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An Initial Assessment of Prehistoric Ceramic Production and Exchange in Northern Yoruba, North Central Nigeria: Results of Ceramic Compositional Analysis

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Instrumental neutron activation analysis (INAA) was employed on 201 ceramic and clay samples from the Igbomina region of northern Yoruba in Nigeria. Ceramic data were obtained from 13 settlement sites spread over four Igbomina localities whose dates range between A.D. 1400 and A.D. 1800, and five raw clay samples from riverbeds and modern potters located in the Igbomina culture area. Quantitative analysis of the INAA data resulted in identification of four ceramic compositional groups that can be attributed to specific locales within the region. These results indicate that ceramics were moved within and among various Igbomina geographic areas and villages as well Ilorin (a Yoruba center located northeast of Igbomina). Results generated from this analysis indicate the tremendous potential for examining regional interaction in Yorubaland immediately before and during the Old Oyo period (fifteenth to the eighteenth century A.D.), a time of sociopolitical and settlement change.

Instrumental neutron activation analysis (INAA) a été utilisé sur 210 échantillons de céramiques et d'argiles provenant de la région Igbomina située au nord de Yoruba au Nigeria. Les données sur les céramiques proviennent de treize villages situés dans quatre endroits dans Igbomina dont les dates varient entre 1400 A.D. et 1800 A.D., et cinq échantillons d'argiles crues provenant des fleuves et des potiers modernes situés dans la zone culturelle d'Igbomina. L'analyse quantitative des données de l'INAA a pu identifier quatre composition de groupements céramiques qui peuvent être attribués à des endroits dans la même région. Ces résultats indiquent que les céramiques avaient été déplacées dans l'enceinte et parmi les

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différents villages et régions d'Igbomina aussi qu'en Ilorin (centre Yoruba situé au nord d'Igbomina). Les résultats obtenus de cette analyse indiquent le potentiel énorme d'un examen minutuex des interactions régionales dans le pays Yoruba dans les temps antérieurement et durant la période de l'Ancien Oyo (15ème au 18ème siècle A.D.), une période marquée par des changements socio-politiques.

KEY WORDS: Yorubaland; Old Oyo; Igbomina; ceramics; neutron activation; exchange.

INTRODUCTION

It has long been wondered if the various ceramic decorative styles associated with the different areas and sites in Igbomina were produced locally from the same or different raw material sources, and how much of these were the result of exchange between the Igbomina groups and with other groups. Few Yorubanist archeologists (Agbaje-Williams, 1983; Aleru, 1998; Eyo, 1974; Ogundiran, 2000) have employed ceramics for understanding regional cultural–historical and intersocietal contacts. This shortcoming is frequently blamed on the lack of historical and ethnoarcheological research on Yoruba pottery (Allsworth-Jones, 1996). Documenting how ceramics were distributed among Igbomina settlements is an important way for determining the direction and intensity of interactions among the settlements located on the northern frontier of Old Oyo and may provide new insights regarding the social and economic relations as a component of the precolonial northern Yoruba social landscape, immediately before the final collapse of the Old Oyo Empire in 1837.

Instrumental neutron activation analysis (INAA) is a sensitive analytical technique useful for quantitative multielement chemical characterization of major, minor, and trace elements. In archeology, INAA is routinely used in ceramic provenance investigations to identify production zones and vessel movement between production zones. INAA has been conducted on ceramics from archeological sites in most regions of the world including Mesoamerica (e.g., Hodge *et al.*, 1992; Kosakowsky *et al.*, 1999; Neff *et al.*, 1991), the American Southwest (e.g., Glowacki *et al.*, 1998; Hegmon *et al.*, 1995), and Africa (e.g., Cruz, 2003). Until now, INAA has not been used to investigate pottery production in Nigeria. Most archeological research in Nigeria has been concentrated until recently on site-specific assemblages with the assumption that ceramics were mostly produced by self-reliant communities tied to subsistence-level economic activities. This paper: 1) examines the usefulness of INAA for pre-nineteenth century ceramics from Igbomina; 2) identifies probable raw material sources used by potters; 3) differentiates between local ceramic and imported ceramic types; and 4) begins to evaluate the nature and extent of precolonial interregional exchange. This approach is a start at developing an insight into the production and distribution of ceramics in the Yoruba hinterland and their implications for cultural–historical relationships and interactions.

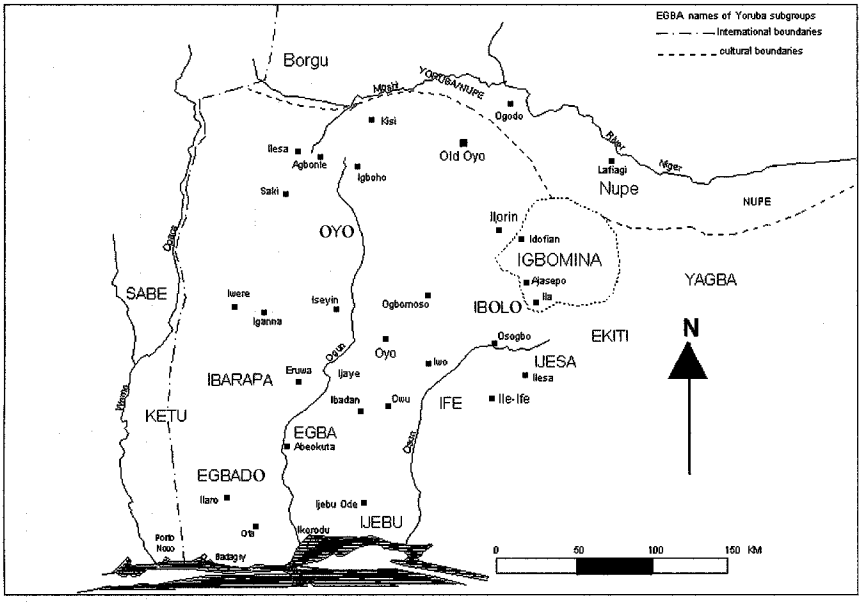

Fig. 1. The Yoruba subgroups and Northern neighbors.

This investigation was carried out in Igbominaland, Kwara State, Nigeria. The area forms part of Yorubaland (a language group) known as northern Yorubaland; it stretches from the southern part of Ilorin in the northwest, to parts of Ekiti in the northeast (Fig. 1). Prior to 1918 when the British colonial administration altered the north–south border and the town of Ila became part of southern Nigeria, Igbominaland stretched as far as the southeast banks of the Niger River up to Jebba. Hence, Ilorin city, which in the nineteenth century became the center of the Fulani state following the collapse of Old Oyo, may have been part of the territory that was later called Igbomina. The area now extends to about 80 km outside Ilorin in the southeast as far as Gama village and to the north–northeast of Ilorin, including Agbeyangi and part of Iponri district.

Igbomina was a northern province of Old Oyo (e.g., Johnson, 1921; Law, 1977), based on the geopolitical division of the Yoruba territory under the Old Oyo administration. The location of Igbomina in the northern marches of the Yorubaland and on the frontiers of empires reinforced its role as an arena of plural cultural, economic interaction, and a focus of power politics and diplomacy (Afolayan, 1991). Its location next to Nupe and Borgu exposed the area to a great deal of political pressure. Such threat may have played a major role in the unification of Igbomina under Old Oyo to promote common leadership and defense (Law, 1977, p. 91; Usman, 2000). The sixteenth century was a turning point in the history of Yorubaland as Old Oyo successfully displaced the Nupe, and established

northern Yoruba frontier communities through expansion and consolidation, and the occupation of the conquered land by groups from Oyo-Yoruba speaking areas. The displacement or partial absorption of the aboriginal inhabitants led to the early frictions between Yoruba and Nupe, which has been described as "frantic efforts by the Nupe to regain the territory" (Adepegba, 1982, p. 105; Aleru, 2001, p. 126). This scenario is likened to "action space" of warfare, a geographic model discussed by Ekanade and Aloba (1998, p. 23). Disputes over space may have occurred after years of peaceful coexistence between the Yoruba and Nupe groups in the area.

OVERVIEW OF CERAMIC STUDIES

Various topics on the organization of ceramic production have been pursued in ethnoarcheological research. These include specialization, either by individual potters or entire community (e.g., Cruz, 1996, pp. 32–34; Kramer, 1997, pp. 72–80; Stark, 1991), social relations of production (e.g., LaViolette, 2000, pp. 66–67), and cultural transmission through marriage or migration or contact (Gelbert, 1999). Some scholars have combined ethnoarcheology with documentary data to study ceramic change (MacEachern, 2001). Broad-scale political changes (e.g., decolonization, national economic reform, monetization of the local economy) are important nontechnical factors that can bring about change in ceramic systems (Stark, 2003). The state may promote production of certain ceramic types (e.g., Duncan, 1998, p. 91), and state-level policies may have negative consequence on ceramic systems that can eradicate local production (Kalentzidou, 2000a,b).

Other studies discuss mechanisms by which ceramics circulate, including through residential sale (e.g., Druc, 2000, p. 86; Vander Linden and Gosselain, 1996), workshop (Kramer, 1997, pp. 81–107), intermediaries (LaViolette, 2000, pp. 67–68), and distribution of vessels to consumer markets (Arnold and Nieves, 1992, pp. 95–96). Some researchers have identified distributional zones by vessel type (e.g., Deal, 1998, pp. 63–65), and have provided scalar estimates for distributional networks (Arnold, 2000, p. 109). Potters commonly sell their wares within a 15–50 km radius of their homes, with a tendency toward the lower end of the range (e.g., Gallay *et al.*, 1996; Kramer, 1997, p. 153; Stark, 1994, p. 187). The distribution range increases in cases where vessels are transported by water. For example, the Soa potters in the inland Niger delta travel almost 100 km to sell their goods (LaViolette, 2000, p. 94).

In Nigeria and particularly in Yorubaland and neighboring areas, a number of ceramic studies have been undertaken (e.g., Aiyedun, 1979, 1997; Ajekigbe, 1998; Akinade, 1995; Aleru, 2000; Anifowose, 1984; Awosina, 1984; Fasakin, 1985; Fatunsin, 1992; Leith-Ross, 1970; Ojo, 1966; Wahlman, 1972). Research focuses have been on clay sources and preparation, forming of vessels, types of vessels, decoration, firing, and marketing. Potters in Ilora in modern Oyo State of

Nigeria, for example, classify clay into five types: amo-dudu (black clay), amo-pupa (reddish clay), amo-ewuyan (used as a temper), and amo-funfun (white clay) (Ajekigbe, 1998). Black clay (abumole), white clay (ogiri amo), and ewuyan are also recognized by Ilorin potters (Fatunsin, 1992). Two distinct types of clay—white and red—are found at Saki and Okeho in the modern Oyo State; while at Imope in Ogun State, the white, red, and black varieties are used (Fatunsin, 1992). At Ogga in Yagba area of Kogi State, potters used two types of clay—amon and an admixture, omu (Akinade, 1995). In most of these places the clays and other raw materials used by the potters are obtained from the immediate environment, often near stream or rivers. In the Nupe and Gwari areas of Niger State clay is collected from riverine and/or marshy areas 1–5 km distance from the village (Aiyedun, 1997).

In Yorubaland pottery vessels are commonly sold to local users at the production center. Potters and/or their children in remote villages carry vessels (on their heads) to the local markets to sell. As vessels can be heavy, only small ones are transported in this way—and only to those markets within walking distance of the production center (Fatunsin, 1992). It has also been suggested that middlemen and pottery merchants purchase vessels in bulk to resell in other towns and urban markets. At Ilora, for example, middlemen would buy ceramic vessels in large quantities to be sold in neighboring Imini, Oja-Oba, and Akesan markets (Ajekigbe, 1998). In more recent times, potters often combined their resources and arranged for vehicles to transport their wares to nonlocal markets. In most of the markets in Yorubaland today, large pots are uncommon; what is usually found are small vessels such as isaasun, oru, amu, kutupu, and konjo that are sometimes in demand for domestic and/or ritual purposes.

Igbomina Sites Chronology and Pottery Typology

Since 1994, archeological research in Igbomina (by the senior author) has produced cultural materials used to investigate social relations and interactions in Igbomina (Usman, 2001) (Fig. 2). One important task faced in the research of Igbomina was refining the boundaries of cultural periods represented in archeological assemblages. Radiocarbon dates have been obtained from charcoal samples derived from some excavated settlements in the region (Table I). However, pottery styles have proven to be the most important material for addressing the issue of cultural boundaries. In Igbomina, pottery decorative attributes include, twisted-string roulettes, incisions (straight, brush, wavy, zigzag), scallops (impressed arc), punctation (dot, triangle, square), groove, snail-shell marking, rocked combing, circle stylus, wiping or striation, carved wood roulette, maize cob roulettes, and groove, among others (Fig. 3). Some of these are representative of the Diogun and Mejiro ceramic types of Old Oyo (Agbaje-Williams, 1983; Soper, 1978; Willet, 1960). In Igbomina, pottery decorative types such as twisted-string roulettes, groove, and

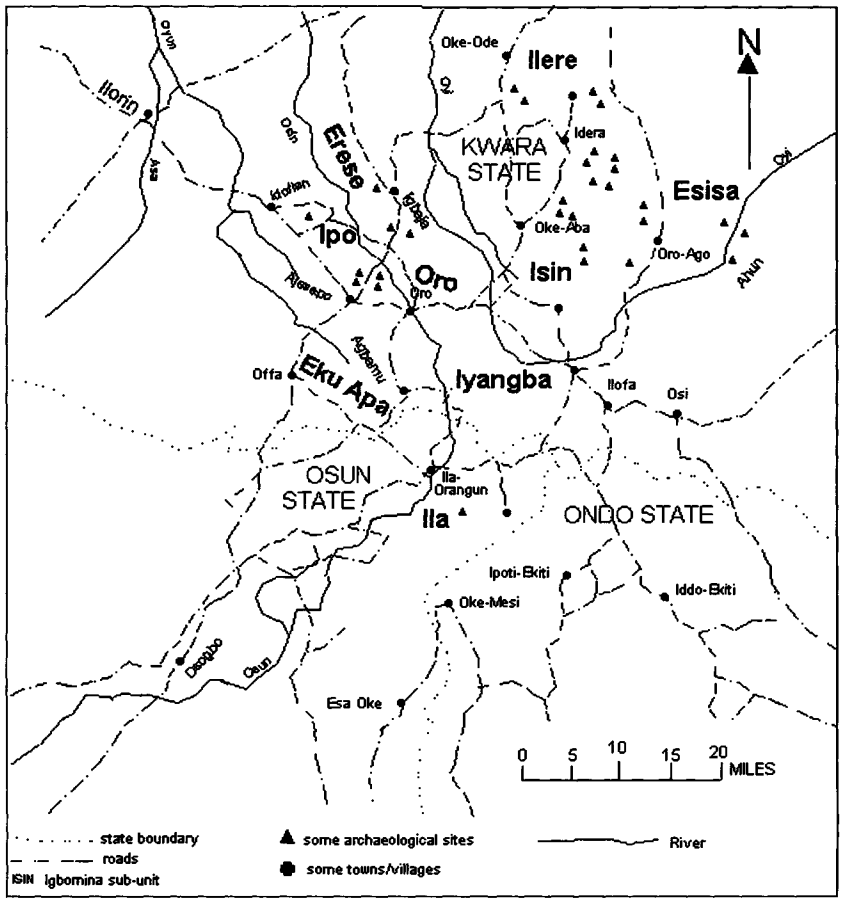

Fig. 2. Igbomina groups and archeological sites.

incision are found throughout the region. On the other hand, brush or broom incisions, snail-shell stamps, carved wood, circle stylus, scallops, and rocked comb are confined to the western and southern Igbomina areas (e.g., Ipo, Erese, Isin, Oro, Esie, and Ila); and pottery with "wiping" or "striation" patterns (Aleru, 2000; Connah and Daniels, 2003, p. 54) to the northeastern Igbomina (e.g., Ilere, Isin, Esisa).

The pottery seriation of Igbomina, the general procedure of which has been provided elsewhere (Usman, 2003), followed a sequence that has been suggested by analyses of the Yoruba (especially Old Oyo) ceramics (Agbaje-Williams, 1983, 1991; Soper, 1983; Willet, 1960, 1962). For example, brush-marked incision, rocked-comb impressions, scallops (or impressed arc), and knotted roulette

Table I. Dated Contexts From Excavated Igbomina Sites

Sites	Levels (cm)	Radiocarbon years (b.p.)	Calib. age (A.D.)	Lab. no.
Gbagede 1b (Ipo)	20–30	320 ± 60	1450–1670 1780–1795	Beta-88414
	50–60	495 ± 45	1324–1350 1390–1481 1404–1444[a]	A-13053
Obaloyan II (Ipo)	160–170	290 ± 60	1460–1680 1755–1805	Beta-88415
Olupefon (Ipo)	45–60	510 ± 80	1300–1515 1585–1625	Beta-88413
Okegi (Ipo)	70–80	40 ± 60	1680–1745 1805–1935	Beta-88416
Apere (Ipo)	20–30	40 ± 60	1680–1745 1805–1935	Beta-88417
Apateki (Ipo)	20–30	350 ± 60	1435–1665	Beta-88411
Ofaro I (Ilere)	60–70	220 ± 70	1505–1595 1620–1950 1645–1685[a] 1740–1810[a]	Beta-88412
Agunjin I (Ilere)	130–140	270 ± 40	1489–1603 1609–1673	A-13048
Ajagun (Esisa)	60–70	200 ± 40	1640–1679 1724–1814	A-13049
Ahun I (Esisa)	60–70	170 ± 45	1655–1712 1716–1887	A-13050
Igbo-Ejimogun (Ilere)	50–60	310 ± 50	1460–1663	A-13052
Ila-Yara (Ila)	140–150	375 ± 40	1442–1531 1545–1635	A-13054
Ikotun (Ilere)	140–150	405 ± 100	1306–1355 1386–1671	A-13056
	80–90	170 ± 40	1656–1709 1718–1823	A-13055

Note. All dates are calibrated to the 2 sigma (95.4 and 98%) probability except as noted.
[a] 1 sigma, 68% probability.

decorative techniques which belonged to the "diogun" period first appeared at Old Oyo, probably about A.D. 1100 ± 110. The "mejiro" period, which was later and dated from A.D. 1300 ± 800, has pottery decorative types like snail shell and carved wood roulette. Maize cob, also a "mejiro" pottery type, appeared at the late end of the period. Twisted string roulette, groove, and fine incision are common to both periods (diogun and mejiro). However, the so-called "diogun" and "mejiro" wares are still controversial because continuity appears to prevail at Old Oyo (Agbaje-Williams, 1983).

The use of a snail shell decorative motif in parts of Igbomina seems to coincide early in time with Old Oyo and the continuity of the tradition throughout the Old Oyo period. In the Ipo area of Igbomina, snail shell decorated pottery was already established by 1300 A.D., and brush mark incision, scallops, rocked comb,

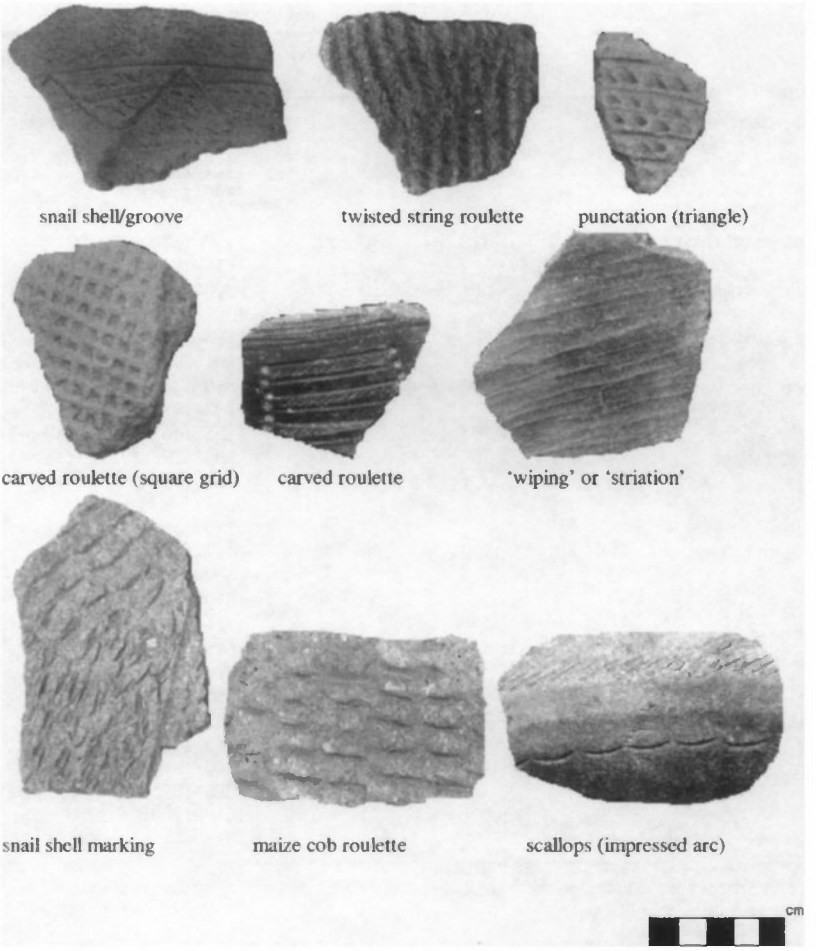

Fig. 3. Some pottery decorative attributes from Igbomina.

and circle stylus appeared much later, probably in the mid-fifteenth century. These ceramic types continued at some sites in Igbomina throughout the seventeenth and eighteenth centuries (Usman, 2001, 2003). Maize cob roulette appeared much later in Igbomina (as at Oyo and Ife), probably by the early or late eighteenth century (Usman, 2003) (Table II).

COMPOSITION ANALYSIS

Igbomina ceramics dating to the Old Oyo period (from ca. fifteenth to late eighteenth centuries A.D.) and raw clays from modern potting centers and natural

Table II. Synthesis of Igbomina Ceramic Typology and Sites Chronology

Chronology (A.D.)	Cultural period	Decorative types[a]	Sites	Areas
1750–1850	Late Oyo	Maize cob roulette	Oke-Oyan	Ilere
		Wiping	Ofaro II	Ilere
			Ago	Ipo
			Apere	Ipo
			Ahun-1	Esisa
1550–1750	Middle Oyo	Snail shell stamps	Gbagede	Ipo
		Circle stylus	Obaloyan II	Ipo
		Carved wood roulette	Okegi	Ipo
		Wiping	Apere	Ipo
			Agunjin-1	Ilere
			Igbo-ejimogun	Ilere
			Ikotun	Ilere
			Ajagun	Esisa
			Ahun-1	Esisa
			Ila-Yara	Ila
			Ofaro I	Ilere
			Apateki	Ipo
1400–1550	Early Oyo II	Carved wood roulette	Gbagede	Ipo
		Broom mark incised	Obaloyan II	Ipo
		Snail shell stamps	Apateki	Ipo
		Scallops	Olupefon	Ipo
		Rocked combing	Igbo-ejimogun	Ilere
		Circle stylus	Ikotun	Ilere
		Wiping	Ila-Yara	Ila
			Agunjin-1	Ilere
1300–1400	Early Oyo I	Snail shell stamps	Olupefon	Ipo
		Carved wood roulette	Gbagede	Ipo
		Wiping	Ikotun	Ilere
		Scallops		
		Broom mark incised		

[a]Twisted string roulettes, incision, and groove decorations were present in all the periods.

formations in Igbomina were chemically characterized by INAA at the University of Missouri Research Reactor Center. The ceramic samples analyzed by INAA were obtained from five sites in the Ipo-Erese area (Gbagede, GBD; Obaloyan II, OBY-2; Okegi, OKG; Olupefon, LPF; Apateki, APK), one site in the Ila area (Ila-Yara, LYR), four sites in the Ilere area (Ofaro I, OFR-1; Agunjin I, AGJ-1; Ikotun, IKT; Igbo-ejimogun, EJM), and three sites in the Esisa area (Ajagun, JAG; Oke-Odia, OKD; Ahun, AHU-1) (Fig. 4). These sites were investigated during the 1995 and 2003 field seasons. All the sites were occupied from the Old Oyo period up to the period of early decline of Old Oyo state (ca. A.D. 1400–1790).

The specimens submitted for analysis include a total of 196 ceramic samples (15 sherds from each of the 13 sites, except Olupefon site with 16 sherds), and five raw clay samples collected from riverbeds at Oro-Ago and Ahun in Esisa area, and from potters located at Temidire (near Igbaja-Erese), Omupo (Ipo area), and at Dada (Okelele area) in Ilorin. The pottery sample represents all the decorative types

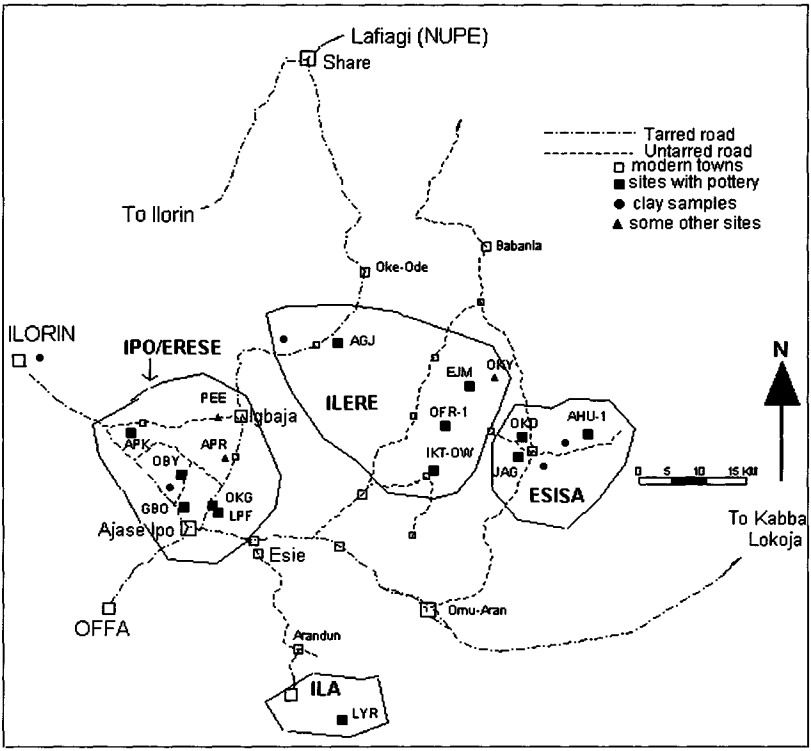

Fig. 4. Archeological sites, ceramic and clay sources.

recognized in Igbomina. In all, 201 ceramics and clay samples were submitted for INAA.

Procedure for Neutron Activation Analysis

The 196 pottery samples were prepared for INAA using procedures standard at the University of Missouri Research Reactor Center (MURR). Fragments of about 1 cm^2 were removed from each sample and abraded using a silicon carbide burr to remove possible contamination from the slip, glaze, paint, and other material adhering to the vessel surface. The samples were then washed in deionized water and allowed to dry. Once dry, sherds were crushed individually in an agate mortar to homogenize the sample. Raw clay samples were fired in a furnace to 700°C. Portion of the fine powder was divided into approximately 150 mg and 200 mg samples to be irradiated.

INAA of ceramics at MURR consists of two irradiations and a total of three gamma counts (Glascock, 1992; Neff, 1992, 2000). As discussed in detail by

Glascock (1992), a short irradiation is carried out through the pneumatic tube systems which transport the sample contained in polyvial to the reactor core, where it is exposed to the neutron flux of 8×10^{13} n cm^{-2} s^{-1} for 5 s. Following irradiation, each sample decays for 25 min, and then counted on a high-resolution germanium detector for 720 s to determine abundances for short-lived elements in each sample: aluminium (Al), barium (Ba), calcium (Ca), dysprosium (Dy), potassium (K), manganese (Mn), sodium (Na), titanium (Ti), and vanadium (V).

Samples sealed in quartz vials are subjected to a 24 h long irradiation at a neutron flux of 5×10^{13} n cm^{-2} s^{-1} to measure the concentration of elements with longer half-lives. After the long irradiation, samples decay for 7 days, and then are counted for 2000 s on a high-resolution germanium detector coupled to an automatic sample changer. The middle count yields concentrations of seven medium half-life elements, namely arsenic (As), lanthanum (La), lutetium (Lu), neodymium (Nd), samarium (Sm), uranium (U), and ytterbium (Yb). After additional 3 weeks decay, a final count of 9000 s is carried out on each sample. The latter measurement yields the following 17 long half-life elements: cerium (Ce), cobalt (Co), chromium (Cr), cesium (Cs), europium (Eu), iron (Fe), hafnium (Hf), nickel (Ni), rubidium (Rb), antimony (Sb), scandium (Sc), strontium (Sr), tantalum (Ta), terbium (Tb), thorium (Th), zinc (Zn), and zirconium (Zr).

Quantitative Analysis of the Chemical Data

The resulting data were then analyzed using multivariate statistical procedures. The goals of quantitative analysis of the chemical data are to identify ceramic groups that enable meaningful archeological interpretations, to link ceramics of unknown provenance to raw clay sources and previously established groups, or to determine that a group assignment is not possible (Glascock, 1992). Based on the "provenance postulate" (Weigand *et al.*, 1977), such groups are assumed to represent geographically restricted sources or source zones. Initial hypothesis about source-related subgroups in the compositional data can be derived from noncompositional information (e.g., archeological context, decorative attributes, etc.) or from application of pattern-recognition techniques to the chemical data.

The first step in analyzing the data is to transform them to log base 10 values. Use of log concentrations instead of raw data compensates for differences in magnitude between major elements and trace elements. Principal components analysis (PCA) can be used in a pure pattern-recognition mode to search for subgroups in an undifferentiated data set or in a more evaluative mode to assess the coherence of hypothetical groups suggested by other criteria (archeological context, decoration, etc.). PCA finds the orientation of axes of greatest variance in the data by eigenvector extraction, and the corresponding eigenvalues

is the length of each eigenvector (Davis, 1986; Glowacki *et al.*, 1998). These axes are organized by decreasing variance. One strength of PCA, discussed by Baxter (1992) and Neff (1994), is that it can be applied as a simultaneous R- and Q-mode technique, with both variables (elements and objects, i.e., individual analyzed samples) displayed on the same diagram to evaluate the contributions of specific elements or groups of elements to group separation. Simultaneous RQ-mode PCA of the variance–covariance matrix was used in the quantitative analysis reported here. To evaluate the coherence of each group, Mahalanobis distances were used to calculate multivariate probabilities of group membership (Bieber *et al.*, 1976; Bishop *et al.*, 1982; Bishop and Neff, 1989; Harbottle, 1976).

RESULTS

INAA of ceramics from Igbomina resulted in the identification of four compositional groups: Group-1 (Ilorin), Group-2 (Ilere), Group-3 (Esisa), and Group-4 (Erese). Table III lists the analyzed specimens and shows the compositional affiliations determined in the present investigation together with various descriptive information. Table IV lists the Mahalanobis distance-based probabilities of membership in the two largest reference groups (Groups 2 and 4). These probabilities are based on 28 elements retained for quantitative analysis. Two PCA biplots based on the correlation matrix of the complete data set are shown in Figs. 5 and 6. These biplots provide a means for assessing the contribution of various elements to the identified subgroup structures. Figures 7 and 8 are bivariate plots of elemental concentrations that further demonstrate the subgroup partitioning. The four compositional groups recognized in the Igbomina sample are differentiated reasonably well on the first three principal components of the data (Figs. 5 and 6). As suggested by the element coordinates in Fig. 5, lanthanide-group elements are important for separating pottery assigned to Ilorin (Group-1) from pottery assigned to Ilere, Esisa, and Ipo-Erese (Groups 2, 3, and 4). Figure 6 shows unambiguous separation of Groups 2, 3, and 4. As suggested by the element coordinates Ipo-Erese pottery (Group-4) is enriched in sodium (relative to Ilere and Esisa pottery—Groups 2–3) and Esisa pottery (Group-3) have higher thorium concentrations than pottery in Groups 2 and 4 (Ilere and Ipo-Erese). We suggest that the chemical differences between the reference groups result from the use of distinct raw clay sources in the Igbomina region.

Because of the small number of samples assigned to Group-1 (Ilorin) and Group-3 (Esisa), these groups were not tested as rigorously as Groups 2 (Ilere) and 4 (Ipo-Erese). The probabilities of group membership listed in Table IV confirm that the proposed subgroup structure is statistically viable. Although there are no posterior misassignments based on Mahalanobis distances, a number of Mahalanobis distance-based probabilities of group membership exceed 1% for

Table III. Descriptive Information and Group Assignments

Id. no.	Site	Description	Form	Id. no.	Site	Description	Form
			Group 1 (Ilorin)				
AUN008	AGJ-1	Redware	Bowl	AUN098	AHU-1	Dot punctate	Jar
AUN022	OBY-2	Black-burnish	Bowl	AUN120	LPF	Black burnish	Bowl
AUN082	EJM	Black-burnish	Bowl	AUN148	JAG	Groove	Jar
AUN084	EJM	Fine string/incised	Bowl	AUN180	OFR-1	Plain	Jar
AUN086	EJM	Plain	Jar	AUN200	ILORIN	Clay	Clay
			Group 2 (Ilere)				
AUN012	AGJ-1	Incised	Bowl	AUN057	LYR	Punctation-triangle	Jar
AUN016	OBY-2	String roulette	Bowl	AUN059	LYR	Fluted	Jar
AUN030	OBY-2	Plain	Jar	AUN060	LYR	String roulette	Jar
AUN032	IKT	Groove	Jar	AUN067	OKD	Plain	Jar
AUN033	IKT	Striation	Jar	AUN076	EJM	Carved roulette	Bowl
AUN034	IKT	String/groove	Jar	AUN077	EJM	String roulette	Jar
AUN035	IKT	String roulette	Jar	AUN078	EJM	Striation	Jar
AUN036	IKT	Incised	Jar	AUN079	EJM	Snail shell	Jar
AUN037	IKT	Striation	Jar	AUN080	EJM	Wavy incised	Jar
AUN038	IKT	String roulette	Jar	AUN081	EJM	Black burnish	bowl
AUN039	IKT	String roulette	Jar	AUN083	EJM	Punctation-square	Jar
AUN040	IKT	Striation	Jar	AUN087	EJM	Striation	Jar
AUN041	IKT	Plain	Bowl	AUN088	EJM	Incised	Jar
AUN042	IKT	String/groove	Jar	AUN095	AHU-1	Striation	Jar
AUN043	IKT	Plain	Jar	AUN105	AHU-1	Black burnish	Bowl
AUN044	IKT	Striation	Jar	AUN110	LPF	String roulette	Jar
AUN045	IKT	Plain	Jar	AUN170	OFR-1	Plain	Jar
AUN047	LYR	Wavy-groove	Jar	AUN171	OFR-1	String roulette	Jar
AUN048	LYR	String roulette	Jar	AUN174	OFR-1	String/groove	Jar
AUN049	LYR	String roulette	Jar	AUN176	OFR-1	String roulette	Jar
AUN050	LYR	Carved wood roulette	Jar	AUN178	OFR-1	String/groove	Jar
AUN055	LYR	Painted-white	Jar	AUN181	OFR-1	Striation	Jar
AUN056	LYR	Applied	Jar				
			Group 3 (Esisa)				
AUN029	OBY-2	Incised- lip	Bowl	AUN091	AHU-1	Fine string roulette	Jar
AUN061	OKD	Plain	Jar	AUN092	AHU-1	String roulette	Jar
AUN065	OKD	Plain	Jar	AUN093	AHU-1	Plain	Jar
AUN068	OKD	String roulette	Jar	AUN101	AHU-1	Plain	Jar
AUN069	OKD	String roulette	Jar	AUN103	AHU-1	Striation	Jar
AUN070	OKD	Plain	Jar	AUN141	JAG	Black burnish	Bowl
AUN071	OKD	Plain	Jar	AUN145	JAG	Fine string/groove	Jar
AUN072	OKD	Plain	Jar	AUN150	JAG	Fine string/incision	Bowl
AUN073	OKD	Plain	Jar	AUN151	JAG	Fine string roulette	Bowl
AUN074	OKD	Carved roulette/punctate	Bowl	AUN152	GBD	Punctation -dot	Jar
AUN075	OKD	Plain	Jar	AUN197	OroAgo	Clay	Clay
			Group 4 (Ipo-Erese)				
AUN001	AGJ-1	Carved roulette	Bowl	AUN107	LPF	F-stringroulette	Jar
AUN002	AGJ-1	Carved roulette	Bowl	AUN108	LPF	Black burnish	Jar
AUN005	AGJ-1	String roulette	Jar	AUN109	LPF	String roulette	Jar
AUN006	AGJ-1	Groove	Lid	AUN111	LPF	Maize cob	Jar
AUN007	AGJ-1	Groove/string	Jar	AUN114	LPF	Snail shell	Jar
AUN009	AGJ-1	Plain-red slip	Bowl	AUN115	LPF	Maize cob	Jar
AUN010	AGJ-1	Fine string roulette	Jar	AUN116	LPF	String/applied	Jar
AUN013	AGJ-1	String roulette	Jar	AUN117	LPF	Punctate/groove	Jar
AUN014	AGJ-1	Black burnish	Bowl	AUN119	LPF	Black burnish	Bowl

Table III. Continued

Id. no.	Site	Description	Form	Id. no.	Site	Description	Form
AUN015	AGJ-1	Striation	Jar	AUN123	APK	Plain	Jar
AUN017	OBY-2	Carved roulette	Bowl	AUN124	APK	Plain	Jar
AUN018	OBY-2	Plain	Lid	AUN125	APK	Plain	Jar
AUN024	OBY-2	Maize cob roulette	Jar	AUN126	APK	Plain	Jar
AUN025	OBY-2	String roulette	Jar	AUN127	APK	String roulette	Jar
AUN027	OBY-2	Plain	Jar	AUN128	APK	Scallops	Bowl
AUN028	OBY-2	Perforation	Jar	AUN129	APK	Black burnish	Bowl
AUN046	LYR	Carved roulette	Jar	AUN130	APK	Plain	Jar
AUN089	EJM	Slipped-red	Bowl	AUN131	APK	Plain	Jar
AUN097	AHU-1	Black burnish	Bowl	AUN133	APK	Plain	Jar
AUN134	APK	Plain	Jar	AUN177	OFR-1	Striation	Jar
AUN135	APK	Plain	Jar	AUN179	OFR-1	Plain	Jar
AUN136	APK	Plain	Jar	AUN182	OKG	Black burnish	Bowl
AUN154	GBD	Plain	Jar	AUN183	OKG	Maize cob	Jar
AUN155	GBD	Plain	Jar	AUN184	OKG	Snail shell	Jar
AUN156	GBD	Scallop/incised	Bowl	AUN186	OKG	Snailshell/groove	Jar
AUN157	GBD	Scallop-jointed	Bowl	AUN187	OKG	String roulette	Jar
AUN161	GBD	Carved roulette	Bowl	AUN188	OKG	Snailshell/groove	Jar
AUN165	GBD	Black burnish	Bowl	AUN189	OKG	Snail shell	Jar
AUN166	GBD	Black burnish	Bowl	AUN190	OKG	Snail shell	Jar
AUN167	OFR-1	Striation	Jar	AUN191	OKG	Plain	Jar
AUN172	OFR-1	Striation	Jar	AUN192	OKG	Snailshell/groove	Jar
AUN173	OFR-1	String roulette	Jar	AUN193	OKG	Snail shell	Jar
AUN175	OFR-1	String roulette	Jar	AUN195	OKG	Maize cob	Jar
				AUN196	OKG	Plain	Jar

Table IV. Group Membership Tables for Reference Groups

Id. no.	Grp. 2	Grp. 4	Id. no.	Grp. 2	Grp. 4	Id. no.	Grp. 2	Grp. 4
The following specimens are in the file Group 2 (Ilere) (Probabilities)								
AUN012	60.184	1.474	AUN044	97.093	0.000	AUN079	68.821	1.758
AUN016	20.316	0.157	AUN045	97.019	0.068	AUN080	20.680	2.104
AUN030	0.633	0.409	AUN047	1.189	0.002	AUN081	50.142	0.014
AUN032	14.348	0.001	AUN048	47.340	0.000	AUN083	31.838	0.001
AUN033	99.630	0.001	AUN049	49.542	0.019	AUN087	38.129	0.193
AUN034	95.268	0.000	AUN050	12.468	0.000	AUN088	96.409	0.340
AUN035	6.352	0.008	AUN055	3.744	0.000	AUN095	11.476	0.019
AUN036	41.280	0.004	AUN056	14.997	0.000	AUN105	54.271	4.594
AUN037	89.770	0.000	AUN057	37.047	3.061	AUN110	15.993	0.000
AUN038	22.910	0.000	AUN059	7.819	0.013	AUN170	92.097	1.524
AUN039	92.710	0.000	AUN060	83.733	0.028	AUN171	8.585	0.000
AUN040	96.728	0.000	AUN067	22.301	0.123	AUN174	94.762	0.001
AUN041	95.369	0.000	AUN076	1.041	0.001	AUN176	66.812	0.000
AUN042	92.596	0.000	AUN077	33.528	4.949	AUN178	75.275	0.000
AUN043	81.024	1.413	AUN078	11.375	0.023	AUN181	17.884	0.000
The following specimens are in the file Group 4 (Ipo-Erese) (Probabilities)								
AUN001	0.000	83.354	AUN025	0.017	42.642	AUN117	0.000	42.686
AUN002	0.001	66.651	AUN027	0.000	0.457	AUN119	0.310	36.314
AUN005	0.121	66.695	AUN028	0.007	3.440	AUN123	0.000	21.557
AUN006	0.006	89.779	AUN046	0.002	23.058	AUN124	0.001	35.428

Table IV. Continued

Id. no.	Grp. 2	Grp. 4	Id. no.	Grp. 2	Grp. 4	Id. no.	Grp. 2	Grp. 4
AUN007	0.010	37.161	AUN089	0.112	98.112	AUN125	0.002	98.334
AUN009	0.012	17.858	AUN097	1.014	38.319	AUN126	0.770	1.469
AUN010	0.051	98.838	AUN107	0.000	84.711	AUN127	0.018	44.604
AUN013	0.000	16.925	AUN108	0.000	74.592	AUN128	0.000	39.076
AUN014	0.027	99.949	AUN109	0.001	63.183	AUN129	0.002	16.113
AUN015	0.000	1.409	AUN111	0.002	63.984	AUN130	0.105	86.870
AUN017	0.005	57.317	AUN114	0.000	87.980	AUN131	0.000	63.321
AUN018	0.009	0.381	AUN115	0.002	38.500	AUN133	0.021	71.405
AUN024	0.000	11.392	AUN116	0.000	3.833	AUN134	0.235	76.172
AUN135	0.000	13.923	AUN167	0.003	62.734	AUN186	0.000	97.303
AUN136	0.002	99.799	AUN172	0.085	61.512	AUN187	0.000	30.951
AUN154	0.000	2.313	AUN173	0.082	65.797	AUN188	0.000	84.489
AUN155	0.000	5.975	AUN175	1.434	53.085	AUN189	0.000	52.432
AUN156	0.000	5.184	AUN177	0.080	69.191	AUN190	0.000	96.361
AUN157	0.001	30.969	AUN179	0.000	18.098	AUN191	0.000	63.044
AUN161	0.000	59.630	AUN182	0.000	69.632	AUN192	0.000	97.308
AUN165	0.000	81.971	AUN183	0.000	0.451	AUN193	0.000	6.818
AUN166	0.010	74.037	AUN184	0.000	93.687	AUN195	0.000	42.131
						AUN196	2.590	45.203
The following specimens are in the file Group 1 (Ilorin) (Probabilities)								
AUN008	0.000001	0.000000	AUN098	0.000377	0.000000			
AUN022	0.000001	0.000000	AUN120	0.000033	0.000000			
AUN082	0.000534	0.000000	AUN148	0.000000	0.000000			
AUN084	0.000017	0.000000	AUN180	0.000285	0.000000			
AUN086	0.000015	0.000000	AUN200	0.000018	0.000000			
The following specimens are in the file Group 3 (Esisa) (Probabilities:)								
AUN029	0.000007	0.000098	AUN091	0.000001	0.181151			
AUN061	0.008874	0.336807	AUN092	0.000000	0.018544			
AUN065	0.000017	0.051526	AUN093	0.000006	1.088730			
AUN068	0.000000	0.502664	AUN101	0.000017	10.373301			
AUN069	0.000115	0.325601	AUN103	0.000042	0.709951			
AUN070	0.000003	0.518553	AUN141	0.000021	0.350704			
AUN071	0.000000	0.000317	AUN145	0.000007	0.090581			
AUN072	0.000000	0.022208	AUN150	0.000000	0.042123			
AUN073	0.000008	0.309451	AUN151	0.000002	1.058706			
AUN074	0.002973	0.532608	AUN152	0.023538	0.158244			
AUN075	0.000000	0.000566	AUN197	0.002405	0.069398			

Note. Mahalanobis distance calculation and posterior classification for two or more groups. Variables used are: LA, LU, ND, SM, U, YB, CE, CO, CR, CS, EU, FE, HF, RB, SC, TA, TB, TH, ZN, ZR, AL, BA, DY, K, MN, NA, TI, and V. Probabilities are jackknifed for specimens included in each group.

both groups (Table IV), indicating that the multivariate distributions of the two groups overlap to some extent.

Fifty-four ceramic and three clay samples remain unassigned. Figure 9 shows several projections of the data with unassigned specimens labeled. The unassigned specimens show marginal status relative to all groups based on Mahalanobis distances. Specimens were left unassigned either because 1) they are derived from different raw material sources poorly represented in the sample database; 2) they

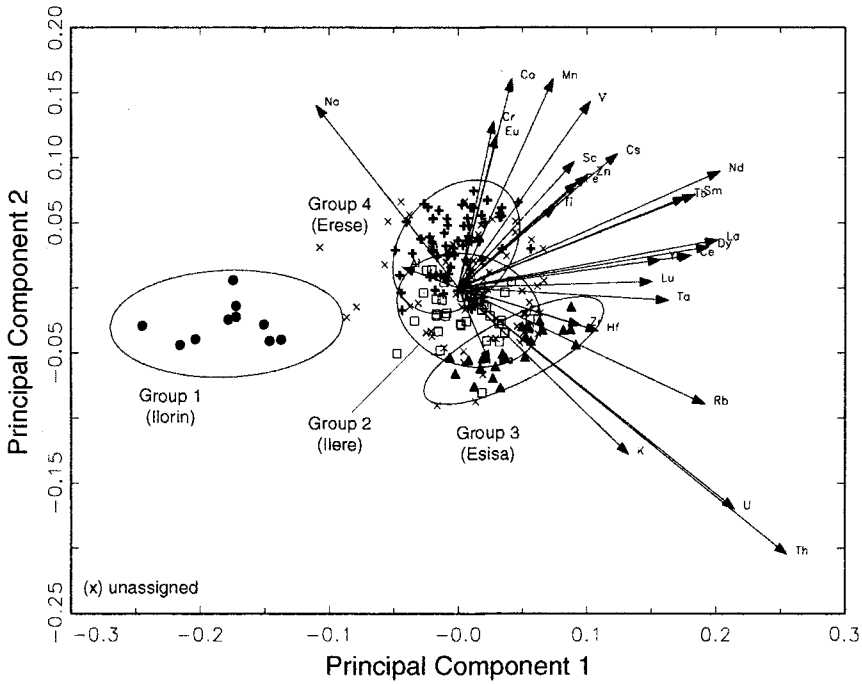

Fig. 5. Biplot of principal component 2 and 3 showing the Igbomina pottery reference groups. Ellipses represent 90% confidence interval for group membership.

showed compositional affiliations with more than one ceramic group; or 3) they were marginal to all groups. However, in most cases, the unassigned samples have less than 1% probability of membership in Ilere (Group 2) and Ipo-Erese (Group 4) or high probabilities of membership in both groups. The unassigned clays were probably not a possible source of prehistoric Igbomina ceramics.

DISCUSSION

Documenting how ceramics were distributed among the Igbomina settlements, a northern Yoruba frontier of Old Oyo, is an important way of determining the direction and intensity of interactions among the settlements and may provide new insight on the social–political and economic interaction as a component of precolonial Igbomina social landscape prior to the fall of Old Oyo in 1837. Also, discovering which of the northern frontier settlements of Old Oyo imperial territory was production center for certain diagnostic pottery styles will provide new evidence of the structure for production and distribution of ceramics and perhaps other crafts.

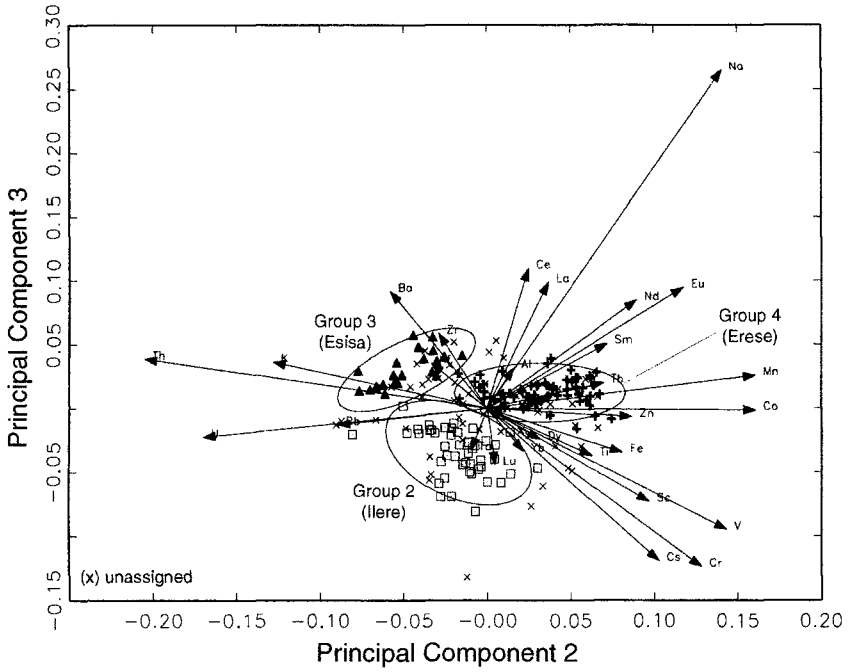

Fig. 6. Bivariate plot of thorium and cerium base-10 logged concentrations. Ellipses represent 90% confidence interval for group membership.

Identifying Production Zones

The four compositional groups and raw clays associated with some of the groups suggest that ceramics were produced at multiple locations in Igbomina. Our results indicate that at least some Igbomina pottery types were produced in Ilere, Esisa, Ipo-Erese, as well as the Ilorin center. Based on the multivariate probabilities shown in Table IV, Group 2 is assumed to represent pottery produced by Ilere potters. Likewise Group 3 is believed to represent pottery made by Esisa potters, and pottery assigned to Group 4 is thought to have origins near the Ipo-Erese villages. The idea that Ilere, Esisa, and Ipo-Erese ceramics can be attributed to the different village groups is based on the criterion of abundance as is illustrated by Fig. 10.

One of the samples assigned to Group 1 is raw clay from Ilorin. Consequently, we can reasonably assume (given the available data) that Group-1 pottery (Table III: e.g., redware, black-burnish, dot punctuate, groove, fine string/incision) was produced in the vicinity of Ilorin. These pottery types are very few in number and originate from Ilere, Esisa, and Ipo sites. Ilorin is a Yoruba town located Northeast of Igbomina, about 35 km to Ipo-Erese area and 70 km to Esisa. As

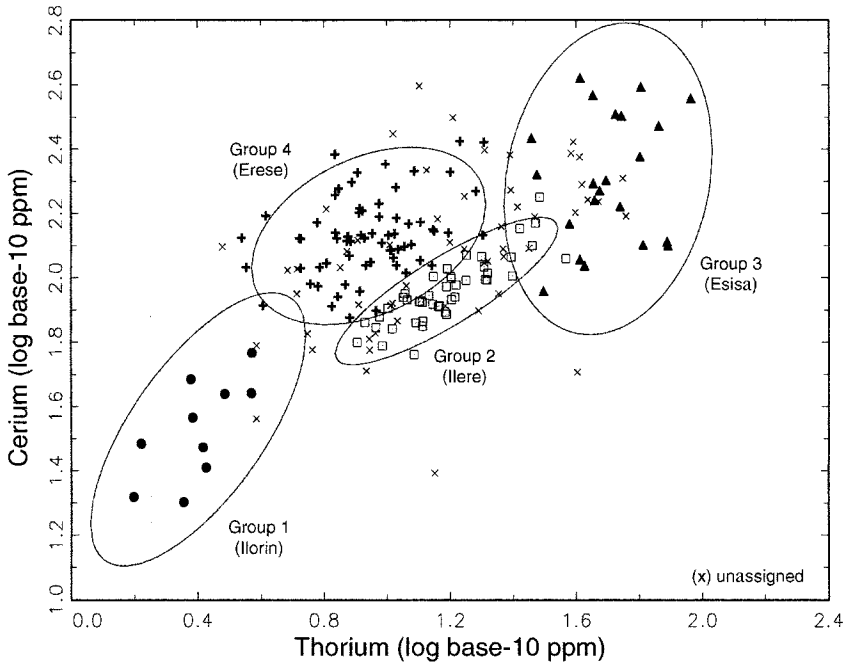

Fig. 7. Bivariate plot of sodium and lantharium base-10 logged concentrations. Ellipses represent 90% confidence interval for group membership.

the pie charts in Fig. 10 indicate, Ilere pottery is most common to Ilere villages. The pottery samples came from Agunjin (AGJ-1), Ikotun (IKT), Igbo-Ejimogun (EJM), and Ofaro I (OFR-1) sites in Ilere area of Igbomina. The most important decorative type at the Ilere sites is "wiping," and it is assigned more frequently to Ilere (Group-2) than to others. This may represent local production by various Ilere villages that used similar clay resources to manufacture their ceramics.

The argument that Esisa potters produced Esisa pottery is also supported by analysis of a clay sample from Oro Ago (a village in Esisa) that has a high probability of membership in Group 3. The clay was collected from an exposed riverbed along the Oro-Ago-Ahun road. Pottery in this group was obtained from the Ajagun (JAG), Oke-Odia (OKD), and Ahun I (AHU-1) sites. Based on the analysis, about 76% of the assigned pottery was produced from clays obtained in this area. Site-to-site variation, however, exists. For example, about 75% of Oke-Odia pottery was produced locally, whereas only 30–35% of pottery from Ajagun and Ahun may have been produced from clays obtained within the Esisa area. Both Ajagun and Oke-Odia sites share similar pottery decoration, i.e., twisted-string roulette. The major pottery decoration type at Ahun was wiping technique. The unassigned pottery samples are not included here, which has more samples

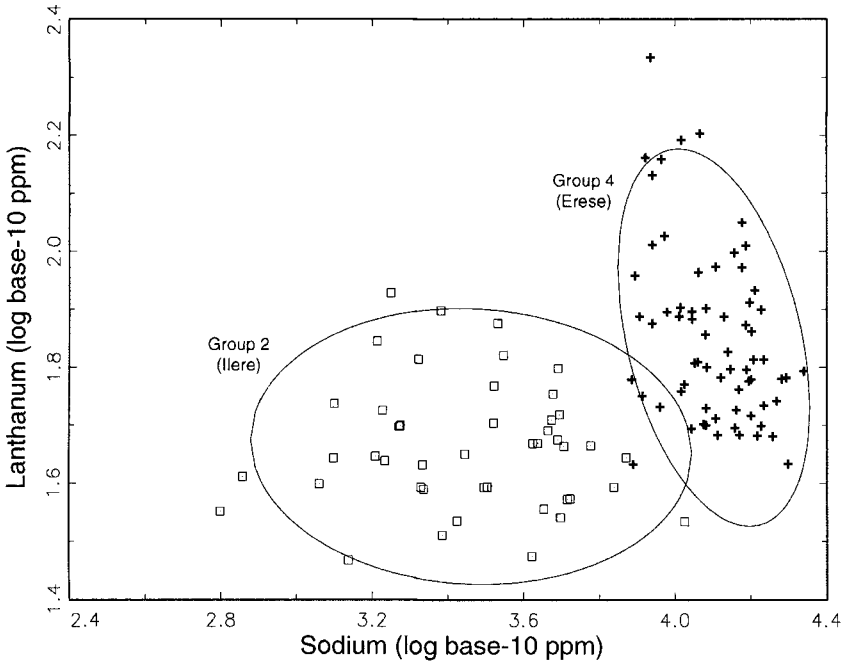

Fig. 8. Same as Fig. 5, but with unassigned specimens labeled.

from Ajagun and Ahun sites, and are of decoration types (e.g., punctations, carved roulettes with checkered and hatched pattern) that are less common in northeastern Igbomina (Usman, 2000). Given that a few ceramics from the Ajagun and Ahun are assigned to Group 3 (Esisa), it is likely that the villages had more access to or relied more on ceramic vessels produced outside the Esisa locality.

Group 4 pottery occurs in greatest frequency in the Ipo-Erese area of western Igbomina. Potters in the area who produced the pottery assigned to the group probably obtained their clays from similar sources or formations. Pottery types in this compositional group include twisted-string roulette, carved roulette, snail shell, scallops, and black ware (Table III). Most of the pottery from the Agunjin (an Ilere site) may have been produced in Ipo-Erese area. Likewise it is equally plausible that Agunjin potters obtained clays from the Ipo-Erese area, or that Agunjin clays are compositionally similar to Ipo-Erese clays. Agunjin is located in close proximity to Igbaja, a major town and potting center in the Ipo-Erese area, and there is a possibility of overlapping source material. However, not all of the pottery assigned to Group-4 was produced in Ipo-Erese area, especially the "wiping" decorated pottery commonly found in the Ilere, Isin, and some Esisa sites. It is most likely the pottery type came from Agunjin site, a member of Ilere village group or sociopolitical unit. Agunjin potters who shared the Ilere pottery

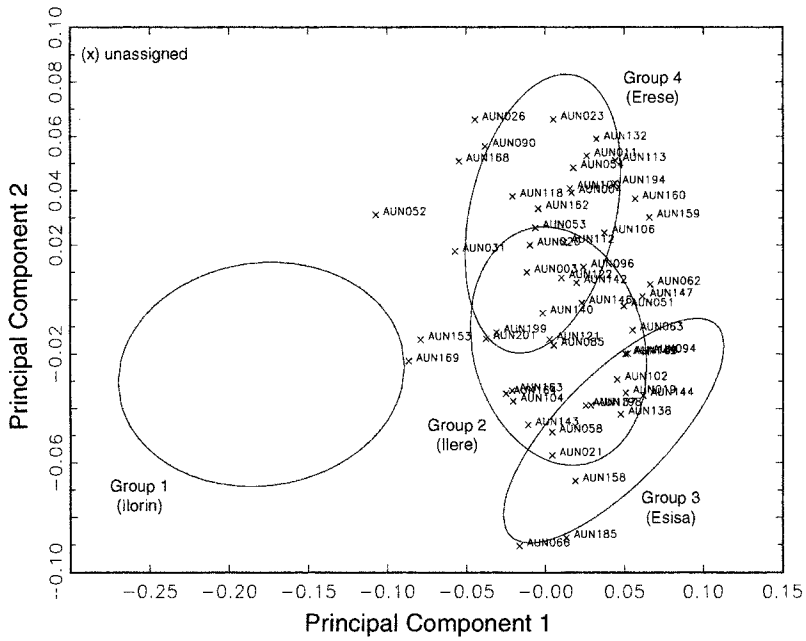

Fig. 9. Same as Fig. 6, but with unassigned specimens labeled.

tradition probably used clay resources that were similar in composition to the clays from Ipo-Erese area.

Based on the available data, it is not clear if pottery from Ila-Yara (in the Ila area) was produced at Ilere or if clays from this area are chemically similar to Ilere village clays. Ila-Yara, located in the lowland southern Igbomina, is a considerable distance from Ilere. Also, the ceramic decorative motifs in both areas are different. Ila-Yara pottery exhibits the Oyo-Ife decorative styles that are mostly absent in Ilere. It is possible that Ila-Yara and Ilere potters used similar Precambrian clays for pottery production and therefore compositional similarities in clay exist between these two areas. Another possibility is that the small number of samples analyzed from Ila-Yara may have affected our results. It is our expectation that if the number of samples were increased, the subgroups would perhaps separate on the first level of the hierarchical structure into distinct compositional groups. Future research will focus on the analysis of an expanded sample of pottery and clays from Ila-Yara.

Vessel Distribution

Our INAA data indicate that vessels were moved between localities and possibly between sites in each area. Figure 11 illustrates these patterns of vessel

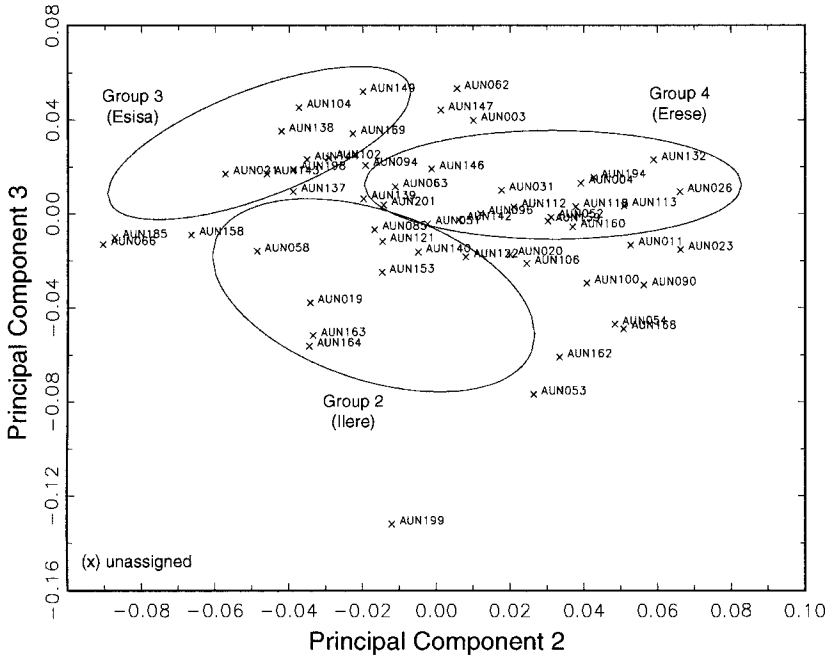

Fig. 10. Investigated sites and ceramic compositional group frequencies.

movement and their potential for local and long-distance exchange. The following sections discuss some of the patterns observed among different village groups. Unassigned pottery samples are not included in this discussion or in Fig. 11.

Based on the results of our analysis, the Esisa locality (Group-3), obtained vessels from Ilorin, Erese, and Ilere areas. Twenty-four percent of the pottery analyzed from Esisa appears to be imported. As expected, the greatest amount of pottery, about 12%, was from the nearby Ilere locality. Pottery imported to Esisa from Ilere is predominantly "wiping decoration," but also includes some black-burnished bowls from the Ahun site. Ahun is the only site in Esisa with pottery decoration similar to Ilere. We suggest that the presence of Ilere pottery types in Esisa sites was a result of interaction between these two groups. Although some Esisa villages obtained vessels from Ilere, there is no evidence of Esisa-style pottery at Ilere. At Esisa, pottery from Ilorin was consumed in higher quantities (8%) than pottery from Ipo-Erese (4%), a much closer locality. Pottery from Ilorin and Ipo-Erese (punctation, groove, black-burnish bowl) are found at Ajagun and Ahun sites. Unlike Ilere, some pottery produced at Esisa is found in the Ipo-Erese area.

Twenty-eight percent of pottery from Ilere (Group-2) area was determined to be nonlocal. Of this amount, 18% originated from Ipo-Erese, and the rest 10% came from Ilorin sources. There seem to be no pottery imported from the nearby

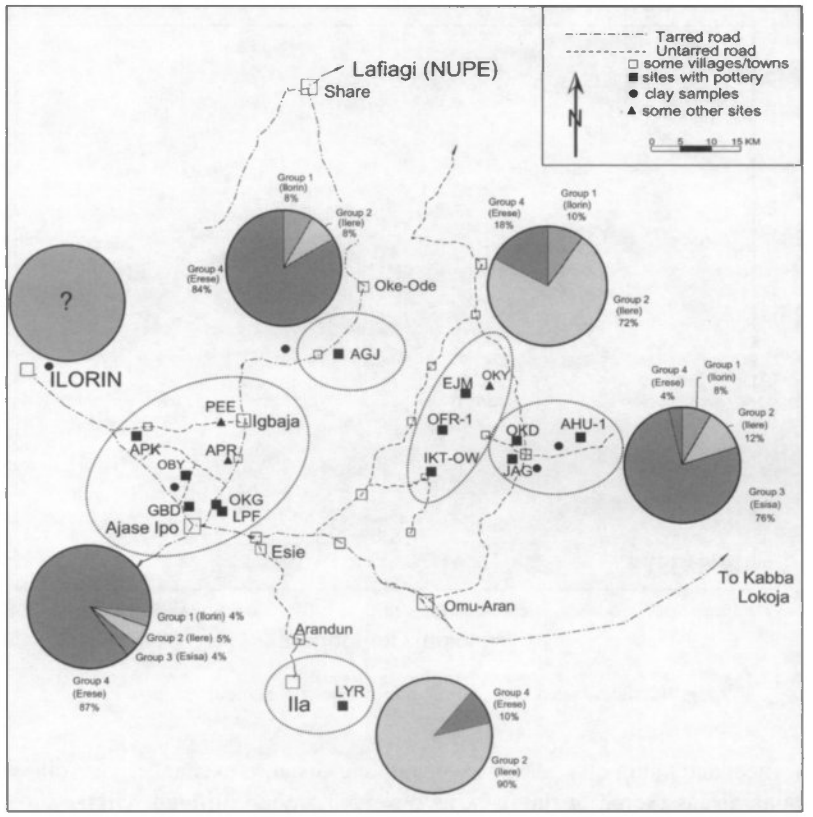

Fig. 11. Biplots of principal components 1 and 2 showing the Igbomina pottery reference groups. Ellipses represent 90% confidence interval for group membership.

Esisa villages, even though the Esisa appear to have consumed some Ilere pottery. The Ipo-Erese pottery in Ilere includes twisted string roulettes and plain jars, which probably came from Olupefon and Obaloyan sites. However, the bulk of the Ipo-Erese pottery in Ilere came from Agunjin, the closest Ilere site to Ipo-Erese. This means location favored interaction in this sense. Agunjin village had easier access to the Ipo-Erese vessels than other Ilere villages.

Pottery was imported into Ipo-Erese villages in minor amounts from Ilorin, Ilere, and Esisa villages, but in no case does the amount of imported pottery exceed 5%. It would appear that equal amounts of pottery were traded between Esisa and Ipo-Erese villages, but Ilere villages consumed a disproportionate amount of Ipo-Erese pottery (mostly at Agunjin). The Ipo-Erese villages may have relied more on vessels produced at one or more popular potting centers within the locality. These centers also served some of the needs of the surrounding villages. From

ethnographic studies carried out in Ipo-Erese, most of the fine-textured vessels (and only a very few of the large vessels) used in Isin, an Igbomina locality near Ilere, were obtained from Igbaja potting center in Ipo-Erese area (Aleru, 2000). The existence of a major potting center in Ipo-Erese and its capacity to meet local needs may have reduced dependency on imported vessels.

From the available data, it is impossible to ascertain whether pottery from Ila-Yara was imported from Ilere or if it was produced from clay resources that are chemically similar to Ilere village clays. Ilere is situated in the upland area of Igbomina with rugged terrain and a distance of about 60 km or more from Ila-Yara. Also, Ila-Yara pottery types are more similar to Ipo-Erese pottery than Ilere pottery. Yet 90% of Ila-Yara ceramics are thought to originate from Ilere area. Oral history from Ila-Orangun and neighboring Ijaba village indicates that Ila, probably in fairly recent times, relied on vessels traded from other places such as Iresi, Isan, Koro in Ekiti Yoruba, and Ajasepo in Ipo-Erese area of Igbomina. Ila's neighboring towns such as Isan, Ara, and Obo made the finest pots and pottery goods in Ekiti (Akintoye, 1971, p. 24). As suggested earlier, additional sampling will be required to address these questions. However, if pottery from Ila-Yara was imported, then it is of interest to note that this village consumed nine times more pottery from Ilere villages than from Ipo-Erese villages with which it shared closer cultural traits and proximity.

With a clay sample from Ilorin assigned to Group 1, we can tentatively assume that the pottery found in Igbomina assigned to the group (e.g., red ware, black ware, incision, groove, and punctation), most likely represents trade with the Igbomina villages. The pottery came from the Agunjin, Igbo-Ejimogun, Ofaro I, Obaloyan, Olupefon, Ajagun, and Ahun sites. It is significant that large quantities of gray/black wares found at Old Oyo are similar to ceramics found in Esie (western Igbomina) and Ilorin. This similarity in wares, according to some accounts, is traceable to contacts with Old Oyo during the reign of Alaafin Abiodun (1775–1805) (Ajekigbe, 1998). Willet (1960) also claims that some of the female potters in Oyo-Ile (capital of Old Oyo) settled or were taken to Ilorin after the collapse of the city, and that these potters brought their traditions with them. It seems that before the nineteenth century Ilorin was part of the general cultural area that is today called "Igbomina," and was actively involved in the interaction sphere that linked the various localities together and with Old Oyo. The location of Igbomina along the south–north trade routes from Akure to Ilorin, Nupe, and Oyo territories (Akintoye, 1971) may have benefited the inhabitants in terms of access to goods that passed through their domains.

CONCLUSION

Instrumental neutron activation analysis (INAA) suggests that local vessel production predominates in the various localities of Igbomina with potters

exploiting clays from their immediate surroundings, a practice that still continued today in Yorubaland. Some Old Oyo pottery types, particularly the snail shell decoration, may have been local production. Snail shell decorated pottery has been assigned in this analysis to Group-4 (Ipo-Erese); the majority of which were recovered from the Okegi (OKG) site in Ipo. Based on excavations at OKG, it appears that snail-shell decorated pottery became abundant in Ipo around the seventeenth century as a result of the large migration of Oyo-Yoruba into the area, a consequence of Old Oyo expansion and the establishment of authority in the region. For the first time in Igbomina, snail shell decorated pottery surpassed long-lived decorative style like twisted string roulette. Okegi, Olupefon, and Gbagede were important political centers of Olupo, a principal chiefly elite. The prevalence of Oyo pottery type during this period may indicate the important role played by Oyo elements in the society.

The northern Igbomina represented by Ilere and Esisa village groups produced a unique ceramic type, "wiping," that has not been found anywhere else in Yorubaland. The fact that this pottery type was produced locally in the area as early as the late fourteenth century suggest it must have been very old and probably preceded the present social groups in the area who claimed to have migrated from Oyo or Ife areas. Although additional data is needed to be able to properly understand the nature of regional interaction and exchange of goods, we can offer here some suggestions. First, the relative isolation of northern Igbomina from Old Oyo's influence or from other Yoruba groups may have forced the local communities to develop their own unique ceramic type. Second, the evidence from the Borno area in northern Nigeria of the presence of "wiping" decoration pottery type (Connah and Daniels, 2003, p. 54) indicate the need to consider the relevance of northern factor in the cultural history of the Yoruba. Nupe activities and domination of the northern Igbomina communities from the nineteenth century is well documented (Dada, 1985; Elphinstone, 1921). However, the nature or extent of northern influence on the Igbomina before the nineteenth century remains unclear.

Generally, there appears to be significant differences in trade patterns within Igbomina before the nineteenth century. There were movements of ceramic vessels, in varying amounts within and between localities. Distance, hills, and rugged terrain in the region may have reduced the frequency and range of transaction between the various Igbomina groups and with outside groups, given that the only means of transporting goods before the nineteenth century was by human porter. The Igbomina communities are located between 5 and 60 km from each other, and this distance can be much higher with settlements in distant localities like Esisa, in relation to Ilorin center. Because of the bulky nature of pottery ware and limited means of transportation, the likelihood of many vessels traveling that far was unlikely. However, different mechanisms could have been employed, including potters selling their wares to consumers directly from their workshops, or vessels were moved in smaller quantities to neighboring markets. Also, the items could

be disposed through intermediaries, or from traders stationed in nearby villages, which had access to particular potters or market centers like Ilorin and beyond.

Overall this project has demonstrated the utility of INAA for examining pottery production and exchange in Igbomina region. This investigation demonstrates that INAA can be effective in differentiating ceramics and raw clay sources in northern Yoruba. The analysis offers tremendous potential for examining regional interaction in Yorubaland immediately before and during the Old Oyo period (fifteenth to late eighteenth century), a time of sociopolitical and settlement change that led up to the collapse of Old Oyo, the Yoruba civil war, and the large-scale settlement abandonment of the nineteenth century. The Igbomina ceramics fall into four compositional groups corresponding to distinct village units and geographic locales (Esisa, Ilere, Ipo-Erese, and Ilorin), which are tentatively linked to clay sources in these areas. The analysis also indicates that pottery vessels were moved between localities and possibly between sites in each area.

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