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Reinvestigation of Kintampo 6 rock shelter, Ghana: implications for the nature of culture change

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Abstract

The excavations of 1982 at Kintampo rock shelter no. 6 are described and the results correlated with those of Flight (1976). The sequence demonstrates an overlap between the Punpun and Kintampo culture ceramic traditions and a progressive introduction of diagnostically Kintampo traits. Decreasing residential mobility is also indicated. Analysis of the organic remains, while casting doubt on earlier identifications of domestic *Bos* and cultivated cowpea, suggests progressive clearing of the forest such as would have occurred with horticulture and the confirmed herding of an ovicaprid.

Earlier interpretations of Kintampo culture origins are reviewed in the light of the new evidence and all available radiocarbon dates, and it is tentatively concluded that the culture emerged in central Ghana through coalescence of autochthonous and northern elements.

Résumé

Les fouilles de 1982 à l'abri-sous-roche Kintampo-6 sont décrites et les résultats comparés à ceux de Flight (1976). La séquence met en évidence un chevauchement des traditions céramiques Punpun et Kintampo et l'introduction progressive des traits diagnostiques de la civilisation Kintampo. Une réduction de la mobilité résidentielle est aussi indiquée. L'analyse des restes organiques, quoique mettant en doute l'identification jadis proposée de *Bos* domestique et de *Vigna unguiculata,* donne lieu à croire à une déforestation en relation avec l'horticulture et l'élevage confirmé d'ovicapridés.

Les interprétations antérieures des origines de la civilisation Kintampo sont ré-évaluées d'après ces nouvelles données et toutes les datations ^{14}C disponibles pour cette période. La thèse soutenue est que cette civilisation a été constituée au Ghana central à partir d'une fusion d'éléments culturels autochthones et septentrionaux.

The earliest indications of food production in sub-Sahelian West Africa are associated with the Kintampo culture occupation of Ghana during the mid-second millennium BC. Evidence of food production in the Sahara predates this, and it appears that there cattle pastoralism preceded plant cultivation (Clark 1980). By extension, the transition to food production in the Sahelian and sub-Sahelian zones of West Africa has typically been explained in terms of environmental deterioration and consequent population movements from northern latitudes, a view incorporated into recent syntheses of West African prehistory (e.g. McIntosh and McIntosh 1981:608; 1983:235; Phillipson 1982:781–83, 827–28). Supporting evidence includes palaeoclimatic data that indicate increasing desiccation from *ca* 4500 bp, and the southward trend of successively later radiocarbon age estimations associated at sites such as Adrar Bous, Karkarichinkat and Kintampo with remains of domestic cattle (Clark 1976:86; Shaw 1977:108; Smith 1980:463; 1984:86–87).

There are several problems in fitting the Kintampo culture into such scenarios. First, emphasis has been placed on the chronology of change in the sub-Sahelian zone rather than on processes underlying the transition to food production. Second, it is implied that Kintampo subsistence adaptation was comparable to that represented at sites farther north. Some imply that Late Stone Age (LSA) hunter-gatherers were displaced (e.g. Flight 1976:216), while others suggest that indigenous groups undertook plant domestication in response to environmental deterioration and/or demographic stress brought about by an influx of peoples from the north (Shaw 1977:111–15; Stemler 1980:520; Clark 1976:85; 1980:568; Posnansky 1984:150). There is, however, a paucity of systematic data regarding the subsistence adaptations of LSA populations and little attention has been paid to the potential impact or implications of interactions between so-called hunter-gatherers and agriculturalists. Also, although a number of Kintampo culture sites have been excavated, there is an insufficiency of published data pertaining to subsistence and settlement patterns. Although generalizations regarding the importance of food production and the settled nature of Kintampo peoples have become entrenched in the literature, supporting data have not been systematically assessed and little attention has been focused upon how the utilization of domesticates and a less seasonal settlement pattern might have been integrated into an existing LSA adaptation.

Archaeological survey and excavation conducted in the Brong-Ahafo Region of central Ghana during 1982 were directed toward obtaining data to fill these perceived gaps in our understanding of the transition from hunting-gathering to food production in West Africa. This paper summarizes the results of the 1982 excavations at K6 rock shelter, a site that documents the transition from a LSA Punpun 'phase' occupation to that of the Kintampo culture. (While the status of Punpun as a 'phase' is dubious, current terminology is best retained until there are adequate data for an accurate diagnosis of the entity.) The implications of this pivotal archaeological sequence for the changing lifestyles of West African populations during the mid-second millenium BC are considered. The research described herein formed the basis of a doctoral dissertation, and full details of the survey, excavation and archaeological materials are provided in Stahl (1985).

Background to research

The Kintampo industrial tradition is amongst the best defined in West Africa. Characteristic material culture includes comb stamped ceramics, polished stone axe/adze blades and arm rings, grinding stones, grooved abrading stones, the enigmatic 'cigars' or rasps, and, frequently, burned daub (Davies 1962, 1980; Flight 1967, 1976:211–12; Dombrowski 1976:64; Posnansky 1984:147–49). Sites are concentrated in central Ghana and occur in a variety of present day vegetational settings, ranging from the savanna woodland to the dry semi-deciduous forest (Flight 1976:212–13; Newton and Woodell 1976; Newton 1980). A number of Kintampo culture sites have been excavated (Nunoo 1969; Davies 1980; Mathewson 1967; Flight 1976; Rahtz and Flight 1974; Agorsah 1976; Dombrowski 1976, 1980; Anquandah 1976; Kense 1983a and b). Data on subsistence (Carter and Flight 1972; Flight 1976) and settlement (Davies 1980; Dombrowski 1980; Anquandah 1976) are, however, either limited or incompletely published. Only two rock shelters in the vicinity of Kintampo yielded stratified LSA Punpun phase and Kintampo culture deposits that are critical to our understanding of the nature of this transition. These rock shelters (K1 and K6) were originally excavated in the late 1960s by Rahtz and later Flight (Flight 1967, 1968, 1970, 1976; Rahtz and Flight 1974). Reports emphasized the discontinuity of the Punpun and Kintampo culture occupations, and suggested that a population replacement in the mid-second millenium BC led to simultaneous change in all aspects of material culture and subsistence.

The K6 rock shelter was relatively rich in preserved organic remains and provided the basis for understanding of subsistence changes that accompanied the Punpun to Kintampo transition (Carter and Flight 1972; Flight 1976). Whereas the Punpun levels at K6 were characterized as a wet season occupation of hunter-gatherers who left '. . . middens full of snail shells, seed husks of *Celtis* sp., and animal bones of a wide variety of species', Kintampo culture deposits contained domestic animals, wild fauna consisting primarily of antelopes, and fewer snail shells than in Punpun layers. Macrobotanical remains in Kintampo deposits included cowpeas (*Vigna unguiculata*), oil palm (*Elaeis guineensis*), *Canarium schweinfurthii* and much reduced quantities of *Celtis* sp. (Flight 1976:216–17). My return to K6 in 1982 was prompted by a desire to obtain more detailed data on the nature of these subsistence changes and to elucidate the processes underlying them.

K6 Rock shelter

Located roughly five kilometers south and west of the village of Kintampo, the K6 rock shelter (8°N., 1°45′W.) is situated at the southern end of a large sandstone inselberg (Fig. 1). The local relief contrasts markedly with areas to the north, east, and west of Kintampo where a more typical Voltaian Formation landscape characterized by low (150 m; 500 ft or less), undulating topography is found. The amount of precipitation and length of the rainy season increase in the Kintampo area, in part due to its higher elevation (Walker 1962), and support a lusher, dry semi-deciduous forest, in contrast to the savanna woodland that characterizes areas at similar latitudes but lower elevations (Taylor 1960; Hall and Swaine 1976). The marginal nature of this forest is indicated by the presence of *Borassus aethiopicum* (fan palm), a characteristic savanna species.

The K6 inselberg is located to the west of the main Techiman-Tamale road and arises abruptly out of the surrounding landscape. The shallow rock shelter opens to the southeast, and is *ca* 45 m wide but less than 10 m deep from dripline to back wall (Fig. 2). The roof rises abruptly from the shelter floor (Figs 3 and 4). The floor of the western two-thirds of the shelter is obscured by large blocks of roof fall. Archaeological deposits are restricted to the eastern third of the shelter.

Colin Flight (1967, 1968, 1970, 1976) conducted excavations at K6 in 1967 and 1968, removing a large part (*ca* 60 m^2) of the eastern portion of the shelter (Fig. 2). The deposits remaining were in good condition and appeared minimally disturbed and only marginally eroded when the shelter was revisited in November of 1982 (Fig. 5). The 1982 excavations were confined to a small, somewhat irregularly-shaped area at the western end of the deposits that remained. Three units were excavated. Units 1 and 2 were each approximately one metre square and 1.3 metres deep. The upper levels of Units 1 and 2 (above Level 2b) had

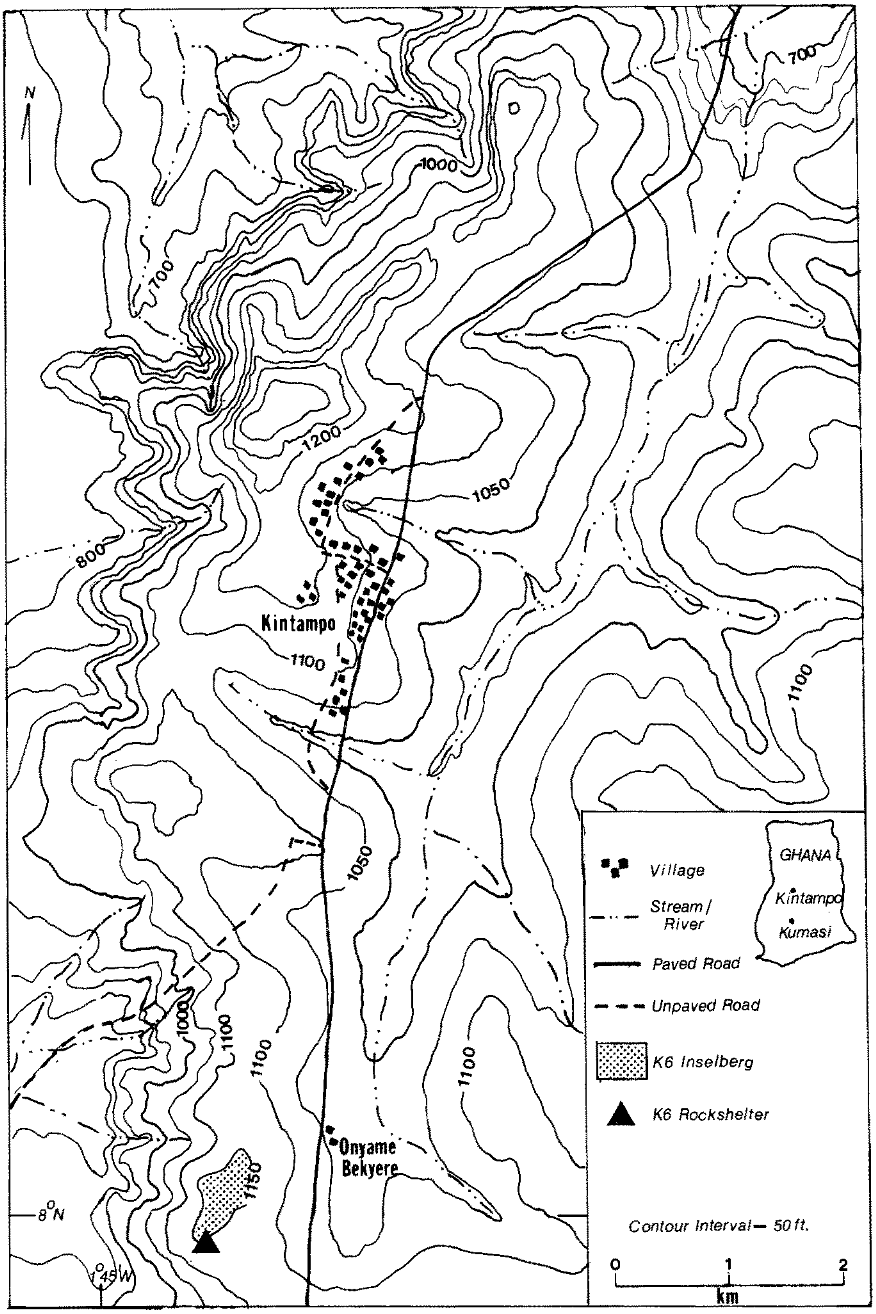

Figure 1 Location of K6 rock shelter.

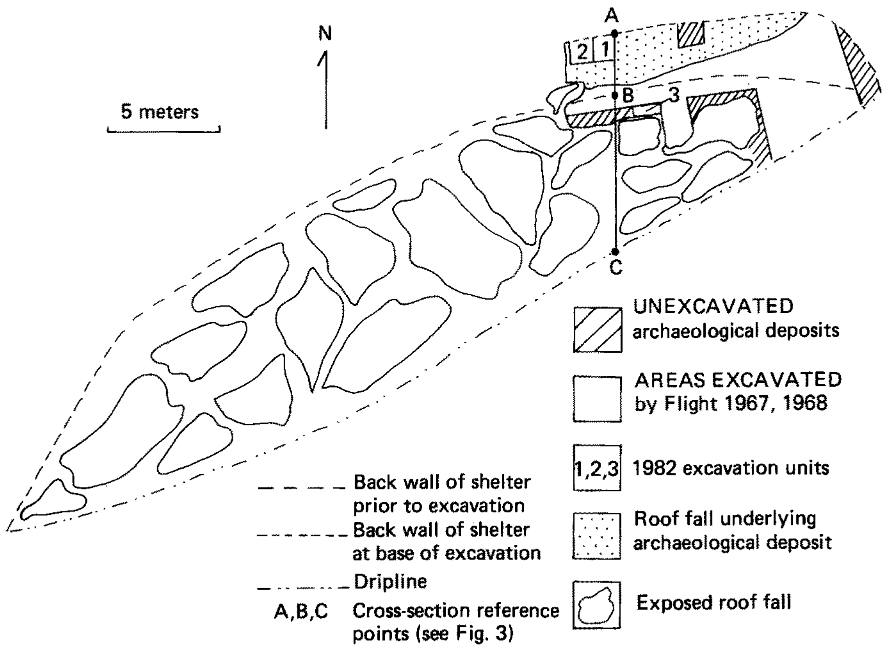

Figure 2 Plan of K6 rock shelter.

been excavated by Flight's team, and roof fall was encountered at the base of both these units. Unit 3 measured one meter by one half meter and encompassed the entire range of strata.

Excavation proceeded by natural layers. All excavated sediment was sifted through one-quarter inch mesh screen. Close attention was paid to the recovery of organic materials. Large pieces or concentrations of carbonized material were taken directly from the deposit and placed in foil. Additionally, soil samples for flotation (Struever 1968) were collected, roughly one 15 litre sample being taken from each 10 cm of deposit. Very fine sediment was screened through a *ca* 2 mm mesh window screen (Unit 1, Level 4; Unit 2, Levels 3b, 3f–g, 4; and Unit 3, Level 6). In the case of Level 4, this resulted in the recovery of large quantities (20+ litres) of macrobotanical material, shell, small bone, etc. To date, only one litre of fine screened deposit from each sample has been analysed.

K6 Stratigraphy

Six natural stratigraphic layers (1–6) were distinguished during the course of the 1982 excavations (Figs 6 and 7). Layers 2 and 3 were further differentiated into various sublevels (2a–d; 3a–h). It should be noted that Flight's (1970) six stratigraphic layers do not correspond precisely with ours (see Table 1).

Table 2 lists soil color (Munsell 1942) and soil pH. A descriptive account of the natural stratigraphy as defined during the 1982 excavations follows.

Layer 1 was represented only in Unit 3 (Fig. 7). This brown, slightly sandy deposit averaged *ca* 70 cm in thickness. Occasional small rocks of the same material as the shelter walls occurred throughout and probably represent roof rubble. Archaeological material was sparse. A handful of probably Iron Age ceramics was recovered but no worked lithic material. Wood charcoal was relatively abundant.

Layer 2 was a brown to dark brown compact silty stratum that was further differentiated into sublevels 2a–d. Sublevel 2a was represented only in Unit 3. It contained numerous large pieces (> 10 cm) of roof rubble as well as several large blocks (> 50 cm) of roof fall. Very little archaeological material was recovered from sublevel 2a, which averaged 35 cm in depth. Sublevel 2b was differentiated by the presence of burned clay and a lack of roof rubble. It averaged 25 cm in thickness and occurred in Units 1–3. Sublevels 2c–d occurred as restricted pockets of sediment in Units 1 and 2. The abundant ceramic and lithic materials in Layer 2b–d were diagnostic of a Kintampo culture occupation.

Layer 3 occurred as a homogeneous deposit in Unit 3 characterized by a light yellowish brown, compact, silty sediment that averaged *ca* 50 cm in thickness. A number of sublevels (a–h) characterized Layer 3 in Units 1 and 2, occurring as thin, alternating layers of friable,

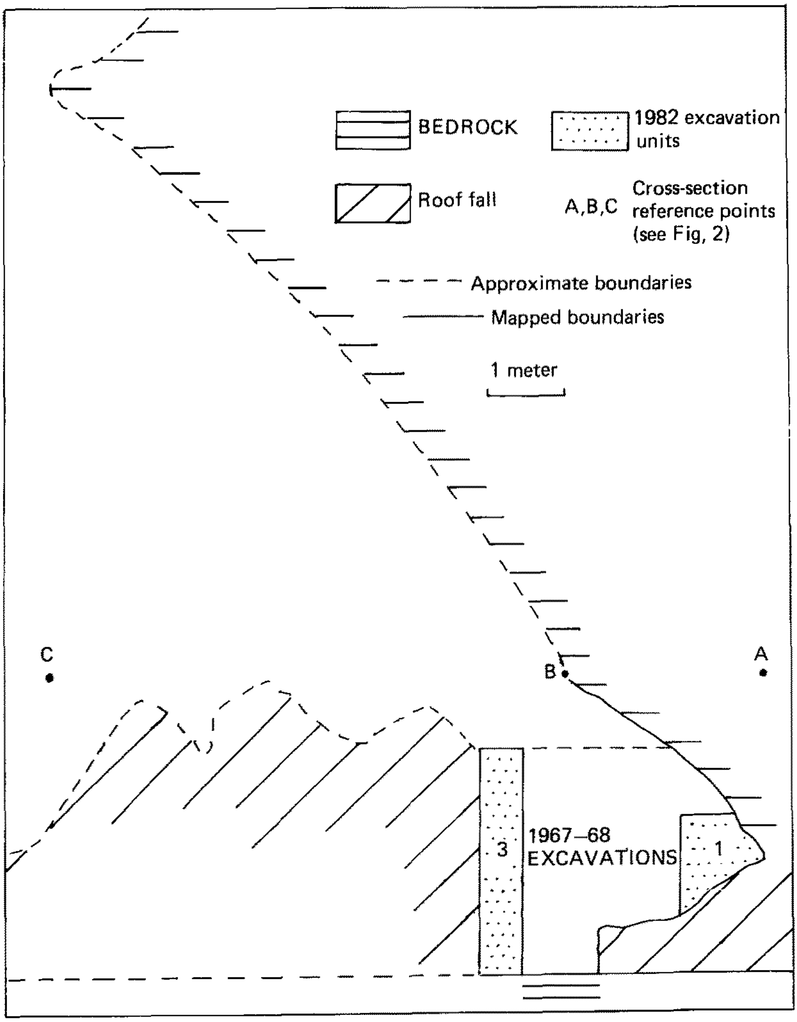

Figure 3 Cross-section of K6 rock shelter.

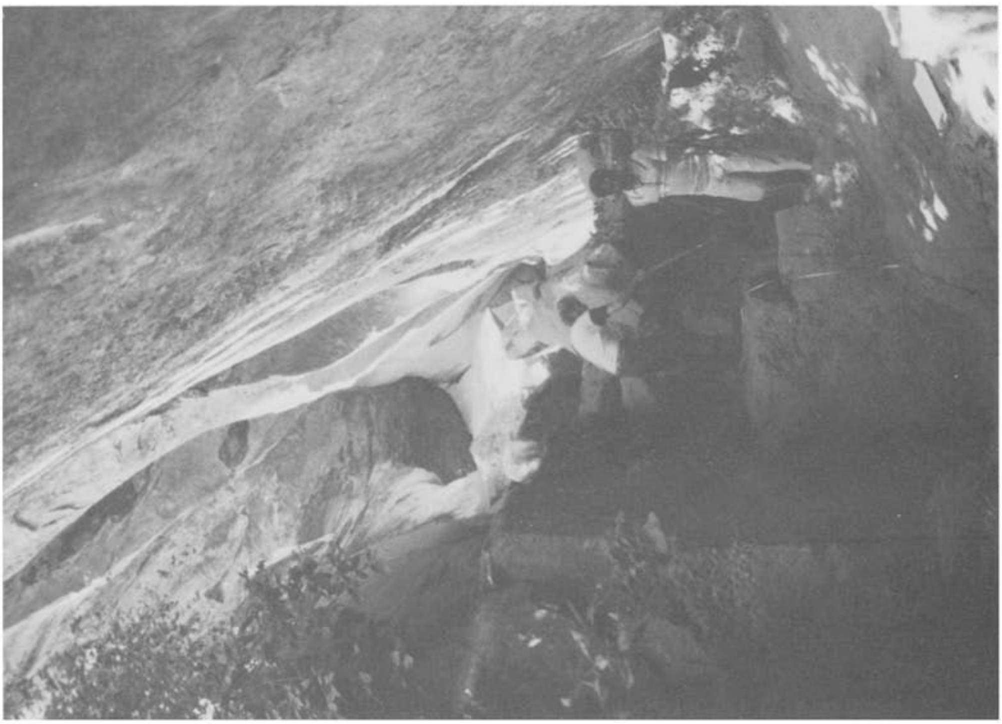

Figure 4 Interior view of K6, facing west.

Figure 5 South face of K6 deposits prior to 1982 excavations.

ashy sediment and lenses of relatively compact burned clay. The clay lenses were generally fairly compact, but could not be characterized as completely consolidated, for, unlike the daub recovered from K6, they disintegrated easily when disturbed. The pH of all sublevels of Level 3 was relatively high, presumably reflecting a high ash content. Archaeological materials were more abundant in the ashy lenses. As indicated in Table 1, Layers 3a–h

Table 1 Correlation of the Flight (1970) and 1982 Stahl stratigraphies.

Flight 1970		Stahl 1980
1—Sandy sediment, 'Iron Age'	=	1—'Iron Age'?
2—Roof fall, 'Iron Age'	=	2a—Roof fall
3—Thin deposit, Kintampo culture	=	2b–d—Kintampo culture
4—Domestic rubbish, burned daub, 5—Thin floors of beaten clay, Kintampo culture	=	3a–h—Kintampo culture
6—Gray ashy midden, Punpun phase	=	4—Mixed Punpun, Kintampo
Below 6—Rubble and roof fall, some quartz	=	5—Punpun phase 6—Virtually sterile

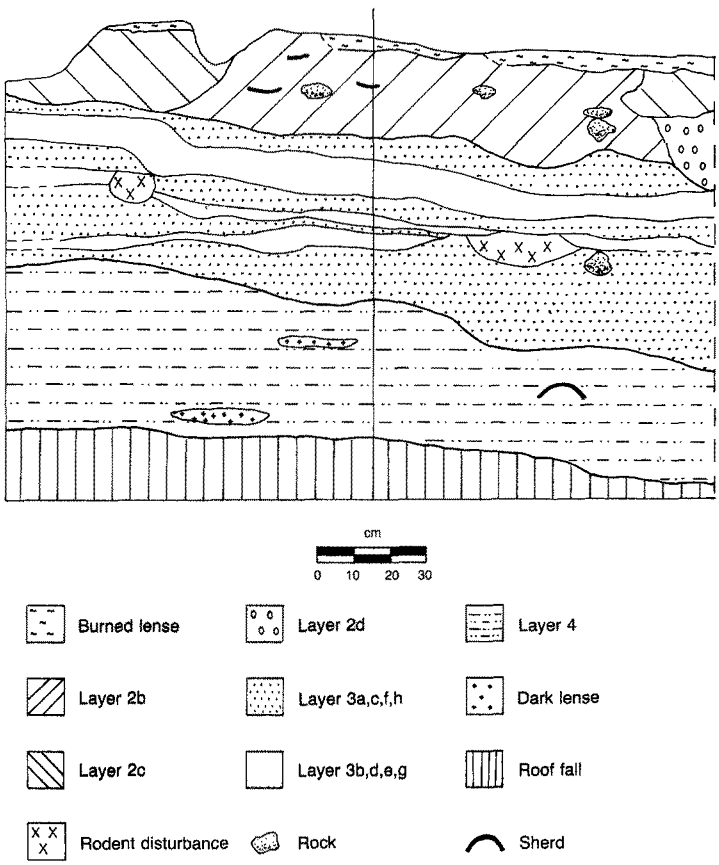

Figure 6 Profile of 1982 excavation units 1 and 2.

appear to correspond to Flight's 4 and 5. Flight's 5 was characterized as thin floors of beaten clay. I would not interpret the relatively compact, burned clay lenses excavated in 1982 (3a, c, f, and h) as floors, for these lenses were rather poorly consolidated. Materials from Layer 3 diagnostic of the Kintampo culture included ceramics, implements of polished stone, and 'cigars'. A small number of Punpun phase sherds were also recovered. Charred plant materials were relatively abundant.

Layer 4 was a thick, homogeneous layer of very friable, light brownish gray ashy sediment that occurred in all excavation units. Roof fall was encountered at its base in Units 1 and 2.

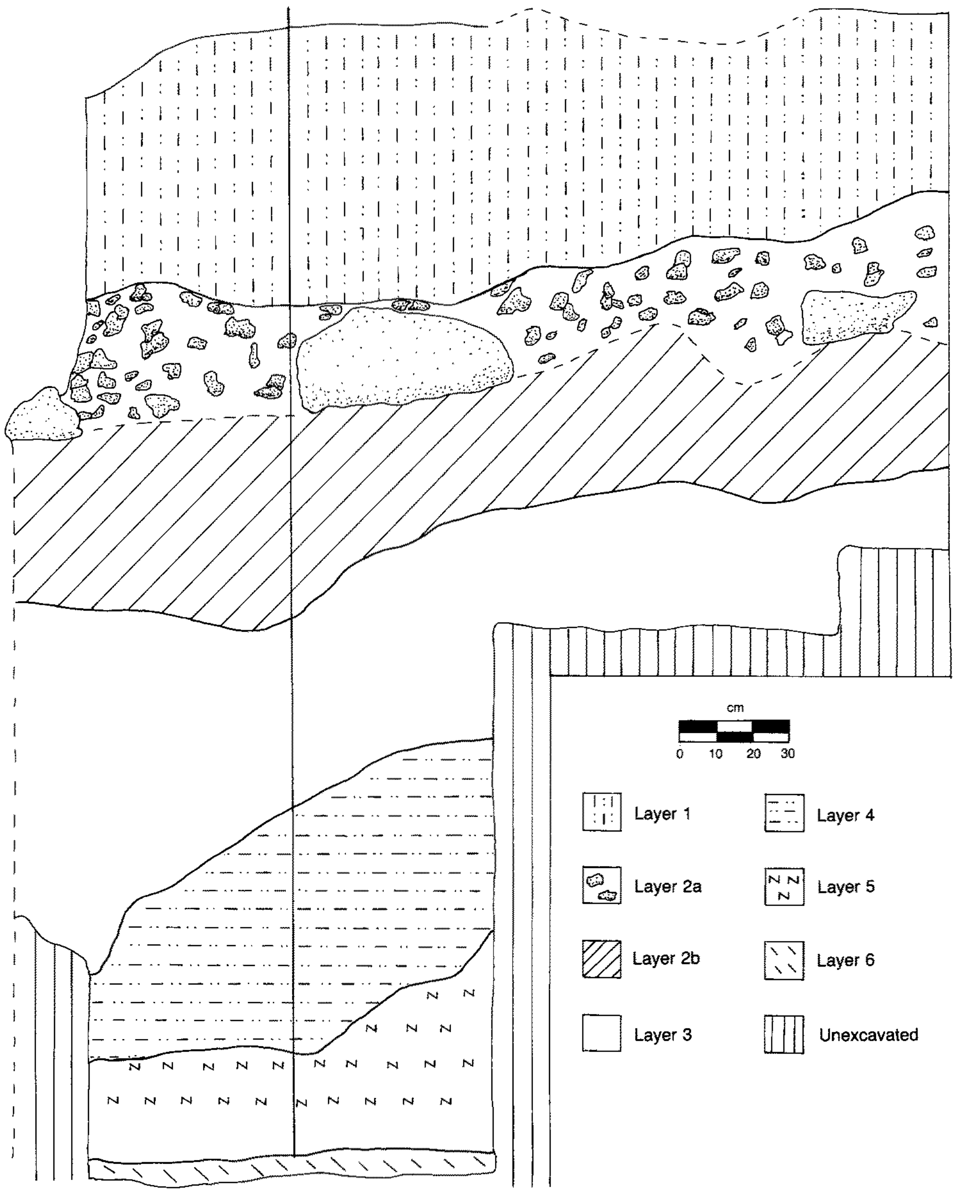

Figure 7 Profile of south face of K6 deposits, including Unit 3.

Table 2 Munsell soil color and pH of natural layers in Units 1 and 3, K6 rock shelter

Unit 1 Layers	Soil Color	pH
2b	Brown to dark brown (10YR 4/3) with burned reddish yellow (7.5YR 6/8) sediment	6.8
2c	Pale brown (10YR 6/3)	7.8
2d	Dark grayish brown (10YR 4/2)	7.4
3a	Brown (10YR 5/3) with burned reddish yellow (7.5YR 6/8) sediment	7.4
3b	Grayish brown (10YR 5/2) with burned reddish yellow (7.5YR 6/8) sediment	7.2
3c	Light brownish gray (10YR 6/2)	7.9
3d	Light brown (7.5YR 6/4)	7.9
3e	Light gray to gray (10YR 6/1)	7.9
3f	Light brown (7.5YR 6/4) with burned reddish yellow (5YR 6/6) sediment	7.9
3g	Light grayish brown (10YR 6/2)	7.9
3h	Pale brown (10YR 6/3) with burned reddish yellow (7.5YR 6/8) sediment	7.7
4	Light brownish gray (10YR 6/2)	8.6
Unit 3 Layers		
1	Brown (10YR 5/3)	7.2
2a	Brown to dark brown (10YR 4/3)	7.1
2b	Brown to dark brown (10YR 4/3) with burned reddish yellow (7.5YR 6/8) sediment	6.5
3	Light yellowish brown (10YR 6/4) with burned reddish yellow (7.5YR 6/8) sediment	6.8
4	Light brownish gray (10YR 6/2)	8.2
5	Grayish brown (10YR 5/2)	8.1
6	Pale brown (10YR 6/3)	8.0

A high ash content is corroborated by high pH. Average thickness was variable, ranging from *ca* 50 to 70 cm. Ceramics recovered included typical Punpun and Kintampo forms. Lithic materials were dominated by struck quartz. Carbonized botanical remains were sparse; however uncarbonized seed husks of *Celtis* sp. were abundant.

Layer 5 occurred only in excavation Unit 3. This fine-textured, grayish brown, silty deposit ranged from 25 to 55 cm in depth. A small number of sherds, some of which fall within the range of styles diagnostic of the Punpun phase, were recovered along with abundant struck quartz. Carbonized botanical material was more abundant than in Layer 4.

Layer 6 was a thin (8–10 cm), pale brown sandy deposit that contained relatively little cultural material. It was represented only in Unit 3 of the 1982 excavations. Bedrock was encountered at its base.

Radiocarbon age estimations

Five samples of oil palm kernel (*Elaeis guineensis*) were submitted for radiocarbon dating (Table 3). The samples selected for dating occurred in concentrations within the deposit. Only in the case of Layer 4 was it necessary to combine all oil palm remains from the three excavation units in order to obtain a sample (UCR–1693) sufficiently large for dating. The age estimations from the 1982 excavations are stratigraphically consistent at one standard deviation. They are comparable to dates from other Kintampo culture sites although tending to be slightly older. UCR–1690 (3495 ± 100 bp), UCR–1691 (3700 ± 90 bp), and UCR–1692 (3550 ± 127 bp) originate from the Kintampo culture levels 2b–3 and overlap with a single date of 3560 ± 100 bp (I–2698) from the Kintampo levels at nearby K1 rock shelter (Rahtz and Flight 1974:30). Two other dates (I–2697 and Birm–30) from Kintampo levels at K1 are several hundred years younger. The age estimations of the Kintampo culture occupation at K6 are generally earlier than those from other dated sites (Table 4).

The single age estimation from Layer 4 of the 1982 excavations (3605 ± 100 bp; UCR–1693) compares well with a date obtained by Flight (1968:19) from the Punpun level at K6 (3570 ± 84 bp; Birm–29). (Willett (1971:352) cautioned that this date might be too old since it was obtained on a sample of seed husks high in carbonate (presumably *Celtis* sp).) The age estimation from the 1982 excavations corroborates the earlier date, as well as the date of 3530 ± 100 bp (I–2699) from the Punpun level at K1 (Rahtz and Flight 1974:30). These contrast with the age estimation of 3320 ± 100 bp (Birm–31) for the Punpun occupation at K8 rock shelter.

Of interest is the age estimation of 6100 ± 250 bp (UCR–1694) from Layer 5 of the 1982

Table 3 Radiocarbon age estimations from the 1982 excavations at K6 rock shelter.

			5568 year half-life	
Layer	Unit	Lab. Number	Years bp	Years bc
2b	2	UCR–1690	3495 ± 100	1545 ± 100
2b–d	1	UCR–1691	3700 ± 90	1750 ± 90
3a–b	1 & 2	UCR–1692	3550 ± 127	1600 ± 127
4	1, 2, 3	UCR–1693	3605 ± 100	1655 ± 100
5	3	UCR–1694	6100 ± 250	4150 ± 250

Table 4 Other radiocarbon age estimations from Kintampo culture and Punpun phase sites.

Site	Lab no.	Years bp	Source
Daboya	S–2370	3405 ± 155	Kense 1983b
Daboya	S–2371	2805 ± 180	Kense 1983b
Daboya	S–2373	2770 ± 185	Kense 1983b
Daboya	S–2375	3095 ± 325	Kense 1983b
Daboya	S–2376	4235 ± 150	Kense 1983b
Ntereso	SR–52	3580 ± 130	Davies 1980:221
Ntereso	SR–61	3190 ± 120	Davies 1980:221
Ntereso	SR–81	3270 ± 100	Davies 1980:221
K1	I–2697	3220 ± 110	Rahtz & Flight 1974:30
K1	Birm–30	3339 ± 35	Rahtz & Flight 1974:30
K1	I–2698	3560 ± 100	Rahtz & Flight 1974:30
K1	I–2699	3530 ± 100	Rahtz & Flight 1974:30
K8	Birm–31	3401 ± 74	Flight 1968:9
K6	Birm–29	3570 ± 84	Flight 1968:9
Mumute	N–1984	3350 ± 100	Posnansky & McIntosh 1976:165

excavations. Layer 5 yielded LSA materials dominated by struck quartz and, in addition, 13 sherds. Although the possibility that UCR–1694 is anomalous must be considered, ceramic LSA occupations have been dated to the 5th millennium bc elsewhere in sub-Sahelian West Africa (York 1978:160). If the Layer 5 date is correct, it indicates that a 2500 year hiatus occurred in the occupation of K6 rock shelter.

Archaeological materials

It is cautioned at the outset that the present study is based upon the excavation of a slightly less than 3m^2 sample of the surface area of the shelter, whereas Flight's team excavated an estimated 60m^2. This makes generalization from the 1982 samples difficult. Quantitative analysis of Flight's material is required to substantiate or refute the interpretations presented in this report.

Ceramics

A total of 1014 sherds were recovered in stratigraphic context, 397 of which were decorated. Sherds selected for detailed analysis (n = 553) were: 1. all rims; 2. all decorated sherds; and 3. sherds displaying unique paste or temper characteristics.

A total of 360 sherds assigned to the Kintampo culture occupation originated from two basic vessel forms; bowls and jars. These categories refer to attributes of shape only and do not necessarily imply functional differentiation. Profiles of all rim sherds recovered from the 1982 excavations are depicted in Figures 8 and 9. A question mark (?) beneath the profile indicates uncertain orientation.

Bowls (Fig. 8) lacked a constricted neck and were, generally speaking, shallow. Bowl rims

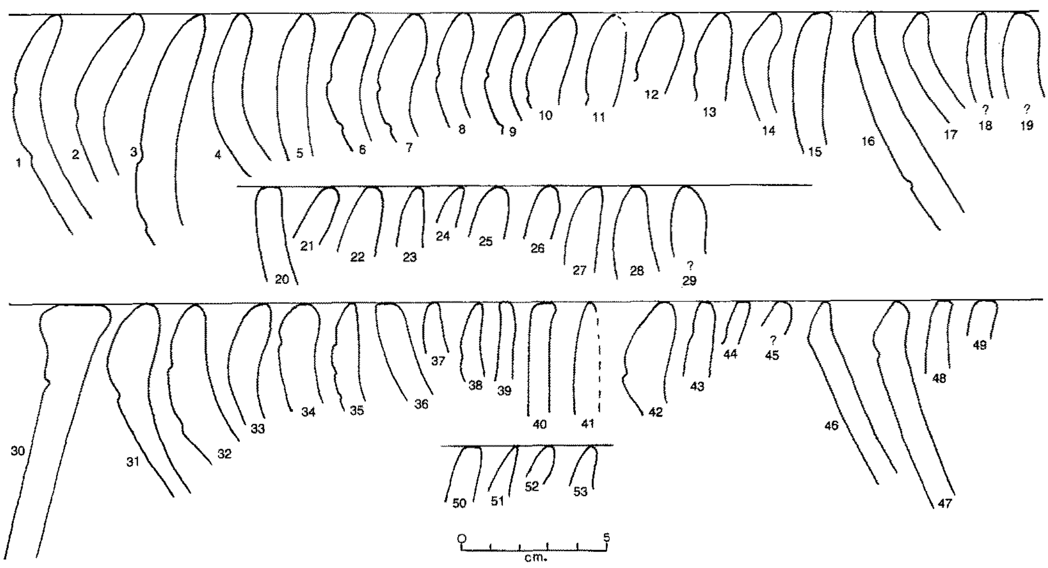

Figure 8 Rim profiles of K6 bowl forms. Layer 2b–d; 1–30; 3a: 31–41; 3b:42–45; 3c:46; 4:47–49; 5:50–52; 6:53. Vessel interiors to the right.

tended to incurve slightly creating a restricted orifice, although unrestricted orifices were noted (e.g. Fig. 8:20, 36). The lip area often exhibited thinning in relation to the vessel wall. Lips were generally rounded; a slight flattening of the lip was infrequently noted. The shoulder area on bowl forms was typically rounded, and bowls exhibited a consistent shape throughout the stratigraphic sequence.

Jar forms (Fig. 9) displayed recurved sides created by constriction of the neck area and splaying of the rim (e.g. Fig. 9:2). In many instances, the junction of the thickened area with the vessel wall was abrupt (cf. Shepard 1956:Fig. 32), creating the 'rolled rims' considered typical of the Kintampo culture. Jar lips were most often rounded, although flattened examples occurred. Heavily 'rolled' jar rims (e.g. Fig. 9:16–18) occurred only in the final Kintampo levels (2b–d). These rims are often considered typical of the Kintampo culture, however, the evidence from K6 indicates that they are more temporally restricted than previously believed. The thickness of jars tended to increase through time.

Decoration on Kintampo culture ceramics seldom covered the entire surface of a vessel, being often arranged in a zonal fashion, interspersed with plain, undecorated surfaces. Four decorative techniques accounted for all of the variability observed: 1. comb stamping; 2. shallow scoring executed with a blunt object creating a wide, U-shaped groove; 3. spatulate impression; and 4. red slipping. These techniques occurred alone or in combination. Table 5 lists the frequency and stratigraphic provenience of all combinations of decorative techniques noted in the 1982 excavation materials.

Comb stamping (Figs 10–12, 13:1) was the most frequently noted decoration. No comb stamps were recovered during the 1982 excavations, although serrated stones interpreted as

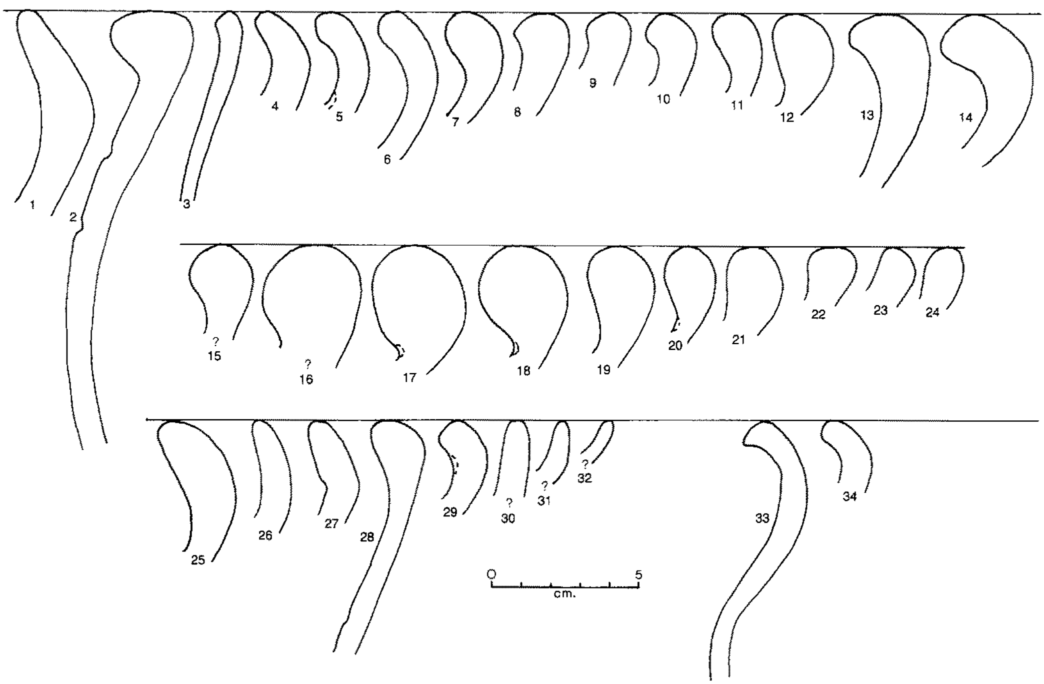

Figure 9. Rim profiles of K6 jar forms. Layer 1:1; 2b–d:2–24; 3a:25–27; 3c–e:28; 3h:29–32; 4:33–34.

Table 5 Frequency and provenience of decorative techniques on pottery from the 1982 excavations at K6.

	KENTAHPO CULTURE																						PUNPUN PHASE						?	
Layer	zaned oblique conbstamp	zaned walking comb & plain	walking comb	triangular zaned comb & plain	triangular zaned walking comb	comb stamp	zaned horiz. & vertical comb	criss cross comb stamp	zaned comb stamp & scoring	horizontal comb stamp	oblique scoring	criss cross scoring	scored (direction?)	criss cross scoring & oblique spatulate impression	criss cross scoring & comb stamp	oblique scoring & oblique comb	criss cross scoring, obliq, comb, & oblique spatulate imp.	oblique comb stamp, walking comb, & red slip	oblique comb & oblique spatulate imp.	oblique comb stamp & red slip	oblique spatulate impression	red slip	mat impression	triangular stabbing	cord wrapped rocker	zaned cord impression	circular punctate	scallop impression	single cord impression	perforation
2a	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0
2b–d	47	9	68	2	2	46	0	0	1	2	5	4	0	2	1	0	0	1	1	0	6	0	0	0	2	0	0	0	4	0
3	4	0	14	0	0	4	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
3a	5	1	15	1	0	7	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0	1	1
3b	1	1	16	0	0	5	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
3c–e	4	0	0	1	0	1	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3f–g	0	0	2	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3h	0	2	16	3	0	3	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	1	0
4	1	0	9	1	0	11	0	0	1	0	0	0	1	0	0	0	2	0	0	0	0	0	15	2	1	1	0	2	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0

pottery decorating tools have been recovered from Bonoase and Ntereso (Davies 1973:36; Dombrowski and Priddy 1978:165). The latter authors suggest that the primary function of the distinctive Kintampo 'cigars' was as pottery decorating implements; however, there are no close parallels in the K6 ceramics with the design created by impressing a 'cigar' in plasticene.

The comb stamps used to create the impressions on K6 ceramics were generally square-toothed. Occasionally, the end teeth exhibited a triangular shape. In some instances, the teeth of the comb were graded in size, those in the center being thickest, becoming smaller towards the ends of the comb. Comb impressions typically were placed close to one another on the vessel surface. Although horizontal comb stamping was occasionally noted (Fig. 11:7), orientation of the impressions was generally oblique in relationship to the rim (Figs 10, 11:1–6; 12). A single sherd (Fig. 11:10) displayed criss-cross comb stamping. Comb stamping most often occurred in zones or bands delimited by shallow scoring (Figs 11:1–4, 8, 9; 13:1), or, occasionally, by a horizontal comb stamped line (Figs 10, 11:5, 6). A pattern of walking comb stamp, created by a rocking application of the comb, was common (Figs 10:2; 11:8; 12; Table 5). Occasionally, walking comb stamp occurred in triangular zones defined by scored lines (Fig. 11:8). More frequently, it took the form of an overall decoration of body sherds from jars (Fig. 12). Execution of walking comb stamp was generally somewhat haphazard.

Shallow scoring occurred in two contexts on the Kintampo culture ceramics, in isolation on necks of jars and in combination with zoned comb stamping on bowls or jars, demarcating the boundaries of the zone. In isolation, scoring was most often applied obliquely or in a criss-cross fashion (Fig. 13:2–3). No sherds identifiable as bowl fragments exhibited scoring in isolation. Spatulate impression was a less common decorative technique and was restricted in its application to the neck area of jars (Fig. 13:1, 5, 6). The impressions were most often oblique in orientation. Red slipping was infrequently noted on Kintampo culture sherds. It

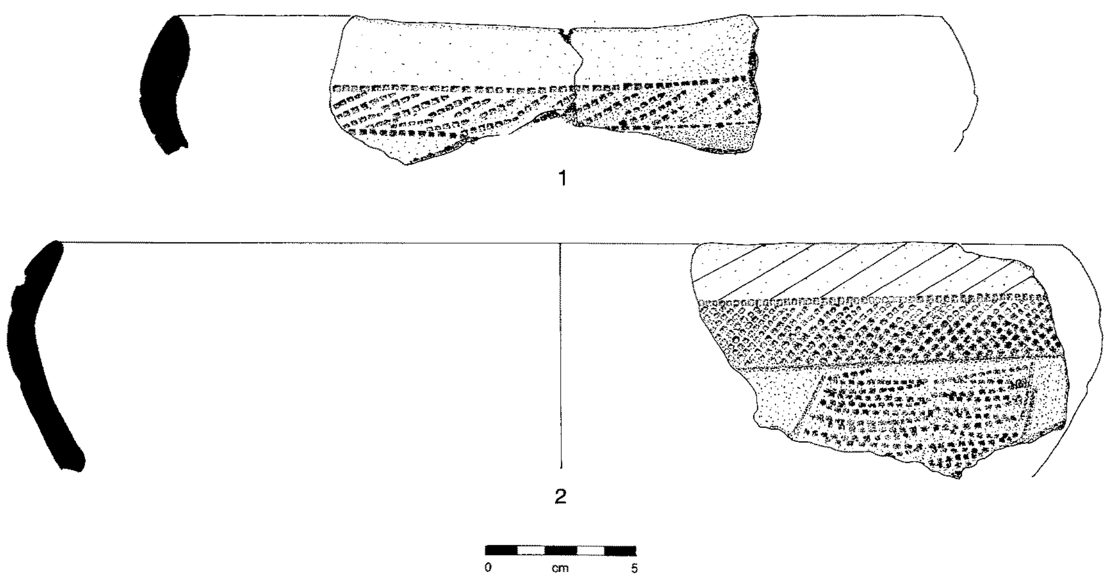

Figure 10 Reconstructed Kintampo culture bowls from Layer 2b. Diagonal hatching indicates red slip.

was applied in wide bands below the lip on the exterior of bowls or as an overall interior treatment (Fig. 10:2).

Identifiable bowl sherds almost invariably displayed zoned, oblique comb stamping on the shoulder area (Figs 10, 11:1–6). Jars exhibited more elaborate zonation of decoration. A

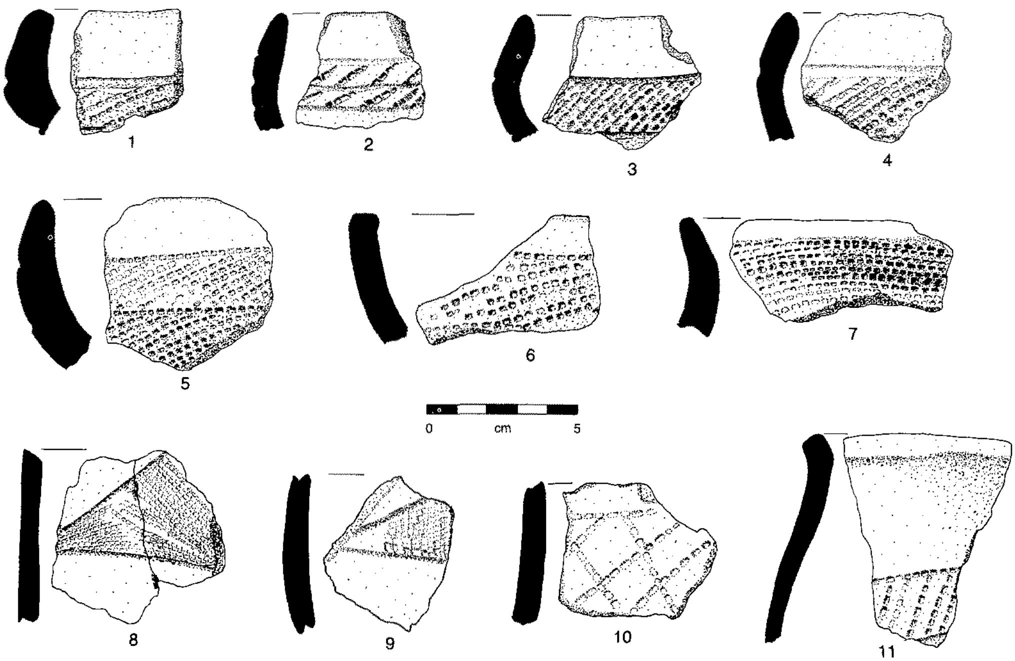

Figure 11 Kintampo culture sherds from K6. Layer 3a–b: 1,2,5,7,10; 2b:3,4,6,11; 3h:8; 3f–g:9.

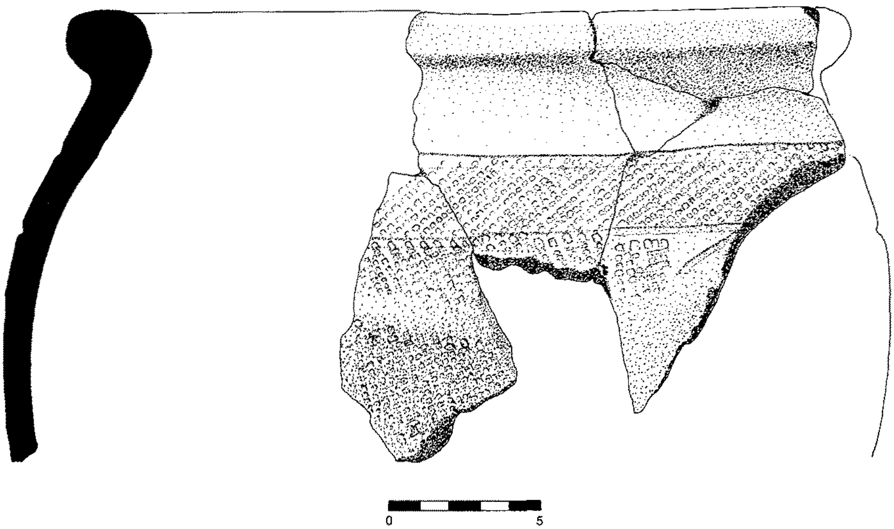

Figure 12 Reconstructed Kintampo culture jar from Layer 2bd.

pattern commonly noted was a horizontal row of oblique spatulate impressions at the most extreme point of constriction of the neck, followed by a row of oblique or criss-cross scoring in the area between the neck and shoulder, with overall walking comb applied to the area below the shoulder. In some instances, the walking comb stamp occurred in triangular zones.

The Kintampo culture sherds contained relatively high proportions of grit inclusions. Although Rahtz and Flight (1974:15) noted a decline in the importance of coarse quartz temper through time, this trend is not marked in the 1982 sample (Stahl 1985:183–84). Temper with quartz inclusions occurred in Layers 2, 3, and 4. Quartz would have been readily available as waterworn pebbles in local watercourses. Sherds with laterite temper, also locally available, occurred throughout the sequence. The number of sherds with mica

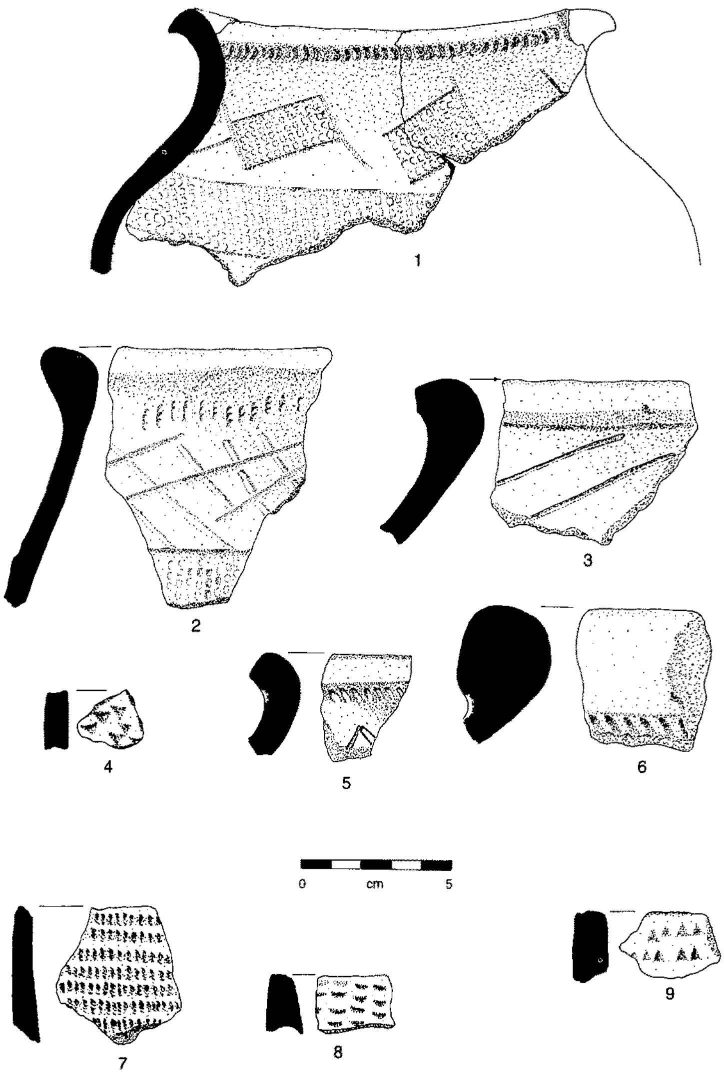

Figure 13 K6 pottery. 1. Kintampo culture jar (Layer 4); 2. Kintampo culture jar rim (3c–e); 3,6. Kintampo culture jar rims (2b); 4. Punpun sherd (5); 5. Kintampo culture jar rim (3h); 7–9. Punpun sherds (4).

inclusions increased substantially in Layer 2, and more specifically in 2b–d. Whereas the percentage of sherds with micaceous inclusions in Layers 4 and 3 are 4% and 3% respectively, the value in Layer 2 is 11%. The closest source of mica is probably the Banda Hills, 70 km to the west. The increasing utilization of micaceous temper may reflect greater contact or trade with groups in the Banda Hills, or movement to that area in order to procure raw materials.

A small sample (n = 34) of sherds recovered from the 1982 excavations were assignable to the Punpun phase. A paucity of rims precludes discussion of vessel shape. A limited range of decorative techniques was applied to the Punpun ceramics (Table 5). Invariably, the entire surface of Punpun sherds was decorated. Most common were mat (Fig. 13:7), or repetitive, zoned cord impressions. In the case of the former, both warp and weft strands could be recognized in the impression. In the case of repetitive cordmarking, the impressions ran in only one direction but were generally closely spaced. A third decorative treatment was overall stabbing of the vessel surface with a triangular stylus (Fig. 13:4, 9). In some instances, red pigment was rubbed into the triangular depressions. Less common techniques which probably also fall into the Punpun phase were 'scallop' impressions (Fig. 13:8), and 'cord-wrapped rocker'. The latter technique is distinctive. It appears as if a crescent-shaped stamp wrapped with fine cord was impressed onto the vessel with a rocking motion. Only a few small sherds from the 1982 excavations exhibited this decoration. I have seen larger examples in Flight's 1967–1968 collections. The rocking action is suggested not by overlap of impressions, as in the case of walking comb stamp; rather, when held at an oblique angle, one can discern depressions in the clay at the tips of the crescent-shaped impressions (Flight pers. comm. 1982). Thus it appears as if slightly greater pressure had been applied to the stamp at each end as might occur if one rocked the stamp gently back and forth. One sherd from Layer 5 exhibited circular punctates that may have been executed using a curved, carved comb. So far as I am aware, this sherd is unique and probably falls within the Punpun phase.

Evidence of coil manufacture was apparent in the Punpun phase ceramics. Several sherds were broken along the coil (e.g. Fig. 13:8). Coil fracture was also apparent on Punpun sherds from K1 (Rahtz and Flight 1974:22).

Stratigraphic change in ceramic composition

Flight (1976:216) viewed the transition from the Punpun phase to the Kintampo culture as rapid and abrupt, probably involving a population replacement. This interpretation is based in part on the distinctiveness of Punpun as compared to Kintampo ceramics. If a rapid population displacement occurred, it might be expressed stratigraphically as a segregation of Punpun and Kintampo ceramics corresponding with a depositional discontinuity.

Table 6 provides a summary of the stratigraphic distribution of Kintampo culture as compared to Punpun phase ceramics. The style of presentation follows Rahtz and Flight (1974) in order to facilitate comparison with the sequence at K1. A mixture of 'Punpun' and 'Kintampo' ceramics occurs in Layers 2–4 at K6. Flight has assigned Layer 4 (his 6) to the Punpun phase. He presumably views any Kintampo culture sherds in this Layer as intrusive from above. In the small sample of 1982 excavation materials, 21 of the 47 decorated sherds in Layer 4 were assignable to the Punpun phase, whereas 26 clearly belonged to the Kintampo culture. The Kintampo culture sherds were not necessarily small in size, as might

Table 6 Stratigraphic distribution of phase diagnostic sherds from the 1982 excavations at K6 rock shelter.

Layer	Punpun phase sherds	Kintampo culture sherds	Total
2a	1	5	6
2b–d	2	197	199
3	9	124	133
4	21	26	47
5	3	0	3

be expected were they intrusive into Layer 4. Figure 13:1 depicts a Kintampo culture rim that was firmly embedded in undisturbed Layer 4 deposits.

A similar mixing of Punpun and Kintampo ceramics occurred at K1. Here, the Punpun (Layer 9) and Kintampo (Layers 8–9) occupations were restricted to the basal levels (Rahtz and Flight 1974:14). Of the 37 sherds recovered from Layer 9, 11 were assigned to the Punpun phase, whereas 26 were Kintampo culture sherds. The Kintampo culture sherds were reportedly small in size. Punpun sherds in Layer 8 were restricted to the lowest spits and were very few (2 sherds out of 31 based on Table III, Rahtz and Flight 1974:16). Layers 8 and 9 were distinct from one another and no disturbance of Layer 9 was reported.

Although there is a stratigraphic trend toward the replacement of Punpun phase ceramics by those of the Kintampo culture at K6, there is no sharp stratigraphic break marking the transition from one ceramic tradition to another. Based upon published description, this appears to be the case at K1 as well. At K6 one might expect such a break in ceramic tradition to have accompanied the sharp depositional break at the juncture of Layers 3 and 4; however, such a discontinuity is not witnessed in the 1982 materials.

Lithics

A range of lithic materials, including polished stone implements, 'cigars', struck quartz and other flaked stone was recovered during the course of the 1982 excavations.

Polished stone (n = 23) was recovered from Layers 2b–d and 3a–e only (Table 7). The polished stone occurred as fragmentary implements or as flakes, the latter presumably produced through use or sharpening of implements. The majority of the larger, identifiable fragments of polished stone originated from polished stone axe/adzes, the so-called *nyame akuma* (Fig. 14:1, 4). The seven polished stone axe fragments from the 1982 excavations were all small (< 10 cm), and exhibit extensive damage to their working edges. An unusual and, to my knowledge, unique polished greenstone implement was recovered from Unit 1, Layer 3a (Fig. 14:2). Measuring 3.5 cm in length with a maximum width of 1.3 cm, the beveled edge of the implement suggests a woodworking function. The opposite end of the implement is tapered, as if for hafting. The implement shows little edge damage, although a few flakes (use damage?) have been removed from one edge. Another unique item (Unit 3, Layer 3) was a flake that exhibited polishing on its dorsal surface and was retouched along one edge with deep, non-overlapping scars, creating a saw-like edge (Fig. 14:3). Use damage is not readily apparent.

The raw materials used in the manufacture of the polished stone implements were not locally available. The most commonly noted raw material was 'greenstone', a fine-grained, calc-chlorite schist not found in the Voltaian Formation rocks surrounding K6. The closest source of greenstone would have been the Upper Birrimian deposits in the Banda-Bui area 70 km to the west (Gay 1956:4). Two of the polished stone fragments were of an unidentified, black metamorphic rock. A single fragment was of a yellow-gray, unidentified metamorphic raw material. Acquisition of greenstone was either by exchange with groups in the Banda Hills, or by procurement expeditions to this area. Evidence from the 1982 excavations suggests that implements were imported in a finished or partially finished form. Only 18 unpolished greenstone flakes, most under three cm in length, were recovered and occurred scattered throughout Layers 2–4. The paucity of unpolished greenstone flakes would argue against importation of large pieces of unshaped greenstone. A single example of what appears to be a flaked, greenstone roughout (Unit 3, Layer 2b) suggests that axes/adzes may have been imported in an unpolished form.

Ten fragments of the enigmatic Kintampo culture 'cigars' were recovered during the course of the 1982 excavations and were restricted to Layers 2b–d and 3a–e of Units 1 and 2 (Table 7). All of the 1982 examples were manufactured from a fine-grained sediment. Despite their original characterization, as '*terracotta* cigars' (Davies 1962), most of those examined from Kintampo sites have proved to be of stone. Several examples from the site of Mumute were sectioned and are said to have been fashioned from a fine clay (Agorsah 1976: 119); however, those from other major sites are clearly of stone (e.g. Ntereso, Davies 1973; 1980:218; Kintampo rock shelters, Flight 1976:211. All those recovered during the 1982 excavations at K6 were broken and/or heavily worn (Fig. 14:5–12). The scoring on two of the implements from Unit 1: 2b–d was almost totally obliterated through abrasion (Fig. 14:5,8). The abrasion marks were oriented slightly diagonally to the long axis in one instance, and parallel to the long axis in another. Three fragments (representing two implements; Fig. 14:5 and 12) exhibited a deep groove along the long axis of the implement that may indicate secondary use as a bead polisher or shaft straightener.

Struck or flaked stone was recovered from all levels with the exception of Layer 1 (Table 7). The overwhelming majority of flaked stone consists of quartz flakes and chunks. The quartz industry at K6 can be characterized as informal at best. A thorough examination of the quartz collection did not lead to the identification of a single formal tool. Several flakes that may have been utilized or retouched were noted. A small number of flakes exhibited burin

Table 7 Frequencies of lithics, daub, and beads in the 1982 excavation units at K6 rock shelter.

Layer	Polished stone implements	'Cigars'	Struck quartz	Greenstone flakes	Daub	Beads
1	0	0	0	0	0	0
2a	0	0	4	0	0	0
2b–d	10	5	43	8	538	3
3a–h	13	5	215	8	527	65
4	0	0	303	2	4	8
5	0	0	268	0	15	0
6	0	0	34	0	6	0

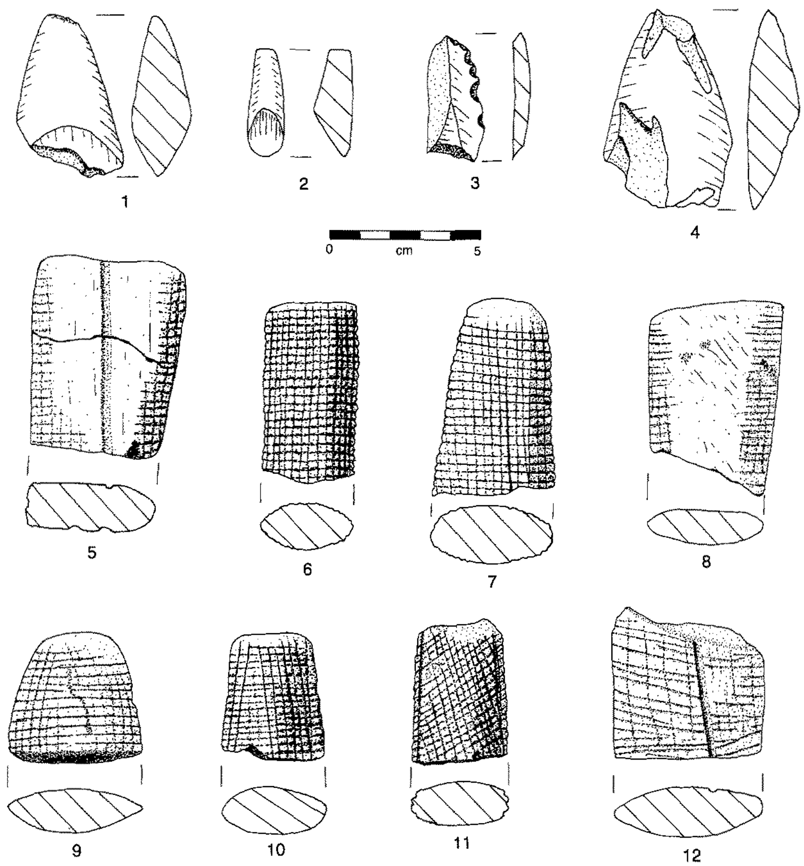

Figure 14 Polished stone implements (1–4) and 'cigars' (5–12) from Kintampo culture contexts at K6. Unit 3 Layer 3:1,9; Units 1 and 2 3a–b:2,3,6,10,12; 2b–d:4,5,8,11; 3c–e:7.

type edges; whether these are the product of intentionally placed burin blows or whether they result from a natural tendency of quartz to fracture in this fashion (J. D. Clark pers. comm. 1983) cannot be ascertained. The source of the quartz was small (< 5 cm), waterworn pebbles available in local streams. A bipolar technique of manufacture is indicated by the numerous pieces exhibiting bashing on opposite ends. The object of the exercise may well have been the production of sharp-edged flakes and pieces used for a variety of purposes. This interpretation is supported by the lack of formal tools or modified flakes. An alternative explanation is that the lack of formal tools is a product of depositional biases, the formal endproducts of the quartz reduction having been discarded elsewhere. Finally, some of the shattered quartz may have been intended for use as ceramic temper.

Although struck quartz was recovered from Layers 2–6, there was a reduction in the amount recovered in the upper levels, most notably in 2. Layer 4 yielded a greater quantity of quartz than 5; however, the figure for Layer 4 combines materials from Units 1–3. Layer 5 was represented only in Unit 3 and represents a smaller volume of deposit. It can be concluded that there occurred a steady reduction in the concentration of struck quartz through the K6 sequence, with a marked decline in Layer 2.

Miscellaneous materials

Burned daub occurred in relative abundance in the K6 deposits. Only burned clay that displayed pole and/or thatch impressions was classified as daub. Table 7 summarizes the distribution of pieces of daub larger than one centimeter. Although daub occurred throughout the sequence, it occurred in abundance only in Layers 2 and 3.

Small shell beads (n = 76) were recovered from Layers 2–4 of the 1982 excavation (Table 7), the majority concentrated in sublevels 3b, e, and g of Units 1 and 2. The beads ranged in size from 1.5 mm to 5.5 mm in diameter and from 0.5 to 2 mm in thickness. Holes in the beads were no larger than 1 mm and were biconical in profile. The majority of beads (51) exhibited smoothed, well-rounded edges, with roughly one-third (25) displaying unfinished angular, or scalloped edges. This suggests that beads were roughed out and holes drilled prior to the final shaping of the beads. The scored sandstone blocks recovered from many Kintampo sites have been interpreted as bead polishers. Although no such objects were recovered during the 1982 excavations at K6, several cigars exhibited scoring that might be the byproduct of bead polishing. The possibility that the raw material used in bead manufacture was marine in origin is suggested by the thickness of the beads (D. Lindberg pers. comm. 1983). Although land snails (e.g. *Achatina*) occurred in abundance in the K6 deposits, a paucity of calcium carbonate in many terrestrial contexts leads to the formation of thin shells in land snails (Mead 1961:24). Similarly, fresh water molluscs may exhibit relatively thin shells. There is in fact unequivocal evidence for the importation of marine shell to K6. A single fragmentary shell from family Cerithiidae was recovered from Layer 3h of Unit 1. The Cerithiidae (Horn shells) are a family of many-whorled snails that inhabit coastal, mangrove environments and attach themselves to grasses and seaweeds (Morris 1951:158). Flight (1976:217) reported the recovery of a single shell of the brackish water species *Tympanotonus fuscatus* from the Kintampo culture levels at K6. It is thus not implausible that the raw materials used in bead manufacture were of marine origin. Of interest in this context is a comparison of the shape of the unfinished beads with that of the Cerithid shell; a number of the unfinished beads exhibit scalloped edges comparable to the 'beading' of the vertical ridges of the Cerithid shell. Diameters of the unfinished beads (*ca* 5 mm) and of the Cerithid shell (6 mm) are comparable.

Faunal and floral remains

Detailed results of the analyses of faunal and floral remains will be published separately (see also Stahl 1985); the findings are summarized below.

Organic materials were well preserved. Identifiable faunal remains were recovered from all levels at K6 with the exception of Layer 2a. Species listed in Table 8 are those for which comparative materials were available at the University of California, Berkeley, or the Los Angeles County Museum. In some instances, comparative West African species were lacking and identifications in Table 8 are listed as the species against which the archaeological specimen was compared. A more probable identification, based on geographical considerations, is given in parentheses.

There are contrasts in the composition of the faunal remains between the upper (2–3) and lower (4–5) layers of the K6 deposits. The lower were characterized by greater abundance of primate remains and snail shell (Table 9), primarily the giant African snail *Achatina achatina*. Large reptiles (*Kinixys* sp., *Varanus* sp.) occurred only in the lower layers. Animal domesticates (cf. *Capra* sp.) and potentially domesticated species (cf. *Bos, Numida meleagris*) are confined to the upper layers. Remains of large rodents (e.g. *Cricetomys, Thryonomys*) increase significantly in the upper levels, whereas *Achatina* sp. declines in abundance. Fish remains were uncommon and were confined to Layer 3.

Unequivocal evidence of domesticates is confined to ovicaprids (cf. *Capra* sp.; goat) which occur in Layers 2 and 3 of the 1982 excavations. Domestic goat was identified in the fauna from the 1967–68 excavations at K6, as well as from Ntereso (Carter and Flight 1972).

Table 8 Summary of the fauna identified from the 1982 excavations at K6 rock shelter.

Identification	Common Name	Layer
cf. *Bos?; (Syncerus caffer nanus?)*	Domestic cattle/ Forest buffalo	3a–b
Cephalophus cf. *nigrifrons*	Duiker (Black-fronted)	1, 5
C. cf. *monticola*	Duiker (Blue)	3a–b
Neotragus cf. *pygmaeus*	Royal antelope	3a–b
cf. *Capra* (possibly *Ovis*)	Domestic goat/sheep	2b–d, 3c–e, 3a–b
Cercocebus cf. *albigena (C. torquatas)*	Mangebey	4, 5
Cercopithecus cf. *aethiops*	Vervet monkey	3a–b, 4
Papio sp.	Baboon	2b–d, 4
Cricetomys spp.	Giant rats	2b–d, 3a–b, 3c–e
Crocidura sp.	Shrew	1
Thryonomys swinderianus	Cane rat	3h
Kinixys sp.	Tortoise	4
Pelomedusa sp.	Freshwater turtle	3a–b, 4
Varanus sp.	Monitor lizard	4
Bucerotidae	Hornbills	3c–e
Numida meleagris	Guinea fowl	3a–b

Table 9 Presence (+) and absence (−) of snail shell in the K6 deposits.

Layer	*Achatina achatina*	*Limicoloria kambeul*	*Subulinids*	Total weight
1	−	+	−	1 g
2	+	+	+	13 g
3	+	+	+	41 g
4	+	−	+	200 g
5	+	+	+	74 g
6	+	−	+	5 g

Domestic *Bos* cf. *longifrons* was previously identified at K6 on the basis of several phalanges and an upper molar. Carter and Flight (1972:280) noted the osteological similarity of domestic *Bos* sp. and the African buffalo (*Syncerus caffer)* and attempted to discriminate between these species through metrical comparison of second phalanges from K6, modern *Syncerus* spp., and archaeological cattle remains from a British Iron Age site. They concluded that the second phalanges from K6 fall outside the range of *S. caffer nanus,* the dwarf forest buffalo, and therefore represent domestic cattle. Their assessment is open to question. As the authors point out, the metric analysis does not take into account the difference between front and back phalange size. Additionally, the size of the phalange samples is small. There were only three complete second phalanges from K6 and the comparative sample of *S. caffer nanus* second phalanges is limited to eight (*ibid.*:280 and Fig. 1), a sample too small to represent adequately interindividual variation. This seems especially significant since the separation of the supposed *Bos* and the *S. caffer nanus* second phalanges is on the scale of millimetres. Klein (1984:283) suggests that the only foolproof osteological evidence for distinguishing *Bos* sp. and *Syncerus* sp. is by examination of horncores.

Neither is there unequivocal evidence for domestic cattle from the 1982 excavations. A single bovine phalange from Level 3a–b was compared to both *Bos* sp. and *Syncerus caffer,* the savanna buffalo, and while morphologically the phalange is more similar to modern *Bos* sp., it is much smaller than either comparative species. No comparative materials were available for either West African dwarf domestic cattle or *Syncerus caffer nanus.* Until such comparisons are made, the identification of cf. *Bos* must be viewed as tentative. The only other potentially domesticated species represented in the 1982 faunal remains was *Numida meleagris* (guinea fowl). The materials recovered were those of an immature individual, and it is unknown whether they represent a wild or domestic variety.

The large rodents represented in Layers 2–3 are highly prized sources of meat today (Booth 1960:55–56, 59–60; Malaisse and Parent 1982; Asibey 1971:19). The possibility that these rodent remains are post-occupational intrusions seems slight. *Thryonomys swinderianus* is not a burrower (Rosevear 1969:546), while *Cricetomys* may dig substantial underground passageways (*ibid.*:217). However, the burning evident on some of the bones, the presence of a restricted number of body elements, and a lack of disturbance of the deposits, all suggest a contemporaneity of the rodent bone with the deposits in which they occurred.

Snail shell occurred throughout the K6 deposits in varying quantities (Table 9). Two species of larger terrestrial snails were identified among the highly fragmented shell: *Achatina achatina* and *Limicolaria kambeul.* A number of small snails belonging to the family Subulinidae were also recovered. The giant African snail (*Achatina achatina*) was the most common throughout the sequence (A. Mead pers. comm. 1984). There is a trend toward the reduction in the amount of snail shell in the upper levels. The reduced quantity of shell in Layer 5 is not significant, for this level was only represented in Unit 3. There is, therefore, a notable reduction in the amount of shell in Layers 2–3 as compared to 4–5.

With the exception of the Subulinids, which are small burrowers found in leaf mold (A. Bogan pers. comm. 1984), the K6 shells are most likely contemporaneous with the deposit in which they occur and probably represent food debris. *Achatina* sp. are characterized as superficial estivators (Bequaert 1950:18; Mead 1961:26), and the highly fragmented state of the shell suggests some form of processing prior to deposition. *Achatina achatina* is attracted to rotting materials and frequents village refuse heaps (Bequaert 1950:18; Mead 1961:20). It thrives under conditions of secondary growth or in gardens (Pilsbry 1919:54–55), but may be found in dense forest. The ecology of *Limicolaria kambeul* is poorly known.

A summary of identified macrobotanical materials appears in Table 10. A total of 50 samples of botanical material were examined and, although an attempt was made to sample all levels and units equally, there is some disparity in representation. Layers 1, 2a, 5 and 6 have fewer samples because they were represented only in Unit 3. Layer 3 is over-represented since it possessed a variety of sublevels, all of which were sampled individually. Sampling effects must be taken into account in interpreting the meaning of quantitative changes in macrobotanical remains through the K6 sequence.

The fragmented woody endocarp of *Elaeis guineensis* (oil palm) was ubiquitous throughout the Kintampo culture and Punpun deposits at K6. The significance of the increase in oil palm in Layer 3 as compared to 4 and 5 is questionable given the sampling problems outlined above; however, its presence in Layers 4–6 is significant in that Flight (1976:216–17) mentions it only in Kintampo culture contexts at K6 (i.e. 1982 Layers 2–3). The endocarp of *Canarium schweinfurthii* was less common, but occurred in small quantities throughout the sequence. Fruits of this species are available in the rainy season (Irvine 1961:509; Taylor 1960:379). *Celtis* was abundant only in Levels 3 and 4 and, given the durability of *Celtis* endocarp, one would not expect preservational bias to contribute to their absence in other levels. The paucity of *Celtis* in Layer 2 may therefore be of cultural significance.

Identification of the wood charcoal from the 1982 excavations is in progress. Preliminary results based on a small sample from Layers 1–4 indicate a range of species generally associated with semi-deciduous forest (Stahl 1985:226–29). The species composition is not dissimilar to that found in the area today. Some of these species are also found farther north as elements of fringing forest along water courses (e.g. *Erythrophleum* cf. *ivorense, Mansonia altissima, Nesogordonia papaverifera*).

A small number of seeds (48) grouped into eleven types were recovered from the 1982 excavations. With the exception of one type, all are small and clearly the remains of wild species. The remaining type is a legume-like seed roughly 5 mm in length that occurred in Layers 2b, 3c, and 4. They compare in a general way with the shape of domestic cowpeas (*Vigna unguiculata*) but are half the size. Flight (1976:217–18) reported that *Vigna unguiculata* occurred in abundance in the Kintampo culture levels at K6. The cowpeas from the 1967–68 excavations were reportedly small in size, and Flight suggested that this might be attributed to shrinkage during carbonization (*ibid.*:218 fn.). I have carbonized modern cowpeas by placing them in foil in a 500°F oven for 15–20 minutes and noted no significant shrinkage.

Table 10 Summary of macrofloral remains from the 1982 excavations at K6 rock shelter.

Layer	Number of samples	Oil palm	*Canarium*	*Celtis*	Wood charcoal
1	2	0 g	0 g	0 g	14+ g
2a	1	1 g	1 g	1 g	3 g
2b–d	11	75 g	7 g	4+ g	11 g
3	23	42 g	8 g	161 g	22 g
4	6	20 g	4 g	649 g	4 g
5	4	14 g	6 g	5 g	2 g
6	2	5 g	1 g	5 g	0 g

Until such time as the seeds from the 1982 excavations can be examined by a specialist, I prefer to refer to them as cf. Leguminosae. If they are comparable to the *Vigna unguiculata* identified from the 1967–68 excavations, it is significant that two of the cf. Leguminosae seeds were recovered from the base of Layer 4 in Unit 1, a 'Punpun' level.

Interpretation of the K6 sequence

Interpretation of the K6 sequence rests upon an understanding of the nature of deposition and the degree to which movement of materials between discrete strata may have occurred. With the possible exceptions of Layers 1, 2a, and 6, the high density of archaeological material indicates that the K6 strata are primarily cultural in origin. The nature of the deposits suggests that the site served as a midden; hence, cultural materials are not in primary context. The high ash content and abundance of burned sediment in Layers 3–5 indicate that much of the debris was derived from hearths. Flight (pers. comm. 1982) also conducted excavations immediately to the south of the rock shelter that yielded Kintampo culture materials. It is plausible, therefore, that the main living area lay outside the shelter.

Interpretation of the nature of the overlap between Punpun phase and Kintampo culture materials is dependent upon an evaluation of the potential effects of post-depositional mixing. I have argued (Stahl 1985:233–35) that the K6 strata and their contents are little disturbed and that, on the whole, vertical distribution of artifactual materials has cultural meaning. Fauna has been the most significant agent of disturbance. Burrowing by rodents was indicated in the K6 deposits by areas of loose soil that were of a different color from the surrounding matrix. On the other hand, burrows were neither common nor did they appear to have led to extensive mixing of deposits. The distinctness of the boundaries between levels at K6 suggests that worms were not an important agent of pedoturbation (Wood and Johnson 1978:327); their colonization may have been limited by dryness of the shelter deposits. Penetration of underlying strata by materials from upper levels may have occurred during deposition, especially if the sediment was loose (as in Layer 4) and rubbish was being tipped into the shelter. The distinctness of the stratigraphic boundaries and the character of the ceramics series nonetheless argue against extensive mixing. The overlap of Punpun phase and Kintampo culture materials, specifically between Levels 3 and 4, can best be attributed to cultural rather than natural formation processes.

The nature of change at K6 rock shelter

Change occurs disproportionately over the total range of material culture at K6. Whereas certain elements considered diagnostic of the Kintampo culture appear first in Layer 3 (e.g. 'cigars' and polished stone implements). Kintampo ceramics occur at an earlier period. Conversely, Punpun ceramics continue above the 3–4 boundary. Finally, despite changes in some classes of material culture, there is continuity in others. For example, although there is a diminution in the quantity of struck quartz in the upper levels at K6, the nature of the quartz industry remains constant throughout the sequence. Beads and daub, both considered typical of the Kintampo culture, occur in the lower levels of K6, but are not common until Layer 3.

Although Kintampo culture ceramics are present below, the large increase in the quantity of pottery in Layer 3 may, if not a product of sampling, be related to a significant change in subsistence and/or settlement. Such a change might be related to one or more of the following: 1. a change in food preparation techniques independent of a change in dietary composition (for example an increased emphasis on boiling or stewing); 2. adoption of, or increased emphasis upon, new food source(s) requiring boiling/stewing or storage in pots; or 3. decreased residential mobility allowing greater accumulation of material goods. An intriguing correlation is that between the increase in the amount of daub, frequently interpreted as an indication of more permanent housing, and the large increase in the quantity of ceramics. Both may relate to decreasing residential mobility.

Exotic goods become an important and relatively common element of the material culture inventory in Layer 3. Evidence includes the Cerithid shell from 3h and the greenstone from which polished stone implements were manufactured. The raw material for shell bead manufacture may also be exotic in origin. These materials became common only in Layers 2 and 3. Intensification of exchange activities may be reflected by the increased use of mica as a tempering agent in ceramics from Levels 2b–d.

The stylistic and technological changes from Punpun phase to Kintampo culture contexts have previously been linked to changing patterns of subsistence (Flight 1970; 1976), and specifically to the adoption of food production techniques. There is direct evidence of domestic grains formed a primary staple (e.g. Davies 1962). Flight (1976:218–19) suggested assessment of the plant food component of the Kintampo culture diet, some have postulated a primary reliance on yam (Posnansky 1984:150), while others suggest that indigenous domestic grains formed a primary staple (e.g. Davies 1962). Flight (1976:218–219) suggested that both yam and cereals were grown as part of an agricultural strategy designed to minimize risk.

The evidence from the 1982 excavations indicates that some changes in subsistence adaptation accompany the depositional transition at the juncture of Layers 3 and 4. Ovicaprids initially appear in 3, and most discussions of Kintampo culture subsistence have stressed the appearance of this exotic domesticate; however, despite its archaeological significance, the role of domestic goat/sheep in the economy remains unclear. What has received less attention in published accounts is the continuing importance, in fact the predominance, of wild animals in Kintampo culture faunal assemblages. Layer 3 witnessed an increase in the importance of large rodents. Conversely, the number of primate elements decreases, while the quantity of artiodactyl elements remains relatively constant. Assuming that sampling error is not a problem, one might speculate that a change in faunal composition reflects either a change in the environment of the K6 vicinity or changing patterns of faunal selection independent of environmental modification. The decreasing importance of primates and the corresponding increase in rodent remains could be indicative of a reduction in forest cover and elimination of the arboreal habitat of certain primates (e.g. *Cercocebus* sp., found in high forest), with a corresponding increase in woodland savanna frequented by large rodents such as *Thryonomys* or *Cricetomys*. That this was not the result of climatic change is suggested by data from the Bosumtwi core indicating the beginning of a transgression at *ca* 3700 bp (Talbot and Delibrias 1980:339, 341). Another possibility is that these changes might have been brought about by forest clearance associated with cultivation. Cleared areas offer expanded opportunities for rodents and may lead to an increase in both their diversity and density (Delany 1972:17; Delany and Kansiimeruhanga 1970:419, 424).

Changing strategies of hunting might have accompanied a shift toward cultivation. Predation may have been focused on species attracted to cleared, cultivated areas, a form of garden hunting (cf. Linares 1976). These might include a variety of rodents such as the grasscutter, giant rat, and squirrel (*Heliosciurus* spp.), as well as baboon and some artiodactyls (e.g. duikers, *Cephalophus*) and game birds (e.g. *Numida*). These are precisely the kinds of animals and birds represented in Layers 2 and 3 of the K6 deposits (Table 8), and all specifically identified remains from these levels are consistent with a strategy of garden hunting. Although the green monkey and baboon do not specifically inhabit cultivated areas, they are serious garden pests (Dorst and Dandelot 1969:46, 73).

The increased importance of rodents in Layer 3 may also be related to the postulated reduction in residential mobility. Genera such as *Cricetomys* are commensal with man and frequent midden areas associated with permanent habitation sites. The reduction in the quantity of snail shell above Layer 4 is, on the other hand, inconsistent with a strategy of garden hunting since snails are frequently associated with human settlements and gardens. The reduction in quantities of snail shell in Layers 2 and 3 may be due to sampling or taphonomic bias, or may possibly represent changing dietary preferences.

In summary, although wild animals continue to be an important element of the faunal assemblage throughout the K6 sequence, there is a shift in the range of species exploited. Whereas the lower levels (4–5) yielded species that inhabit a variety of niches not particularly associated with man, the Kintampo culture levels (2–3) contained a variety of animals commonly found in cleared or more open areas.

There is greater continuity between Layers 3 and 4 in macrobotanical remains than is reflected in the faunal assemblage. Oil palm increases in abundance in 3 and especially 2b, but it occurs in significant amounts in 4 and 5. *Canarium schweinfurthii*, another oleaginous seed, occurred in small quantities throughout the K6 sequence. *Celtis* was very abundant in Level 4, but occurred in significant quantities in Level 3 as well. The paucity of *Celtis* sp. in Levels 5–6 may be due to seasonality of occupation since *Celtis* fruits are available for a relatively short period. In the case of Layers 2b–d, in which settlement is suggested to have been of a more permanent nature, the dramatic reduction in the amount of *Celtis* may reflect the increasing importance of other subsistence pursuits, and one is tempted in this context to think of agricultural activities. Although Flight (1976:217–18) suggested that cowpea was a significant addition to the plant food inventory of Kintampo culture peoples, the presence of legume-like seeds at the base of Layer 4 may call this into question.

Summary

Numerous changes in style, technology, and subsistence are witnessed in the K6 sequence, most of which had coalesced by the occupation of Layer 3; however, it appears that change occurred disproportionately and was not necessarily synchronous across the range of material culture. Basic continuities are evident in: 1. lithic technology (e.g. struck quartz); 2. the exploitation of certain types of wild fauna (small artiodactyls, snails); and 3. utilization of selected plant foods (e.g. oil palm, *Celtis* and *Canarium*). Significant changes apparent in the sequence by Layer 3 include: 1. a probable reduction in residential mobility as witnessed in greater investment in building and increased accumulation of material goods; 2. greater quantities of exotic goods that may signal involvement in wide ranging trade networks; 3.

increased importance of ceramics and consequent implications for changes in techniques of food preparation and/or dietary composition; 4. a shift toward the exploitation of wild fauna attracted to or associated with cleared areas, settlements and/or savanna woodland vegetation; and 5. addition of at least domestic goat/sheep to the range of fauna exploited. It appears that adjustments in subsistence continued to occur after the advent of what archaeologists recognize as a full-fledged Kintampo culture. The available data indicate that there was no significant climatic change during the occupation of K6 rock shelter, and that any environmental change was in the direction of increasingly open conditions and probably resulted from human perturbation (see also Talbot 1983).

Changes in technology and subsistence are undoubtedly related to changes in the social sphere. Patterns of increasing residential permanence, the possibility of widening exchange networks, and increasing accumulation of material goods, suggest alterations in the organization of activities and, by extension, of social relations.

Culture change and the origins of the Kintampo culture

Whereas all researchers agree that the Kintampo culture is unlike any preceding archaeological entity in Ghana or surrounding countries (although it must be conceded that much of the area outside Ghana remains unknown archaeologically), they disagree on the mechanisms underlying the transition from the Punpun phase to the Kintampo culture. One group of researchers (Davies 1967:217, 222; Flight 1976: 216; Dombrowski 1976:65) views the Kintampo culture occupation of Ghana as a product of immigration. Flight (1976:216), for example, postulates a complete population replacement between the Punpun and Kintampo occupations. Our reinvestigation of K6 however indicates that the continuities witnessed in the sequence are greater than Flight suggested and argue against a model of population replacement.

The radiocarbon chronology of the Punpun phase and Kintampo culture occupations is relevant in this context. Figure 15 shows all available age estimations in uncorrected radiocarbon years bp at one standard deviation. (Sources of the dates are given in Table 4.) Sites are ordered from north to south. Dashed lines indicate Punpun phase dates and solid lines those from Kintampo culture occupations. A summary of important events from the Lake Bosumtwi core appears at the top of the figure. Although the sample of dates is small ($n = 19$), there are several patterns in the radiocarbon chronology that may be of cultural significance. First, there is significant overlap in age estimations from Punpun and Kintampo contexts. In the case of K1 and K6 rock shelters, the Kintampo levels succeed the Punpun occupations, while at neighbouring K8 there is no overlying Kintampo occupation (Flight 1967:68). If the single date from K8 is not aberrant, it suggests a persistence of the Punpun phase after the advent of the Kintampo culture. The second pattern that may be culturally significant is the progressively younger age of sites to the north. The oldest consistent age estimations from Kintampo culture contexts are those from K6. I am discounting the date of 4235 ± 150 bp from Daboya (S–2376) since it does not fit well with the other radiocarbon age estimations from the site. Additionally, Kense (1983b:9) does not provide stratigraphic provenience of the dates other than to state that the samples were collected from the Kintampo-associated area; hence it is impossible to assess their stratigraphic consistency. Caution is therefore warranted in accepting Kense's conclusion that the Daboya dates

'. . . generally demonstrate an occupation from the early first millennium through to the mid-third millennium . . . they indicate that the Daboya Kintampo component may be somewhat older than the conventionally accepted date of 1500 bc' (*ibid.*:9). Instead, the bulk of the dates from Daboya are more comparable to those from Ntereso and support a slightly later occupation than at the Kintampo rock shelters.

If the Kintampo culture represents an incursion of a population from the north we would expect to see a pattern of early dates at northern sites, and progressively later dates further south. The estimates available do not support this view; rather, they indicate just the opposite. Flight (1976:220) has postulated a possible incursion of peoples into the Kintampo area from the west. The only date from a Kintampo culture site located west of the Kintampo rock shelters is from Mumute. It is slightly later than those from K6, although there is some overlap. Clearly, this is not conclusive; however, it gives no reason to suspect that sites to the west will be more ancient than those in the Kintampo region. Thus the available radiocarbon dates do not support the notion that people with a distinctive cultural baggage moved into Ghana from either north or west.

Other researchers have suggested more diverse origins for the Kintampo culture. According to this model, an indigenous population practising yam and oil palm management, and collecting diverse wild plant and animal resources, came into contact with

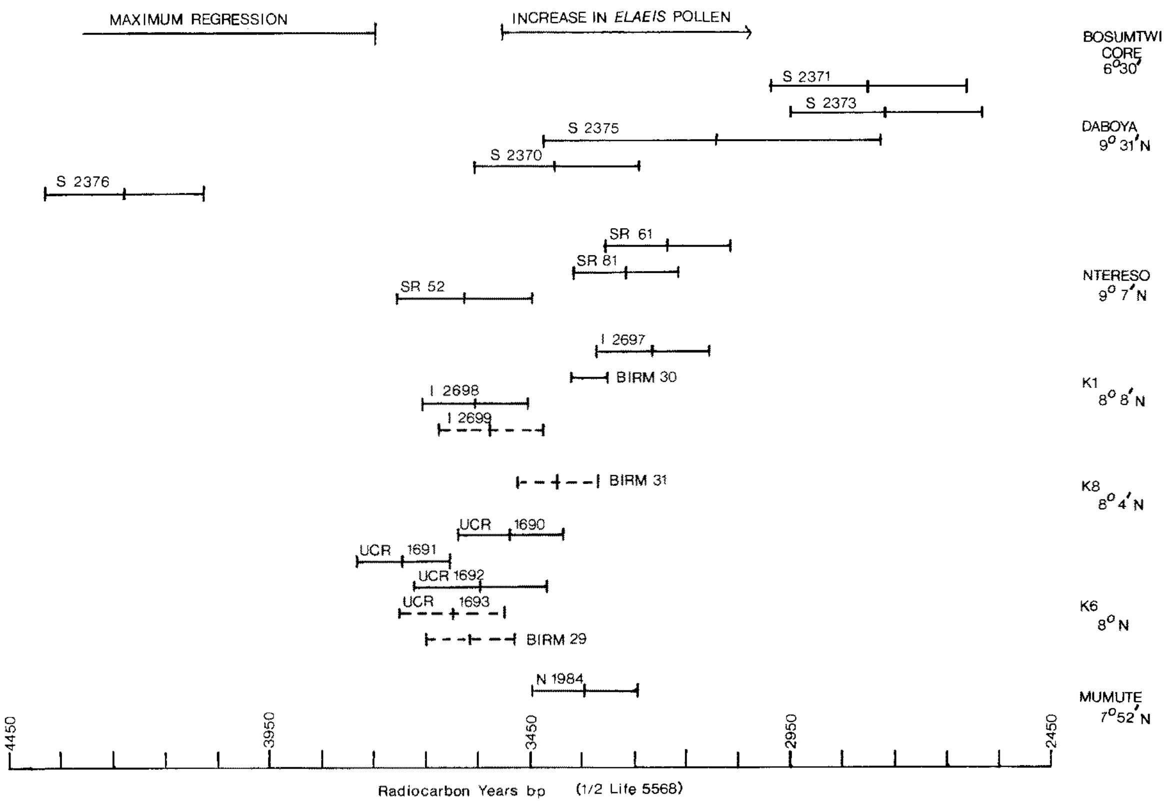

Figure 15 Radiocarbon chronology of Punpun phase and Kintampo culture occupations of Ghana. Sources of dates listed in Table 4.

populations from the Sahel and ultimately from the Sahara. These populations possessed a distinctive lithic technology and exotic domesticates which became incorporated into the indigenous LSA adaptation. The contact in this case was not necessarily in the form of intrusive occupations in central Ghana; rather, introduced traits were incorporated into a local adaptation. Posnansky (1984:150) suggests that differential integration of these traits accounts for regional variation in the Kintampo culture.

The existing radiocarbon dates are not inconsistent with a coalescence of the Kintampo culture in central Ghana, involving a fusion of local and exotic traits that resulted in a distinctive adaptation. Less clearly defined are the mechanisms that underlaid these changes. Culture contact, in and of itself, is insufficient motivation for change (Hitchcock and Ebert 1984:330–33; Tringham in press). There are archaeological examples of hunting-gathering and food-producing populations living in close proximity for long periods while maintaining distinctive adaptations (e.g. in Zambia, Phillipson 1976:196–97). Thus, the question must be reformulated from 'Did contact occur?' to 'How might contact have disrupted LSA adaptive patterns due to perturbations in ecology, demography or settlement strategy, and ultimately have led to changed patterns of subsistence and settlement?'

An examination of functioning cultural systems undergoing change in situations of culture contact suggests that there are numerous variables that affect the form that contact takes, whether or not change occurs, and the trajectory of change. Among these are demographic stress, the impact of an immigrant group on the local ecology, the degree of residential mobility, the flexibility of extant technology or adaptation, the nature of social interaction between groups, and the flexibility of the existing value system (Stahl 1985:258–82). Whereas some of these variables possess archaeological correlates, others lack archaeological visibility altogether. Literature that describes the impact of culture contact on indigenous adaptive strategies draws attention to the complexity of interaction between these variables (e.g. Brooks *et al.* 1984). If we are to gain a processual understanding of changing lifestyles in Ghana during the mid-second millennium BC, we must focus future research efforts on assessing the contribution of these diverse variables to the advent of the Kintampo culture.

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