased site stability and greater intrasite population density. However, one could also argue for higher per capita pottery consumption associated with higher living standards brought on by the rise in iron production for inter-regional trade in Production Period 2. Interestingly enough, it is at Ceramic Group VIII sites that geometrically shaped potsherds (circles, triangles, rectangles) make their first appearance. Their function, for gaming pieces or potsherd pavements, is not known, but they may reflect an increase in leisure time.

In any event, two significant increases in site sherd densities are directly correlated with events of the Iron Age: first, with the introduction of ironworking in the region, and later, with the rise of iron production for trade with neighbouring regions.

#### *Community size and stability*

The data in Table 2 also suggest significant increases in both mean and maximum site size. Prior to sites with Group V ceramics, the largest site covered 4 ha and most were less than 3 ha. Two Group V sites attain 7.5 and 14 ha: large enough to be labelled villages as opposed to

hamlets. Increases in site size and possible increases in site longevity and population densities can be explained by the rise of specialist ironworking villages (see below) which appear to have focused primarily on smithing. Communities and regions could support larger populations due to their ability to trade for foodstuffs even in the face of declining soil fertility. The replacement of stone tools with iron ones probably increased per capita food production due to the greater bush-clearing, field preparation, and weeding capabilities of the iron axe and hoe. Such increases are also likely to have spurred population growth (Boserup 1965).

*Population aggregation and settlement hierarchy?*

Within the intensive survey zone, ceramic and settlement data strongly suggest a trend toward population aggregation at Dekpassanware. Group IV ceramics are absent from this area. With Group Va, a 7.5 ha site appears (Site 242 in Fig. 3) associated with other smithing sites dispersed across the landscape. With Group Vb, population was further concentrated as the Dekpassanware site grew to 14 ha (Site 252) and contained several major smithing loci, perhaps associated with a trade route resulting from the rise of the site as an important market for iron products. This large village also had a commanding view of the Bassar penepplain.

The settlement pattern suggests a central village associated with dispersed (satellite?) hamlets of 1–2 ha. With time the central village grew while the hamlets decreased in number. This pattern suggests a low-level settlement hierarchy coinciding with a period of active engagement in ironworking. It is difficult to say, however, whether this reflects increased political and economic power for the village headman at Dekpassanware. If Dekpassanware was an important market centre, it may have been associated with the emergence of a big-man system (cf. Fried 1967; Strathern 1969; 1971) based on competition for the control of the production or exchange of iron products. At this point, however, one can only speculate.

*Specialization*

For the present paper, the term specialization refers to part-time craft or industrial specialization of individuals within a community or sub-region. There is no evidence for the rise of full-time craft specialists. Horticulture and hunting have continued to be practised by all Bassar communities into the twentieth century.

By the fourteenth century (Production Period 2), there is clear evidence that smelting was practised throughout the Bassar region. Six radiocarbon dates calibrated after Clark (1975) to one standard deviation fall within the period AD 1265–1445, with four concentrated between AD 1330 and 1415 (de Barros 1986). These are from the Kabu, Nababun (3), Bassar and Bitchabe zones. (Similar sites presumably exist near Bandjeli but have been obscured by the many large smelting sites of later date.) Presumably, smithing activities were likewise dispersed, but the initial regional survey emphasized the recording of smelting sites, with the result that little is known about smithing. However, the intensive survey of the Nababun zone systematically recorded both smelting and smithing sites: despite abundant evidence for smelting during Production Periods 2 and 3, there was almost no trace of smithing debris. This suggests that both village and areal specialization in smelting and smithing may predate large-scale iron production. Moreover, the presence of numerous



smithing sites with Group V ceramics (Production Period 1) suggests that the Nababun zone may have specialized in smithing at an even earlier date. This is a more tenuous conclusion, however, since smelting may have taken place in the ore zone, but outside the sampled units, as near the Wawa and Liba ore deposits (Fig. 2). In addition, early mounds were probably small or disturbed and were thus not dated.

In any event, to the extent that village and areal specialization within the Bassar iron industry did occur during Periods 1 and 2, it cannot be explained in terms of the efficiencies of scale associated with large-scale production. It may have been present since the introduction of ironworking in the region and was perhaps linked to different ethnic groups and/or clans (see Martinelli 1982:25–37).

### **The rise of large-scale iron production (Periods 3 and 4)**

#### *Population densities*

During Production Period 2 the total habitation site area in the intensive survey zone was about 10 ha (see Ceramic Groups VIII and IX in Tab. 2). During Period 3, when large scale production commenced, the total site area tripled to nearly 30 ha. Even when limited to a subset of sites whose ceramic assemblages are most homogeneous (Group X'), site area at least doubled. This 100–200% rise in total site area correlates with a 400–600% increase in iron production (see above).

This increase was not due simply to a redistribution of population within the region, as there is no evidence to suggest a depopulation of other areas (de Barros 1985:415–19). Nor can it be explained solely by increases in population densities that probably occurred throughout West Africa during this time due to the introduction of American food plants (Vansina 1960; Hopkins 1973). Bassar village histories clearly show an important immigration of ironworkers attracted to the growing iron industry (de Barros 1985:416; Cornevin 1962:37–42; Martinelli 1982:26–37).

To check whether the increase in total site area was not accompanied by a corresponding decrease in intrasite population density, surface sherd density figures were examined. As noted earlier, the effects of differences in average sherd size and cultivation state have been neutralized. Differences in average vessel life are not thought to be a significant factor since variation in vessel wall thickness and construction techniques are minimal during Periods 2 and 3. Differences in per capita pottery consumption are also considered minimal since the number of vessel forms or types appears to remain relatively constant.

This leaves differences in site population density and site longevity. The time-periods associated with Ceramic Groups VIII (150–200 years) and X (200–250 years) are reasonably similar when you consider the imprecision of radiocarbon dating. Mean site sherd densities are also similar (Tab. 2). While the mean sherd density for the intervening Group IX sites was much lower, such sites were occupied for a correspondingly shorter period of 50–150 years. Thus, by a process of elimination, it would appear that changes in intrasite population densities were not significant and that the sharp increase in site area can be largely attributed to population growth.

*Community size and stability*

Average community size does not change significantly during Periods 2 and 3. The apparent decrease for Ceramic Group IX sites is largely due to the beginning of a shift in site location to the ore zone (see below). There is, however, a distinct increase in the size of the largest sites from 3–4 ha hamlets to villages of 7.5 and 10 ha during Period 3 (de Barros 1985:Chapter 13).

The data on site stability are also suggestive. Site lifespans appear to shorten during the latter part of Period 2 (Ceramic Group IX), but this is primarily due to population movement toward the ore zone as production levels increased (see below). In addition, a close look at the ore zone in Figures 4–6 shows that there was basically little change in site location during the time represented by Ceramic Groups IX and X. Site 277 simply enlarged and expanded southward (Site 277/281) until intensive slave raiding by the Tyokossi and Dagomba led to its abandonment around AD 1800. Its longevity is particularly interesting since the ore zone soils are generally mediocre when compared with other zones of the region (de Barros 1985:418).

Data from outside the intensive survey zone tend to confirm this picture of increased site stability. Major habitation sites near Bandjeli (Titur) and adjacent to the Dikre sacred forest near Bassar were continuously occupied throughout Periods 2 and 3, when they too were abandoned in the face of intensive slave raiding. However, the lack of good temporal control for earlier periods cautions one to view the data for Periods 2 and 3 as highly suggestive rather than as definitive evidence for an increase in site longevity.

As noted earlier, the suggested increases in population density, maximum site size and site longevity are not difficult to explain, particularly in the context of large-scale iron production. Populations specializing primarily in ironworking would spend less time on farming, obtaining a part of their foodstuffs through trade. Local farmland could thus support larger populations at more and larger sites, and villages would have to move less often in the face of declining soil fertility. Neither individual production zones nor the Bassar region as a whole would have had to depend solely upon its own food resources.<sup>3</sup>

*Population aggregation*

During Period 3 there is dramatic evidence for movement into the iron ore zone (Figs. 4–6). A single smelting camp of 0.2 ha is the only settlement within the surveyed portion of the ore zone for early Period 2 (Ceramic Group VIII), representing 2% of the total settlement area for all surveyed units. Somewhat later, a 3.2 ha hamlet of Ceramic Group IX was established within the zone, representing about 30% of the total settlement area. With large-scale production in Period 3, 70% of the total site area (20 ha) is situated in the ore zone. This zone's relatively mediocre soils make the shift in resource priorities from agriculture to iron production all the more apparent.

Such population aggregation is not unexpected. As a resource becomes critical to the livelihood of a group there will be a strong tendency for the population to cluster in the vicinity of that resource (Glassow 1977:188–9; Earle 1976; Parsons *et al.* 1982:4). According to these authors, the key element is the energy expended in transportation costs, which are high in a pre-industrial society (Hopkins 1973:73–4). Just as Chisolm (1968) has noted that pre-industrial farmers will tend to walk a maximum of 2 km to reach their fields,

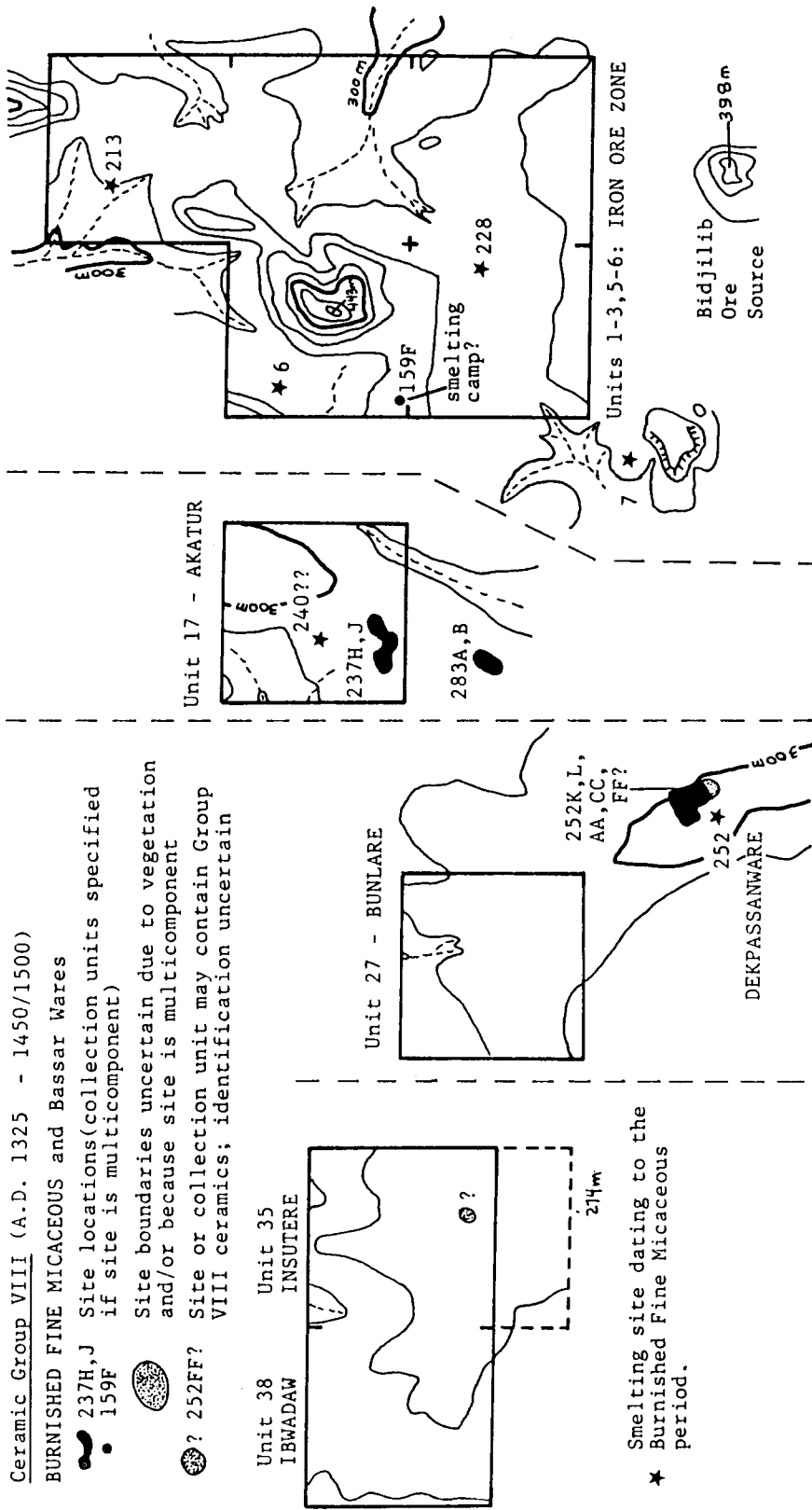


Figure 4 Habitation and smelting sites recorded in the intensive survey zone with Group VIII ceramics.

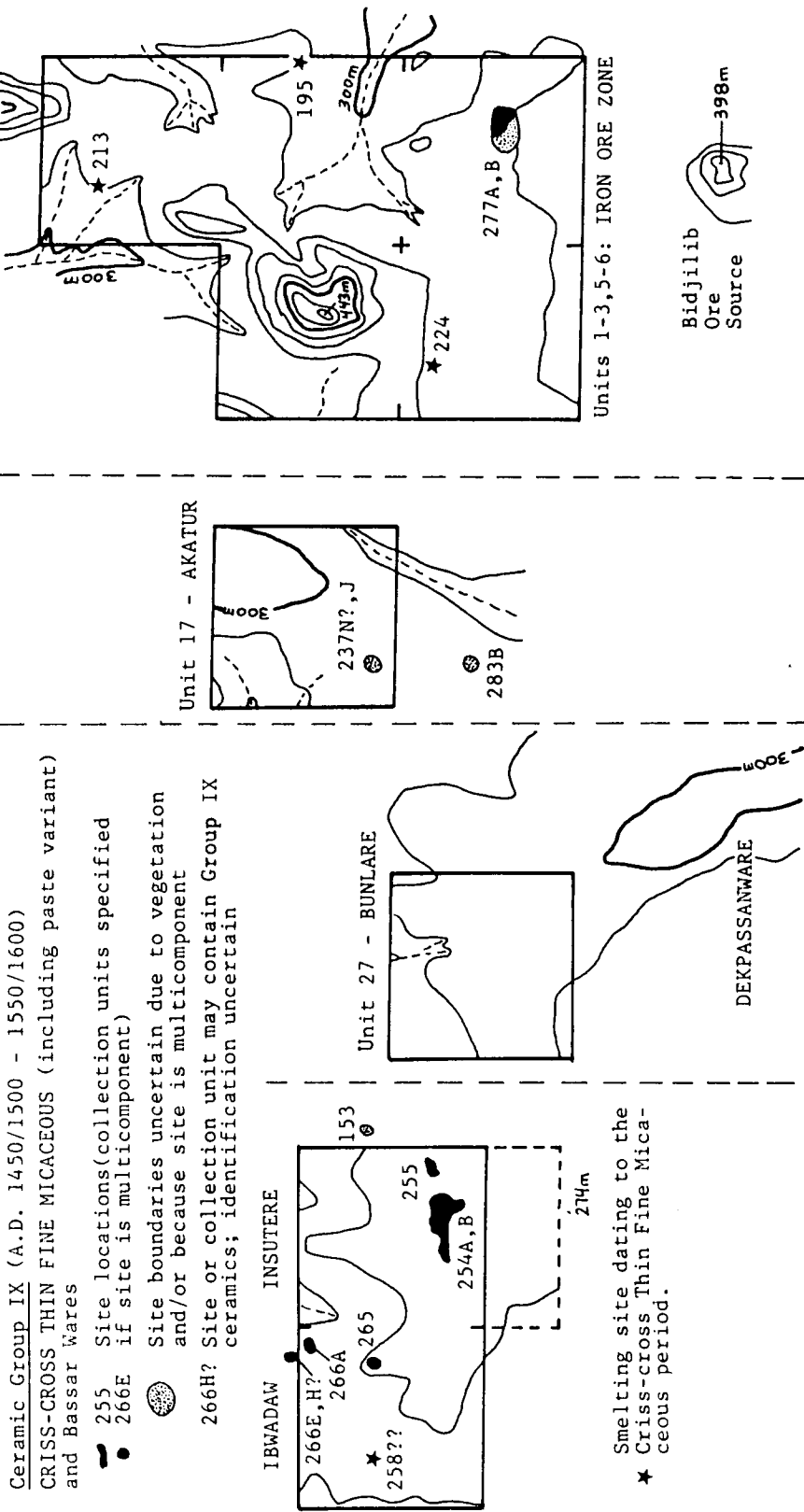


Figure 5 Habitation and smelting sites recorded in the intensive survey zone with Group IX ceramics.

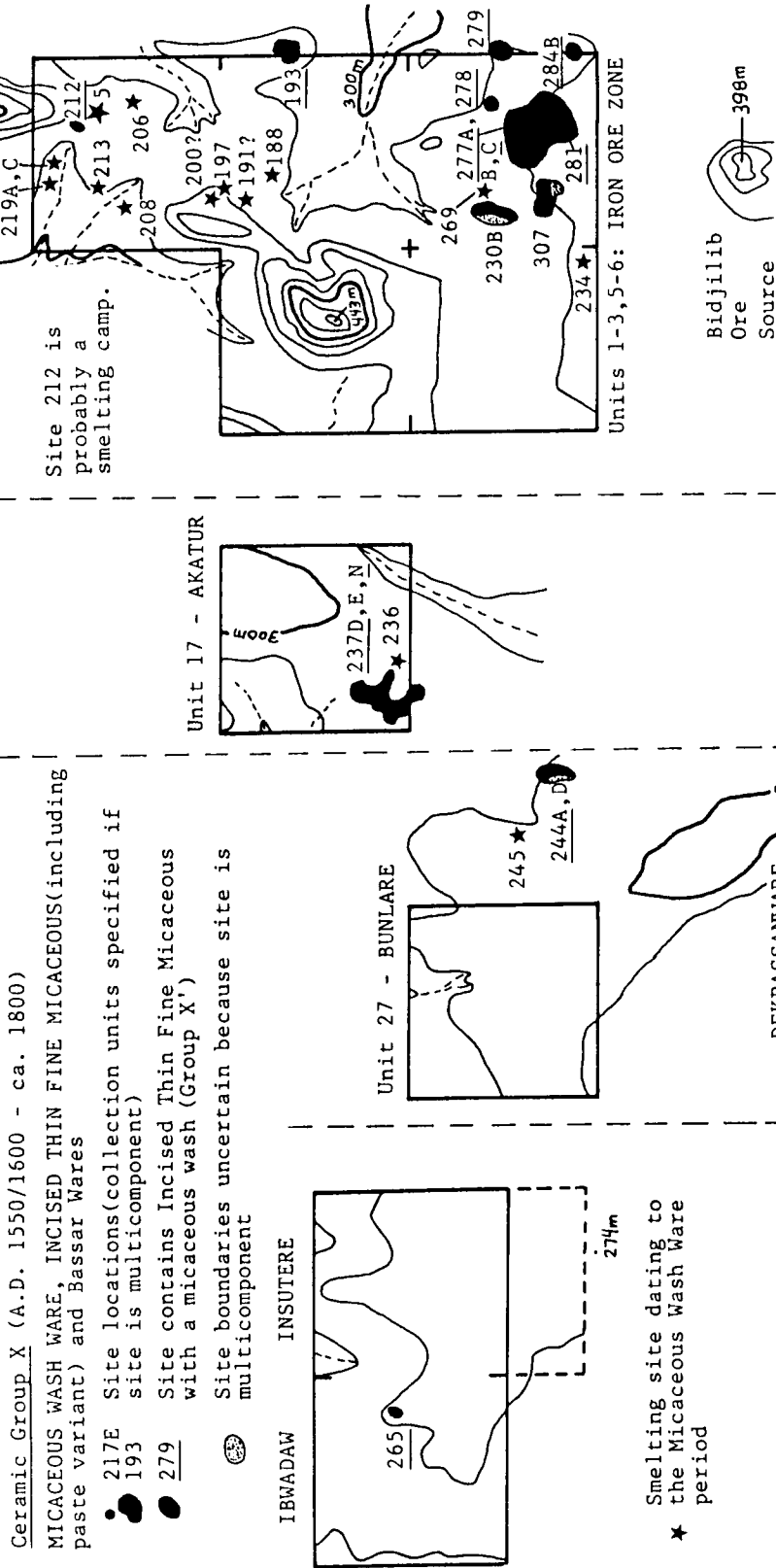


Figure 6 Habitation and smelting sites recorded in the intensive survey zone with Group X ceramics.

once the iron industry became the principal source of livelihood for the Bassar, it is not surprising that ironworkers moved to within 1.0 km of the ore source. Similar population movements are likely to have occurred toward the Apetandjor deposit near Kabu and the Djowul ore near Bandjeli (Fig. 2).

*Settlement pattern and settlement hierarchy?*

The movement into the ore zone resulted in a change from a pattern of dispersed hamlets to one of a central village and associated hamlets (Figs. 4–6). This new pattern and the location of Site 277/281 adjacent to the Bidjilib ore source suggest a possible low level settlement hierarchy. A big-man system or small chiefdom may have emerged as a result of competition for control and access to the Bidjilib–Wawa–Liba ore deposits (cf. Earle 1978; Binford 1977:307–9). The big man or chief living at Site 277/281 may even have exercised subregional authority over smelting populations on the neighbouring peneplain (e.g. at Akatur) which probably obtained ore from the same source. Perhaps similar political and economic relationships developed in the Bandjeli and Kabu production zones. At this point, however, one can only speculate about the extent of increased political centralization.

While the end of Period 3 corresponds to the rise of the present day Bassar chiefdom, whose chief reigned over the populations that had taken refuge in the vicinity of Mount Bassar, it is not yet clear how this relates to increased iron production because of the intervention of external forces: the Tyokossi and Dagomba slave raids and the development of a major Hausa kola route through Bassar. The latter two events are sufficient in themselves to explain the rise of the Bassar chiefdom for reasons of defence and/or the manipulation of exchange through tolls and taxes on passing caravans. Future research is needed to determine whether the political economy of Bassar was based primarily on the control of iron production and exchange or on the benefits derived from the passage of the Hausa caravans or both. The foundation of the rival Kabu chiefdom *ca* 1850–60 is more clearly linked to competition over the trade of iron and iron items produced in the Bandjeli and Natchamba zones, and may be a late reflection of the kinds of competition that existed between Kabu, Nababun and Bandjeli during Period 3.<sup>4</sup>

*Specialization*

Village and areal specialization within the iron industry became quite pronounced during Periods 3 and 4. This took two forms. In the west, areal specialization was the rule: Bandjeli with its rich iron ores concentrated on smelting, and the Bitchabe–Natchamba zone with its abundant stone for hammers and anvils abandoned smelting in favour of smithing (de Barros 1985: Chapter 6). In addition, during late Period 3 or early Period 4, the depletion of forests in the core industrial area led Dimuri to specialize in charcoal making (Fig. 7; Posnansky and de Barros 1980). This division of labour was due to a combination of resource variability and the demands and ecological effects of large-scale production.

To the east, smelting was the primary activity during Period 3. While areal specialization in smelting may have occurred during both Periods 2 and 3, this was not true for Period 4. Instead, village or residential groups specializing in both smelting and smithing are associated with the rise of the Bassar and Kabu chiefdoms (Fig. 7). In the Bassar

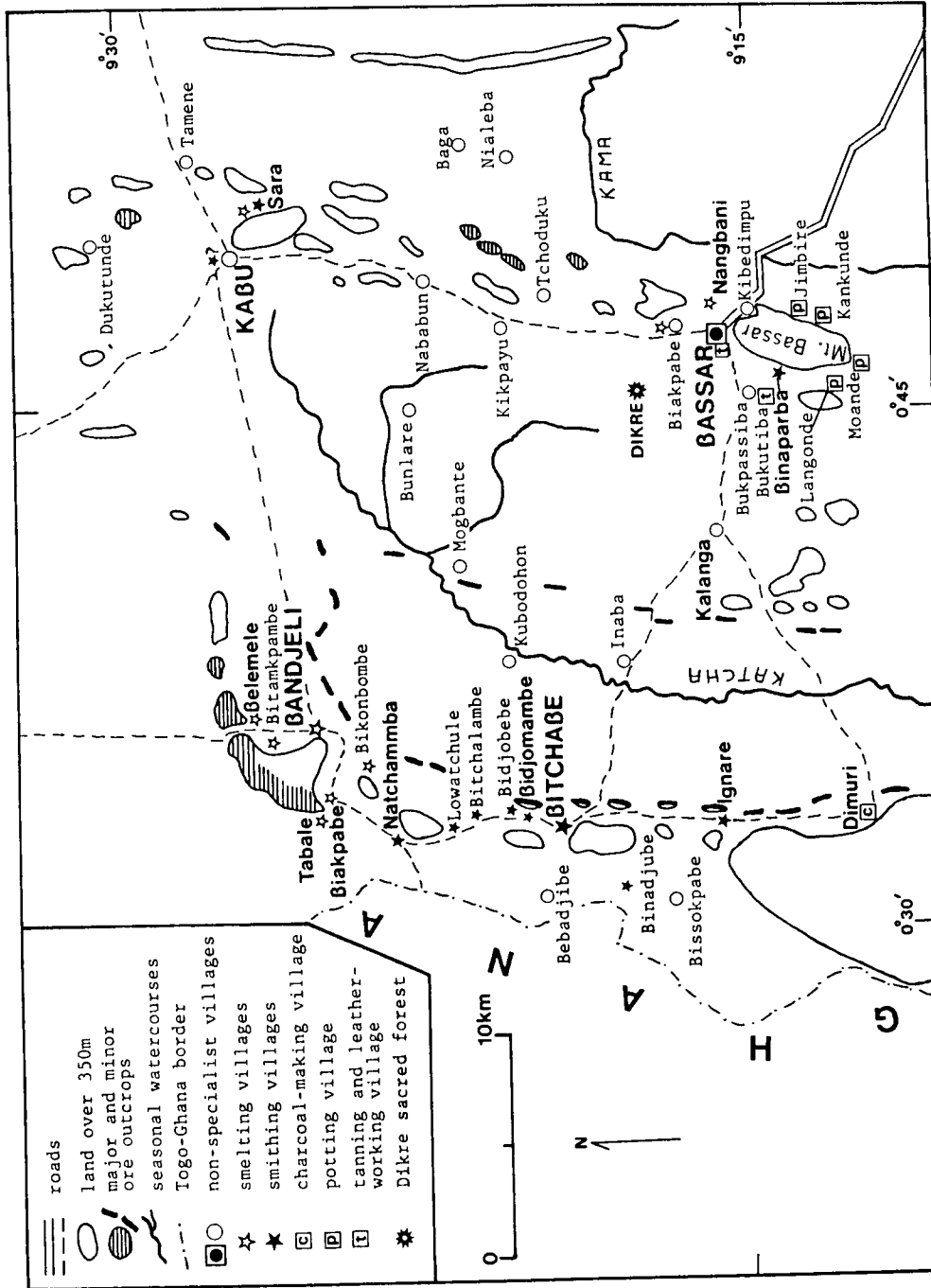


Figure 7 The Bassar industrial region showing specialist villages as they existed in the 1890s.

agglomeration, smelting was done primarily by the village of Nangbani, with some smelters in other villages such as Bukutiba and Biakpabe; smithing was done primarily in Binaparba. In the Kabu area, smelting and smithing activities took place in different residential groups in nearby Sara. Kabu oral traditions make it clear that the chief initiated and protected the settlement of smelters and smiths in Sara in order to ensure his own source of iron tools and weapons (Gnon 1967).

Ethnohistoric and ethnographic accounts also note the presence of four specialized potting villages adjacent to Mount Bassar and specialized tanning activities in the village of Bukutiba and within a residential group in Bassar itself (Fig. 7). However, it is not known whether such specialization occurred as a result of the growth of the iron industry and/or the rise of the Bassar chiefdom or whether it was already present during previous periods.

In short, while the evidence for the region as a whole is still somewhat ambiguous, there is a clear correlation between the growth of large-scale iron production during Periods 3 and 4 and the rise of pronounced areal specialization within the iron industry in the west. Along the Kabu-Bassar axis, the location of ironworking villages was ultimately linked to the rise of competing chiefdoms which sought to have an independent source of iron and iron products. With the arrival of the first Europeans (Germans) in the 1890s, village craft specialization so dominated the region that very few villages engaged solely in farming.

### *Trade*

Although one can only speculate about the nature of trade during Period 1, previous research indicates that the Bassar were trading iron with neighbouring groups by the fourteenth century AD (de Barros 1985:Chapter 12). While it is not known exactly when the region first became integrated into long distance trade networks, there is good evidence to show that a major Hausa kola route to Salaga (Ghana) passed directly through Bassar and Bitchabe as early as the late eighteenth century. The large-scale production of Period 3 suggests that Bassar iron was traded at some distance as early as the late sixteenth century, but this is not yet confirmed by the discovery of appropriate trade goods at Period 3 sites. It is not clear, however, that the Hausa route passed through Bassar because of its large-scale iron production. Norris (1984) believes that it passed through Bassar because this represented one of the shortest routes between Hausaland and the Middle Volta Basin. In any case, there is no denying the clear correlation between the rise of large-scale iron production and the increased importance in the life of the Bassar of both long distance and intraregional trade between specialists.

### **Conclusions**

In the intensive survey zone, the Bassar iron industry passed through four stages (Fig. 8):

- (1) an era when villages may have specialized in smithing (Ceramic Group V);
- (2) a period when neither smithing nor smelting was important (Groups VI and VII);
- (3) a period dominated by smelting activities and culminating in large-scale iron production (Groups VIII-X); and
- (4) the collapse of the smelting industry due to Tykossi and Dagomba slave raiding (Group XI).

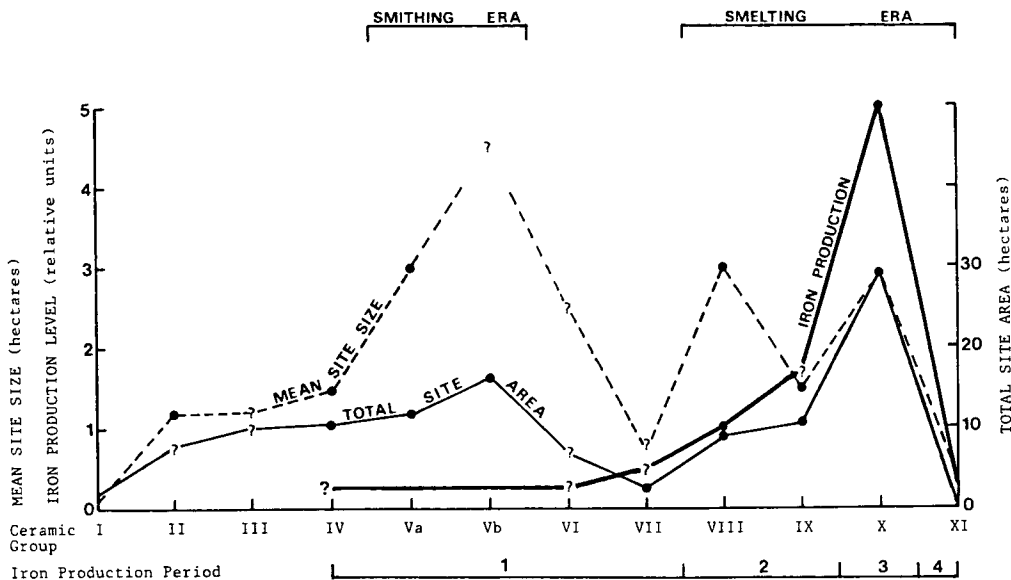


Figure 8 The relationship between developments in the Bassar iron industry and changing patterns of demography and settlement in the intensive survey zone. The peaks associated with the smithing and smelting eras also correlate with population aggregation, village-size sites, and possible low-level settlement hierarchies. (Note: The total site area for ceramic Group II has been halved to allow for probable lack of site contemporaneity.)

The first two stages probably do not reflect events of the Bassar region as a whole, except insofar as iron production was limited to local needs. The last two stages certainly do reflect regional events, although the iron industry did not in fact collapse; it simply regrouped around new centres.

If the data from the intensive survey zone are a reliable guide, the rise of large-scale iron production in the Bassar region was accompanied by significant increases in regional population densities and in maximum site size, a probable increase in site longevity, and a marked tendency toward population aggregation in the major ore zones. The pattern of villages with satellite hamlets suggests the appearance of low-level settlement hierarchies led by big men or, possibly, chiefs and centred on the major production zones. While the nature and degree of political centralization prior to the nineteenth century remain obscure, it is clear that competitive chiefdoms (Bassar and Kabu) were present at the time of European contact, and that the origin and economic lifeblood of both were linked to trade. Whether their origins and strength can be strictly attributed to the rise of Bassar iron production and exchange is less clear.

Finally, large-scale production resulted in a pronounced level of areal specialization within the iron industry along the Bandjeli-Bitchabe-Dimuri axis. Along the Kabu-Bassar axis, village craft specialization in both iron-related and other fields thrived, but its geographic distribution was linked to the rise of competitive chiefdoms. For the region as a whole, village craft specialization became the norm.

Although the data base for the introduction and early expansion of Bassar ironworking is not as complete as for later periods, trends similar to those just described apparently

occurred well before the rise of large-scale iron production (Fig. 8): a probable increase in regional population density and site longevity, an expansion of average and maximum site size, a tendency towards population aggregation, and the possible development of a low-level settlement hierarchy.

While research results from Bassar are at times more suggestive than definitive, they do make a significant contribution toward our understanding of the impact of the introduction and growth of ironworking in sub-Saharan Africa. While they tend to confirm much of what previous scholars had predicted regarding food production, demography, settlement size and specialization, they do not indicate that large-scale iron production based on localized iron deposits necessarily leads to significant increases in political centralization. While the rise of the Kabu chiefdom does appear to be so linked, this was a very late development, and the evidence for the Bassar chiefdom is ambiguous. Furthermore, Bandjeli, the most important production centre with the richest ores, was never under the suzerainty of the chief of Bassar, and there is no evidence that it ever developed its own chiefdom. Although it may briefly have fallen under the influence of the neighbouring state of Dagomba in the nineteenth century, it was basically left alone.

While a society's mastery of iron production may have been of critical significance during the initial development of iron metallurgy when most populations were still using stone tools, and while chiefdoms and states did need to insure a steady supply of iron for hoes and weapons, it does not appear that ironworking centres were destined to become important political centres (Dupre 1982; Raber 1980). As Cornevin (1962) has suggested, they may have often been neutral areas which were able to protect their political independence from more powerful political entities because of their monopoly over ironworking technology. Any attempt to conquer such areas and force them to produce would only have resulted in depopulation and decreased production.

### **Endnotes**

- <sup>1</sup> The change may also reflect the replacement of one ethnic group by another. Today, the Bassar region is occupied by the Bassar who live in hamlets or villages and other more recent groups (Konkomba, Lamba, Kabiye) who live in dispersed nuclear and extended family residences. All these groups practise horticulture.
- <sup>2</sup> Archaeologists working in the Valley of Mexico have utilized site sherd densities to help make population estimates (Parsons 1971; Blanton 1972; Parsons *et al.* 1982; Sanders, Parsons and Santley 1979), and have also noted that they may reflect differences in site longevity and in the state of cultivation.
- <sup>3</sup> For a survey of ethnographic data, see Chisolm (1968) who suggests that the typical farming catchment zone has a 1–2 km radius; greater distances frequently entail the creation of farmsteads. See also Vita-Finzi and Higgs 1970; Brumfiel 1976; and Steponaitis 1981.
- <sup>4</sup> Martinelli (1982:81–2) asserts that chiefs from Bassar and Kabu received salt bars as taxes from caravans and other levies from commercial transactions but he cites no source, and the present author has been unable to obtain confirmation of this from the oral traditions of Bassar or Kabu. The same is true for Martinelli's (*ibid.*: 31, 36) assertions concerning the payment of tribute to the Bassar chief in the form of iron and iron products.

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