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A Comparison of Early and Later Iron Age Societies in the Bassar Region of Togo

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ABSTRACT

The Bassar region of northern Togo has been the locus of two major ironworking societies over the last 2500 years. An Early Iron Age society is documented at the large ironworking centre of Dekpassanware and its satellite hamlets, dating from cal BC 420 to cal AD 130. After an apparent hiatus of a millennium, extensive ironworking reappears after cal AD 1275 and thrives well into the 20th century. Enough data are now available on both periods to make a worthwhile comparison focused on: 1) regional settlement patterns; 2) intra-site spatial organization in terms of habitation and industrial areas; 3) smelting and smithing technologies; 4) iron production levels; 5) diet; 6) material culture; and 7) probable ethnicity. The data are derived from ethnographic, archaeological, and analytical research by the author between 1981 and 2009, along with past and ongoing specialist studies of botanical, faunal, and metallurgical remains.

KEYWORDS: ironworking, EIA vs. LIA, settlement patterns, technology, production, diet, material culture, ethnicity

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Introduction

The Bassar region is in northern Togo about 10° north of the Equator (Figure 1).

Figure 1 here

Annual rainfall of 55 inches produces a mixed woodland-savanna habitat heavily impacted by past ironworking activities (deforestation) and past and current horticultural practices. The region contains nearly pure hematite ores (69% iron) near Bandjeli and numerous iron ore hills to the east (35-45% iron). The archaeological study of the region is based primarily on an extensive survey of slag mound sites identified by local farmers and ironworkers, and a stratified, systematic unaligned sample survey of a 14 x 3 km^2 area stretching from a major iron ore source in the east (*Bidjilib*) to the Katcha River to the west (Figure 2). Nearly 10 km^2 were intensively surveyed to obtain information on site size and settlement patterns in the context of a dated ceramic sequence. The survey recorded both Later Iron Age (LIA) and what would eventually be identified as Early Iron Age (EIA) sites, such as Dekpassanware (de Barros 1985, 1986, 1988, 2003).

Figure 2 here

Two major ironworking societies have occupied the Bassar region over the last 2500 years. An EIA society was centred on the 28-ha village and industrial site of Dekpassanware and its satellite hamlets, dating from 2500 to 2000 BP. After an apparent hiatus of a millennium, ironworking reappears during the Later Iron Age from about 650 BP through the mid-20th century (de Barros 1986, 2003). These EIA and LIA societies are compared below in terms of their temporal ranges, settlement patterns, intrasite spatial

organization, ironworking technology, iron production levels, diet, material culture, and probable ethnicity.

Temporal Range

The EIA deposits at Dekpassanware have produced radiocarbon dates from cal BC 420 to cal AD 130. These are directly underlain by a Late Stone Age (LSA) component that dates from cal BC 1360 to 1050 and cal BC 830 to 400 (Table 1).

Table 1 here

The LIA in Bassar is dated from cal BC 1265 to the 1950s, during which time Dekpassanware was reoccupied from cal AD 1280 to 1615. The LIA dating is based on ethnography, ethnohistory, and 16 calibrated, charcoal-based radiocarbon dates from the Bassar region (de Barros 1986). Research thus far has not found evidence for ironworking during the long hiatus between these ironworking occupations. This period is long enough that it cannot be easily explained by a simple ecological collapse of the early iron industry, followed by a period of reforestation, and the subsequent reintroduction of ironworking (de Barros 2000; Goucher 1984). This hiatus is likely due to insufficient intensive sample survey of this vast region whose core area – centred on the communities of Bassar, Kabu, Bandjeli, and Bitchabe -- is minimally 625 km^2. Other ironworking sites or centres may exist during this hiatus in areas not yet surveyed and/or dated.

Regional Settlement Patterns

As noted above, Dekpassanware is underlain in places by terminal LSA deposits. The LSA regional settlement pattern, based on lithic and lithic-ceramic scatters recorded

during the intensive survey, consists of dispersed hamlets and activity areas ranging from <0.5 to < 3 ha in size (de Barros 1985, pp. 376-444). The EIA settlement pattern, also documented by survey, includes the 28-ha ironworking centre of Dekpassanware and five 1-2 ha satellite hamlets 3-7 km away (Figure 3). Some of these hamlets have ironworking debris (slag and tuyere fragments) and some do not. Perhaps reflecting its importance as a major centre, Dekpassanware is on a high gentle rise from which virtually the entire core of the Bassar region is visible (Figure 2).

Figure 3 here

At the onset of the LIA (13-14th c.), intensive survey results indicate a relatively dispersed pattern of sites averaging about 3 ha in size, with a range of <1 to 3.5 ha. As iron production increasingly became the dominant regional economic activity (late 16th c. onwards), settlements shift eastward, aggregating in the *Bidjilib* iron ore zone. Regional iron production increases 300-450% during this period (de Barros 1986). By the 17-18th centuries, the settlement pattern consists of two large villages of 7 and 9.5 ha and at least eight satellite hamlets averaging 3 ha, with a range of >1 to <5 ha (de Barros 1988; Figures 4-6). During the late 18th and 19th centuries, Dagomba slave raiding from the

Figures 4, 5 and 6 here

west and Tyokossi slave raids from the north led to the near total abandonment of the Bassar peneplain and the creation of refuge sites near major mountains or hills. When the Germans arrived in the 1890s, they encountered regional iron specialization along the western Bandjeli-Bitchabe-Dimuri axis – with smelting focused at Bandjeli (richest ores), smithing north and south of Bitchabe (best stone for anvils and hammers), and charcoal

making at Dimuri near remaining forested areas to the south. The eastern Kabu-Bassar axis consisted of the village chiefdom of Kabu (found ca. 1860) to the north with its specialist ironworking village at Sara, and the larger Bassar chiefdom to the south (founded ca. 1780) with its specialist smelting, smithing, and pottery villages near Mt. Bassar (de Barros 1988; Figure 7). Thus, during both the EIA and LIA, the pattern of central villages with satellite hamlets arises as ironworking becomes a major activity. This low-level settlement hierarchy may or may not have been associated with chiefdoms or some kind of informal big man system (de Barros 1988, 2001; Dugast 1988). Finally, while the introduction of ironworking resulted in significant increases in regional population densities and maximum site size, as well as aggregation of settlements in the iron ore zone during LIA large scale production, it did not lead to any significant increase in political centralization during either period (de Barros 1988).

Figure 7 here

Spatial Organization of Habitation and Ironworking Areas

In West Africa, including the Bassar region, several factors affected where smelting took place. These include the location of quality ores; proximity to water, appropriate wood fuel, and refractory clay sources for furnace and tuyere construction; and avoidance of habitation areas. Reasons for the latter included sexual taboos regarding women's participation in or proximity to smelting operations; fear of witchcraft and evil spirits; protection of ironworking secrets from espionage; and/or the avoidance of fire hazards (de Barros 2000; Goucher 1984; Herbert 1993). Aside from iron bloom crushing, Bassar women did not participate in traditional smithing, but cultural taboos apparently did not

lead to significant spatial isolation of such activities. At the EIA site of Dekpassanware, where both smelting and smithing took place, four of the six industrial zones – which contain slag, ceramics, broken tuyeres, stone hammer fragments, and in one case, stationary stone anvils and iron bloom crushing mortars (see I-1 in Figure 7) – are on the periphery of residential areas; however, the other two zones are 280 and 330 m to the north (Figure 8). Since the industrial areas are generally similar in their contents, there apparently was no strict requirement that ironworking areas be located at a considerable distance from habitation areas. In fact, at the smaller hamlets with ironworking debris (slag, tuyeres), there is no physical separation between habitation and ironworking areas; however, it is possible that only smithing took place at these sites.

Figure 8 here

At present, little is known about EIA smelting activities near major iron ore deposits to the east (Figure 2). This is partially because the intensive survey avoided dating small or surface slag deposits to avoid charcoals introduced by rodent and agricultural disturbance (de Barros 1985, pp. 523-526); as a result the two EIA hamlets in the *Bidjilib* ore zone have not been excavated or dated (Figure 3). To verify forge activity locations, soil samples were taken near probable stationary and portable stone anvil sites and within industrial zones; these were then sifted for hammer scales and microspatter (battitures). These signatures of smithing activity were found in abundance in industrial areas 1, 2, and 4, including near the stationary anvils; traces were also found near a possible portable anvil. Samples from industrial areas 3 and 6 have not yet been examined. Future studies will systematically sample residential areas to check for forge locations, as is known ethnographically for the LIA (de Barros 1985, pp. 166-184).

Archaeological and ethnographic data from LIA sites exhibit a pattern of distinct, often major, separation between smelting and residential areas (de Barros 1985, 2001). In a few cases, smelting was done a short distance away, but these may be smelting camps (de Barros 1985, 1988; Figure 4 & 6). During the LIA reoccupation of Dekpassanware, the two smelting slag zones are 95 and 240 m from residential areas (Figure 8). During the slave raiding of the late 18th and 19th centuries, which led to major population shifts (including the abandonment of Dekpassanware), major smelting sites continued to be set well apart from habitation sites, though smaller ones were occasionally close by (de Barros 2001). However, after the end of smelting in the mid-20th century, people began to build houses near abandoned smelting sites, making interpretations sometimes difficult.

During the LIA, smithing consisted of three operations – crushing iron bloom in stone mortars, purifying the bloom, and manufacturing iron tools, the latter two in the forge (de Barros 1985; Dugast 1986; Goucher 1984). Mortar locations were tied to good stone outcrops, which might be somewhat removed from habitation areas, whereas forge activities could be conducted either near the mortars and/or more commonly within or near habitation areas. The intensive survey found smithing debris (tuyeres) associated only with EIA sites. This is puzzling and suggests regional specialization in smelting and smithing may date back to the early part of the LIA, with smithing perhaps done in the Bitchabe-Bidjomambe area, which was not intensively surveyed. Ethnographic and archaeological data obtained from the Bitchabe zone in 2002 suggest stone mortars were generally near habitation areas. Prior to the slave raiding period, archaeological data suggest forges were grouped in large smithing zones near residential areas, but after

contact smithing was more likely to be directly adjacent or within residential areas. Additional studies are necessary to clarify these patterns.

Ironworking Technology

Based on the physical appearance and preliminary chemical analyses of ore samples recovered from excavations at Dekpassanware, iron ores were probably mined during the EIA from the iron-rich hills and mountains of the region. There is no evidence for the use of lateritic ores. Little is known about the furnaces used, but the paucity of furnace structural debris suggests they were small and bellows-driven. A search for furnace emplacements on the surface or in shallow pits has not yet been successful. The smithing technology resembles the LIA with conical tuyeres, stone anvils, stone hammers, smithing furnace bottoms, and stone iron bloom crushing mortars (de Barros 2006). The metallurgical analysis of an iron bracelet from an EIA burial indicates it is of good quality (low slag content), though somewhat heterogeneous in carbon content (0.1 to 0.6%), with evidence of folding but no quenching (Killick, D 2009, pers. comm., 13 February; Figure 9). Initial chemical analysis of ores from both EIA and LIA components at Dekpassanware indicates that relatively high quality ores were being smelted during both periods (Serneels, V 2009, pers. comm., 12 February).

Figure 9 here

Abundant ethnographic evidence, including data from replicative smelts (Goucher 1984; Hahn 1997), is available for the LIA (de Barros 1985, pp. 134-185; 1986). Ore was mined from iron-rich hills and mountains using iron picks with wooden handles, usually by women. Wood charcoal was made locally or imported by women, and highly refractory clays were obtained locally. Furnaces and tewels (circular liners for draft holes) were

constructed by men. Tall, more efficient induced draft furnaces were used which operated without bellows or tuyeres. Smelting took two days in the Bandjeli area, and 3-6 days in the eastern region due to lower quality ores which requiring more charcoal fuel and larger capacity furnaces. A typical iron bloom weighed 30 kg. The blacksmith or his wife crushed the bloom in stone mortars using large spherical stone pounders or smaller hammer stones made of quartzite. The crushed bloom, now free of powdered slag, was reworked in the forge to eliminate additional impurities and to obtain the desired carbon content (Goucher 1984). Iron was worked into pill-shaped ingots (*lukopile*) that were later fashioned primarily into circular hoe blades, but also into axes, picks, arrow points, knives, bracelets, machetes, nails, and musical gongs. The all-male blacksmith team consisted of a master smith who manipulated the iron with iron tongs and later did finishing work using metal hammers; a stone hammer man who wielded four different types of large quartzite hammers for rough-out work; and a third man who worked the bellows (Dugast 1986). The forge was made of clay, often reinforced at the lip with a large olla rim. Tuyeres (made from clay mixed with straw) were used to direct air from the concertina bellows (made of wood and animal skins) into the forge. Slag was not recycled for iron production or other major uses. Ongoing metallurgical analyses of iron bloom, tools, and bracelets will help determine to what degree there was continuity and/or change between EIA and LIA ironworking technologies.

Iron Production Levels

At the EIA site of Dekpassanware, all indicators suggest production for local regional needs. Slag deposits are generally level with the surface (rarely 10-20-cm high) and range from 30-60 cm in depth. More importantly, the entire 28-ha site has only one bloom

crushing mortar complex with only seven mortars. Although several ore samples and a few cylindrical tuyeres with heavy slag deposits at one end suggest smelting activity, the vast majority of tuyeres are conical with little or no attached slag, but often with some melting or fusing at the end, suggesting smithing. These observations, taken along with the relative lack of fused furnace lining, the paucity of fired clay furnace fragments, and the inability thus far to find furnace emplacements, suggest the dominant ironworking activity at Dekpassanware was smithing. Smelting probably also took place closer to the *Bidjilib-Wawa-Liba* ore sources to the east, but this remains to be demonstrated (Figure 2).

The above picture changes with the LIA. From the late 13th to mid-16th century iron production was for both local and regional consumption through trade with adjacent ethnic groups; however, from the mid-16th to the early 20th century, production data (slag mound volume, large iron bloom crushing mortar sites) indicate large-scale production for long-distance trade (de Barros 1985, 1986). During this time production levels increased from 300-450%. The induced draft furnaces used varied in size from 2-2.5 m in the Bandjeli area and 2.5-3.5+ m along the Kabu-Bassar axis – due to important differences in iron ore quality noted above. Estimated annual regional production during the LIA was 7-20 tonnes from the 14th to mid-16th centuries; 28-81 tonnes from the mid-16th c. to ca. AD 1800; 60-135 tonnes during the 19th century; and 150-200 tonnes from ca. 1900-1915 at Bandjeli alone. The latter is based on actual bloom weights measured at Bandjeli region markets by German colonial officials. The former figures are based on the conversion of iron slag mound volumes to iron production (de Barros 1985, pp. 317-364; 1986). The

Bassar region was one of most important iron production centres in sub-Saharan Africa with over 80,000 m^3 of slag, often in very large mounds (Figure 10). Bassar compares favorably with other large ironworking centres at Mema (Mali, Babungo (Cameroon), and

Figure 10 here

Meroe (Sudan) (de Barros 1986). This large-scale production is thought to be due to the rise of the Dagomba, Gonja, and Mamprusi states within the Volta Basin in the 15th and 16th centuries, which would have increased the demand for iron hoes and weapons and which helped stimulate long distance trade into the Middle Volta Basin, as did the rise of Bono-Mansu and its Asante successor state (de Barros 1986).

Diet

The available evidence for the LSA deposits at Dekpassanware is limited, consisting primarily of faunal remains that suggest that consumption of domesticated cattle was limited. Faunal analyses by Murrey (2003) and Linseele (2008), and the study of charred seeds and wood from flotation and excavation samples by Eichhorn and Kahlheber (2002) and Eichhorn (2008), indicate the EIA diet at Dekpassanware consisted of domesticated pearl millet (*Pennisetum glaucum*) and cowpeas (*Vigna unguiculata*) or black-eyed peas, as well as domesticated West African shorthorn cattle (*Bos taurus brachyceros*; cf. Rege, Aboagye and Tawah 1994), whose remains dominate the faunal sample. Also recovered were small amounts of goat/sheep and guinea fowl (*Numida meleagris*) -- as opposed to chicken which probably arrived in West Africa ca. 100-500 A.D. (Macdonald and Blench 2000). Yams are inferred based on current cultivation patterns and the assumption of its use (Harlan, de Wet and Stemler 1976; Sowunmi 1985). Attempts to extract yam starch from excavated groundstone tools are ongoing by Amanda Logan.

Domesticated sorghum has not yet been documented prior to the first century A.D. at 10° north latitude (Kahlheber and Neumann 2007). And, aside from one unripened grain of what might be sorghum (Kahlheber, S 2008, pers. comm., 3 September), it was not recovered at Dekpassanware. The project area is also within the zone of wild fonio, which extends from central Nigeria into northern Benin and Togo (Ruskin 1996), but no wild or domesticated fonio was recovered. Although the sample size is small, the shorthorn cattle at Dekpassanware may be dwarf shorthorn (Linseele 2008), although today's dwarf shorthorn cattle are found only in more humid and forested environments than what is typical of Bassar's savanna-woodland. Wild animal foods are surprisingly uncommon compared to sites in Ghana (Gautier and Van Neer 2005), but there is some evidence for hare (*Lepus sp*.), antelope, duiker (*Cephalophus* or *Sylvicapra sp.),* and rodents – probably the cane rat or grasscutter (*Thryonomys swinderianus*). A fragment of giant land snail (*Achatina sp.*) was also recovered. Some bones could be either cattle or savannah buffalo (*Syncerus cafer*), but the lack of secure buffalo identifications suggest they are all cattle (Linseele 2008). Charcoal studies also suggest the presence of a park savanna at this time with probable karite, nere, and possibly baobab (Eichhorn 2008).

During the LIA, early observations by Frobenius (1913) and Klose (1899) suggest the following for the precolonial LIA diet: yams; millet and sorghum or "gros mil" (*sorghum bicolor*), though the date of introduction of sorghum is not known; beans (cowpeas); groundnuts (*Arachis hypogaea*); sesame seeds, and taro and tobacco at the house; and domesticated cattle, dwarf goats, sheep, guinea fowl (*Numida meleagris*), and chicken (*Gallus gallus*]. Wild animal foods included antelope, hare, leopard (*Panthera pardus*),

bush pig (*Potamochoerus porcus*), monkeys, and cane rat. Wild plant foods included karite (*Butyrospermum parkii*), nere (*Parkia biglobosa*), baobab (*Adansonia digitata*) seeds and greens, palm nuts, and wild leaves and roots. Hippos were occasionally hunted, and the cultivation of okra and red peppers is likely.

Aside from slag mounds, excavated data for the LIA are limited to the upper 50 cm at Dekpassanware. Surprisingly, faunal remains are not common and only sparse amounts of domesticated cattle are present. This major difference between the EIA and LIA ironworking occupations at Dekpassanware is not easily explained given ethnohistoric data emphasizing the ownership of cattle. However, given the limited sample size of the LIA deposits, it would be presumptuous to assume that EIA populations depended more upon cattle for food than did LIA populations.

Other Aspects of Culture

The evidence from Dekpassanware suggests ironworking did not completely replace flaked stone technology. A few quartz flakes, core fragments, and scrapers were recovered from EIA levels in residential areas, though such material was virtually absent in industrial areas. It is not clear whether LSA artifacts were introduced via rodent disturbance or whether flaked stone tools continued. Since flaked stone fire starters continue to the present, it is likely that remnants of flaked stone technology persisted. Groundstone tools (manos, metates, hand stones), hammer stones, polished pebbles, fire-altered rock, and abundant ceramics are present. Most ceramics were made from clays derived from rock types found east of the Bassar region (de Barros 1985, p. 543) indicating non-local manufacture. Clear quartz, rose quartz, chalcedony, chert and shell

beads are present in small quantities (de Barros 2008a). Ceremonial items, such as a bird-like object made of volcanic tuff and a rasp-like object (non-Kintampo) are also present. Iron bracelets (and a finger ring) of different types are common, along with fragments of knives, hoes and iron wire. Several burials are known at the site, some excavated and some found by a local farmer digging a borrow pit. Excavations in 2002 found either a communal or familial burial containing at least four adults and one juvenile, the latter with a large olla pot fragment in direct contact with its skull. Two adults and one child wore iron anklets, bracelets or necklets.

Information on LIA material culture is more limited. It is based primarily on the extensive and intensive regional surveys and associated surface collections, the excavation of slag mounds, and material recovered from the upper 50 cm at Dekpassanware. Ethnographic data indicate that while cemeteries existed, burials were not communal or familial because adults and children were buried separately, and grave goods did not generally accompany the deceased (Cornevin 1962; Tigon 2002; Dugast S 2009, pers. comm., 12 March). No LIA burials have been excavated. During the LIA, ceramics were even more abundant than during the EIA. Based on resemblances to ethnographic forms and present-day ceramic trading patterns, ceramics were probably imported from the neighboring Losso or possibly Nawuda (Niamtugu) to the northeast, the Kabiye to the east, the Kotokoli to the southeast, and the Konkomba from the north, the latter primarily for the Bandjeli area (de Barros 1985, pp. 541-593). Calabash millet beer drinking bowls appear to have been replaced by fine, thin-walled, smudged and decorated imported ceramic drinking bowls. Recovered geometric potsherds are probable remnants of potsherd pavements, based on

the discovery of eroded pavement remnants at a late 18th century site. After ca. 1800, slave raiding radically altered Bassar settlement patterns and imported ceramics declined drastically in quantity, with new, local clay sources subsequently developed near Mount Bassar (de Barros 2001; Figure 7).

Probable Ethnic Affiliation

It is always risky trying to infer ethnic affiliation deep into the past. However, ethnographic, ceramic, technological, and mortuary data strongly suggest the EIA inhabitants of Dekpassanware were related to the present-day Kabiye (and/or Lamba). Oral traditions collected by Froelich and Alexandre (1960) suggest the region was formerly occupied by the Lama, ancestral to the present-day Kabiye and Lamba. The paste of the dominant Bright Mica Ware contains minerals derived from gneisses and granites from the Precambrian shield exposed in the Kabiye region to the east (de Barros 1985, p. 573). Moreover, the vessel forms strongly resemble those of Kabiye potters today, including the frequent use of hollow ring bases and groove and incision decorative motifs. In addition, the Kabiye claim to be indigenous with ancestors descended from the sky are also the only other ironworking group in Togo who use stone hammers for making iron tools (Hahn 1997). Finally, Bassar mortuary patterns do not include communal or familial tombs with adults and children buried in the same area, whereas the Kabiye do have burial chambers for clan or family burials (Posnansky and de Barros 1980, pp. 20-26). Local informants also stated the Bassar do not normally bury their dead with grave goods, whereas the Dekpassanware EIA burials frequently contain iron bracelets, anklets and necklets worn by the deceased.

During the LIA, ethnographic, archaeological and metallurgical data suggest induced draft furnaces were brought to the Bassar region probably from the north, perhaps ultimately from Burkina Faso, and that the Bassar represent a mixture of indigenous peoples with larger numbers of later ironworking (and non-ironworking) migrants attracted to the rich ironworking centres of the region. Cornevin (1962), de Barros (2000), and Dugast (1987) have documented the multiple origins of Bassar clans: Dagomba, Konkomba, Gurma, Mossi, Gonja, Kotokoli, Lamba, Kabiye, Tyokossi, and others. But who were the indigenous peoples of the Bassar region at the onset of the LIA? While the evidence strongly suggests Lama-Kabiye peoples 2000 years ago, the evidence is ambiguous for the LIA. Various traditions suggest possibly indigenous Lamba at Jimbiri or Kankundi, possibly indigenous Gurma at Byakpabe, and possibly indigenous Gonja (Nataka clan) at Nangbani and formerly at the sacred forest of Dikre (de Barros 2008b, Dugast 1987). These data could support either a long-term development of the Bassar from ancient indigenous habitants and/or the replacement and/or absorption of ancient indigenous peoples of another origin (Dugast S 2009, pers. comm., 12 March).

Conclusion

The EIA-LIA comparison suggests the following: 1) the presence of ironworking during the EIA and LIA correlates with the rise of a low-level settlement hierarchy but no dramatic increase in political centralization; 2) smelting areas tend to be spatial separated from habitation areas, but this is not necessarily the case for smithing areas; 3) whereas EIA furnaces were probably bellows driven, the large-scale production of the LIA was associated with the introduction of large, induced draft furnaces; 4) a relatively good quality carbon steel was already produced during the EIA; 5) millet, cowpeas, and

shorthorn cattle were important in the EIA diet, but the relative absence of cattle in LIA deposits remains to be explained; 6) the EIA appears linked to Lama-Kabiye (gurunsi) peoples, whereas the LIA is linked to a mixture of indigenous Lama and/or other paragurma-speaking peoples and later immigrant groups, together called the Bassar; and, 7) further research is needed to determine whether the millennium-long gap between the EIA and LIA is real or due to sampling issues.

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Table and Figure Captions

Figure 1 – Bassar region in Togo showing maximum extent of Bassar iron trade in the LIA.

Figure 2 – Bassar region smelting sites recorded during extensive and intensive surveys. Major ore deposits, intensive survey units, and the EIA site of Dekpassanware also shown.

Figure 3 – EIA settlement pattern, ca. 400 BC to AD 100, with Dekpassanware and satellite hamlets.

Figure 4 – LIA settlement pattern, ca. 1300 to 1500 AD, showing habitation and smelting sites.

Figure 5 – LIA settlement pattern, ca. 1500 to 1600 AD, showing habitation and smelting sites.

Figure 6 – LIA settlement pattern, ca. 1600-1800 AD, showing habitation and smelting sites.

Figure 7 – Bassar region specialist and non-specialist villages when the Germans arrived in the 1890s. The EIA site of Dekpassanware is also shown.

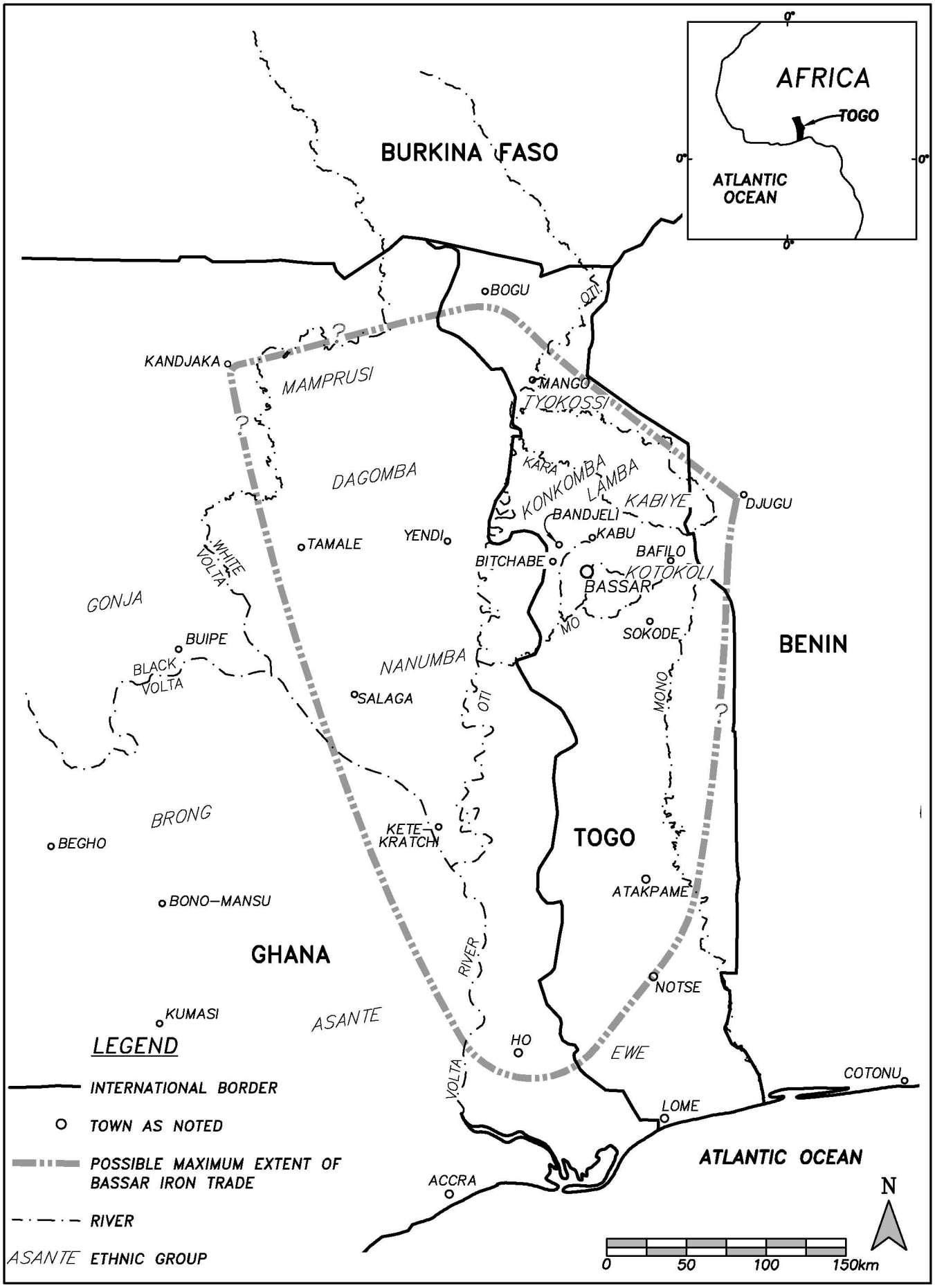
Figure 8 – Dekpassanware and vicinity showing EIA and LIA components.

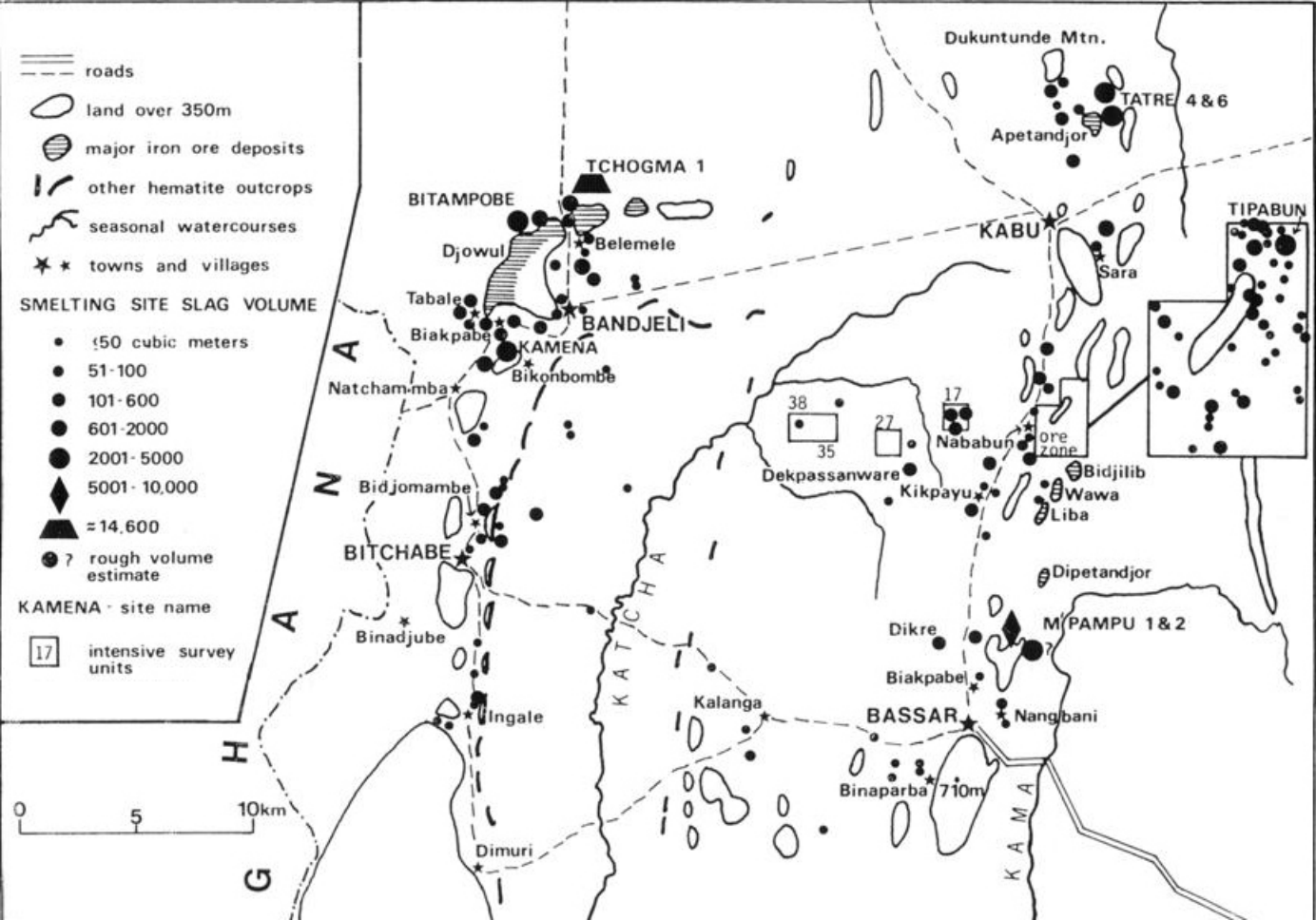
Figure 9 – 200x etched slide of EIA bracelet, Dekpassanware: 1) slag inclusions: fat gray blobs of wustite (FeO) in glass, in a 0.4% carbon steel; 2) white areas: ferrite (pure iron); 3) gray areas in fine structure: pearlite (eutectic of ferrite & iron carbide). Eutectic structure indicates bracelet was slowly air cooled, not water quenched.

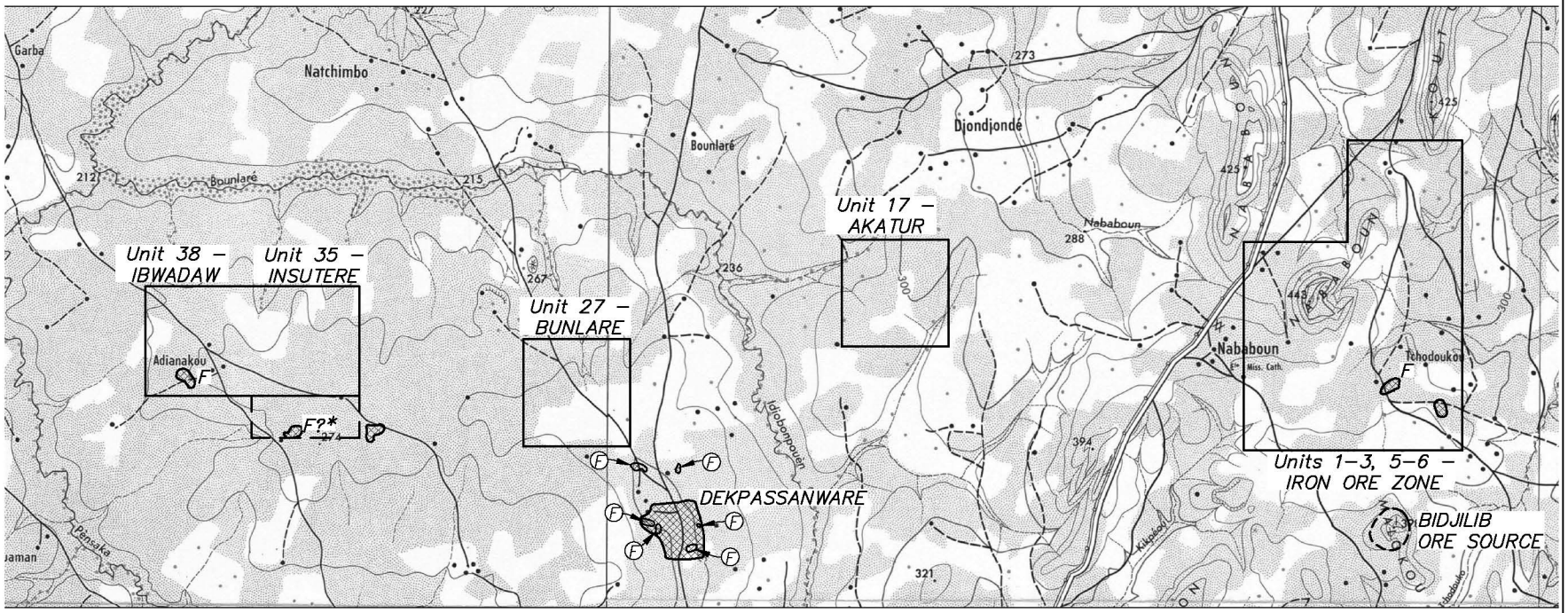
Figure 10 – Large 5 m+ high slag mound near the LIA habitation site of Titur north of Bandjeli.

Table 1 – Charcoal-based radiocarbon dates from Dekpassanware in the Bassar region of northern Togo.

Beta Lab No.	Conventional C14 Date	Calibrated Date (2 sigma)	Unit	Site Area	10-cm Level	Associated Ironworking Debris	AMS or Extended Counting
Eastern Zone of Site: Units 23, 24, and 45 (2002-03, 2008) *[Units 23 and 45 are directly adjacent]*							
173469	2320 ± 60 BP	**BC 520-350 and BC 310-210**	23	Rubbish Dump	6	Iron ore	
173470	2030 ± 80 BP	**BC 340-320 and BC 210-AD 130**	23	Rubbish Dump	9	Slag	
169559	2300 ± 60 BP	**BC 420-200**	23	Rubbish Dump	10		
173471	2580 ± 60 BP	**BC 830-740 and BC 710-530**	23	Rubbish Dump	14		
252672	2210 ± 40 BP	**BC 390-170**	45	Rubbish Dump	15 147 cm	Slag (1) in Level 16	AMS
252674	2970 ± 40 BP	**BC 1360-1350 & BC 1310-1050**	45	Sparse debitage & ceramics	18 174 cm		AMS
169560	2260 ± 50 BP	**BC 400-190**	24	Residential Area	17		
Western Zone of Site (95 m west of Unit 23): Units 36 and 42 (2002-03; 2008 [directly adjacent units]							
169562	2150 ± 70 BP	**BC 380-10**	36	Rubbish Dump	8	Slag and ore	
173472	2110 ± 90 BP	**BC 380-AD 70**	36	Rubbish Dump	10	Slag	Ext Ct
173473	2210 ± 40 BP	**BC 380-170**	36	Rubbish Dump	12	Level 11: slag & ore	
169563	2520 ± 80 BP	**BC 820-400**	36	Rubbish Dump	13		
173474	2310 ± 80 BP	**BC 750-700 and BC 540-190**	36	Rubbish Dump	14		
252673	2200 ± 40 BP	**BC 380-170**	42	Rubbish Dump	15 150 cm	Slag	AMS
Industrial Zone 2 (160 m west of Unit 36): Unit 29 (2003)							
173468	2150 ± 80 BP	**BC 390-AD 20**	29	Adjacent to Industrial Zone	8	Slag & tuyere frags	Ext Ct
Later Iron Age Reoccupation - Large Slag Mounds: Unit 32 (2002) & unnumbered unit (1982)							
169561	640 ± 40 BP	**AD 1280-1410**	32	Slag Mound No. 5	5	Slag & furnace frags	
5352	330 ± 30 BP	**AD 1470-1615 (1 sigma)**	NA	Slag Mound No. 1	multiple levels	Slag & furnace frags	


AFRICA
TOGO
ATLANTIC OCEAN
BURKINA FASO
BOGU
OTI
KANDJAKA
MAMPRUSI
MANGO
TYOKOSSI
KARA
DAGOMBA
KONKOMBA
LAMBA
KABIYE
DJUGU
BANDJELI
KABU
TAMALE
YENDI
BITCHABE
BAFILO
KOTOKOLI
BASSAR
WHITE VOLTA
GONJA
MO
SOKODE
BENIN
BUIPE
BLACK VOLTA
NANUMBA
SALAGA
OTI
MONO
BRONG
KETE-KRATCHI
TOGO
BEGHO
ATAKPAME
BONO-MANSU
GHANA
RIVER
NOTSE
KUMASI
ASANTE
HO
EWE
VOLTA
COTONU
LOME
ATLANTIC OCEAN
ACCRA
N
0
50
100
150km
LEGEND
INTERNATIONAL BORDER
TOWN AS NOTED
POSSIBLE MAXIMUM EXTENT OF BASSAR IRON TRADE
RIVER
ASANTE ETHNIC GROUP


roads
land over 350m
major iron ore deposits
other hematite outcrops
seasonal watercourses
towns and villages
SMELTING SITE SLAG VOLUME
<50 cubic meters
51-100
101-600
601-2000
2001-5000
5001-10,000
≈14,600
? rough volume estimate
KAMENA - site name
17 intensive survey units
0 5 10km
Dukuntunde Mtn.
TATRE 4&6
Apetandjor
TCHOGMA 1
BITAMPOBE
Djowul
Belemele
KABU
Sara
TIPABUN
Tabale
BANDJELI
Biakpabe
KAMENA
Bikonbombe
Natcham-mba
38
35
27
17
Nababun
ore zone
Dekpassanware
Kikpayu
Bidjilib
Wawa
Liba
Bidjomambe
BITCHABE
Dipetandjor
Binadjube
Dikre
M'PAMPU 1&2
Biakpabe
Kalanga
BASSAR
Nangbani
Ingale
Binaparba
710m
Dimuri
GHANA
KATCHA
KAMA

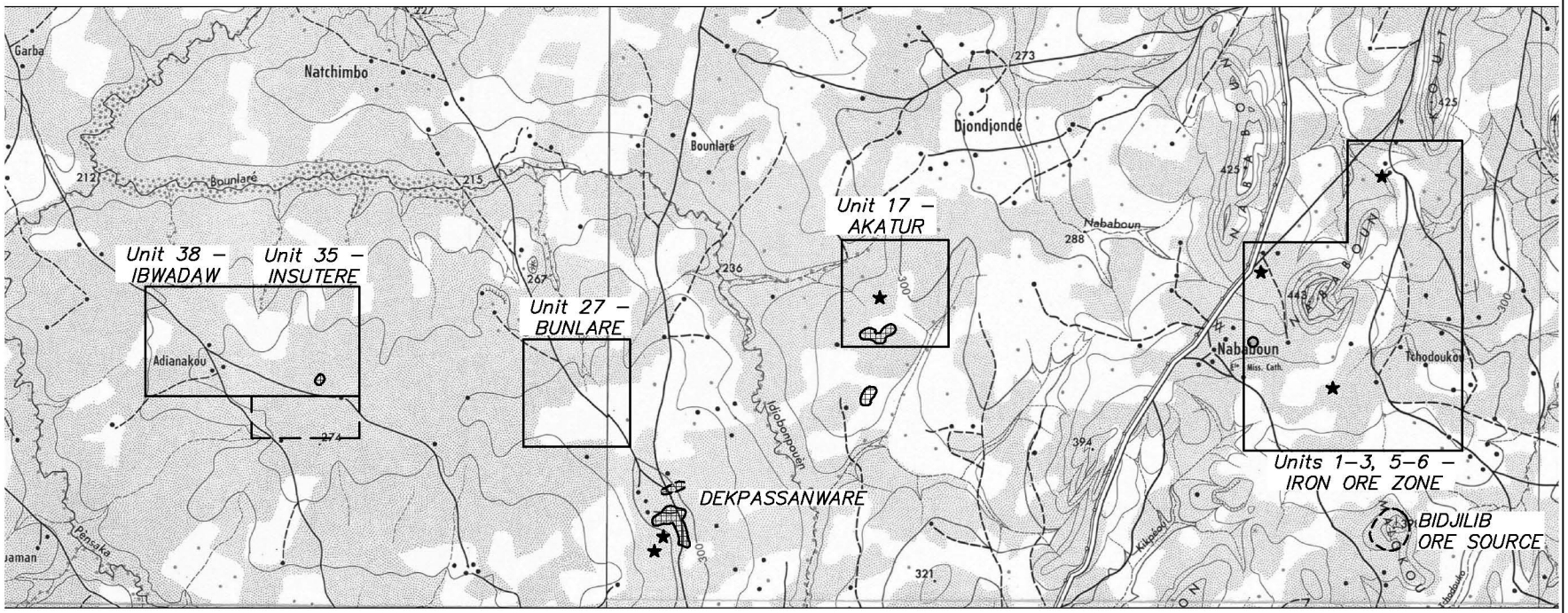


LEGEND:

- Sites with Bright Mica Ware
- F Sites with iron working refuse
- Ⓕ Zones with iron working refuse
- * Forge Fragments noted, but vegetation obscured ceramics

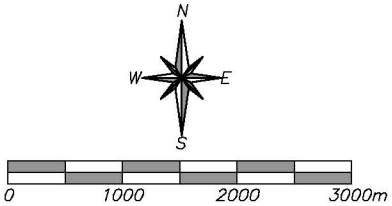
N
W E
S

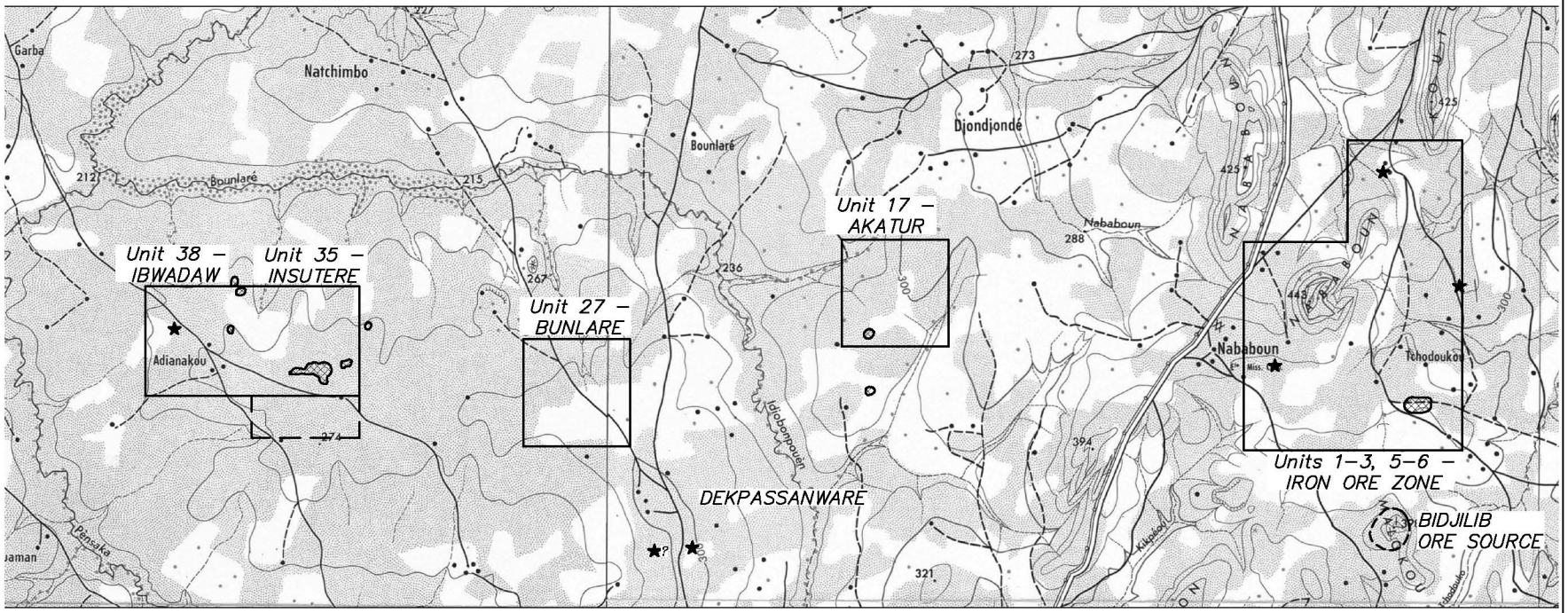
0 1000 2000 3000m



LEGEND:

- Site containing Burnished Fine Micaceous Ware
- Smelting site dating to the Burnished Fine Micaceous period
- Probable smelting camp





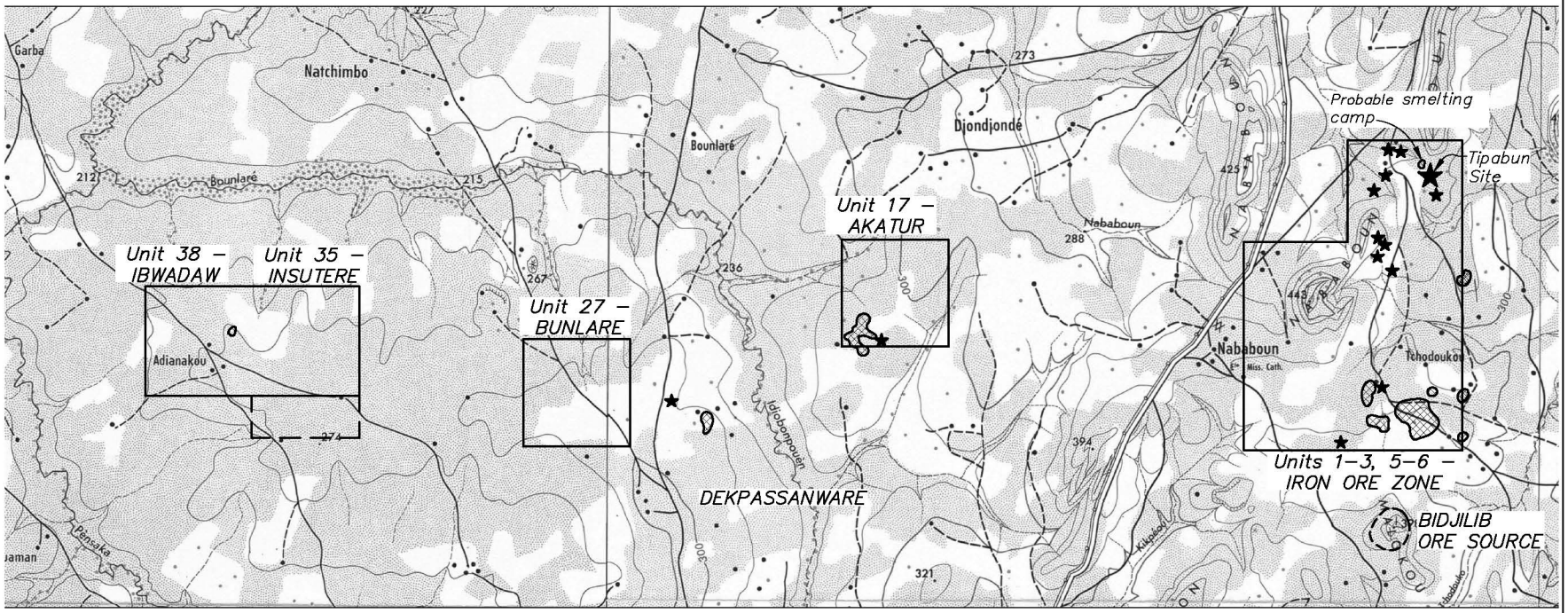
LEGEND:

Site containing Criss–cross Thin Micaceous Ware

★ Smelting site dating to the Criss–cross Thin Micaceous period

N
W E
S

0 1000 2000 3000m



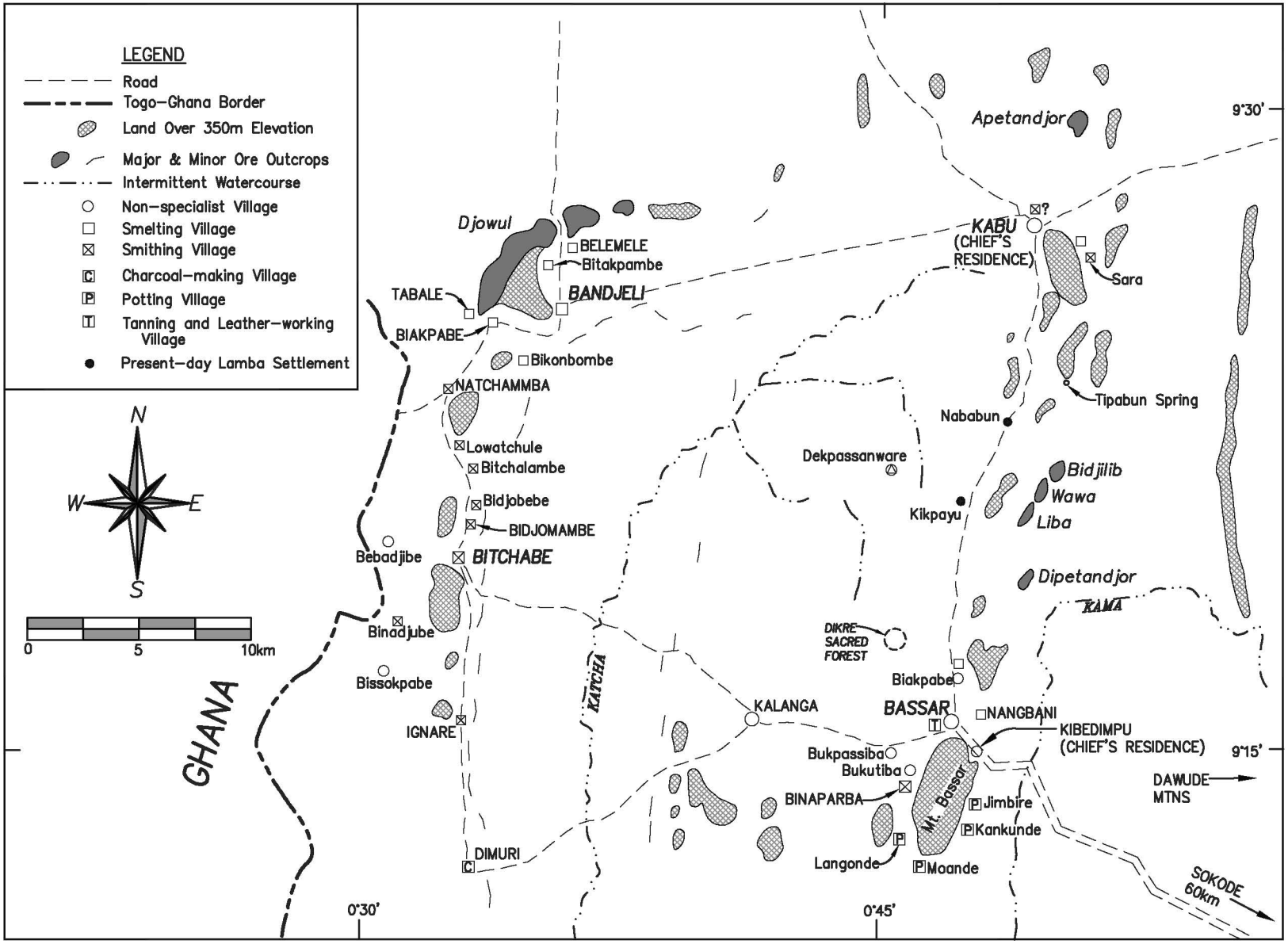
LEGEND:

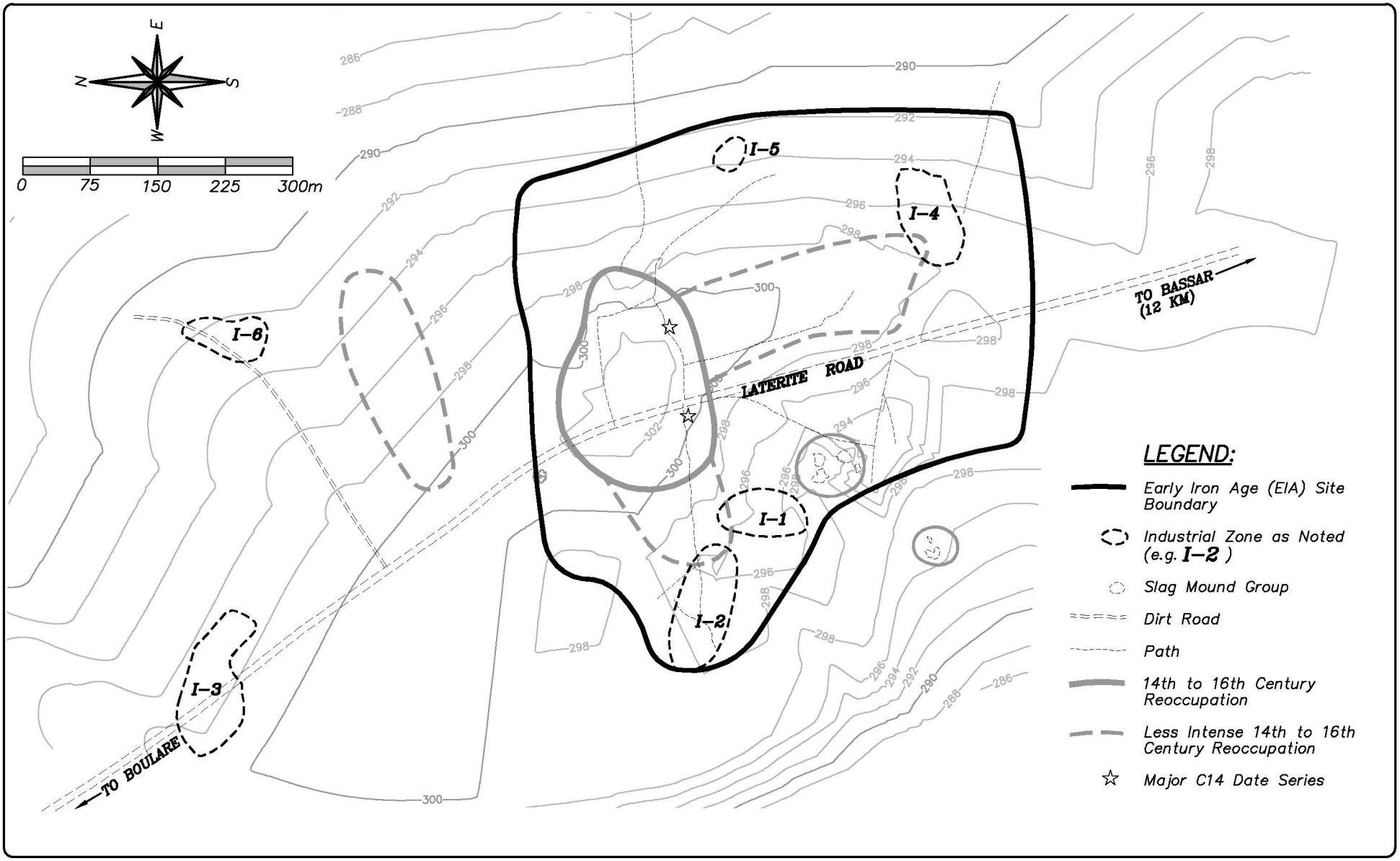
Site containing Micaceous Wash Ware & Incised Thin Fine Micaceous Ware

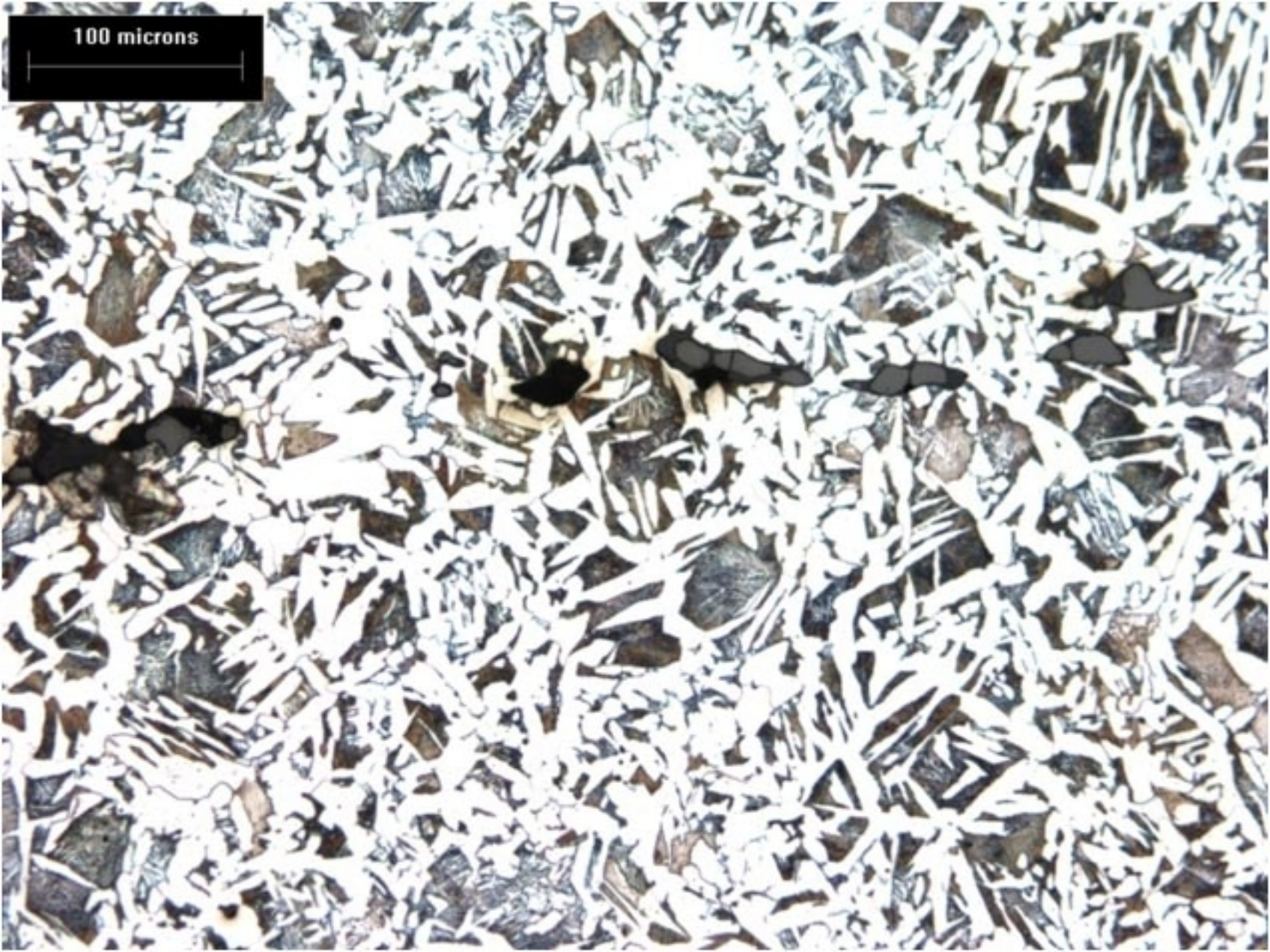
★ Smelting site dating to the Micaceous Wash Ware period

N
W E
S

0 1000 2000 3000m


LEGEND
Road
Togo–Ghana Border
Land Over 350m Elevation
Major & Minor Ore Outcrops
Intermittent Watercourse
Non–specialist Village
Smelting Village
Smithing Village
Charcoal–making Village
Potting Village
Tanning and Leather–working Village
Present–day Lamba Settlement
N
W
E
S
0
5
10km
GHANA
Djowul
BELEMELE
Bitakpambe
BANDJELI
TABALE
BIAKPABE
Bikonbombe
NATCHAMMBA
Lowatchule
Bitchalambe
Bidjobebe
BIDJOMAMBE
BITCHABE
Bebadjibe
Binadjube
Bissokpabe
IGNARE
DIMURI
KATCHA
Apetandjor
KABU
(CHIEF'S RESIDENCE)
Sara
Tipabun Spring
Nababun
Dekpassanware
Kikpayu
Bidjilib
Wawa
Liba
Dipetandjor
KAMA
DIKRE SACRED FOREST
Biakpabe
KALANGA
BASSAR
NANGBANI
KIBEDIMPU
(CHIEF'S RESIDENCE)
Bukpassiba
Bukutiba
BINAPARBA
Mt. Bassar
Jimbire
Kankunde
Langonde
Moande
DAWUDE MTNS
SOKODE 60km
9°30'
9°15'
0°30'
0°45'


N
E
S
W
0
75
150
225
300m
I–1
I–2
I–3
I–4
I–5
I–6
LATERITE ROAD
TO BASSAR (12 KM)
TO BOULARE
LEGEND:
Early Iron Age (EIA) Site Boundary
Industrial Zone as Noted (e.g. I–2)
Slag Mound Group
Dirt Road
Path
14th to 16th Century Reoccupation
Less Intense 14th to 16th Century Reoccupation
Major C14 Date Series


100 microns