Afr Archaeol Rev
https://doi.org/10.1007/s10437-024-09583-8

ORIGINAL ARTICLE

Remaking the Late Holocene Environment of Western Uganda: Archaeological Perspectives on Kansyore and Later Settlers

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Accepted: 5 April 2024

Abstract Archaeological and environmental research by an international and interdisciplinary team opens new perspectives into the settlement histories of Kansyore, Early Iron Age, and Bigo period peoples in the once forested regions of the Ndali Crater Lakes Region (NCLR) of western Uganda. The research examines the role of Kansyore agropastoralists and their Early Iron Age and Bantu-speaking contemporaries in remaking a once forested environment into a forest-savannah mosaic from circa 500 BC to the end of the first millennium AD. Archaeological settlement and subsistence evidence is examined within a framework of social interaction of Sudanic speakers with Bantu speakers, drawing on historical linguistics and environmental studies to arrive at a new synthesis of late Holocene history in western Uganda. This perspective also unveils the significance and chronology of Boudiné ware, a long enigmatic ceramic tradition that we identify as contemporary to Transitional Urewe and deeply influenced through social interactions with those making Kansyore ceramics and inhabiting the same landscape. Using archaeological evidence from fifteen sites and multiple burials spanning from 400 to 1650 calAD, new views of ceramic histories, lifeways, and

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10437-024-09583-8.

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Published online: 09 July 2024

symbolic values are revealed, including Bigo period settlements that arose in what was an environmental refugium beginning in the early fourteenth century AD. This research also shows that the Kansyore of the forested region east of the Rwenzori Mountains had greater affinities to late Holocene archaeological evidence from western Equatoria, in the southern South Sudan, and Kansyore Island, Uganda, than it does to the Kansyore in eastern Kenya.

Résumé Les recherches archéologiques et environnementales menées par une équipe internationale et interdisciplinaire ouvrent de nouvelles perspectives sur l'histoire du peuplement des Kansyore, de l'Age du Fer ancien, et de la période Bigo dans les régions autrefois boisées de la Région des lacs de cratère de Ndali (NCLR), en Ouganda occidental. La recherche examine le rôle des agropasteurs Kansyore et de leurs contemporains de l'Age du Fer ancien et de langue bantoue dans la transformation d'un environnement autrefois forestier en une mosaïque de forêt et de savane, d'environ 500 avant J.-C. à la fin du premier millénaire de notre ère. Les preuves archéologiques du peuplement et de la subsistance sont examinées dans le cadre de l'interaction sociale entre les Soudanophones et les Bantuphones, en s'appuyant sur la linguistique historique et les études environnementales pour parvenir à une nouvelle synthèse de l'histoire de l'Holocène tardif en Ouganda occidental. Cette perspective dévoile également la signification et la chronologie de la céramique Boudiné, une tradition céramique longtemps énigmatique que nous identifions comme contemporaine de l'Urewe transitionnel et profondément influencée par les interactions sociales avec ceux qui fabriquent la céramique Kansyore et qui vivent dans le même paysage. En utilisant des preuves archéologiques provenant de quinze sites et de multiples sépultures s'étendant de 400 à 1650 après J.-C., de nouveaux points de vue sur les histoires de céramiques, les modes de vie et les valeurs symboliques sont révélés, y compris les sites de peuplement de la période Bigo qui sont apparus dans ce qui était un refugium environnemental au début du 14e siècle après J.-C. Cette recherche montre également que le Kansyore de la région forestière à l'est des Monts Rwenzori avait de plus grandes affinités avec les preuves archéologiques de l'Holocène tardif de l'Équatoria occidental, dans le sud du Soudan du Sud, et de l'île de Kansyore, en Ouganda, qu'avec le Kansyore du Kenya oriental.

Keywords African paleoenvironment · Uganda · Kansyore · Bantu speakers · Rwenzori Mountains · Early Iron Age · Bigo · Albertine Rift · Forest colonization · Historical ecology · East African archaeology

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Archaeological Issues and Perspectives

The narrative we present in this article addresses one of the primary conundrums in the archaeology of eastern Africa: What is the Kansyore tradition, and how closely related are sites in Uganda, Kenya, and Tanzania to the type site on Kansyore Island, located in the valley of the Kagera River, separating Uganda from NW Tanzania? When we began research in the Ndali Crater Lakes region (hereafter NCLR), immediately to the East of the Rwenzori Mountains, we had no expectation that Kansyore peoples would become a dominant focus of our research in a humid zone once covered in tropical forest outside the Lake Victoria basin, which has been the primary focus of Kansyore research. Given that Kansyore has been depicted as a hunting, fishing, and foraging/gathering culture, the additional issue of a Kansyore

agropastoral presence in this forested zone provokes critical questions about prior representations. We examine these ambiguities; among them, the evidence that Kansyore in the NCLR incorporates pastoralism and agriculture, two subsistence strategies that have not gained sufficient recognition in the study of this tradition. We also address the question of Kansyore origins by taking account of historical linguistic and archaeological evidence in Equatoria, southern South Sudan.

First documented on Kansyore Island by Chapman (1967), Kansyore ceramics in that context were marked by comb stamping and punctate decorations and appeared alongside other ceramic wares, such as Urewe, rouletted wares, and a little understood ware labeled Boudiné. Both Urewe and Boudiné were associated with a Late Stone Age (LSA) microlithic industry mostly based on quartz. In the five decades since Chapman's publication, archaeologists working in western Kenya and as far afield as Serengeti and the Lake Eyasi basin in northern Tanzania have described ceramics designated as "Kansyore" (Bower, 1973, 1991; Mehlman, 1977, 1989; Prendergast et al., 2007, 2014). This raises questions about the extent of Kansyore's presence in eastern Africa. Also, issues about the adequate identification and dating of Kansyore have been raised over the decades (for reviews, see Dale, 2007; Jones & Tibesasa, 2022). Unfortunately, the absence of dates from Chapman's original Kansyore report has exacerbated a scattershot approach to identifying ceramics with roughly similar decorative applications and widely differing dates to "Kansyore." The result is a huge range of dates from 8240 ± 245 and 4015 ± 260 b.p. on shell and bone apatite in South Nyanza (Robertshaw et al., 1983, p. 35) to approximately 6000–5500 BC at the Pondo site and to 1300–1200 BC at Usare in northern Nyanza (Dale et al., 2004; Lane et al., 2006).

Amplifying disparate dates is a distinct reluctance to address the embedded notion that Kansyore, as constructed in western Kenya, is a continuous "culture" over thousands of years. To finesse this improbability, subdivisions like "early" (6000 to 5000 calBC) and "later" (c. 1000 calBC to calAD 500) have been proposed to address the gaps in radiocarbon dates. Recently, Tibesasa and Jones (Jones & Tibesasa, 2022; Tibesasa, 2021; Tibesasa & Jones, 2021) documented Kansyore sites along the shores of Lake Victoria in far eastern Uganda where Namundiri 1—a site with a rich array of faunal and fish remains—dates to approximately 6000 years ago, a date that falls between the previous widely separated dates, providing a rationale for a "Middle Kansyore." Four dates (Jones & Tibesasa, 2022) cluster in the early fourth millennium calBC.

The association of sites in western Kenya with waterways and shell mounds (e.g., Dale & Ashley, 2010; Robertshaw, 1991) along the shores of Lake Victoria and its eastern feeder streams has led to arguments for an economy partly based on fishing, giving rise to the characterization of Kansyore as a hunting, fishing, and foraging economy, with adoption of domestic stock herding as early as the mid-third millennium calBC (Prendergast, 2010). Additional interpretations have suggested that a modified, delayed return is appropriate for the eastern facies (a regional variation of a ceramic tradition) of Kansyore (e.g., Dale, 2007; Dale & Ashley, 2010; Dale et al., 2004; Jones & Tibesasa, 2022; Prendergast, 2010). This refers to people moving seasonally to take advantage of dry season shellfish harvesting and seasonal fish runs at rapids, such as at Gogo Falls (Karega-Munene, 2002; Robertshaw, 1991) and Wadh Long'o (Dale, 2007; Dale & Ashley, 2010; Lane et al., 2007; Prendergast, 2010). Though more regional data are required to evaluate this model in western Kenya, our research into the Kansyore of the western rift shows that it does not apply to the NCLR, where a mixed economy with agriculture and pastoralism played a primary role alongside hunting and gathering, common in agricultural economies in the region into the mid-twentieth century.

Introducing the Ndali Crater Lakes Region

The NCLR sites are found in similar contexts as Kansyore Island—once humid tropical forest and waterways. This compels us to refocus our gaze away from the sites east of Lake Victoria and to explore the Kansyore in its place of original documentation—western Uganda. Since 1995, we have periodically engaged in reconnaissance (2012), survey (1995, 2014, 2015), and excavations (2014, 2015, 2019, 2021) of Kansyore and other sites in the NCLR of western Uganda (Fig. 1). Our findings from surveys and excavation, supplemented by the PhD research of

JNB during 2021, are presented as new evidence for Kansyore that is more than the hunter-fisher-gatherer economy, the previous focus of researchers. While these economic components are present and important, we also present evidence for a Kansyore with significant pastoralism and grain agriculture—far more diverse and complex than previously known.

It has been suggested that the Oltome (a term introduced by Collett & Robertshaw, 1983 & Robertshaw and Collett 1983 and used extensively in Robertshaw et al., 1983) peoples at the Nsenge 3 site, western Kenya, may have had their ceramic styles influenced by Early Iron Age (EIA) agricultural and pastoral neighbors (Lane et al., 2007). We present evidence that cross-cultural influences occurred in the other direction—from Kansyore to Urewe and Boudiné ceramics in the NCLR. We draw attention to the importance of a Boudiné component that is linked with later Urewe-associated people and coeval with Kansyore. This ware may represent the product of an intermixed group. These results significantly change how we think about the Kansyore economy and the relationship that Kansyore people had with linguistic groups originating in southern South Sudan and the Democratic Republic of Congo (DRC).

Here, we reference the Kansyore-type site as the starting point in any attribution of Kansyore identity. Given what we know of its associations and probable dating, as well as the alterity of the Oltome facies in Kenya, the western facies of Uganda is neither late, nor is it appropriate to label the Oltome facies as "Late Kansyore." Keeping these principles in mind, we use the convention of "Kansyore" for western Kenya/eastern Uganda while remembering that our use of the name is anchored to the type site and signifies a different economy in western Uganda.

Kansyore forest dwellers with diversified economies, including stone tool technology, present significant opportunities to study the impact of social groups on humid tropical forested landscapes over time (Schmidt, 1997a, 1997b; Stephens et al., 2019). We know, for example, that forest fragmentation by early settlers often led to greater biodiversity (Taylor et al., 1999), a phenomenon, along with nutrient-rich volcanic soils, which served as a magnet for subsequent settlement and exploitation of that biome. The archaeological footprints of early incursions of small groups of hunter-gatherer-fishers are sparse, almost ephemeral, comprising mostly lithics at open-air sites outside manufacturing areas—a developmental process Lane (2004) identified as the pioneer phase. As subsequent groups came to occupy, transform, and remake the environment, each left signatures of their

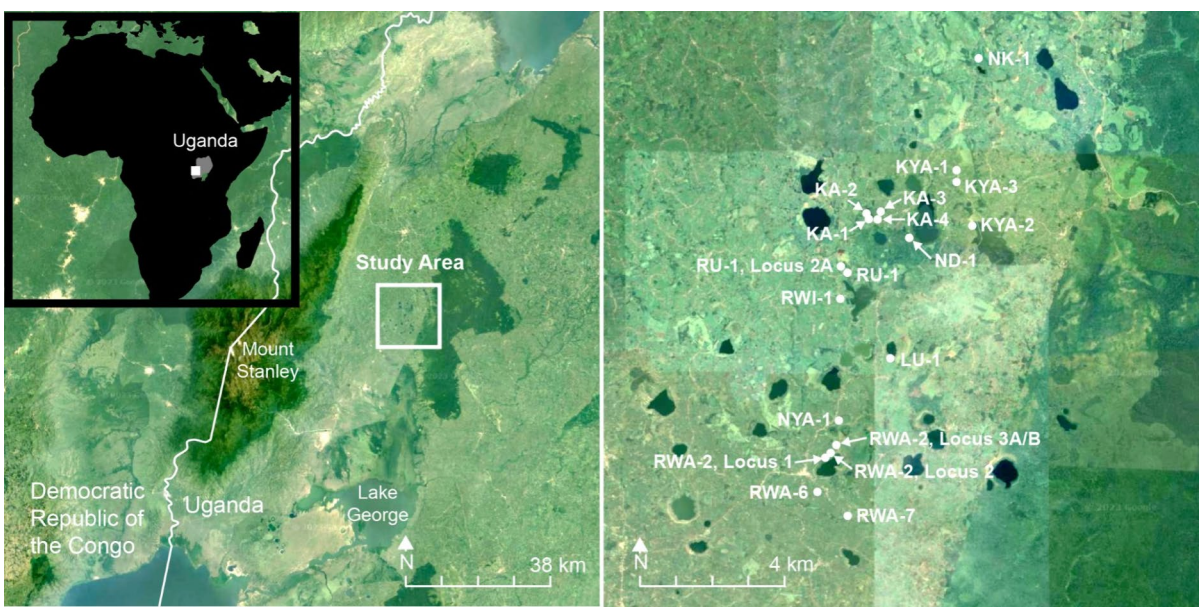

Fig. 1 The NCLR, with excavated sites (right panel), of Western Uganda; Mt. Stanley is the highest peak of the Rwenzori Mountains that divide the Democratic Republic of Congo from Uganda

economies and ontologies—worldviews—that we can read in the archaeological record, notably during the mid-first millennium AD. The most accessible records are near the caldera lakes and filled calderas scattered across this eroded volcanic landscape. We draw on the environmental histories embedded in these lake sediments, linking them to occupational histories, resource exploitative practices, cultural preferences and prescriptions, and human responses to anthropogenic changes and climate change. Through multiple views within a regional landscape approach that draws on the principles of historical ecology (Balée, 2006; Crumley, 1994, 2021; Schmidt, 1994), we address the causes of environmental change during the late Holocene in the NCLR.

The Physical Region

A prominent lacuna of archaeology in East Africa is the absence of landscape histories around the well-watered crater lakes of western Uganda. In the shadow of the Rwenzori Mountains, this part of the Albertine Rift harbors primate-rich Kibale National Park (KNP), with several crater lakes within its boundaries. The forests of the KNP—though significantly modified through time (Struhsaker, 1997)—are a useful proxy for the diversity of forest environments that once prevailed in this humid and well-watered zone that begins about 20 km east of the DRC-Uganda border (along the Rwenzori peaks) and includes the eastern boundary of Kibale National Park. The crater lakes and calderas are in a zone of approximately 15-×-15 km. Our research area is located in the center of the volcanic field and is 9 km (N-S) by 4 km (E-W) (OSM Fig. 1).

The Ndali landscape harbors ~ 900 calderas (dry, in-filled marshy, and lakes). Though most remain uninvestigated for their scientific and historical potential, there is a history of environmental and biological investigations (e.g., Bwanika et al., 2004; Chapman et al., 1998; Chapman & Chapman, 2003; Crisman et al., 2001; Efitre et al., 2009; Efitre et al., 2016; Kizito et al., 1993), including paleoenvironmental studies (Kiage et al., 2017, 2019; Russell et al., 2009; Ryves et al., 2011; Saulnier-Talbot et al., 2014, 2018; Ssemmanda et al., 2005; Taylor et al., 1999, 2000). Our interviews with local observers provide critical knowledge about deforestation. For example, the densely populated and large, dry caldera bordering our archaeological sites (RWA2, Locus 2, and Locus 3) in the southern research zone was thickly forested 55 years ago. Similarly, Lake Wankenzi has seen three fish die-offs in the last 45 years—a condition related to eutrophication caused by nutrients running into lake calderas from dense agricultural production along their rims and interior slopes. Similar events occurred during the mid-second millennium when Bigo-period populations were practicing intensive agriculture in the region, directly contributing to the death of Lake Wandekara, which is contiguous to Lake Wankenzi (Russell et al., 2009). Such testimonies provide insights into recent environmental changes and offer strong proxies for understanding parallel changes in the past.

The structural geology of the area is highlighted by granulites and gneisses (one source for stone tool manufacture) that make up an Archaean basement complex, along with Proterozoic metamorphized sediments, intrusive granites, and Cenozoic sediments. The most visible parts of the geology are the explosion craters and remnant tuff cones that dominate this distinctive landscape. Lacking direct local studies of volcanic histories, insights into the formation of the Ndali volcanic field may be inferred from geological studies of nearby volcanic fields (Barker & Nixon, 1989; Beloussov et al., 1974; Combe, 1938; Holmes & Harwood, 1932; Kapustin & Polyakov, 1985; Nixon & Hornung, 1973; Vinogradov et al., 1980; von Knorring & Du Bois, 1961). Volcanic vents, some of which now contain crater lakes, erupted through basement rocks of Precambrian gneiss in a WSW-ENE-trending area north of the town of Fort Portal as well as in the NCLR, marked by carbonatite tuff cones and marls.

Investigations into the vegetational history of the Rwenzori Mountains dated a "layer of volcanic ash from Mahoma Lake at 4,670 ± 80 years B.P. (Y-1410)" (mid-fourth millennium calBC) (Livingstone, 1967, p. 32), which Livingstone also presumed dated eruptions in the Ndali region. Our AMS dates of 10,946 to 11,126 calBC (Table 2, row 7) on shallow layers of carbonatite tuff at Kabata-1 and 13,895 to 13,625 calBC (Table 2, row 10) at Kabata-3 fix the most recent volcanic activity in the northern NCLR from the fourteenth to twelfth millennium calBC.

The Albertine Rift's largely reliable rainfall and fertile volcanic soils have attracted peoples with

diverse economies over the last five millennia, a period during which our study seeks to understand the human presence of successive populations. During the last 70 years, the NCLR has attracted thousands of immigrant settlers from SW Uganda and eastern DRC. This increase of large numbers of agriculturalists has caused significant deforestation and erosion with concomitant social stresses and poverty (Fisher & Christopher, 2007). Ranging between 1200 and 1475 m a.s.l., the research region has multiple channelized streams. Surface soils are shallow near caldera rims where tuff is often exposed. Present ground cover includes scattered forests, high grassy patches, clusters of banana farms, pastures, and fields of cassava, maize, sorghum, millet, and legumes. Overall surface visibility is modest to poor.

The Archaeological Backdrop

Earlier archaeological surveys in the Albertine Rift along the eastern shore of Lake Albert and the Victoria Nile by Graham Connah (1996) skipped over this region to include areas to the south, near Lake George and Lake Edward. Schmidt visited the region in 1995 as part of a landscape assessment project. He conducted archaeological transect surveys near Kabata swamp and the surrounding calderas, documenting a variety of cultural components, including Late Stone Age (LSA) lithics and ceramics identified as the Kansyore tradition, Early Iron Age (EIA) and Boudiné ceramics, abundant frequencies of Middle Iron Age (MIA) Bigo ware, and other Late Iron Age (LIA) components. This survey identified 48 locales (incidences of 2–5 diagnostic ceramics), some of which are now incorporated into our site inventory. These included one locale with burials in ceramic pots since destroyed by road construction. Several months later and unaware of the archaeological survey, Taylor (Taylor et al., 1999, 2000) took sediment cores from Kabata swamp (see Fig. 2). The analysis shows evidence of forest clearance at about 500 BC, attributed to EIA iron production.

To explain the pollen and sedimentary records for rapid deforestation at Kabata Swamp, Taylor used as proxy archaeological research in northwestern Tanzania (250 km to the southeast), also once a humid tropical forest in the late first millennium BC. Archaeology there documented an iron industry and settlement from the mid- to late-first millennium BC to ca. AD 600 (Schmidt & Childs, 1985; Schmidt, 1978, 1997a, 1997b). However, our 2014 survey and excavations showed no evidence for a

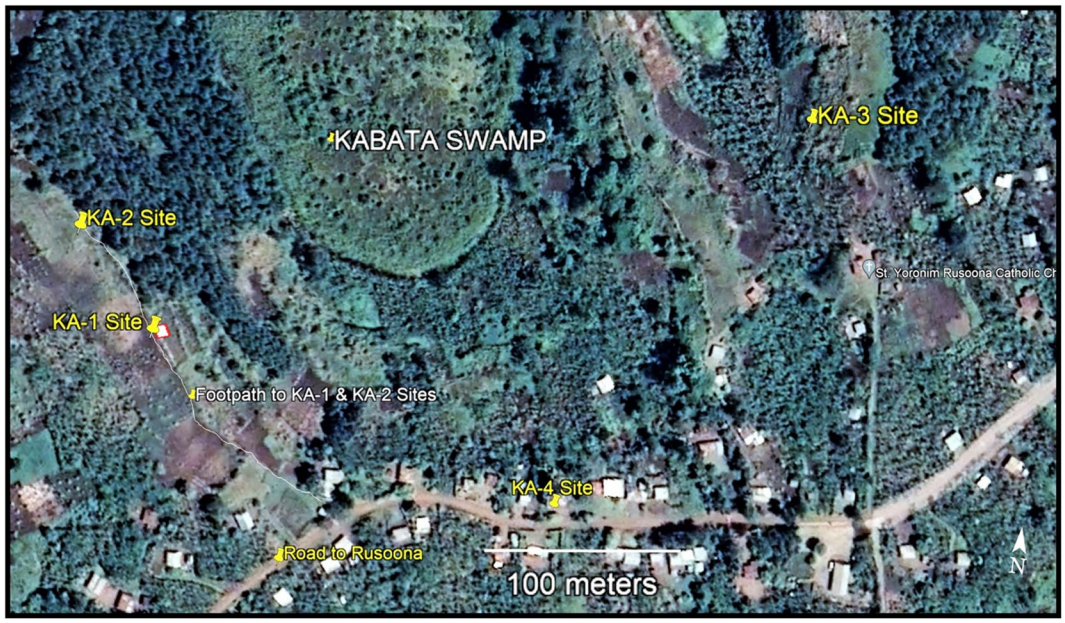

Fig. 2 Excavated Sites near Kabata Swamp. The red-bordered square on the eastern edge of KA-1 marks the 10×10 m inventory area downslope from a hoe-cut embankment. Google Earth image

classic Urewe ceramic tradition and associated iron working in the NCLR during the EIA, thus invalidating the thesis that iron production caused deforestation ca. 500 BC.

This disjunction, along with the high frequency of Kansyore settlements, fueled our interest to explore thoroughly the complex relationship between environment and culture in this unique region. Our focus quickly shifted to a more intensive study of Kansyore sites around the NCLR and later mid- to late-first millennium AD occupations that lacked iron production. The NCLR is an ideal region to study anthropogenic influences on the landscape because of the high density of caldera swamps and lakes scattered across a lush zone that was tropical forest just a half-century ago. The location of settlement sites on the slopes and rims of caldera lakes focused our attention on the potential of a developed interactional record between the environment and residents (OSM Fig. 2). There is cheek-to-jowl proximity, with lake sediments only meters distant from areas of cultural activity (OSM 1.1 for survey methods, overview, and maps of sites).

Prelude to an Overview

In the overview of NCLR historical ecology that follows, we adopt an integrative perspective that does not treat artifacts, ecological evidence, and interpretation as discreet categories. Rather, we weave a narrative that presents data and interpretation as an interactive process that recognizes the cultural meanings of artifacts as they are presented. Using a narrative approach in this overview, we do not present a series of site reports, instead privileging the salient characteristics of each site. We reference key interpretive observations across sites and use Supplemental Materials to present specific data, such as lithics (including drawings), additional plans and photographs, and referenced faunal evidence. The NCLR offers exciting research results, yet it also holds archaeological challenges, such as small assemblages of lithics and fauna alongside sparse botanical evidence (thus necessitating the use of proxies from historical linguistics). Also, there are few occurrences of well-preserved ceramics. The evidence presented here nevertheless provides a significant new view of the ancient history of western Uganda that importantly rethinks previous representations of Kansyore, Urewe, and Bigo peoples and their interactions with a humid forested environment that they remade over time. Among the more significant results are twelve well-dated burials that represent a deep chronology of the different groups that lived in the NCLR over nearly two millennia, transforming its environment to their advantage. As a guideline for the following discussions, we provide a summary (Table 1) of site names, site identification codes, primary and secondary occupations, physical location, and the approximate dates of the occupational components. We organized our presentation by northern, central, northeastern, and southern research zones. We begin with the northern sub-region and present our discussions serially thereafter.

Northern Survey and Sites

We returned to the NCLR in May and June of 2014 with a team of participants from the Uganda Museum, Kyambogo University, Makerere University, Mbarara University of Science and Technology (MUST), and the University of Florida. The project included a significant outreach initiative in communities often ignored by environmental and biological scientists drawn to the region's lakes. We assigned one team of two to three project members to lead outreach into the surrounding villages to create a climate of participatory knowledge, with as many people as possible participating in the project and tailored meetings at schools and churches to enhance understanding of our scientific and historical goals (Asiimwe, 2023). Finally, we sampled sediments in one marshy caldera (Kabata Swamp) and one caldera lake, Wankenzi.

Our initial survey strategy retraced the 1995 survey around Kabata Swamp and its sites (Fig. 2) with the additional goal to conduct survey transects around Lake Mwamba and Lake Wankenzi and its associated calderas to the south. Our resurvey of the Kabata swamp environs predictably yielded high artifact densities. A north–south path along the western rim was slowly being removed by hoe agriculture that continues to pull soil and hundreds of embedded artifacts downhill and, inside the lip of the caldera, including significant amounts of Boudiné ware, which is unmistakable: roughly finished, black, brown, or brown-black; tempered with large quartz fragments; with exposed coil breaks that may be partly smoothed or

Table 1 A listing of site names, codes, primary and secondary archaeological components, geographical locations, and approximate dates

Site name	Site code	Primary culture component(s)	Secondary culture component(s)	Location in NCLR	Approximate dates: primary listed first
Kabata-1	**KA-1**	1-Transitional Urewe/ Boudin**é**, 2-Bigo	3-Kansyore	Northern, Kabata Swamp	1&3-Early fifth to mid-sixth century calAD 2-Mid-second millennium AD
Kabata-2	**KA-2**	1-Transitional Urewe	2-Kansyore (trace) 3-Bigo (trace)	Northern, Kabata Swamp	1&2-Mid-first millennium AD 3. Mid-second millennium AD
Kabata-3	**KA-3**	1-LSA, Kansyore 2-Transitional Urewe/ Boudiné	3-Bigo	Northern, Kabata Swamp	1-Early first century calAD to mid-sixth century calAD 2-Mid-first millennium AD 3- Mid-second millennium AD
Kabata-4	**KA-4**	1-Boudiné		Northern, Kabata Swamp	Mid-first millennium AD
Rusoona-1	**RU-1**	1-MSA/LSA 2-Kansyore 3-Transitional Urewe 4-Bigo		Central, NW of Lake Mwamba	1–3600 calBC 2&3. Mid-first millennium AD; Late ninth to early eleventh century calAD 4-Mid-second millennium
	RU-1, Locus 2	1-Bigo	2-Kansyore	Central, NW of Lake Mwamba	1-Late thirteenth century calAD to mid-fourteenth century calAD 2-Mid-second millennium AD
Rwitampungu-1	**RWI-1**	1-Kansyore 2- "Intermediate" burial	3-Bigo	Central, NW of Lake Mwamba	1-Mid-first millennium AD 2-Early tenth century to early eleventh century calAD 3-Mid-second millennium AD
Lugembe-1	**LU-1**	1-Bigo	2-Kansyore (trace)	Central, Lake Lugembe	1-Mid-second millennium AD 2-Mid-first millennium AD
Kyakatama-1	**KYA-1**	1-Bigo	2-Kansyore 3-TU/Boudiné	Northeast, east of Lake Nyinambuga	1-Early fourteenth to late fourteenth century calAD 2&3-Mid-first millennium AD
Kyakatama-2	**KYA-2**	1-Kansyore 2-TU/Boudiné	3-Middle Iron Age (trace, intrusive)	Northeast, east of Lake Nyinambuga	1&2-Mid-first millennium AD 2-Mid-second millennium AD

Table 1 (continued)

Site name	Site code	Primary culture component(s)	Secondary culture component(s)	Location in NCLR	Approximate dates: primary listed first
Kyakatama-3	**KYA-3**	1-Kansyore	2-Bigo	Northeast, east of Lake Nyinambuga	1-Early to late sixth century calAD 2-Mid-second millennium AD
Ndali-1	**ND-1**	1-Bigo	2-Kansyore 3-Transitional Urewe/Boudiné	Northeast, SW of Lake Nyinambuga	1-Early to mid-fifteen century calAD; 2&3-Mid-first millennium AD
Nyakabungo-1	**NYA-1**	1-MSA/LSA 2-Kansyore	3-Bigo (trace) 4-Recent Trash	Southern, NW of Lake Wankenzi	1-Mid-fourth millennium calBC 2-Early to mid-first millennium AD; 3-Mid-second millennium AD; 4-Recent
Rwankenzi-2	**RWA-2, Locus 1**	LSA; Kansyore (surface scatters)	1-Burial, no context	Southern, west of Lake Wankenzi	1-Burial, Mid-eleventh to mid-twelfth century calAD
Rwankenzi-2	**RWA-2, Locus 2**	1-Kansyore	2-Bigo 3-TU/Boudiné	Southern, NW of Lake Wankenzi	1&3-Mid-third to mid-fourth century calAD burial 2-Mid-second millennium AD; 3-Mid-second millennium AD
	RWA-2, Locus 3A	1-Kansyore	2-Bigo (trace)	Southern, NW of Lake Wankenzi	1-Burial, Mid-fourth to mid sixth century calAD 2-Mid-second millennium AD
	RWA-2, Locus 3B	1-Kansyore	2-Bigo	Southern, NW of Lake Wankenzi	1-Burial, early fifth century to mid-sixth century calAD 2-Mid-second millennium AD
Rwanwenzi-6	**RWA-6**	1-Transitional Urewe (TU)/Boudiné 2-Bigo	3-Kansyore	Southern, south of Lake Wankenzi	1&3-Mid-first millennium AD; 2-Mid-second millennium AD
Rwankenzi-7	**RWA-7**	1-Kansyore 2-Transitional Urewe (TU)/Boudiné		Southern, south of Lake Wankenzi	1-Mid-first millennium AD
Nkuruba-1	**NK-1, Locus 2**	1-Bigo	2-Kansyore; 3 TU (traces)	North, near Lake Nkuruba	1-Mid-seventeenth century calAD 2&3-Mid-second millennium AD

incised with vertical strokes; thick, flat, and heavy bases; and urn-like morphology (OSM Fig. 3).

We also documented Transitional Urewe (TU) ceramics with Urewe ware affinities, particularly globular pots with cross-hatching on exterior rims. There are no beveled rims, no grooving or incising, no dimples, no parallel grooves or dropping triangles, and no burnish—characteristics that are

not consistent with EIA Urewe according to Ashley (2010, p. 150), who suggests a time range of 800–1200 AD—a period of change and transformation in East Africa. The TU in the NCLR appears earlier by four centuries (see below) and even earlier in Rwanda (Giblin, 2013). Ceramics of TU have been documented in Kenya (e.g., Ashley, 2010, p. 149–152; Robertshaw, 1991), Tanzania (e.g., Schmidt, 1980), and Rwanda (e.g., Giblin, 2013; Nenquin, 1967), but grouped with earlier classic Urewe. Nenquin identified TU ceramics in Rwanda as "Dimple-based ware" (see 1967, p. 263), some sherds of which are similar to TU ceramics in the NCLR. Lumping different chronological phases of Urewe resulted in a monolithic approach to EIA ceramics (Stewart, 1993). We must now account for a TU phase that began several centuries before AD 700. Iron production, often associated with classic Urewe (Schmidt, 1978, 1980; Stewart, 1993), is absent in the EIA (500 BC to 600 AD) in the NCLR. The occasional tuyere and random piece of forging slag were located within Bigo period settlements but without evidence of iron smelting.

Kabata-1

Our initial survey of KA-1 showed an extremely high frequency of ceramic artifacts on the eastern, downhill, swamp side of the footpath through the site. To understand whether they were derived from upper layers or were in situ, we used a 10 × 10 m grid with

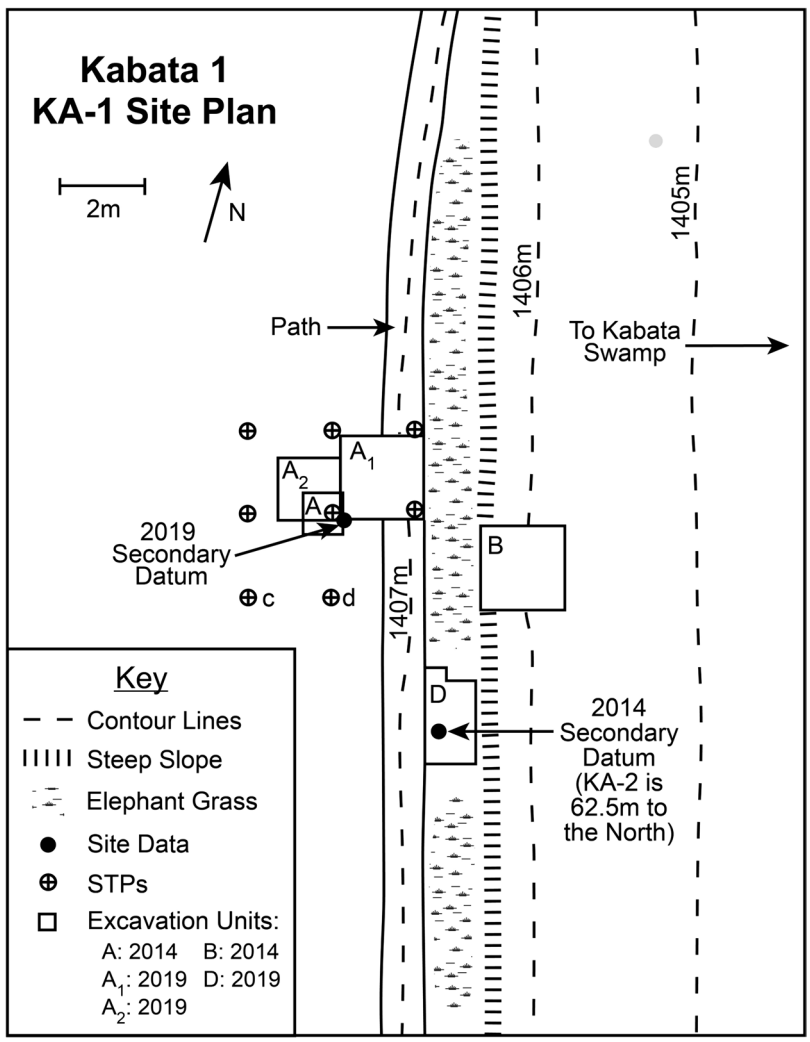

Fig. 3 Site plan for Kabata-1 (KA-1). Excavations occurred 2014, 2015, and 2019

Table 2 AMS radiocarbon dates for Kabata-1 and Kabata-3. All dates in this and subsequent AMS tables are calibrated using OxCal or CALIB 8.2 (all GAAMS dates)

Item # & Lab #	Site & year collected	Sample ID & source	14C age uncalBP	68% low/high OxCal calibrated; GAAMS calibrated by CALIB 8.2	95% low/high
1. AA104755	Kabata 1 (2014)	KA-1A.Fea.1 *Charcoal*	2963 ± 28	1229 to 1127 calBC	1265 to 1057 calBC
2. AA106858	Kabata 1 (2015)	KA-1A, Fea. 1; *Bone-metatarsal*	1603 ± 25	410 to 532 calAD	400 to 537 calAD
3. AA115918	Kabata 1 (2015)	KA-1A, Fea. 1 *Encrusted urn*	1759 ± 14	249 to 331 calAD	242 to 345 calAD
4. AA114070	Kabata 1 (2019)	KA-1A1@ -43 cm *Charcoal*	3243 ± 35	1602 to 1452 calBC	1611 to 1442 calBC
5. AA115398	Kabata 1 (2019)	KA-1A2 *Tooth*	1588 ± 23	433 to 536 calAD	423 to 544 calAD
6. AA104756	Kabata 1 (2014)	KA-1B, Fea. 2 *Charcoal*	2159 ± 33	352 to 166 calBC	359 to 101 calBC
7. GAAMS62050	Kabata 1 (2022)	KA-1D *Tuff*	11,040 ± 20		10,946 to 11,126 calBC
8. AA106626	Kabata 3 (2014)	KA-3A.49 *Charcoal*	1936 ±	88 to 121 calAD	21 to 132 calAD
9. AA104757	Kabata 3 (2014)	KA-3A.40 *Charcoal*	1875 ± 27	79 to 209 calAD	72 to 221 calAD
10. AA115445	Kabata 3 (2020)	KA-3B, Locus 1 *Tuff*	13,101 ± 33	13,822 to 13,695 calBC	13,895 to 13,625 calBC
11. PSUAMS9767	Kabata 3 (2021)	KA-3E *Bone-humerus*	1590 ± 15		428 to 540 calAD

16 inventory units to document clusters of artifacts. This inventory showed diverse materials: an iron spearhead, fishbones, and numerous TU and Boudiné ceramics. Most artifacts appeared displaced from deposits near the path. Large Boudiné bases were lodged deep within the soil, compelling excavation to determine if they were in situ or displaced. We positioned a 2 × 2 m test unit (KA-1B) under and against the embankment near the path where Boudiné ceramics were commonly found (Fig. 3 and OSM Fig. 3). In the displaced soil was a shallow layer of very dark grey loam, atop a dark brown sandy loam, which also was displaced from the embankment. The lowest natural stratum was dark reddish brown, a hard-packed clay that was culturally sterile but with tuff inclusions.

At Kabata-1 (KA-1), we focused our attention on the plateau-like area to the west of the footpath (Fig. 3). Transects spaced at 5 m intervals documented significant frequencies of Bigo ware 5 to 40 m to the west of the path along a 90 m N-S axis. We found the western plateau to be rich in Bigo ceramics, characterized mostly by large vessels decorated with plaited grass roulette (PGR), often with thick, bulbous upper rims/lips, incisions (nicks) on the lip-top, slipped interiors, and red paint on the exterior. These ceramics date from the early- to mid-second millennium AD (Posnansky, 1961; Reid & Young, 2000; Robertshaw, 1994).

However, the zone from the footpath to 5 m west displayed significantly lower frequencies of Bigo ware and higher frequencies of Kansyore, Boudiné, and TU ceramics within darker soil with fewer tuff fragments on the surface. We placed eight shovel test pits (STPs) at 2 m intervals on a N-S grid to examine soil profiles and assess concentrations of artifacts. Among the findings were slabs of broken volcanic tuff, a variety of ceramic evidence including Kansyore, TU/Boudiné, and Bigo traditions, and a burial

associated with Boudiné urns, the latter located by a STP placed at the center of our grid. We modified this 40 cm diameter STP to a 1 × 1 m unit (A in Fig. 3). The ceramic finds first included Bigo ware ($n = 3$), quickly replaced after 9 cm below datum (b.d.) by 6 TU/Boudiné rims and decorated sherds. We observed a distinct soil color and texture difference at − 25 cm in the southern part of the unit where the soil was hard reddish-brown clay and sterile, which contrasted with the black loam in the north. This proved to be part of a grave outline on an E-W axis. At − 31 cm within the black loam, we defined the edge of a coarse vessel, the heavy, flat base of a Boudiné urn that was recovered in three pieces with two Boudiné rim sherds (OSM Fig. 4a).

Among these ceramics was a 2.5 × 2 cm piece of smoothed kaolin and a trimmed blade made of quartz. During the late second millennium AD, Bantu-speaking peoples of the Great Lakes used kaolin as a key symbolic ingredient in various rites of passage (Schmidt, 2006, 2017, 2018, p. 69). The inclusion of kaolin in this context points to its possible use as a symbolic treatment of the deceased, a ritual of renewal. As we will see elsewhere in this article, there are signs of deep time symbolic continuity in the geographical placement of burials, a phenomenon that helps to underwrite the possible longevity of other burial rituals. The inclusion of a perfectly trimmed blade also turns our attention to the inclusion of lithic tools as a ritual funerary activity—a topic that arises repeatedly among burials in the NCLR.

Underlying the heavy vessel base was a small, undecorated urn. Two sections of this fragmentary and highly friable ceramic were removed, revealing visible human skeletal elements (feet). A remaining fragment of a small undecorated urn (associated with Boudiné rim sherds) at 40 cm b.d. was left in situ for later excavation, which occurred in 2015 (see below, OSM Fig. 7-A and 7-B). A large charcoal sample contiguous to the remaining partial urn provided an AMS date of 1265–1057 calBC (Table 2 row 1), unrelated to the burial age and linked to a fire event (see below).

Ceramics, Unit B

Unit B excavations revealed large Boudiné sherds from necked vessels ($n = 8$) (see Supplementary Materials 3.14) and the flat-bottom bases of these urn-like vessels ($n = 3$), the most prominent elements of the ceramic assemblage (Fig. 4-A). Finger impressions on one base resembled the application of finger impressions on a flat base of a Kansyore urn found in a burial at RWA-2, Locus 3A (see below)—a cross-over design treatment in both Boudiné and Kansyore vessels. Among the ceramic finds in test unit B was a fragment of a small urn with the same proportions and fabric as the remaining urn fragment excavated near the foot burial in 2015 (below, OSM Fig. 7-C). This displaced small urn and the presence of at least three bases of large urns evoke the interpretation that these ceramics may once have been located near the foot burial, being displaced by subsequent reoccupation of the site. The Boudiné vessels from Unit B were found with TU ceramics and incidental Kansyore sherds (e.g., OSM Fig. 4b-C; OSM Fig. 5-A & -C) as well as prestige goods that point to possible funerary objects displaced to the test unit B area, including a fragment of a small, undecorated urn similar to that documented near the foot burial (see below, OSM Fig. 7C). The painting on this ritually related urn with red ochre amplifies its use for rituals associated with the dead. Among these apparent grave goods is ground ochre, likely used in activities associated with ritual in the funerary process, given the evidence manifest on the small urn fragment. We review the significance of this ritually related ochre in the KA-4 excavation results (see below, KA-4).

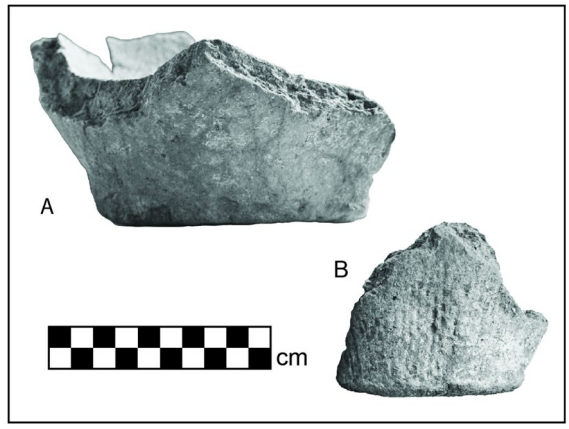

Fig. 4 A Base from Boudiné vessel decorated with finger impressions from stratum 2 of KA-1B; B base of a Boudiné urn decorated by stab-and-drag punctates, a Kansyore ceramic decorative technique, from stratum 2, KA-1D, 2 m north of unit B. Photos: by author

Beads and Ivory Ornaments, Unit B

The urn-like vessels with Boudiné characteristics are associated with apparent grave goods in KA-1B: beads made from land snail shells or elephant ivory, personal adornments/ritually charged items such as a carved ivory pendant made in two parts (Fig. 5-A), and two sections of carved ivory bracelets (Fig. 5-B). The ivory objects would have come from the tusks of forest elephants, endemic in the region today. Two of the disc-shaped beads are made from the shell of a giant African land snail (*Lissachatina* sp.), with the third made from elephant ivory (Fig. 6, far right). The snail shell beads have smoothed edges and measure 20–23 mm (max. width) with a 2–3 mm centrally located perforation. The periostracum, or outer organic layer of the shell, is still evident on one of the beads (center, Fig. 6). These are similar to beads found at many sites in eastern and southern Africa (Miller et al., 2018; Walz, 2017). The descriptions of flat, round beads recovered from a fifth century AD burial in Rwanda may match these but were not specifically identified (Giblin et al., 2010). The ivory bead is apparently distinctive for this era. Reid (2015) documents the extensive production of ivory beads at Ntusi in the early second millennium, nearly a millennium later.

Fig. 5 **A** Carved pendant in two sections, made from elephant ivory with a hole for a string at top, located beneath a Boudiné urn in test unit B; **B** two ivory bracelet fragments located beneath Boudiné urn in KA-1B. Photos: by author

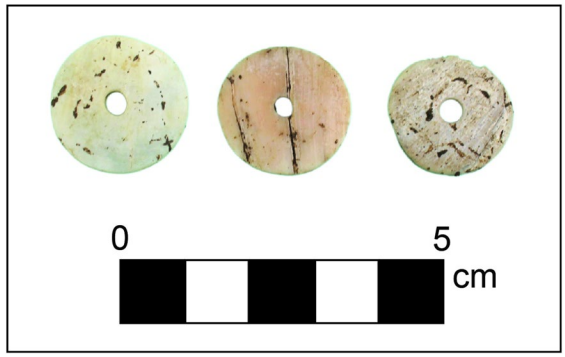

Fig. 6 Beads (left, middle) made from the shells of giant African land snail, recovered from beneath a Boudiné urn in stratum 2 of KA-1B; the bead on right was made from elephant ivory. Photo: by author

A recent review (Miller et al., 2018) shows that the land snail shell beads at KA-1 are the first such beads reported from an archaeological setting in Uganda. The shell beads and ivory objects found under and among large Boudiné ceramic sherds further support the idea that such large, heavy urns are associated with funerary practices. We sampled and dated charcoal beneath a Boudiné base, obtaining an AMS date of 359–101 calBC (Table 2, row 6). Given the disturbed context and the anomalous early date on charcoal near the burial-associated urn of KA-1A, this date is unrelated to nearby ceramics but appears to date a burning event.

Iron Items, Unit B

Iron items were scarce in the NCLR. Thus, the presence of a knife associated with Boudiné pottery in unit B and two bracelet fragments excavated in the top 10 cm of KA-1A, the burial location (OSM Fig. 6-A), provoked significant interest. The location of the bracelet fragments immediately above the burial points to a relationship with that feature. Supporting this perspective is an iron knife (OSM Fig. 6-B) located under Boudiné ceramics at the bottom of the second stratum in unit B. This, like other displaced objects in this test unit, was likely derived from a burial. As there is only one known burial, the knife, beads, and the large Boudiné vessels likely come from the funerary setting observed in unit A. The knife

resembles a knife used to trim banana plants, documented in NW Tanzania as an emblem of authority (Schmidt, 1997a). Given the absence of iron smelting in the region during the EIA, these objects must be trade items or curated heritage items acquired from outlying areas where the availability of iron ore made production possible.

Other Finds and Dating

During our 2015 season, we conducted another survey transect along the embankment next to the path, documenting Boudiné urns (e.g., OMS Fig. 3-A) as well as what appears to be a partially crafted stone bowl (see Supplementary Materials 3.15 for photos). We mitigated damage to the burial and opportunistically sampled three metatarsal bones for dating and ancient DNA analysis. An AMS date on well-preserved bone collagen of 400 to 537 calAD (Table 2, row 2) provides chronological insights into associated Boudiné and TU ceramics. We also removed the remaining fragment of a small urn, part of which was removed in 2014, for dating and residue analysis (OSM Fig. 7-A and 7-B). A TU rim sherd was associated with Boudiné and Kansyore sherds (OSM Fig. 4b—E, D, & C). The location was demarcated for resident farmers until we could return with a bioarchaeologist for comprehensive excavation.

The partial, small burial urn removed in 2014 with a thick charred deposit on its interior was AMS dated to 241–345 calAD (Table 2, row 3). This is older than the associated burial, a half century separating their range of statistical (95%) variation. The residue suggests that it was a curated heritage vessel later used for a special rite. This provides a glimpse into the values of such objects and their power to link the deceased to ancestors with deeper lineage history.

Lipid Analysis, Ceramics Of the twenty-seven ceramic samples selected for residue analysis from the region, ranging from heavy-duty Bigo "feasting" vessels (Posnansky, 1961, Fig. 4.8, p. 188) to narrow-mouth, petite Kansyore pots, two vessels (5.4%) yielded interpretable lipid profiles. Absorbed lipid residues from the Kansyore vessel, from a STP 2.8 m to the NE of the foot burial, showed that it was used to process/store ruminant carcass products, with the minor addition of non-ruminant products (OSM Fig. 5-B, Dunne & Evershed, 2019; for methods OSM 1.2).

Discussion

If ceramics elsewhere in the region are compared to the open bowl with lipid results, then its date places it in the mid-first millennium AD. It shares characteristics with Urewe ware in its morphology as a hemispherical bowl with a faceted (but not beveled) rim, yet it belongs to a category of stamped designs common to the Kansyore of the NCLR (see RWA-2, Locus 3A below). The dating results and associated ceramics also compel us to examine the significance of many TU ceramics associated with Boudiné ware near the burial. Though Kansyore ceramics are present, we do not see an association with this burial. We propose that the TU in the NCLR begins in the fifth century AD (see discussions of KA-1A burial and KA-3E burial), a period that is consonant with Giblin's findings in Rwanda (Giblin, 2013). This is earlier than the approximately 700–800 AD proposed for western Kenya (Ashley, 2010; Ashley & Grillo, 2015, p. 464)—an estimated date yet to be affirmed by multiple AMS dates. Intriguingly, among the Urewe ceramics from Gogo Falls in western Kenya, the first illustrated group (Robertshaw, 1991, Fig. 30.a-e, p. 131) has TU attributes. The date from the KA-1A individual agrees with other dating in the NCLR for both TU and Boudiné vessels, particularly at the KA-3 site, 350 m east. The earlier date (Table 2, row 1) on charcoal is unrelated to the burial and its grave goods. Given this and other early dates on charcoal from archaeological sites in the region, we believe that these dates are from charcoal derived from ancient forest fire episodes, most likely in a zone of dense and mature tropical forest.

We returned to the KA1 site in 2019, hoping to sort out the relationship of Boudiné ware with TU and Kansyore ceramics and further document the burial found in test unit A. Once the location was reopened, we found that all that remained were the foot bones without other skeletal elements. As we moved from the extant remains in the expected direction of a body in repose, we found only hard-packed, reddish-brown clay that had not been disturbed by hoe agriculture.

With meticulous attention to any bone fragments in the overlying matrix, we documented in excavation units A1 and A2 two small rib fragments and two human teeth, one of which was AMS dated to 423–544 calAD (Table 2, row 5), a date consonant with the date on the metatarsal (Table 2, row 2). The

absence of additional skeletal elements was striking, either a distinctive mortuary treatment, with only the feet of the individual buried, or an almost complete erasure of an in situ burial. More probable is a funerary event with special post-mortuary treatments that occurred nearby.

On the northern side of unit A1, a burned area at − 43 cm b.d. was documented where there was a high frequency of charcoal chunks and burned soil of a reddish-brown hue (Fig. 7), possibly caused by an ancient forest fire. A charcoal sample from this feature yielded an AMS date of 1611–1442 calBC (Table 2, row 4), four centuries earlier than the date of charcoal lodged against the small urn in the burial. This does not prove that the charcoal in the burial context came from the same fire event, but we must consider that trees of variable age were burned, leading to different dating results. We feel confident that the burned area contiguous to the foot burial is the source of the charcoal lodged against the urn. The layer of tuff on the eastern side of unit A1 is missing where the burn event occurred (Fig. 7).

Our 2019 excavations expanded spatial understanding of the burial setting. We opened unit A2 east of the foot burial to understand its wider horizontal context and the stratigraphic setting (OMS Fig. 8), also examining the path above the embankment created by deep hoe agriculture at Unit D (see Fig. 3). In the embankment profile, we observed large Boudiné bases and rims. The results of these excavations added significantly to our understanding of variations in Boudiné ware and provided additional direct evidence for Boudiné-associated burial practices.

Ceramics and Burial Discussion

What emerged clearly in 2019 was a mixture of Kansyore, TU/Boudiné, and Bigo ceramics in the A1 and A2 excavations. The assemblage remained modest ($n = 51$), with 33.3% representing the mid-first millennium AD and the remainder of the Bigo period—indicating a significant presence for the latter. However, in natural stratum 2 ($n = 13$), Kansyore and TU/Boudiné constituted 54% of the assemblage, a

Fig. 7 Remaining in situ foot bones (left center) and the burned area where the north/scale marker is located; under the sign board, on the right, is a layer of broken tuff. The two natural strata are visible in the west wall. Photo: by author

testimony to the perturbation that these open-air sites have experienced. Yet, importantly for the open-air sites of the NCLR, the stratigraphic integrity of unit D was less impacted by hoe agriculture, with Bigo ceramics significantly diminished in stratum 1—a minimum number of vessels (MNV) of 17 identifiable rims of which 3 were Kansyore, 12 TU/Boudiné, and 2 Bigo period. This provides a more reliable setting for insights into mid-first millennium AD funerary rituals as well as subsistence practices that included wild and domesticated animals. Stratum 2 also contained mid-first millennium ceramics, including Boudiné rims and pieces of urn bases (OSM Fig. 9).

The technological attributes of Boudiné and Kansyore vessels (large and small)—large quartz tempering (<5 mm), rough paste, and mostly reduced firing (though the less common, large open urns are more oxidized)—are so similar as to suggest shared resources and repertoires. These affinities are amplified by similar flat, thick bases on large urn-like vessels. Moreover, the decorative applications to the bases of some Boudiné urns parallel those found on Kansyore vessels in burial settings, such as finger impressions on the bottoms of the bases (e.g., Fig. 4-A). At KA-1D, a concentration of Boudiné vessels showed a variety of decorative treatments to bases: (1) impressions applied to the underside of the base and (2) rows of incisions (and stab-and-drag incisions) applied to the bottom of the base (Fig. 8a, also see OSM Fig. 4-B), a treatment that mimics the upper lines of exposed coils (Fig. 8b). When taken with the nearly identical technological similarities, where decorative treatments are placed on both large flat-based Kansyore and Boudiné vessels, this suggests a close relationship, indicating interactions between different social groups. The Kansyore ceramics from this limited zone of KA-1 provide a diverse collection, a fine baseline for comparison to type sites, the most important of which is Kansyore Island (Chapman, 1967).

Comparative evidence for burials in the western Great Lakes is sparse, but Giblin's (Giblin et al., 2010; Watts et al., 2020) excavation of EIA burials provides important parallels. Though associated with classic Urewe pottery, Giblin documented partial skeletal elements, with an adult burial missing all the lower post-cranial elements and cut marks on a broken humerus that point to de-fleshing post-mortem. This burial scenario fits with the foot burial at KA-1, though the latter is tied to Transitional Urewe/Boudiné practices during the mid-first millennium AD, and cut marks are absent. Nonetheless, these intriguing similarities may point to distinctive post-mortem treatments in this greater region during the mid-first millennium AD.

Other Burial Finds From the Boudiné-associated stratum in unit D, a partial bead made from a giant African land snail shell was recovered, perhaps derived from the same context as those documented in unit B, 2 m to the north.

Fig. 8 **a** (left) Two bases of Boudiné vessels documented from feature 1 at KA-1D. The bottom figure shows wide, shallow incisions on the underside, while the top figure shows horizonal incised lines applied to the lower 3 cm; **b** (right) Boudiné rims from (A) small open bowl; (B) small narrow-mouth bowl; (C) large urn-like vessel, 26 cm diameter mouth

Fauna

The KA-1 faunal assemblage, though quite modest, shows diversity in the procurement of wild species, with seventeen different mammalian species from all contexts, including two primate species. There are distinct spatial patterns, with most wild mammal species located contiguous to or near the foot burial; these wild mammal species range from small antelopes such as suni, bush duiker, and bushbuck (2 spp.) to African giant rat, vervet monkey, warthog, spotted hyena, and African buffalo. Given the strong presence of contemporary Kansyore and TU/-related populations on the site during the early to mid-first millennium AD, some of these species undoubtedly derive from that period. All these mentioned species are clustered near the burial, which motivates us to consider if some may be related to the rituals conducted at that event.

Chimpanzee remains were recovered in an STP, 3 m NE of the A1 excavations, and the remains of giant forest hog, spotted hyena, and civet cat (NISP and MNI = 1 each) were documented during the surface survey, located in deflated, disturbed contexts in areas with significant frequencies of Bigo period ceramics—the likely component with which these fauna are associated.

The faunal assemblage at unit B (a disturbed setting below the path with mostly TU/Boudiné ceramics) included two wild mammals, an immature bush duiker and both immature and adult impala (all 1 NISP and 1 MNI), mixed with domestic cow (NISP = 5—four charred long bones) and caprines (NISP = 5—one a charred long bone). The presence of charred long bones, a characteristic of Bigo period domestic fauna (see below), may point to a Bigo period influence here on top of the displaced earlier deposits.

As mentioned, unit D contained mostly TU/Boudiné era deposits; the upper stratum lacked faunal remains, and the lower stratum yielded one NISP of a domesticated cow and two NISP of caprines, with modest wild fauna: suni—one charred long bone (considered the same individual as in A1) and a typical striped field mouse, suggesting that smaller mammalian species such as suni (a very small antelope found in bushy environments, especially cleared areas of the former forest) were a small part of the earlier, first millennium AD meat diet (OSM 5.1 for all faunal data, hereafter).

Fauna Discussion

Prendergast's (2010) examination of Kansyore faunal remains at Wadh Long'o in western Kenya establishes that a herding component was present as early as the mid-third millennium calBC, which leads to the conclusion that "Kansyore foragers appear to have begun including domesticates in the diet whether through exchange or wholesale adoption of food production without major cultural or population change…" (Prendergast, 2010, p. 108). This important observation warns us that herding is a deep-time subsistence strategy for the Kansyore communities of western Kenya and likely was for Kansyore communities in western Uganda of a later era.

The key observation from the KA-1 assemblage is the dominance of caprine and cattle herding in the economy, with wild species constituting a supplementary, minor role. This was also the case in the "late" Kansyore at Wadh Long'o, where domesticated species comprise 65% of the assemblage and more than 90% NISP (Prendergast, 2010). In the NCLR, it is no surprise that the Kansyore-associated populations and their contemporary Bantu-speaking neighbors were herders and agriculturalists, given that Central Sudanic and Eastern Sog speakers (Nilo-Saharan languages) practiced grain agriculture and herding long before Bantu-speakers arrived.

The KA-1 site has experienced multiple occupations. Recent reuse of the site has added complexity but not occupational perturbations, particularly in excavation units A and D. Deposits deeper than 20 cm b.d. contain few second millennium AD ceramics, which suggests that faunal remains deeper than the hoe zone have integrity for documenting early dietary practices, much more so than those in the upper, disturbed stratum. Among the most significant faunal remains are those associated with the burial in KA-1A. Associated with the foot bones and funerary objects were fragments of three mammals (NISP = 1 each): a charred adult cow bone, a charred immature cow tooth, and an immature caprine vertebra. Though the residue from the vessel is older than the human individual, the presence of burned ruminant bones speaks to possible funerary rituals that incorporate domestic ruminants. These remains provide insights into both domesticated animals in subsistence practices and the importance of those animals in rites of passage. The use of immature animals in

these rituals compels us to consider an associational identity between the deceased and the animals, with a relationship that incorporates ideas of renewal—also present in the geographical placement of the burial on the western rim of the Kabata caldera where the first renewing rays of the rising sun strike—a theme that we explore in greater detail when examining burials elsewhere in the NCLR, particularly those in the Rwankenzi-2 sites northwest of Lake Wankenzi.

Additional possible interpretations pertaining to the association of animal bones with the human foot burial must account for the environmental setting during this period at KA-1—forest mosaics with interspersed grasslands and bush—habitat suitable for the small antelopes among faunal remains from KA-1 and other sites of this era. These ruminant remains, along with evidence for the creation of forest mosaics three to four centuries earlier by Kansyore peoples, suggest that possibly both domestic and wild animals played a key role in symbolic, ritual processes as well as daily life for those who produced and used Boudiné ware and their coeval occupants of the NCLR landscape—those associated with Kansyore ceramics. We must also consider the possibility that the ruminant remains are part of an earlier hunter tradition in which antelope played a role in subsistence and ritual processes, cultural practices passed on to the Boudiné/TU diet and symbolic world.

The presence of catfish remains, contiguous to the burial, is evidence of fresh-water fishing, a characteristic of Kansyore people elsewhere in the eastern reaches of Lake Victoria (Jones & Tibesasa, 2022; Lane et al., 2007; Prendergast, 2010; Robertshaw, 1991). While we expected more evidence of fishing given the proximity of the site to lakes and marshes, the Kansyore period in the NCLR does not show a record of fishing, perhaps influenced by taphonomic processes. In this limited instance, the fish remains are associated with those responsible for TU/Boudiné ceramics.

Lithics

The lithic assemblage from KA-1 derives from mixed deposits and thus has limited utility for characterizing the different occupational histories. Throughout subsequent sections of our discussions, we will report on sites with higher confidence for undisturbed deposits or single component sites. Lithic assemblages were modest in size, the sites are relatively small and subject to significant perturbations. They, therefore, present challenges for interpretation compared to sample sizes of tens of thousands of lithics (e.g., Kessy, 2005; Seitsonen, 2010) elsewhere in eastern Africa (Lithics Overview with figures, OSM 1.3).

Kabata-2

We encountered high surface frequencies of TU ceramics 62.5 m north of the secondary site datum at KA-1, with Kansyore and Bigo in lesser frequencies. After setting a 5×10-m inventory grid of eight units across the access path and the area below the embankment, our surface inventory determined placement of a 1×1-m test unit in the path. The test provided more evidence for the EIA TU component. Of the eight identifiable ceramics in the assemblage ($n = 17$), six were TU (see OSM Fig. 4b—A & B), one belonged to Bigo, and one to Kansyore (OSM Fig. 5-C), all located within a natural stratum of black loam, a shallow setting where dark reddish-brown soil appeared 14–18 cm b.d. This deeper horizon was excavated to − 41 cm to confirm a sterile deposit. Additional survey north of KA-2 documented a 140 m (N-S) by 50 m (E-W) area of TU occupation with occasional Bigo and Kansyore ceramics, confirming that the northern sector of KA-2 was primarily a TU occupation.

Fauna

The test in KA-2A provided a more secure context to assess mid-first millennium AD fauna, especially the role of domestic stock. This small test provided a larger sample (nonetheless modest) than did the larger excavation to the south in KA-1. Caprines (NISP = 1, MNI = 1) were not as popular as cows (NISP = 16, MNI = 2), with an immature individual alongside two specimens of bush-duiker—tentatively pointing to a supplementary role of wild meat in the first millennium AD.

Kabata-3 Site

Our transect surveys around Kabata Swamp in 1995 documented KA-3, initially identified as a concentration of LSA lithics. The KA-3 site is situated to the

east of Kabata Swamp, and separated from it by the deforested, cultivated, and seasonally wet Kidubule caldera (see Fig. 3). KA-3 was reidentified in 2014 as a dense concentration of lithics on the surface in a groundnut farm. Within an 8 m diameter zone, we placed three STPs to assess possible congruence between surface frequencies and subsurface evidence. This led to unit A, a 1 × 1 m test excavated to a depth of 80 cm b.d. within two natural strata. Unit A yielded an array of artifacts distinctive from any other site in the NCLR. Ceramics were few—one Bigo period ceramic and one Kansyore sherd, with three additional heavily weathered sherds with Kansyore-like paste and temper. Notably, lithic artifacts constituted virtually the entire artifact assemblage. We reprise here the highpoints of the lithic evidence.

Lithics

Of the 38 recovered lithics, 26 (68%) originated from levels 2 to 6 (natural stratum 2A and upper natural stratum 2B). Debitage (i.e., flakes) is common in unit A—68% of lithics. Finds at KA-3 indicate that this was a site of lithic production. Quartz (55%) is the most frequently used and distributed raw material across strata (OSM Table 1). Chert flakes ($n = 11$) are evident only in the uppermost strata, suggesting that this non-local raw material was increasingly accessible via mobility and/or interaction up until the site's most recent use.

The lithic assemblage at KA-3 also includes cores (8%), informal tools (8%), and formal tools (16%). Cores are bipolar ($n = 1$), multi-platform ($n = 1$), and single platform ($n = 1$). Bipolar cores are typical of the LSA in the NCLR (OSM Table 2). Compared with test unit A at Rusoona-1, there is a reduced diversity of formal tools ($n = 6$), perhaps due to a small sample size, the inclusion of a comparatively later period (with decreased lithic variation), and/or a difference in site function. End scrapers, thumbnail scrapers (single and double), a single side scraper, and a single backed blade occur in the assemblage. Retouched pieces display uni-marginal, bi-marginal, and/or combination retouch. A soft hammer was used to retouch select lithics from levels 2 to 4.

Typically, scrapers are quartz. This test captures a similar period as unit A at RU-1, but it does not have an early (third) natural stratum and it persists into a more recent millennium. At KA-3, the most recent tools, mostly quartz, and flakes (quartz and chert) indicate lighter tools when compared to the excavated formal tools (e.g., robust end scrapers) at RU-1.

KA 3 provides important environmental evidence, namely, two burning episodes during the earlier part of the lithic sequence (Schmidt et al., 2024). Stratum 2A contained large pieces of a small tree or large limb at − 40 cm b.d. and below, by 9 cm, another concentration of charcoal was documented (Fig. 9). We dated both burning episodes. The upper of the two samples dates to 72–221 calAD (Table 2, row 9) and the lower sample dates to 21–132 calAD (Table 2, row 8). These dates are several centuries earlier than the Kansyore burials at RWA-2, Locus 3, and Locus 2, as well as the KA-1-A burial. The association of these burning episodes with LSA lithics and sparse

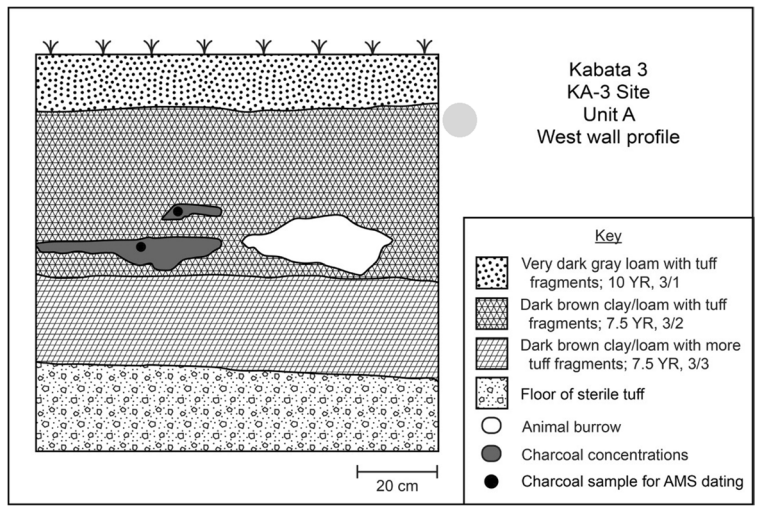

Fig. 9 Profile view of the west wall of KA-3A shows precisely where charcoal samples were located within two burning episodes

ceramic evidence points to early forest clearance by frontier LSA Kansyore forest dwellers and agropastoralists (see Paleoenvironmental and Historical Linguistics sections below).The KA-3 site sets a cultural reference point, along with several other dated sites, for forest disturbance through burning, events that we can link to changes in the environmental record around the NCLR (lithic illustrations and regional overview, OSM 3.1).

Additional KA-3 Excavations, Ceramic Overview

The KA-3 site takes on even greater importance when we examine the ceramic evidence from the 2021 excavation conducted by J. Besigye to gather additional information about the lithic record (Besigye, 2022). These excavations confirm a preceramic phase and also provide considerable evidence for a later Kansyore/Boudiné presence on the site in the mid-first millennium AD. A summary profile of decorated ceramics and rims ($n=107$) from ten 1×1 m units shows the bottom stratum (-50 to -90 cm b.d.), like the earlier excavation at KA-3A, was populated mostly by lithics. Modest numbers of Kansyore ceramics in the assemblage ($n=11$; 10.3%)—mostly narrow mouth bowls and other sherds decorated with rows of punctates (OSM Fig. 10) were located mostly on the surface to -40 cm b.d., leading us to query if there may have been a later Kansyore reoccupation of the site given the dense and deeper TU/Boudiné ceramics ($n=79$; 73.8%) in high frequencies between -20 and -40 cm depth. The Bigo period ceramic footprint ($n=17$; 15.9%) was less distinct than KA-1A.

Of interest are ceramics with close affinities to ceramics documented in Rwanda during the 1960s (Nenquin, 1967, Fig. 158.3, p. 265). These ceramics are characterized by a row of thin, crescent-like incisions (OSM Fig. 11a). In Rwanda, this pottery was labeled as "B Ware," initially documented at the Masangano site as associated with "Dimple-based ware." The differences with classic Urewe (Dimple base) are as clear as Boudiné, which was also designated as "Dimple-based" (Nenquin, 1967; see Giblin, 2013). At KA-3, there was a vessel with three rows of similar impressions mixed with Kansyore and Boudiné sherds (OSM Fig. 11b). This evidence we attribute to Transitional Urewe, as does Giblin (2013) in his restudy of Masangano, dated by AMS from the third to sixth centuries calAD, the same period for the earliest expression of Transitional Urewe in the NCLR.

Other ceramics from KA-3 trigger comparisons with ceramics documented by early investigators in Rwanda, such as Nenquin (1967) and later by Giblin (2013). For example, a vessel (OSM Fig. 12a) from Ruhimangyargya, Rwanda, was labeled "Dimple-based" by Nenquin (1967, p. 265). While the vessel's context was Early Iron Age, it lacks typical Urewe attributes. In other words, it is Transitional Urewe. It bears a resemblance to a pot excavated at KA-3 among Boudiné ceramics (OSM Fig. 12b) and appears to have been influenced by contemporaneous Kansyore pottery-making, like Boudiné ware. This decorative application in Rwanda—a line of rectangular punctates—is outside the Urewe repertoire and is much more in keeping with Kansyore, leading us to posit that similar interactions occurred in Rwanda; that is, communities who made TU ceramics were accommodating to and influenced by local Kansyore populations. The KA-3 bowl was found alongside lithics, particularly those made of chert, which tends to mark a transition to later, non- Kansyore manufacturers.

Among significant finds during the 2021 excavations was a large Boudiné vessel, later partially reconstructed, that illustrates the significant size of some Boudiné vessels with mouth diameters ranging from 26 to 30 cm (Fig. 10a). The morphology, large capacity, and a flat and heavy base ideal for a stable vertical orientation suggest a storage vessel, possibly for pearl millet and sorghum that were staples in the diet of this period (Schoenbrun, 1993), which is affirmed by Giblin's (Giblin & Fuller, 2011) documentation of sorghum and pearl millet at Kabusanze, Rwanda, with Classic Urewe of the mid-first millennium AD. Similar vessels were used with urns (also with heavy bases) for funerary purposes. This was made more vivid by another find at KA-3E, a large Boudiné vessel used for an infant burial. This vessel resembles the vessels at KA-1, where they are associated with the foot burial and grave goods such as land snail shell beads and ivory bracelets.

The infant was placed with their feet in the bottom of the vessel, with the skeletal elements consolidated in the bottom 25 cm (Fig. 10b). In nearby excavation unit KA-3C, there were three pieces of ochre in the same stratum, suggesting a ritual space dominated by the infant burial (see discussion of ochre at KA-4

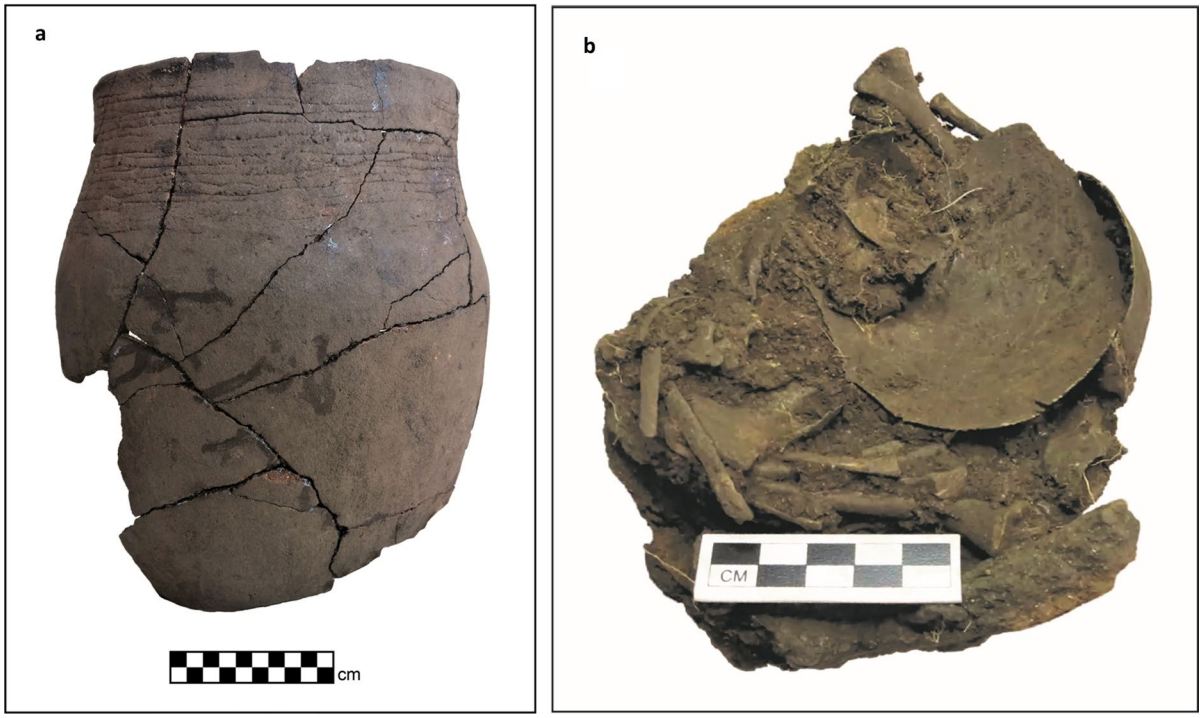

Fig. 10 **a** (left) Large Boudiné vessel excavated at KA-3C in 2021. **b** (right) Infant burial at the bottom of a large Boudiné vessel at KA-3E ~ −40 to 50 cm b.d. Photos: R. Asiimwe

below). The infant's age was approximately 6 months, based on the humerus length, later dated by AMS to 428–540 calAD (Table 2, row 11). This date places the Boudiné ceramic form as part of the TU complex in the fifth century AD, the period during which Kansyore populations inhabited the same forest/savannah mosaic. The NCLR was an interaction sphere where pioneer Bantu speakers exchanged economic and cultural knowledge with the earlier Kansyore populations of the region.

We were aware of the possible association of large pots with human burials, a relationship first observed in 1995. During a survey in 1995, a suite of pot burials was documented in a path leading to the top of Kyakatama Hill (see below). We observed fragmentary human remains and one immature tooth inside the exposed rims of two vessels. The broken rims of these vessels exhibited large quartz tempering and coil breaks, leading to their identification as burial vessels with Boudiné characteristics. When we returned to this site in 2014 and 2015 to relocate the vessels, we found that their location had been destroyed by road construction. This infant burial definitively establishes that some large Boudiné vessels were associated with activities pertaining to the treatment of the dead in the NCLR and perhaps Kansyore Island (Chapman, 1967).

Kabata-4: Boudiné Pot Burial

Another Boudiné pot burial was found during the transects around Kabata swamp. It was located in the front yard of a home on the Ndali—Mahoma—Rusoona road, only 30 m from and overlooking the southern end of Kabata swamp (see Fig. 3; site plan, OSM 3.1). Lying 3 m north of the road, the site came to light when Boudiné ceramics protruded above a small patch of "lawn" contiguous to a front courtyard. The restricted space necessitated a modest 0.75×0.75 m excavation to rescue this threatened fragmentary concentration of sherds of what appeared to be a Boudiné urn. The decorated Boudiné rim sherds and other urn pieces also have typical Boudiné tempering and paste (Fig. 11a). The base of the interior was encrusted with 3 mm thick charred deposits.

Fig. 11 **a** (left) Boudiné urn overlying a possible child burial at KA-4. **b** (right) An undecorated urn recovered by the landowner; it is much larger than the urn in KA-1A burial yet also undecorated and shares the same morphology and technological characteristics. Photos: by author

Excavation continued in dark brown loam until most of the unit was sterile, except for a circular area in the NW corner that may mark a grave outline. The test was sealed for later excavation but could not be addressed during the 2019 season. As we completed excavation, the homeowner brought a large urn from her house, excavated years earlier at this location and since used for miscellaneous purposes in the household (Fig. 11b). This well-preserved urn closely resembles the morphology of the smaller urns at the KA-1 site, associated with the foot burial. The absence of coil breaks on its rim raises questions about its relationship with other Boudiné vessels. However, the affinities with Boudiné urn morphology and technology are strong, suggesting a specialized, likely ritual function, especially given its context.

The disturbed circumstances of the upper deposit point toward the truncation of the deposits during the construction of the courtyard. We were alert to the possible presence of human remains, given vessels at the KA-1 site. Four immature human teeth (cusps, no roots) were recovered under these sherds, affirming that this locale was once associated with either post-mortuary treatments or highly specialized funerary activities. The immature age of the individual, in addition to the presence of Boudiné and large plain urns, recalls the similarities to the infant burial documented in a Boudiné urn at KA-3 as well as the plain and Boudiné urns at KA-1. We identified seven Boudiné rim sherds at KA-4A. Rim profiles indicate remnants of three vessel forms, all showing large (<5 mm) quartz tempering and paste color ranging from black to dark brown. The rims and the remaining 132 body sherds (very friable, not possible to reconstruct) from the funerary vessel weighed 2.645 kg.

Discussion: Lipid Analysis, Ceramics, and Ochre

Lipid analysis of this urn demonstrated that it was also used to process/store mainly ruminant (presumably

from domesticates) carcass products, with the addition of non-ruminant products. This outcome suggests a ritual in which a domestic animal was cooked on an open fire, given that the exterior of the vessel was charred. We cannot determine if this was part of the funerary ceremony or a prior burning, but the careful placement of the urn with human remains shows a replicated ritual process across these two sites and likely characterizes a funerary ritual that derives from a syncretistic blend of values. We see this taking form as a West African group (those making the interrelated TU and Boudiné ceramics) encountered and then mixed, borrowed, and learned from East Africans (contemporary Kansyore hunters/gathers/agropastoralists) whose cattle and sheep figured prominently in daily and ritual life.

The association of Boudiné vessels with funerary practices strengthens the findings at KA-1, where there was a plethora of such vessels. Finally, the presence of ochre within this matrix points to a ritual significance wherein the domains of death, sacrifice (blood), and domestic animals were united in a ritual enactment that affirms these life-giving elements within a death ritual of renewal. Ochre amplifies these tropes, so when identified in such settings—KA-1B and KA-3—we are more confident of its ritual significance.

Lithics

Among miscellaneous lithic items was a quartzite drill in the midst of Boudiné sherds. This object, distinct among pieces of gneiss and a familiar LSA artifact, takes on added meaning when the context is considered—an infant burial with material culture common to Kanysore neighbors. We posit that this event replicates other practices evident in NCLR burials, perhaps a gesture of identity linked to a neighboring culture.

Central Sites:

Rusoona-1

The Rusoona site (RU-1) was first identified in 2012 during a reconnaissance visit with personnel from the Uganda Museum and scientists from the Mbarara University of Science and Technology. It is located on a high, small plateau (~ 1394 m a.s.l.) overlooking Lake Mwamba (1304 m a.s.l.) to the south and bordered on its north by a steep-sided dry caldera, with the nearest accessible water source 600 m NE at the Dura River. Rusoona hosts a church and a small primary school (Figs. 12 and 13).

In 2012, we observed Kansyore and TU ceramics and LSA lithics in a 70 cm deep road cut near the driveway to the Rusoona church. We returned in 2014 to record a stratigraphic sequence. Transects were spaced at 5 m intervals across the 50 × 200-m (1 ha) site, documenting the culture history, including Bigo period ceramics and iron forging slag on the western side of the site. The iron slags were near

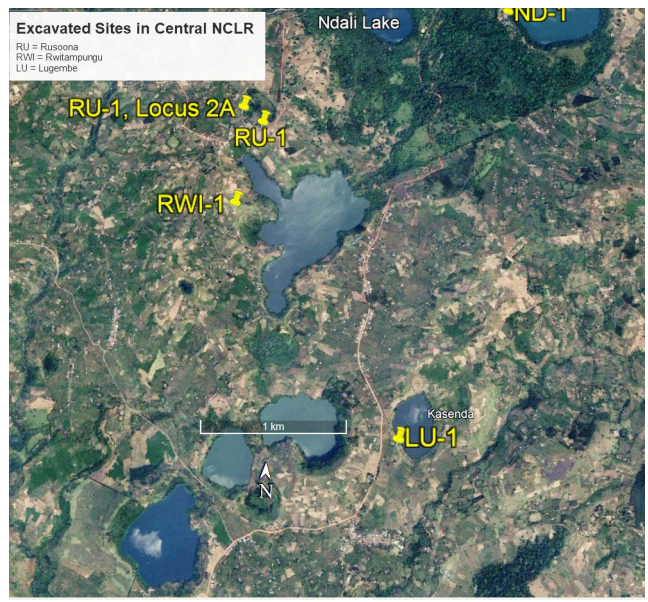

Fig. 12 Excavated sites in the north-central zone of the NCLR: RU-1 = Rusoona-1; RWI-1 = Rwitampungu-1; LU-1 = Lugembe-1. Google Earth image

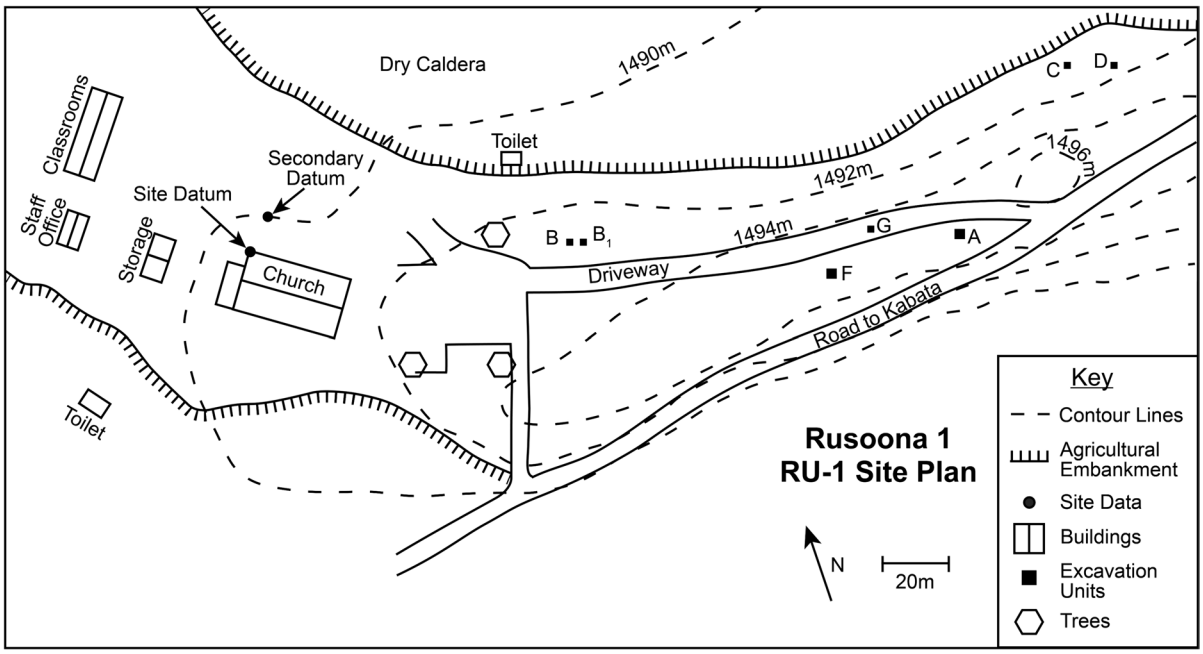

Fig. 13 Site plan of Rusoona-1 (RU-1); Test unit H is off the map to southwest and RU-1, Locus 2 is 108 m west of the site datum

exposed tuff patches behind the church in a deflated setting. Contemporary, intensive agriculture occurs south of the road on a 15-to-20-degree slope toward Lake Mwamba and north on a slope into a filled caldera with steep walls. The soil near the road is a hard-packed loam with dense concentrations of volcanic tuft and pieces of gneiss, a matrix difficult to penetrate with excavation tools.

We selected a 4 m wide zone between the driveway and road-cut exposure to place a 1.5 × 1.5 m test unit (RU-1A, Fig. 13). The initial excavation levels (surface and a 15 cm hoe-zone level) revealed high frequencies of gneiss gravel mixed into very dark grey loamy soil. The end of level 2 corresponded to the end of the first natural stratum, where the soil became hard-packed, very dark brown, and again with gravel (gneiss and tuff) inclusions. A concentration ($n = 7$) of mostly quartz and greenstone cores was located in the NW quadrant of the test unit. A color change to very dark grey soil, more loam-like in texture in a 30 cm diameter circular area from − 14 to − 25 cm b.d. in the SW corner contained pieces of tuff and decorated Bigo ware (feature 1). Ceramics, lithics, and large pieces of gneiss (packed together at times) were found throughout in higher frequencies, along with burned animal bones. This upper part of the second stratum was rich in ceramics, particularly Kansyore (Fig. 14). This stratigraphically distinct Kansyore ceramic concentration was impacted in the SW corner by later human activity.

Ceramics

A high frequency of Kansyore ceramics was documented in the lower part of stratum 1 (15 to − 17 cm b.d.) and the upper part of stratum 2, starting at − 15 cm b.d. and continuing to − 35 cm b.d. This 20 cm zone contained 73% of the decorated Kansyore ceramics ($n = 33$), clearly marking the Kansyore occupational horizon. The Bigo period component appeared in the top of stratum 1, with 54% ($n = 13$) Bigo pottery present in the upper 15 cm and 25% ($n = 6$) derived from the small intrusive feature that penetrated to − 25 cm b.d. As excavation continued below − 35 cm b.d., the soil remained the same but lithic frequencies increased while ceramics decreased. The high frequency of cobbles made excavation difficult. Frequencies of ceramics continued to diminish to − 55 cm b.d, where there was a soil color change on the south side to very dark grey, marking the

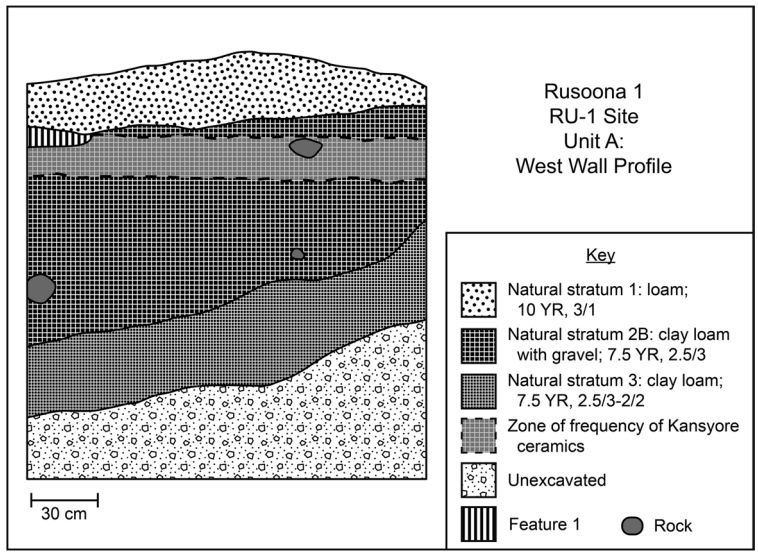

Fig. 14 Profile of West wall of RU-1A

beginning of a natural stratum with lower frequencies of rubble. From − 45 to − 65 cm, only two undecorated Kansyore ceramics were recovered. Thereafter, deposits were aceramic.

Notable is the absence of Boudiné ware in this excavation. The relative integrity of the stratigraphy at RU-1A vis-à-vis other sites investigated during 2014 and the distinct horizon of in situ Kansyore ceramics merit description. The most frequent decorative treatment among Kansyore ceramics was horizontal rows of cylindrical stamping (30%; $n = 10$). Other stamped treatments include checkerboard and converging stamps (45%; $n = 15$) and horizontal rows of punctates (15%; $n = 5$). Horizontal rows of decorative applications—stamped and punctate—dominate the assemblage at 45%. The absence of composite panels is a distinguishing characteristic, contrasting significantly from western Kenya and congruent with Kansyore Island.

Lithics

Lithics from this test excavation provide insights into the LSA associated with Kansyore. While the lithic assemblage is modest—as at most sites within the NCLR—RU-1A and KA-3A present the best opportunity to understand Kansyore lithic evidence. Excavated lithics at RU-1A are best characterized within three natural strata (NS) excavated to a depth of 120 cm b.d. Of the 36 lithics, 23 (64%) derive from levels 4–6 (NS2A and upper NS2B). Debitage is rare, suggesting an area of use rather than lithic production and retouch. As to lithic raw materials (OSM Table 3), quartz (42%) and gneiss (39%) are most frequently used and best distributed across strata. Greenstone (13%) and chert (6%) appear only in levels 4–6. The frequencies of raw materials correspond to the use of a local landscape with lithic raw material sources. Notably, however, lithic raw materials diversify (e.g., to "not local but accessible" sources, like chert) in levels 4–6, the most intensive site use period.

The lithic assemblage (OSM Table 4) at RU-1 includes cores (11%), flakes (5%), and informal tools (3%). Formal tools predominate (81%). Cores are discoid ($n = 3$) and multi-platform ($n = 1$) in character. The formal tools ($n = 29$) include end scrapers (59%), side scrapers (7%), burins (10%), backed crescents (7%), and bifacially flaked points (7%). Retouched pieces display only uni-marginal retouch. West of the Lake Victoria Basin, discoid cores, backed pieces, and points are common during the later MSA and Early to Middle LSA. Cores and points at RU-1A are of non-quartz raw materials, also characteristic of this region during this period. Most tools, especially gneiss end scrapers with steep faces and convergent bases (for hafting), are robust.

Other Finds

Ochre The upper part of stratum 1 contained a piece of ochre, with another piece documented at − 90 b.d.

in an aceramic deposit. Ochre pieces at the KA-1, KA-3, and KA-4 sites have clear contextual associations with rituals related to death and renewal. The significance of ochre among Bigo ceramics in the upper stratum may be linked to its use in decorating ceramics with red paint, seen, for instance, in a Bigo burial at RU-1, Locus 2 where vessels have red slips and were painted with red stripes (as are other Bigo period ceramics at other sites). During the mid-second millennium AD, the ochre-colored painting was an important part of the ceramic decorative repertoire. The significance of the pre-ceramic ochre is unclear without additional evidence.

Fauna There were three bone fragments in the upper natural stratum, with caprine and domestic cow located in an intrusive feature associated with Bigo ceramics. There were no faunal remains from the Kansyore cultural stratum.

RU-1B, RU-1B1, RU–C, and RU-D Test Units

We returned to RU-1 in 2019 to test the open field east of the church and north of the RU-1A, where survey transects had documented artifact concentrations. We placed two 1×1 m test units (B and B1, see Fig. 13) where fragments of heavy urn-like bases were common. This zone had dark, black soil, and while surface inventories showed promising areas to assess, the sparse frequencies of excavated artifacts (e.g., 66 ceramics, mostly undecorated) did not correlate with surface scatters. RU-1B, a shallow test trench near the church courtyard, was sterile at − 20 cm b.d, with four Bigo, one Kansyore, and six Boudiné sherds recovered before a dense gneiss gravel was encountered. Based on surface finds, a similar test unit, RU-1B1, was placed 2 m to the east. The presence of five Bigo period ceramics in the top level of the culture-bearing stratum confirmed that this part of the small plateau was utilized during the mid-second millennium AD. The second spit was distinctly different. It reached sterile tuff/gneiss gravel and yielded two TU rims—one faceted—plus three Boudiné ceramics and three base fragments. This assemblage affirms the presence of TU/Boudiné-making populations in the mid to late first millennium AD.

To gain a more complete perspective of RU-1, we placed test RU-1C (see Fig. 13) to the east and downslope from the B and B1 test units. The earlier occupations, especially Kansyore, were located on the rich soils of the caldera slopes. There were three clear strata based on soil color, texture, and inclusions. The soil profiles of RU-1C and RU-1D (Fig. 15a and Fig. 15b) capture the lower slope characteristics. Most ceramic artifacts in RU-1C derived from the second stratum, a black clay loam marked by a pavement of gneiss chunks covered by dense gneiss gravel in lower stratum 1. This rock concentration generally varied in thickness from − 28 to − 42 cm b.d. within stratum 2 and into the top of stratum 3, the latter of which was a very dark brown clay loam. Within the rocky layer and stratum, there were six decorated Kansyore and Boudiné ceramics and one incised TU sherd. An AMS date was obtained from a charcoal sample in the SW corner at − 31 cm b.d.—a tenth century AD date: 894–1022 calAD (Table 3, row 1). This date is associated with the cross-hatched TU rim. This finding suggests that Transitional Urewe in the NCLR may extend through the tenth century AD.

The same rock layer—less dense—appeared in RU-1D in a very dark brown loam ~ − 32 cm b.d. This rock layer included and sealed a high frequency of Kansyore ceramics in both test units. Its integrity also increases confidence that the faunal remains are little influenced by the Bigo period and other later occupations in the western part of the site. The layer of gneiss chunks—5 to 20 cm in diameter and packed together in a tight matrix of gneiss gravel—deserves additional inquiry in the future. This pavement-like feature suggests purposeful transport to this locale, possibly to construct houses of stone and mud that subsequently collapsed with a Kansyore component sealed within and below them. Our assessment of these results and their context in deep, rich loam is that they mark a spatial segregation within the site, with agriculturally attractive land in the north and east separate in space from later Bigo period habitation.

Ceramics

At RU-1C, the ceramic assemblage was modest ($n = 12$) but provided key insights about Kansyore (33%) and Boudiné/TU (50%/8.3%) ceramics highlighting, for instance, the contemporaneity of the two wares and their associated populations and emphasizing a predominantly early first millennium assemblage. Kansyore ceramics at RU-1C and -1D are dominated by punctate decorative applications. Rectangular, spatulate, round, and square punctates

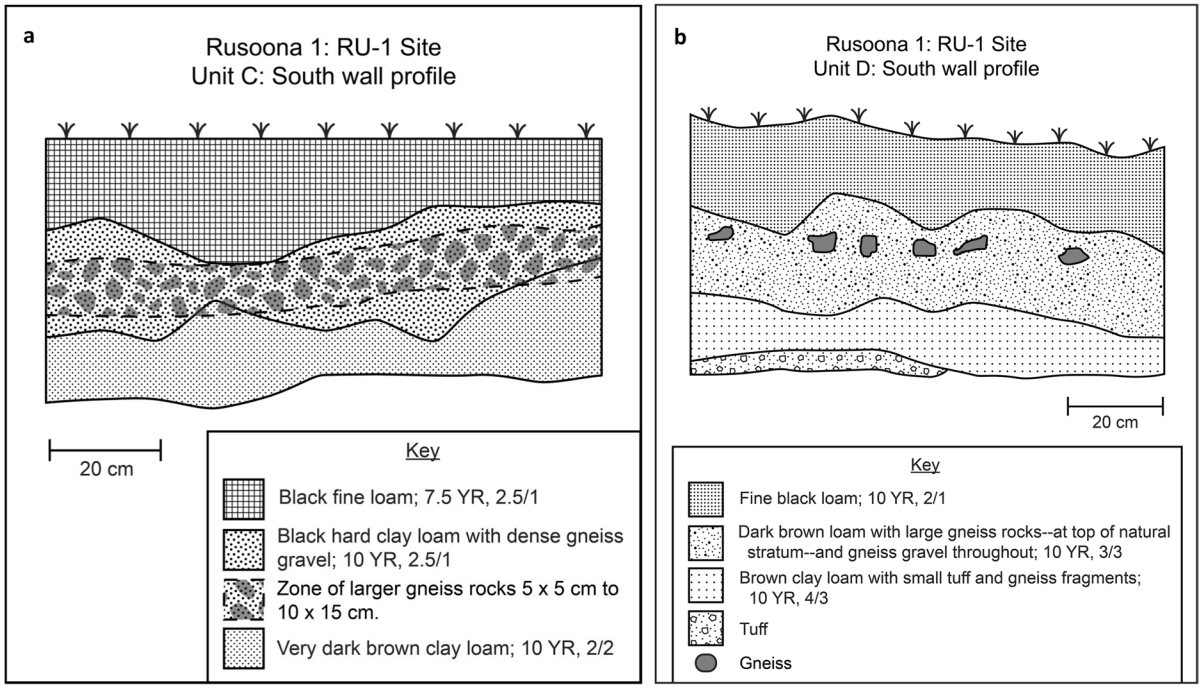

Fig. 15 **a** (left) Profile of South wall, unit C at RU-1; **b** (right) profile of south wall, unit D at RU-1

characterize decorations in the assemblage, mostly in rows (Fig. 16-B, C, & F). Some rather irregular cylindrical stamping, both in rows and converging/crisscrossed (Fig. 16A & E) and in a singular case, a diamond-shaped pattern was also present (Fig. 16-D). Significantly, one base fragment from unit C and a complete base from unit D are decorated with finger impressions (Fig. 16-G; also see Fig. 28b for RWA- 2, Locus 3A & OSM 3.9). This attribute ties these ceramics—also tempered with very large quartz fragments in micaceous clay—to those documented in a Kansyore burial at RWA-2, Locus 3A, and in stratum 2 of KYA-2 (both below). The bases of these robust urn-like vessels were closely associated with a Kansyore rim sherd (OSM Fig. 13) that bears the same decorative motif as the rims at the sites referenced above. This observation establishes this vessel form and its associated decorative motifs (convergent and crisscrossed stamping with borders) as a pan-regional Kansyore ceramic type. The large volume and morphology of these vessels and their presence in domestic and funerary settings point to a primary function of storage.

Of note, about 53% ($n=34$) of the Kansyore and Boudiné ceramic assemblage from both RU–C and RU-D was located *within this rocky stratum*, while 90% of the ceramics within this stratum in RU-1D were Kansyore and Boudiné wares, thus indexing significant integrity and contemporaneity. Kansyore ceramics comprised 90.5% ($n=19$) of the ceramic

Table 3 AMS radiocarbon dates from Rulama-1, Rulama-1/Locus 2, and Rwatampungu-1

Item # & Lab #	Site & year collected	Sample ID & source	14C age uncal BP	68% low/high	95% low/high
1. AA114071	Rusoona-1 (2019)	RU-1C *Charcoal*	1069 ± 35	952 to 1017 calAD	894 to 1022 calAD
2. GAAMS 58846	Rusoona-1 (2019)	RU-1, Locus 2A1 *Tooth*	650 ± 20		1287 to1356 calAD
3. PSUAMS 9768	Rwitampungu-1 (2019)	RWI-1A *Bone- metatarsal*	1025 ± 15		993 to 1030 calAD

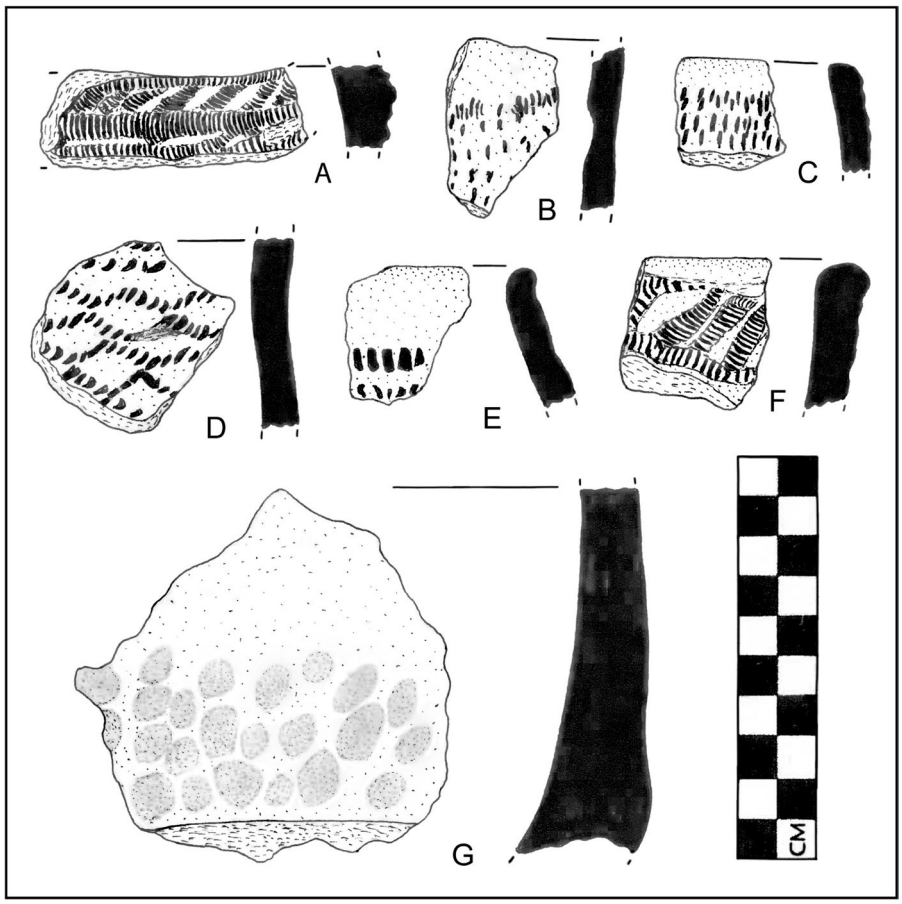

Fig. 16 Examples of decorative applications on Kansyore ceramics at RU-1C and RU-1D; **B**, **C**, and **E** illustrate the dominant decorative application—rows of punctates; **A** and **F** are examples of convergent and crisscrossed stamping using a carved cylinder; single sherds with diamond-shaped, stamped intersecting lines (**D**) occur at two other sites—KYA-2 and RWI-1

assemblage in this unit, with one TU and one Boudiné sherd. Even among the surface finds ($n=9$), Kansyore ceramics were significant (33%), while Bigo period (44%) ceramics were only located on the surface.

Fauna

The faunal remains at RU-1C and RU-1D provide important evidence for the role of domestic stock in subsistence practices during the early first millennium AD. There were well-preserved and undisturbed faunal remains compared to other NCLR sites. Starting with RU-1C, the uppermost stratum—transitional to TU/Boudiné and Kansyore—had a relatively mixed profile of cows (NISP = 3; MNI = 2), with caprine remains (NISP = 4). In Kansyore stratum 2, caprine (NISP = 7) dominated the assemblage. A similar pattern emerged in RU-1D, where caprine (NISP = 5) remains were more frequent than cows (NISP = 1) in stratum 1. In Kansyore stratum 2 at RU-1D, caprine remains (NISP = 2) were not as frequent as cow remains (NISP = 4). The entire Kansyore assemblage suggests a pastoral Kansyore subsistence component at this locale that favored domestic caprines over cows.

There is a mixture of wild and domesticated animals associated with Kansyore deposits. Domestic animals are present alongside a vervet monkey, suni, and bush duiker (each, MNI-1). The bush duiker is a small antelope known to inhabit high altitudes of woodland and grassy environments—pointing to a modified environment in the NCLR during the Kansyore occupation. Snares, rather than organized hunting, may have captured these small antelopes and vervet monkeys. The presence of each of these species in the Kansyore-bearing deposits suggests the inclusion of meat in a diet based predominantly on domestic herd animals supplemented by opportunistic capture of wild game. RU-1C provides a parallel but slightly different view of the Kansyore meat diet

with warthog and baboon (each MNI = 1) rather than the antelope and vervet monkey of RU-1D. Domestic stock dominated Kansyore horizons in both excavations—though the data are very modest in number—they amplify similar fauna profiles at Kataba-1.

These results sketch out an agropastoral economy where people practiced opportunistic capture of primates and small antelopes as a part of their subsistence diet, which was dependent on domesticated animals. The habitats of these wild animals are bushy fringes of extant forests and more open savannah grasslands created by the clearing of forests for agriculture and grazing of cattle, goats, and sheep. The presence of wild animals in the meat diets of these early and mid-first millennium AD communities suggests that domestic animals did not fulfill all of their needs, with wild animals playing a supplementary role—modestly resembling the Oltome at Wadh Lang'o in western Kenya (Prendergast, 2010), where there is a much richer faunal record.

Lithics

Lithics from the Kansyore strata complement the LSA Kansyore horizon observed in unit RU-1A. The assemblage is small ($n = 13$), which is characteristic of most open-air sites in the NCLR. RU-1C and -1D are characterized by a pyramidial core ($n = 1$), a blade ($n = 1$), flakes ($n = 6$), and other debitage ($n = 1$). Similar to RU-1A, debitage is rare. With a dearth of formal tools (and only one utilized notched flake), production areas have yet to be excavated at RU-1. In terms of raw materials, RU-1C yielded quartz ($n = 5$) and gneiss ($n = 4$), while D produced chert ($n = 1$) and gneiss ($n = 3$) artifacts, paralleling an emphasis on quartz and gneiss documented at RU-1A (OSM 3.1 for lithic evidence and drawings). Excavations continued at RU-1 during 2021 as part of PhD research by J. Besigye. These excavations (F. G, and H, see Fig. 13) will be reported separately, with results demonstrating a significant aceramic component that dates between the mid-fifth and late third millennia calBC, with lithic artifacts that are congruent with the findings at RU-1A.

Rusoona-1, Locus 2A/A1

As part of our regional program to rescue threatened burials with the assistance of residents, we learned of the presence of a partially exposed burial 113. 1 m W of the secondary datum. Located partly in a small courtyard and in an embankment created by a hillside house platform, this locale was designated as RU-1, Locus 2. Skeletal elements were visible in the courtyard. We placed a 1.5 × 1.5 m excavation unit in the contiguous embankment (RU-1, Locus 2A), with a 1.5 × 1.5 m unit over the remaining burial (RU-1, Locus 2A1).

The grave outline was observed after the removal of 10–15 cm of overburden, resulting in the exposure of the in situ burial (OSM Fig. 14). As to the preserved skeleton, the skull and the associated cervical vertebrae were absent, but a relatively complete extended postcranium was identified. This Bigo period individual was lying on her back with arms extended and her hands crossed at the pelvis. Portions of the axial skeleton, including the ribs and thoracic/lumbar vertebrae, were well preserved. Yet, a fair amount of the skeleton was poorly preserved (e.g., shoulder girdle and sternum). This individual had a well-preserved pelvis with a sciatic notch that confirms a female. The Locus 2A excavation helped to document the culture history of the locale. The top 15 cm of black loam had numerous tree roots, garbage thrown up from the courtyard, human teeth, and a partial mandible discarded on the embankment, an uneven surface with a significant slope. While the pottery vessels associated were broken and scattered, the breakage occurring post-burial as tool-like scars on some sherds point to battering by hoes used to excavate a modern house platform. A human tooth was dated by AMS to 1287–1356 calAD (Table 3, row2), placing this individual and her associated ceramics in the early fourteenth century AD. Thus far, this is the best contextualized Bigo period burial documented in the NCLR. It is also the earliest, corresponding to a time immediately after a severe drought when the region experienced another wet, humid phase (see Paleoenvironment below).

Ceramics

As the thoracic portion of the individual was uncovered, we found Bigo pottery near the ribcage, an 11 cm diameter vessel decorated with plaited roulette and vertical stripes of red paint, similar to the partial vessel found with a disturbed Bigo burial at Nkruba-1 (NK-1, Locus A & A1, see below). A partial open bowl with plaited grass rouletting on the

upper rim and finished with a burnished red slip was documented next to the right femur (Fig. 17a-A & Fig. 17b). A diminutive open bowl with plaited grass roulette (PGR) bordered by punctates was included in the grave goods (Fig. 17a-B); see Posnansky, 1961, Fig. 5, p. 190) for diminutive vessels). A large open bowl was recovered from contiguous unit A in the same stratum where the skull and cervical vertebrae once were situated (OSM Fig. 15).

This assemblage comprises eleven rim sherds from ten open bowls and forty decorated body sherds. The decorative elements on rims, PGR and TGR (twisted grass roulette), are equivalent in frequency (each $n=10$) and are placed atop the rims, often bordered by impressed cord designs. Two Kansyore sherds, including one narrow-mouth bowl, are decorated with linear rows of punctates. This light activity footprint on the western slope of Rusoona is consistent with Kansyore and Boudiné-period (one sherd) occupations favoring locations with good view sheds. It also speaks to a more transitory presence on the landscape, with family units and lineages passing over the landscape in shorter intervals.

What emerges most importantly is the presence of pottery decorated by slash-like incisions, which constitute 17.5% ($n=7$) of the decorated body sherd assemblage, two of which were painted red. Ceramics with these attributes plus two TGR rims with red slips make up 25% of the Middle Iron Age rims (MIA; 1200 to 1650 in the NCLR) and are key indicators that these decorative motifs are part of the Bigo period tradition, similar to our findings at the LU-1 site and KYA-1D excavations.

Discussion

There are different funerary treatments of individuals across the NCLR landscape and through time. Burial goods were found at K-1A, -1B, and -1D, where items of value such as iron objects, ivory ornamental adornments, land snail shell beads, and specialized pottery—urns and heavy, flat-based vessels—were documented as TU/Boudiné associated. Contemporaneously, a Kanysore-period female at RWA-2, Locus 3A, was interred with one large and elaborately decorated flat-based ceramic vessel.

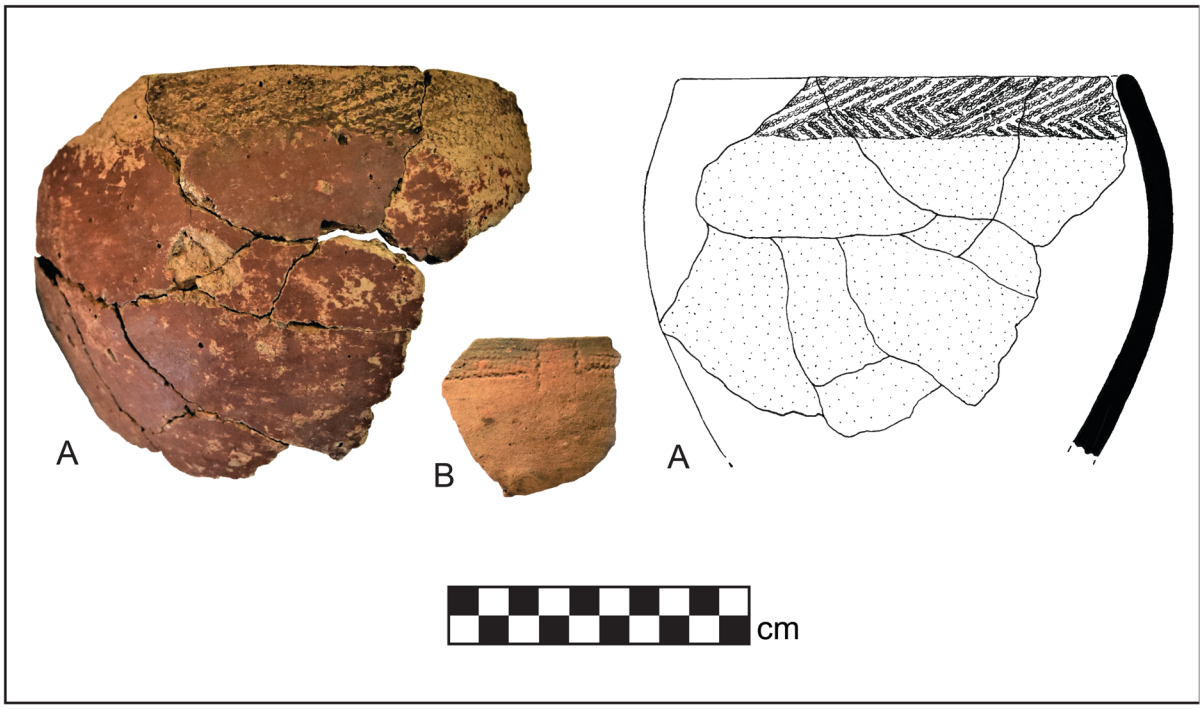

Fig. 17 (left & right, **A**) Partial, red-slipped, and burnished vessel with band of TGR placed near the right femur and pelvis; (bottom, **B**) Small, delicate, open bowl with vertical sides and a band of TGR bordered by punctates. Photo: by author

There is a vast archaeological literature about prestige goods in burials. In eastern Africa, little detailed evidence exists for the Early Iron Age or Kansyore burials associated with burial goods. An assumption about "wealth" has recently been applied to the EIA in Rwanda (Giblin et al., 2010), focused on an EIA female burial associated with iron bracelets, a necklet, a disc, and a complete Urewe vessel among ten partial vessels as well as shell beads and a cowrie. Certainly, the Boudiné/TU burial at KA-1 is comparable and a vivid testimony to the diverse items of value placed with the deceased. Though we have documented twelve burials, it is premature to venture an interpretation about prestige or wealth. Among the four adult individuals documented from the mid-first millennium AD, only the Kansyore period female at RWA-2, Locus 3A, was interred with a fancy burial items.

Among all remaining burials, only this later Bigo period female at Rusoona-1 was treated in a manner to set her off from other individuals, male and female. Likewise, lithic artifacts found in other graves—like the EIA burial in Rwanda (Giblin et al., 2010)—may point to ritual performances that captured each individual's identity or how they were perceived in their past, present, and future lives. We draw attention to the continuities in ritual practices over 1000 years, including urns and pots with some burials, even those whose partial remains are ritually imbued (e.g., at KA-1A).

Rwitampungu-1, Burial

As we excavated the grave at RU-1, Locus 2A, a nearby resident and manager of the Ndali vanilla factory, learned we were soliciting information about burials. He encouraged us to visit his property at Rwitampungu, 1.7 km to the SSW, where he had recently built guest bungalows. We immediately visited the site, whose name means "where eagles die," a reference to a deep, vertical volcanic vent 1 km to the South. Underneath one structure, builders reported a burial. We troweled through debris next to a support pillar without finding a burial, except for random skeletal elements in the backfill. The owner insisted we had missed it and asked that we return to excavate again. He was correct. The cramped quarters—excavating while lying flat under the joists of the house—had restricted forward progress (OSM 3.2 for photo).

The next day, we uncovered forearm bones and a skull of a young adult male with hands placed adjacent to the face. The individual was interred on his back, but construction cut off the lower postcranial skeleton after the fifth lumbar vertebra (OSM Fig. 16). Disturbed remains include the aforementioned lumbar vertebra (L5) which shows marked degenerative joint disease, a complete sacrum (with associated lipping along the inferior portion of the L5), a left distal tibia (< 50%), a right distal tibia (< 25%), and a near-complete left fibula (~ 90%), less the proximal end. Concerning pathology, this individual was seemingly healthy in the upper portions of the body, but from his lower back (lower lumbar region) and below, there are insults to the skeleton that are noteworthy. There is marked lipping along the rims of the L4 and L5 vertebral bodies and the corresponding superior surface of the sacrum. There is marked osteophyte development in the right transverse lamina of L4 and L5; all lumbar inferior articular facets show evidence of degenerative joint disease. This individual had a compromised lower back. A right calcaneus, found in a disturbed portion of the pit, also exhibits marked osteophyte formation and entheseal changes at the site of the insertion of the Achilles tendon.

Our surveys of the hilltop on which the site was located yielded significant evidence of Kansyore ceramics (OSM Fig. 17). The location on the western rim of Lake Mwamba caldera added to our expectation that this burial might date from the early to mid-first millennium AD like other Kansyore burials. Kansyore ceramics were associated with the burial with a backed blade of quartz, located 10 cm west of the skull in undisturbed soil. This appears to be a purposeful placement of the lithic artifact, similar to our findings at RWA-2/L3A (see below). The burial of a lithic tool with the deceased may be a ritualized heritage practice or recognition of the life role of the deceased, an interpretation based on multiple examples.

This burial dates to 933–1030 calAD (Table 3, row 3), an intermediate date that is significantly younger than the Kansyore burials documented in the NCLR. The high frequency of Kansyore ceramics on the surface of Rwitampungu Hill strongly suggests a significant Kansyore site. However, the presence of later ceramics indicates that a later burial may have penetrated the Kansyore occupation horizon and included

Kansyore ceramics in its fill, an interpretation we favor. Among the Kansyore ceramics documented, several display composite decorative elements—examples that are exceptional in the region. The date provokes consideration that populations from southern South Sudan may have continued to cycle into the region until the end of the first millennium AD. While the specific cultural affiliation of this individual is unclear, we may imagine that this individual represents a yet-to-be-identified group, perhaps pioneer agropastoralists of eastern origin (e.g., west-central Uganda and further eastward) seeking greener pastures at the onset of a drying episode. Like many other Kansyore sites in the region, RWI-1 had a remarkable viewshed, with vistas to the East, South, and West.

Lugembe-1

The Lugembe-1 (LU-1) site was identified during our 2015 regional survey using radiating transects from caldera lakes. It differs significantly from other sites in the region due to the low-lying terrain surrounding two-thirds of the lake's circumference (see Fig. 12). The site lies at 1306 m a.s.l. at the caldera rim's highest northern point and varies in altitude from 10 to 5 m vis-a-vis the lake level—relatively flat terrain close to the lake shoreline. The caldera cone remains only on the eastern side of the lake, where it stands prominently at 1410 m a.s.l. (105 m above LU-1). The initial survey identified LU-1 as a Bigo occupation of approximately 0.25 ha, replete with high frequencies of Bigo period ceramics, particularly heavy-duty vessels with bulbous rims with stripes of red paint and sometimes white paint. Our transect surveys at the site and three STPs in areas of artifact concentration confirmed a predominantly Bigo site, with an opportunity to gain more knowledge about this occupation period and the presence of ironworking marked by surface slag. Based on these assessments, we placed test unit A on a westerly slight down-slope with surface scatters of Bigo ware and slag. Test unit B was located closer to the lake, a 1×1-m test unit placed in a zone with surface ceramics but proved to be very shallow (9 cm) soil over tuff.

Ceramics

The ceramics from RU-1A confirm an initial, light Kansyore presence (via one stamped and a comb-decorated wavy line sherd on the surface) and a significant Bigo occupation. There are a variety of vessel forms. Of interest is the presence of diminutive Bigo pots (OSM Fig. 18-A), narrow-mouth vessels, some with interior slip and lacking the heavy rims of the heavy-duty vessels (OSM Fig. 18-B). Our criteria for identifying Bigo ceramics include several attributes, foremost among them designs of plaited grass roulette (PGR), red slip, burnish, red and white paint applied in vertical stripes on vessel exteriors, and vertical and diagonal incised slashes across *twisted grass roulettes* (TGR, upper right, OSM Fig. 18-C).

At Lubembe-1, the ceramic assemblage opens different perspectives on Bigo period ceramics, with definitive evidence for twisted grass roulette—27.7% ($n = 18$) of vessels display decoration from this technique, clearly identifying it as the Bigo tradition when painted and slipped. We also found TGR with overlying slash-like incisions (OSM Fig. 18-C), which comprise 6% of the Bigo period assemblage. Irregular slash-like incisions alone constitute 14% of the decorations in the assemblage. The use of thick slashes on vessels is also found at other sites (see KYA-1D below). It is now evident that some Bigo period decorative applications fit this profile, but it does not ipso facto mark the LIA. Within this assemblage of 65 decorated Bigo period ceramics, red paint occurs on 9.2% of the vessels, and white paint appears on 3%. More common is red slipping, often applied to the interiors and, in 23% of instances, to upper outside rims. Tempering is predominantly medium-sized (2–5 mm) quartz, sometimes mixed with similarly sized laterite.

The rim diameters of thick-rimmed vessels are very large, 38 to 59 cm ($n = 5$). These ceramics deserve identification as feasting vessels (OSM Fig. 18-B). The bulbous and thickened upper rims span 15 to 24 mm, the latter on an enormous open bowl with a mouth diameter of 50 cm and a second open bowl with a mouth diameter of 51 cm; both these vessels have knicks on the top of the rims. These are distinct from the other large open bowls with everted rims or necked vessels. Using rims to determine the minimum number of vessels (MNV) ($n = 21$), the proportion of heavy-duty vessels (52.4%) was only slightly more than the small, narrow-mouth, and open bowls (47.6%). Smaller bowls were found below − 10 cm b.d., while all heavy-duty vessels were in the upper 10 cm of excavation. This separation may point to a

specialized use, perhaps related to the industrial character of this locale, with more portable vessels used for purposes associated with iron production. An alternative view is that once brought to the surface by hoe agriculture, the heavy-duty vessels—with greater surface area—tend to remain on the surface. One base of a heavy-duty vessel was modified by grinding into a circular shape, which may have created a tool for pottery finishing or a lid for a small pot.

Iron Working

The LU-1 site shows evidence of ironworking. In the second stratum of LU-1A, we documented iron slag in association with Bigo ware. There is no evidence of smelting, and it is, like at other Bigo sites, forging slag. Though iron smelting was not indicated here or elsewhere during our surveys, iron forging was an important economic activity. Similarly, LU-2 is an ironworking site with abundant surface evidence, located at the top of the tuff cones east of the lake. It, too, hosted a Bigo occupation and a significant Kansyore settlement. Iron bloom was imported from outside the volcanic zone and forged at LU-1, LU-3, and other sites during the mid-second millennium AD.

Fauna

The fauna at LU-1 contrast significantly with KA-1 and RU-1, where during the early first millennium AD, wild species were mostly small and easily snared or trapped mammals commonly found in open grasslands and forest fringes, for example, an environmental setting that was the result of forest clearance that created a forest-savannah mosaic in the region. LU-1, in contrast, shows the presence of larger wild mammals during the mid-second millennium AD, similar to the contents of a Bigo period refuse pit at KYA-1D (discussed below), where larger mammals were also documented during the Bigo period. Like KYA-1D, there is African buffalo, but with a larger antelope, in this case, waterbuck. While there are MNI designations for each of these wild species, each was represented by only one fragmentary element, whereas domesticated cows (NISP = 32) and caprines (NISP = 40) were documented in test unit A.

The relative paucity of wild species (one MNI for each) must be measured against the small sample size. Yet, it hints at the possible distribution of body parts across the site, perhaps among kin units mobilized for hunting purposes. Given that the site was also the locus of ironworking, the gathering of kin groups for that activity may have provided the social network for hunting, an activity linked to ironworkers in the greater region (Schmidt, 1978, 1997a, 1997b). Test unit B, while reaching sterile tuff after only 6–9 cm depth in a deflated area, gave a distinct perspective, with fragmented and charred elements of caprines (NISP = 34) and cow (NISP = 4) found alongside a charred occipital condyle fragment of warthog suggests a concentrated cooking event or coeval disposal. The embryonic picture that emerges from LU-1 and develops further at KYA-1D is the hunting of larger wild animals in comparatively more open grasslands, with a primary dependency on domestic stock such as cows and caprines. This scenario complements environmental evidence pointing to significant grassland expansion and agricultural impacts during Bigo period occupations.

Lithics

Formal tools from this mostly Bigo period occupation were few ($n = 9$), with quartz and quartzite being the most common raw materials found in the two test units, paralleling what was observed at NK-1 and ND-1. Most cores had bipolar elements—they were multiplatform or double opposed—with shuttering marks indicating the use of an anvil. Three prismatic or single-platform cores were present. Most sites in the NCLR have both bipolar and prismatic core reduction evident as well as blade technologies, common in later LSA microlithic tools (Kessy, 2005; Nelson, 1973; Nelson & Posnansky, 1970; OSM 2.1 for raw material profiles).

Northeastern Sites:

Kyakatama-1

The Kyakatama sites first came to our attention during the 1995 survey. The most prominent, Kyakatama-1 (KYA-1), is located on a high ridge (~ 1553 m a.s.l.) 1 km NE of Lake Nyinambuga (1366 m a.s.l.) and 500 m west of a back-flooded stream, a readily accessible water source. The open location presents significant viewpoints to the east, west, and north and continues to provide warmth during the cold rainy season

when there is also a reduced risk of mosquito infestation. During the 1995 survey, we located several exposed pot burials in what then was an ungraded road 110 m north and downhill from the KYA-1 site (Fig. 18).

The technological characteristics of these buried vessels were similar to Boudiné ware, with one rim fragment bearing exposed coils. The site was erased by road construction before our return in 2014. Examination of nearby fields showed no sign of similar features but did provide evidence of Bigo ceramics. We returned to Kyakatama in 2015. Our survey had located Kansyore and Bigo ware on the hill crest near a residence where an initial test (KYA-1A) was placed (Fig. 19).

Investigations at KYA-1 continued in 2019 using ground-penetrating radar (GPR) along the road margins. The goal was to locate features like those observed in 1995. GPR survey did not show anomalies, yet, by successfully drawing on local knowledge, a human burial was documented (KYA-1B) on a footpath 34.35 m west of the Kyakatama road. While excavating, our team also surveyed the neighboring homesteads with radiating pedestrian survey transects. High frequencies of Bigo ware were located in sweet potato plantings 25 to 70 m northwest of KYA-1A. Significant scatters of Kansyore, Bigo, and MIA/LIA ceramics were documented in the fallow and cultivated fields to the NE of KYA-1A. Two exposed features in an embankment (created to level land for a residence) on the east side of the road were recorded; the smaller of these features, KYA-1C, was marked by black soil and exposed bases of large Boudiné vessels. Nearby, a large feature in the same embankment displayed embedded ceramics and faunal remains in dark, contrasting soil. This exposure was excavated as KYA-1D and proved to be a refuse pit.

Kyakatama-1A

This test unit was intended to document the context of Kansyore and Bigo period ceramics located during surface inventories. Situated in the courtyard of a home, a 1×1 m test unit was excavated in well-consolidated soil. The excavation methods employed both natural strata and arbitrary levels. The first stratum of black, hard-packed loam to − 14 b.d. had a high frequency of irregularly shaped gneiss rocks, making it difficult to trowel. Thereafter, the gneiss-infused soil remained dark grey to − 31 cm b.d. in the center of

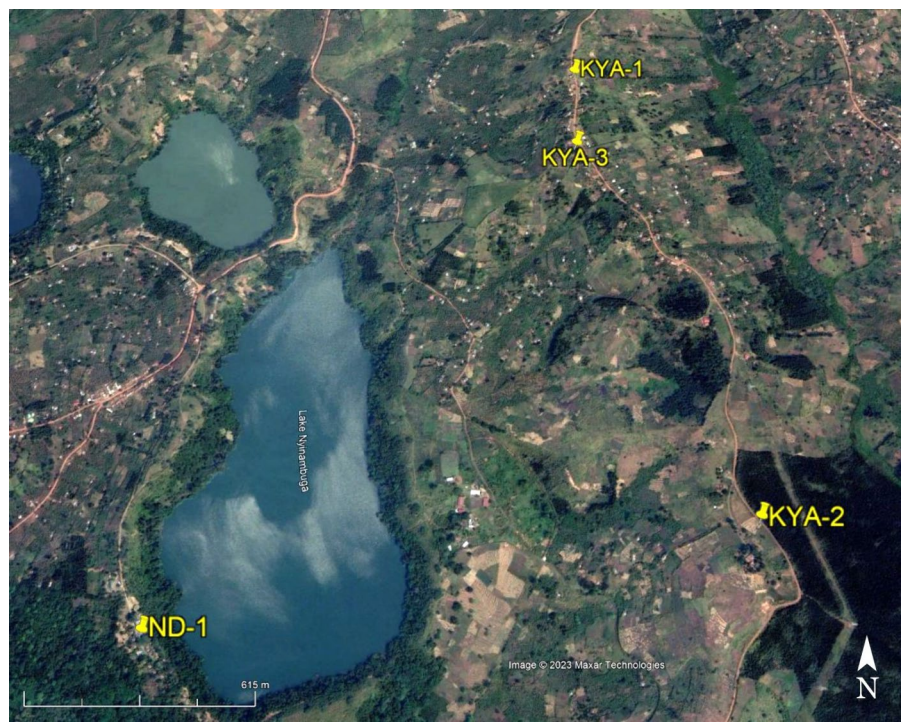

Fig. 18 Excavated sites in the northeastern sector of the NCLR study area; from KYA-2 to Lake Nyinambuga is 1 km. Google Earth Image

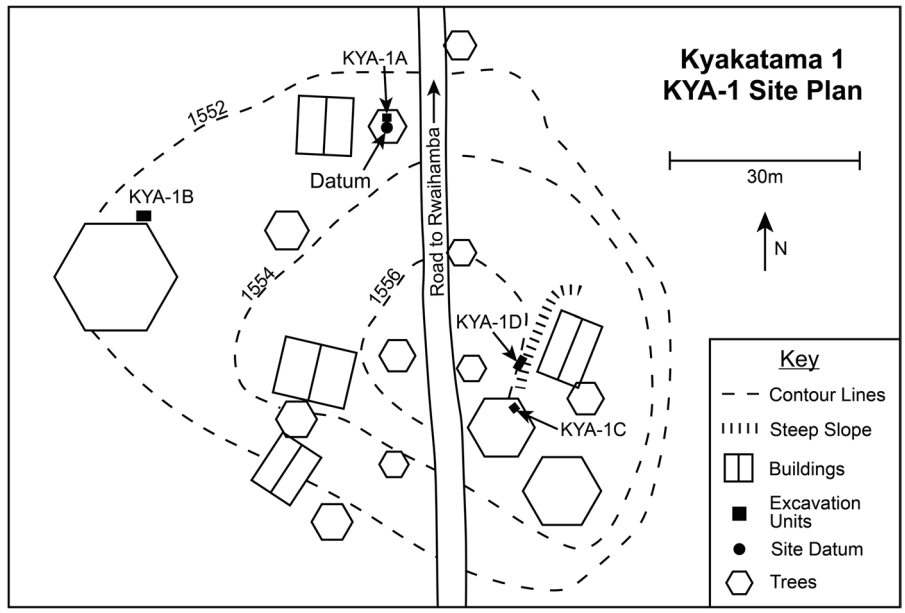

Fig. 19 Site plan of Kyakatama-1 (KYA-1)

the unit; at − 47 cm b.d., a bovid tooth was recovered and then sent for AMS dating but was found to have insufficient collagen to produce a date. Between − 40 and − 50 cm b.d., the frequency of ceramics diminished significantly with one Kansyore rim and one MIA sherd recovered. As the field season closed, we backfilled the excavation and planned for subsequent excavation.

We returned to KYA-1A in 2019 to confirm the presence of sterile deposits. Excavations continued for an additional 8 cm into dense gravel and strong brown soil without recovery of ceramics. Lithics were present until sterile soil was confirmed at − 56 cm b.d. A large rock intruded into the central floor starting at − 31 cm b.d., limiting the soil matrix to 0.7 m^2 at the deepest point (OSM Fig. 19).

Ceramics

The decorated ceramics and rim sherds ($n = 64$) found at KYA-1A were mixed throughout the deposits, with plain rims and decorated sherds—TGR and PGR—as deep as − 45 cm b.d. alongside Kansyore ceramics. This homogenization points to significant perturbation, affirmed by the presence of cassava roots—a disturbance found at other locales used for habitation and agriculture. Decorated Kansyore ceramics make up 14% ($n = 9$) of the assemblage—with a preponderance of rows of punctates and stamped applications ($n = 6$). The remaining Kansyore ceramics show convergent stamping. This is in keeping with the dominant decorative application in the Kansyore of western and southwestern Uganda. Bigo and later ceramics (80%) and Boudiné (6%) complement the assemblage. Faunal evidence must be viewed as deeply influenced by a later Bigo period occupation of the site, given the unusually deep mixing at KYA-1A.

Fauna

The faunal evidence from test KYA-1A shows domestic cow (NISP = 2) and caprines in the topsoil, while in the second stratum, an inversion of these proportions was domesticated. Additionally, the tooth enamel of an immature African buffalo was identified. Faunal evidence from KYA-1D (see refuse pit, below) shows that harvesting of African buffalo occurred during the Bigo period occupation of this site. Furthermore, the skeletal elements of an immature buffalo are present in that refuse pit, suggesting that the tooth fragment may be part of a larger event, the distribution of meat cuts within the community. The assemblage from KYA-1A, while small, affirms previous observations of dependence on domestic herd animals during the Bigo period in the NCLR.

Lithics

The thorough homogenization of deposits at KYA-1A also impacted its small lithic assemblage, rendering it impractical for any analysis seeking culturally linked characterizations, though as observed at other sites such as KA-3, RU-1, and NYA-1, there was a small preceramic LSA component.

Kyakatama-1B

This excavation unit was located 43.35 m southwest of the datum and 34.35 m west of the Kyakatama road (Fig. 19). The presence of human skeletal elements was known to residents, who took us to the location. Several small pieces of bone were exposed on the surface. A 2 × 1-m unit was positioned to document this individual. This excavation was consistent with our 2019 goal to rescue threatened burials while seeking additional information about burial practices around the NCLR. We also sought insights into dietary practices.

The burial location parallels those found on the western side of the calderas. The individual (a male "middle adult") was interred in a flexed position, with his head facing East and arms flexed. The skull was absent and likely destroyed by modern trampling. Presumably, other parts of the postcranial skeleton suffered a similar fate. Portions of the skeleton that were found to be intact during excavation included (1) the right scapula; (2) right/left knees; (3) the right shoulder girdle/upper arm and the left forearm; and (4) the right fibula.

Excavation across unit B established that the two discrete bone masses were a single in situ feature burial (OSM 3.3 for photo). Portions of the skeleton connecting the two discrete masses included a highly degraded vertebral column and a barely intact os coxa (pelvis). Both femora were missing, as was the complete left leg and foot and most of the right leg/foot, including the tibia. The arrangement of the preserved and flexed arms and orientation of the trunk clarified that the individual was interred flexed and on their right side.

The skeletal inventory includes key elements identified and removed in the field. Long bones identified in the field (e.g., left radius, right fibula) were damaged upon removal, but there is enough information gleaned from recovered elements to establish basic demographic (age and sex) information for the individual. Male status is suggested by the relatively large size of the well-preserved right clavicle and humerus. With respect to age, an important clue comes from a single, worn premolar tooth (ULP4), which is likely too worn for that of a younger adult individual. Other skeletal markers on the intact arm bones suggest a more mature individual; these observed entheseal changes are consistent with an individual of middle adult (35–50 years) status. There is no evidence of skeletal pathologies for this individual based on observations of the recovered elements.

Ceramics

Given the deflated and disturbed conditions, it was surprising that associated material evidence embedded with the burial presented such clear insights. Four MIA ceramics (one in two pieces) were documented in association with the burial: a TGR-decorated with red paint and three TGR-decorated ceramics with slash incisions across the rouletted motifs. These associations are noteworthy, as the ceramics from the top 50 cm of fill in the refuse pit defined in unit D are predominantly TGR-decorated, with a high frequency of slash incisions across the TGR decorative treatments. This episode appears to capture a distinct social group in the community, an alterity partially expressed in ceramics and subsistence practices—hunting more wild mammals than those who produced and used classic Bigo ware. The individual in the burial shows affiliation with that social group within this Bigo period settlement, suggesting cosmopolitan groups seeking alternatives to the drought and cold conditions of central western Uganda that began mid-thirteenth century AD. A rib fragment yielded an AMS date of 1303–1402 calAD (Table 4, row 4), the beginning of the Bigo period occupation. This fourteenth-century date is congruent with other dates at the site.

Kyakatama-1C

This small feature was exposed in an embankment profile near a house platform (Fig. 19). It was marked by dark black soil and an extruded large base fragment of a Boudiné vessel. Its proximity to unit D, where our focus was on a much larger excavation, prompted a 1 × 1 m test unit. Using the frequency of

Table 4 AMS radiocarbon dates from Kyakatama-1, Kyakatama-2, Kyakatama-3, and Ndali-1

Item # & Lab #	Site & year collected	Sample ID & source	14C age uncalBP	68% low/high	95% low/high
1. AA114070	Kyakatama 1 (2019)	KYA-1D.S4 *Charcoal*	611 ± 32	1300 to 1396 calAD	1294 to 1404 calAD
2. AA114068	Kyakatama 1 (2019)	KYA-1D.S6 *Charcoal*	692 ± 32	1273 to 1380 calAD	1262 to 1389 calAD
3. AA114069	Kyakatama 1 (2019)	KYA-1D.S8 *Charcoal*	633 ± 32	1294 to 1390 calAD	1285 to 1399 calAD
4. AA115399	Kyakatama 1 (2019)	KYA-1B *Bone-phalange*	603 ± 22	1315 to 1396 calAD	1303 to 1402 calAD
5. AA106859	Kyakatama 2 (2015)	KYA-2A Fea.1.34 *Charcoal*	3340 ± 25	1682 to 1566 calBC	1691 to 1532 calBC
6. AA106860	Kyakatama 2 (2015)	KYA-2A.S4.49 *Charcoal*	3486 ± 31	1878 to 1758 calBC	1892 to 1698 calBC
7. GAAMS60924	Kyakatama 3 (2019)	KYA-3A *Bone-femur*	1530 ± 20		440 to 455 calAD (3.2%) 478 to 497 calAD (6%) 533 to 599 calAD (86.3%)
8. PSUAMS5118	Ndali 1 (2018)	ND-1 *Tooth*	450 ± 15		1431 to 1457 calAD

artifacts and soil characteristics, three stratigraphic levels were excavated, starting with black loam (12 cm), dark brown loam (20 cm), and closing with dark reddish-brown sandy clay (− 32 cm to sterile at − 56 cm b.d.). Ceramics were heterogenous: Kansyore, Boudiné, and Bigo period ceramics. The topmost stratum included highly micaceous Kansyore sherds ($n = 4$), with rows of punctates as well as two rims from heavy-duty open Bigo period bowls, three sherds with PGR, and two ceramics with TGR decorations—an overall mixture indicating redeposition. The second stratum included one Boudiné rim sherd from an open bowl, while the third stratum revealed one heavy Boudiné base and an undecorated narrow-mouth bowl tempered with laterite, the last a marker for the later, likely Bigo period. This deposit, marked by a prominent Boudiné base, likely resulted from Bigo period activity that stirred up and redeposited earlier materials.

Kyakatama-1D

The exposure of a pit feature in profile was recorded during survey along an embankment made from house construction (Fig. 19; Fig. 20).

Initially mapped in profile, we first placed a 1 × 2-m unit over the feature to gain a better perspective on the pit outline and then expanded this unit to a 3.5 × 2-m zone to remove and expose the feature outline (OSM Fig. 20). The top level of the pit feature and the overburden were homogenous, leading us to conclude that the pit feature had been sealed or filled with erosional debris from the surrounding soil. Survey data and initial exposure showed that the topsoil in this area included Kansyore ceramics, also represented in the pit fill. The fill was excavated in arbitrary levels (spits) of 10 cm, sensitive to natural stratigraphic changes. Three charcoal samples were selected for AMS dating—spit 4 (1294–1404 calAD), spit 6 (1262–1389 calAD), and spit 8 (1285–1399 calAD). The results show that the feature fill dates to the fourteenth century AD, the peak of Bigo settlement, and contemporaneous with the burial at KYA-1B (Table 4, rows 1–3).

Ceramics

We earlier observed the absence of classic Urewe ceramics in the NCLR. An exception is a Urewe rim from the surface horizon at KYA-1D; the rim sherd

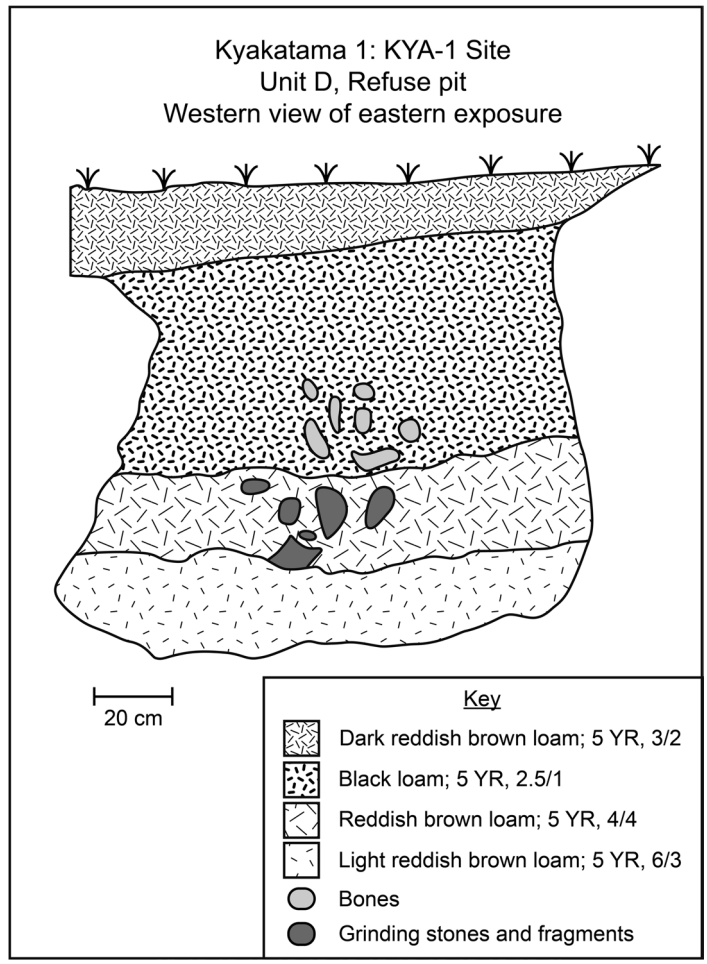

Fig. 20 Profile view of exposed episodes of fill, before excavation, with some faunal remains exposed in profile. The external, oxidized soil with different colors did not occur in the pit fill

of a hemispherical bowl has three bevels on the rim and a groove beneath the rim, under which appears cross-hatching (OSM 3.4 for photo). This outlier does not mark the presence of classic Urewe-associated people in the region and is more likely the result of exchange or incidental contact. KYA-1D presents the full range of ceramic history in the NCLR: Kansyore, Transitional Urewe, Boudiné, and Bigo period, with various decorative treatments and morphologies for Bigo period ware.

Excavation of the pit feature at KYA-1D significantly adds to our knowledge about the chronology and attributes of MIA ceramics, specifically Bigo period ceramics in western Uganda of that era. The overburden of 20 cm contained only Kansyore and Boudiné ceramics, void of ceramics decorated with plaited grass and twisted grass roulette. This suggests the absence of a Bigo period habitation in the area downslope and east of the hilltop, a location for refuse disposal outside residential areas. The fill inside the pit feature, however, had a plethora of roulette-decorated ceramics and twisted grass-impressed and incised treatments. Whatever Kansyore ceramics were included in the pit fill came from the direct overburden when the pit was filled with refuse.

This Bigo period occupation was marked by a significant frequency of TGR-decorated ceramics mixed with the PGR-decorated ceramics that characterize the heavy-duty Bigo period ceramics seen at KA-1 and LU-1 as well as smaller vessels found at RU-1A, LU-1, and NK-1. The sealed context allows us to precisely fix various decorative elements, such as TGR, to the fourteenth century AD. This date establishes the contemporaneity of TGR and PGR in the region. These findings also definitively fix other decorative techniques and elements to the fourteenth century,

such as slash incisions at LU-1. These decorative applications and the use of twisted grass to make single, linear impressions make up a diverse repertoire that includes PGR applications with red paint and slipping.

The assemblage is dominated by TGR decorations, including incised and impressed treatments, as well as slash incisions applied over TGR. Ceramics with these attributes in the first four spits make up 54.8% ($n=40$) of the assemblage. Classic Bigo period ceramics with PGR constitute 26.7% ($n=18$) of ceramics, while the remaining sherds are earlier mixed-in components. The lower spits, five through ten, have comparatively modest frequencies of MIA ceramics, with PGR treatments at 51.2% ($n=20$) and other TGR impressed and incised treatments at 48.7% ($n=19$) frequency. These varying frequencies by depositional episodes may indicate activities by different households or immigrant groups. The first clearly marked deposition is the upper 40 cm with a high frequency of ceramics decorated by TGR, impressed twisted grass, and slash incisions deposited with few faunal remains. Among the sparse faunal remains was a high incidence of wild animals (see below) compared to domestic animals, a profile that suggests a hunting identity for those discarding these ceramics. The different ceramic profile, when viewed in relation to the associated fauna, compels us to consider the presence of different social groups at KYA-1 during this early Bigo period settlement.

The second distinct episode is a concentration of small vessels from −60 to −70 cm of pit fill, where ceramics were dominated by rims of five diminutive Bigo period narrow mouth bowls—three of which were painted red and had orifice diameters of 16 to 18 cm (OSM Fig. 21). Spit 8 (−70 to −80 cm)—the third distinct episode—was marked by the presence of grindstones and an absence of faunal remains that otherwise populated the pit fill from −50 to −70 cm (OSM 3.5 for photo). This was followed by another episode marked by faunal remains, yet few ceramics.

If the ceramic assemblage is examined using rims to determine MNV (identified by paste, morphology, and decorative elements), then Kansyore vessels—small open and narrow mouth bowls—and TU and Boudiné vessels make up slightly less than one-third of the assemblage. Classic Bigo ceramics and TGR-decorated and related vessels are dominant (OSM Fig. 22a). If we examine rims within the pit fill, keeping in mind that earlier components are intrusive, then TGR and incised/impressed grass vessels are dominant (OSM Fig. 22b), definitively showing that TGR is an integral part of the Bigo period assemblage, especially given the sealed context and red paint on some rims (the presence of ochre in spit 9 was likely used to make the red paint applied to Bigo period pottery).

The association of different decorative applications and morphologies by fill episodes compels us to consider this community as culturally diverse, pioneer settlers who may have been derived from multiple origins as the NCLR became a refugium for people from the greater region during a period of climatic instability that swept the region in the mid-thirteenth century AD. The Kansyore ceramic assemblage ($n=19$) included in the pit fill reflects sites elsewhere in the NCLR: 52.6% of the assemblage is decorated with rows of punctates, 31.5% with convergent/crisscrossed, cylindrical stamping, and 15.8% displays comb-stamping and stab-and-drag punctates (Fig. 21).

Fauna

The faunal assemblage at KYA-1D provides insights into the diversity of meat sources in the dietary practices of the early Bigo period in the NCLR. The evidence adds to our knowledge about food preparation and selection of body parts. In the upper parts of the refuse pit (−0 to −50 cm), there was modest faunal evidence associated with the dominant TGR ceramics and related motifs, yet there was a diverse mixture of wild mammals (NMI 1 = bush pig, reedbuck, bush duiker, African buffalo, and suni) with few NISP of adult domestic cow and caprine. We have already introduced the idea that this ceramic/faunal assemblage may represent a distinct social group that settled in the same community with those producing classic Bigo pottery. The higher frequency of wild mammals in the upper fill may indicate a greater emphasis on hunting by that part of the community.

Smaller mammals continue to be present in the second millennium diets, as they were during the Kansyore and TU/Boudine period at RU-1 and KA-1, though some species (e.g., vervet monkey) favored by mid-first millennium populations are missing. The presence of African buffalo in this secure, sealed context proves that early Bigo settlers were hunting large

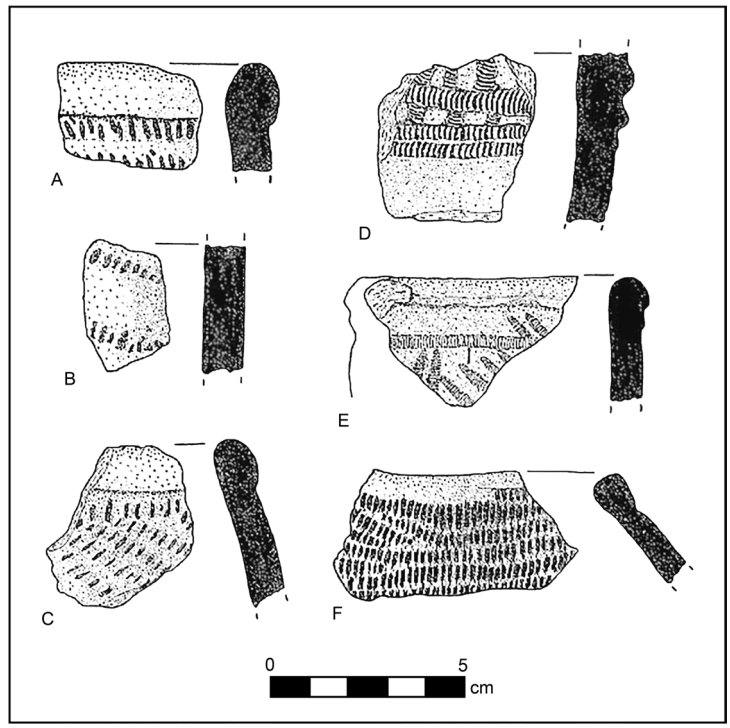

Fig. 21 Kansyore ceramics from Kyakatama: punctates in rows: **A** from KYA-1A, **B** and **C** from KYA-1D, **F** from KYA-2 Stratum 2; converging and crisscrossed stamping: **D** (on appliqué) and **E** from KYA-1D)

game. This endeavor would have required organized group hunting in a society that devoted relatively little effort to hunting (though an immature African buffalo would have been taken more easily than an adult). This also indicates a period of environmental recovery sufficient to sustain African buffalo after a severe drought during the late thirteenth century (Saulnier-Talbot et al., 2014, 2018; see Paleoenvironment below). This finding also suggests—like the fauna at LU-1—a human-made environment of reduced forests and more extensive grasslands that hosted larger grazing mammals.

There was a distinct episode of mostly domestic animal bones deposited in spit 7: caprines (NISP = 6) and cows (NISP = 6), with one African buffalo long bone fragment; spit 8 had no faunal remains but numerous classic Bigo vessels. The lowest deposit was sealed with grindstones in matrices of ash and miscellaneous stones in spit 9 that included both wild and domestic animal elements: caprines (NISP = 4; MNI = 1); domestic cow (adult NISP = 4; immature NISP = 1; MNI = 2) alongside African Buffalo elements (adult NISP = 2; immature NISP = 3; MNI = 2) as well as an African giant pouched rat (NISP = 1), the only individual represented of that species and an important part of diets throughout sub-Saharan Africa. At the bottom of the pit were the remains of 10 black rats, 15 typical striped mice, and a frog. The high concentration of black rats and striped field mice is puzzling. If the garbage attracted them, then why would so many have died within the pit? Rather, they appear to have been purposely placed in the pit, perhaps to rid the community of vermin, though we cannot exclude them as a food source during a time of famine.

Fauna Discussion and Other Observations

In the NCLR, faunal remains at open-air sites are not plentiful and subject to varying degrees of disturbance, mostly related to soil depths and intensity of cultivation. Thus, an important advantage derives from the sealed context of KYA-D—an undisturbed context in which distinct episodes of fauna deposition are associated with and interdigitated with deposits of different types of Bigo ceramics. This allows us to posit possible community identities partly linked to meat procurement. As with other Bigo period sites, we observe that domestic meat sources are favored over wild meat, with larger wild animals such as the

African Buffalo marking a shift in hunting habits from the fist-millennium AD preferences for smaller, easily captured animals.

Butchering practices using sharp instruments were sometimes employed to deflesh animals, with cut marks evident on cows, caprines, and African buffalo. Sharp cut marks were mostly on smaller skeletal elements such as ribs (caprine and adult and immature buffalo) and a phalange (cow), and larger skeletal elements such as a long bone (cow) and pelvis (immature buffalo). The availability of iron during this Bigo period occupation may match such butchering practices. This observation also applies to Kabata-1, where the only cut bones (cow rib and semilunar lunate) come from shallow, Bigo period contexts. However, lithic tools were still being manufactured and used during the mid-second millennium, so they may have played a role in defleshing bones.

Meat cooking preferences manifest in this collection as charred bones, pointing to meat roasting on open fires. During this period of occupation, there was a preference for roasting meat attached to long bones, perhaps explaining fewer cut marks on long bones. In this assemblage, seven of the eight pieces (NISP) of long bones with char derived from domestic animals (caprine = 4; cow = 3), though a cow vertebra points to the roasting of other body parts of animals. Compared to Kabata-1, there is more meat roasting at Kyakatama-1, a practice that may reflect different cultural preferences in the community, which parallel tendencies in the ceramics and hunting of wild mammals. The absence of vervet monkeys also attracts our attention to the possibility of an ontological explanation: the adoption of clan totems and ancillary taboos on their consumption as food, which may have come into play to bias the faunal record during the mid-second millennium AD.

Lithics

The refuse pit at KYA-1D contains mostly Bigo period artifacts, but the significant inclusion of Kansyore ceramics means that earlier lithics were also included. This observation throws doubt on any characterization by culture alone. The modest lithic inventory ($n = 24$) shows that three of the five formal tools are made of chert (bifacial scraper, convex end scraper, composite scraper). Though there are preferences for quartz and quartzite at other Bigo sites (e.g., LU-1, NK-1), the presence of chert confirms our observations that chert increases at some sites (e.g., KA-3, 2021 excavations) in the second millennium (OSM 2.2 for chronological mixing of lithics at KYA-1D.

Kyakatama-2

As part of our regional survey in 2015, we located a high frequency of artifacts, particularly bases of urns, extruding from an embankment along the Kyakatama road 1.65 km SSE of KYA-1 (~1516 m a.s.l; see Fig. 18). Transects in surrounding fields with crops failed to document additional sites, but this exposure showed that sites are present, though not always visible from the surface. Located contiguous to the same stream accessible to KYA-1, this location is marked by deep soils and rich deposits (OSM Fig. 23). Once scraped clean, the excavation showed a profile of three distinct strata, which were used to guide the excavations. The 0.5 m deep × 1.5 m wide excavation unit, KYA-2A, produced a rich array of Kansyore artifacts, two twisted grass rouletted sherds, one piece of iron forging slag, and one small iron artifact, the last possibly an awl or punch. Significant termite activity with large voids and hard-packed soil, characteristic of termite mounds, alerted us to the likelihood of artifact migration and possible contamination of charcoal samples.

Ceramics

The KYA-2A excavation yielded significant Kansyore ceramics in strata 2 and 3, many of which were within a stratum 2 ceramic layer, where there were horizontally oriented sherds (OSM 3.6 for photo). Two vessels depart from the rows of punctates common to this western Kansyore facies (Fig. 22); these two vessels are congruent with the ceramics documented in the RWA-2, Locus 3A burial (see below, Fig. 26)—stamped with a carved cylinder in hanging hemispheres, sometimes pointed at the bottom. These vessels also display similar technological elements—large quartz tempering, dark brown color, and decorative applications—dominated by stamped, interlinking diagonal rows. They also share the characteristic of large pyrite inclusions. They depart, however, in morphology from the RWA2, Locus 3A burial vessels. More specifically, the vessels at KYA-2A are

very large open bowls with flat-nicked rims, whereas the sister vessel at RWA-2 to the south is a large necked vessel.

Most significant in this assemblage is the high number of Kansyore ceramics and their association with Boudiné ware. This co-mingling is important and points to contemporaneity, as at KA-1 and KA-3. A similar co-mingling also occurs at the RWA-7 site. The mixing of Kansyore and Boudiné is clearly neither incidental nor the result of taphonomic processes. Shared decorative techniques and technologies accompany this mixing. Sherds from the vessels illustrated in Fig. 22a would dominate the assemblage if we did not determine the minimum number of vessels (MNV). Of the 11 MNV of Kansyore vessels with rims, 63.6% were decorated with nicks and 36.4% with stamping on the rim top—distinguishing features. Of importance, 57% of the Boudiné rims ($n=7$) had nicks, a far higher proportion than at other sites. One example is a Boudiné urn with nicks on its flat rim (Fig. 22-c). While Boudiné is associated at KA-1 and KA-3 with TU ceramics, the ceramics at KYA-2 indicate that there was a synergistic relationship between Kansyore and Boudiné that extends to the eastern and southern reaches of our research region.

The ceramic assemblage had three heavy, flat bases of urns or heavy-duty open bowls, one in each of the three strata. One with decorative finger impressions resembles the decorations on the large Kansyore vessel base at the RWA-2 Locus 3A burial (see Fig. 28a & b & OSM 3.7). Though a fit could not be made with other sherds, it is likely that this flat base belongs to a Kansyore vessel, yet another cross-over attribute between Boudiné ware and Kansyore seen at other sites in the NCLR.

To determine the frequency of horizontal rows of punctates and stamping in Kansyore decorative applications, we used the MNV ($n=36$) of vessels: 43.4% are decorated with rows of punctates (OSM Fig. 24) and linear stamping, 33% have convergent and crisscrossed stamping, 11.1% have simple curvilinear punctates or crossing punctates, and 5% show only nicked rims (Fig. 22), with one outlier, a narrow-orifice bowl with wavy line applied by stamping. Given the small fragments of vessel bodies, convergent and crisscrossed stamping are likely over-represented. One Kansyore rim departs from the NCLR norm with a wavy-line treatment with successive vertical stamping. Only two other such sherds were documented at the RWI-1 and RWA-6 sites, respectively. True to the vessel morphology of Kansyore in the NCLR, 60% of the vessels with representative rim sherds ($n=10$) were small, narrow mouth bowls (diameter 11–16 cm), with the remainder open bowls (diameter 35–40 cm), two of which are large open bowls.

Two twisted grass roulette sherds from strata 2 and 3 have an almost perfect rectangular shape (OSM Fig. 24, right). The inclusion of mid-second millennium AD ceramics points to probable intra-strata transport. Stratum 1 is an erosional deposit from the hill to the west markedly devoid of artifacts. Bigo period populations in this sub-region are likely responsible for ceramics once deposited above the Kansyore horizon during the mid-second millennium AD. The significant concentration of Kansyore ceramics we attempted to date with an associated charcoal sample from stratum 2: 1691–1532 calBC (Table 4, row 5). We avoided any sample in or near the termite mound voids or earth. However, this AMS date and another AMS date associated with Kansyore ceramics in stratum 3—1892–1698 calBC (Table 4, row 6)—are inconsistent with both the dated ceramics from the burial at RWA 2/L3A), dated to the fifth century calAD and the associated Boudiné ceramics at KA-1A and KA-3E of a similar date. The AMS dates do not pertain to these cultural deposits and likely derive from charcoal from an ancient forest fire event transported to the site (e.g., erosion, termites).

Iron One piece of iron forging slag was found in stratum 3, and a severely corroded awl-like tool, 4.7 cm, was located in stratum 2.

Lithics In this small assemblage ($n=29$), there was one river pebble (2.6 × 4.2 cm ground on one of its sides). Of the three shaped tools, a notched scraper was made of quartzite, and the two other tools were made of chert—a notched scraper and curved back microlith. The chert raw material, obtained either by mobile hunters or mobile pastoralists, was one of the preferred materials during the early first millennium AD that also reappeared during the mid-second millennium (OSM 2.3 for raw material by tool type).

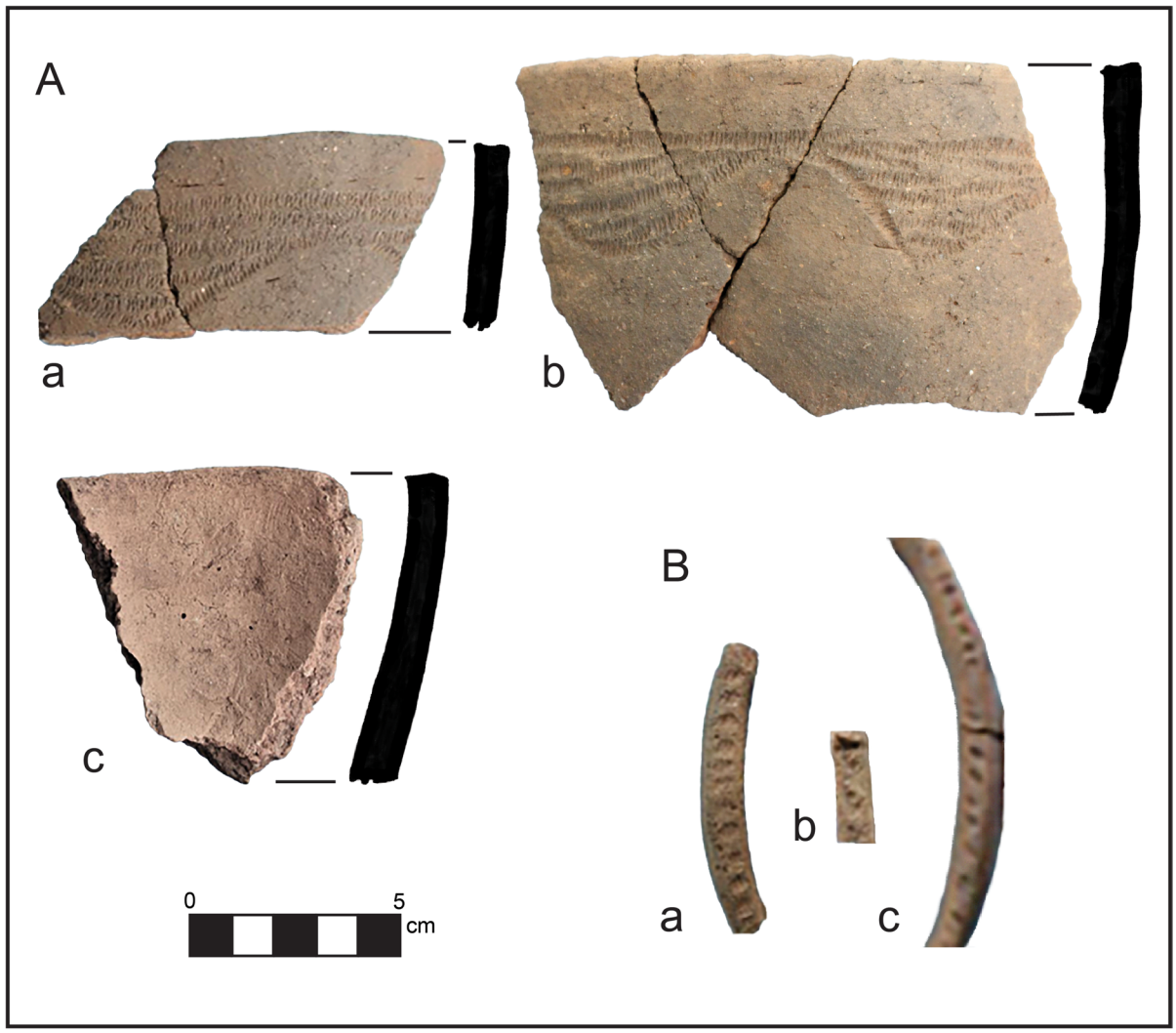

Fig. 22 Kansyore and Boudiné vessels from stratum 2 of KYA-2A. **Aa** is a large Kansyore open bowl with a 28 cm diameter mouth; **Ab** is an open Kansyore bowl with a 35 cm diameter mouth dia. Both vessels have decorated, flat-top rims; Aa is decorated with nicks (**Ba**), while Ab is stamped with the same stamp applied to the body of the vessel (**Bb**); **Ac** is the inside of a Boudiné urn (with rough exterior finish showing coil breaks) decorated with nicks on its flat rim (**Bc**)—a Kansyore to Boudiné cross-over decorative application with parallel technological affinities

Kyakatama-3

Approximately 275 m south of KYA-1 (see Fig. 18), the KYA 3 (~1559 m a.s.l.) site was first identified in 2015 by the presence of Kansyore ceramics in the western side of the Kyakatama road cut. The site's proximity to a well-traveled, narrow road precluded further documentation. As we were drawing on local knowledge about the location of human burials in 2019, we were escorted to a location west of the embankment. In a field shaded by large *Eucalyptus* trees 54 m from the road, we were encouraged to examine an area where human bones had been exposed during the planting of tree seedlings. We placed two STPs to locate the grave site, found to be significantly disturbed by agricultural activity. Where highly fragmented bones were concentrated, we placed a 1.5 × 1.5-m test unit (KYA-3A).

This was a shallow deposit without a grave outline but with significant shattering and dispersal of

skeletal elements, mostly fragments of a femur and tibia. Four of the 12 potsherds belong to MIA, and the remaining belong to TU, Boudiné, and Kansyore. Cultural associations fixed the burial to the Kansyore period, as only decorated Kansyore ceramics were associated with the human skeletal elements in stratum 2. An AMS date established that this individual is mid-sixth century calAD (Table 4, row 7). The date is within the range of other dates for Kansyore-period individuals in the southern zone of the NCLR.

Ndali-1 (Ndali Crater Lodge)

Our first knowledge about the settlement history of the Ndali Crater Lodge property developed in 1995 during our transect surveys in the northern research zone, immediately following our surveys around Kabata Swamp (see Figs. 1 & 18). We identified TU and Kansyore sites along the road leading to Ndali Crater Lodge on the SW rim of Lake Nyinambuga. The lodge was under construction, and the land disturbance revealed sites of interest, particularly Bigo period burials with cattle bones, exposed in the sides of an excavation for a water cistern. In 2014 and again in 2019, we attempted to locate the burial site but failed due to the construction of staff housing in the probable area.

In 2012, the lodge expanded its parking area, and the uprooting of a tree exposed a burial, fortunately rescued by a knowledgeable amateur archaeologist. We returned to retrieve that individual in 2018 from a reburial location on the rim—the remains had been placed in a plastic rice bag and reburied. Well preserved and mostly intact, this female individual dates to 1431–1457 calAD (Table 4, row 8), the intermediate Bigo period. This locale was 7 m north of an ancient, large, and likely once-sacred *Ficus* tree.

Notably, the Bigo period female was buried on the western rim of the crater lake and near a sacred tree, thus replicating burial placements observed at many other locales in the NCLR and amplifying a millennium-long ritual identification with these locales, a landscape heritage preserved through deep memory that hosted death rituals privileging the renewing power of the rising sun. This theme is amplified in discussions of the Kansyore burials at the RWA-2 sites NW of Lake Wankenzi.

Additional Inquiry at ND-1

We conducted GPR transects in 2019 along the rim road, in a spacious parking lot/heliport, and in the gardens south of the lodge headquarters. Among the 15 STPs placed along multiple transects, we documented a variety of waste pits dating to the lodge's initial construction. GPR and STPs along transects along the open caldera rim, in the courtyard of the staff quarters, and in the lodge gardens again confirmed that GPR is not a reliable technology for locating cultural features in the NCLR. The most definitive evidence derived from STPs in the lodge gardens, where incidental Boudiné and Kansyore ceramics were documented.

We knew from our 1995 survey and from transects on the lodge property that this site hosted both Kansyore and Boudiné ceramics. To better understand the context in which the Bigo period female was located, we placed a 1.5×1.5-m test unit 4 m west of the lodge kitchen and 6 m south of the *Ficus* tree. The surface and first 10 cm level had building debris, for example, mortar and brick fragments, within black loam that reappeared near sterile soil after being interlayered with sand and a layer of brick fragments that had disintegrated to color the soil. Approximately 50% of the unit's volume was large roots from the nearby Ficus tree. This test unit established that the setting had been disturbed during the construction of the lodge, with distinct layers of sand used for mortar and broken building bricks (OSM 3.8 for profile).

Ceramics

In the modest ceramic assemblage ($n = 29$), we documented Bigo-related components, with the presence of Kansyore and Boudiné ceramics and one human bone. The ND-1A test established that this crater rim had a significant Bigo period occupation (OSM Fig. 25), affirming burial details documented in 1995 and supplying evidence of classic Bigo ceramics as well as slash-like incisions on pottery dated to the Bigo period in the refuse pit at Kyakatama-1D (approximately 1 km to the east).

Lithics Like its Bigo period counterparts at LU-1 and NK-1, quartz and quartzite prevail (77%) in this assemblage ($n = 30$), a significant characteristic of

Bigo period sites. Four shaped tools, two utilized flakes, and three cores were documented (OSM 2.4 for raw materials vis-à-vis tools, cores, and flakes).

Southern Sites:

Nyakabungo

During 2012, our reconnaissance survey covered the caldera rims near the Nyakabungo church, situated among two dry and two wet calderas, one located 190 m east, and another located 40 m south—both of which have floating vegetation (Fig. 23). The caldera rims are relatively flat, with open grassland and crops as well as small remnant forests. The presence of Kansyore ceramics and Bigo and LIA ceramics suggested that the area deserved closer investigation in 2014. The area 110 to 220 m east of the church (~ 1256 m a.s.l.) has deep, rich black soil determined by auger soundings and supports several contemporary homesteads. The absence of a tuff layer within 1.5 m depth, deep soil profiles, and scatters of diverse artifacts led to excavations at NYA-1A at 100 m from the SE corner (datum) of the church.

A 1.5 × 1.5-m test unit was placed 1 m south of a village path. The top horizon was black loam, rich in humus. It contained lithics, a variety of ceramics, pieces of a land snail shell, plastics, cloth, metals, and cement up to − 42 cm b.d., where the soil transitioned to a dark brown consolidated loam. The intrusion of contemporary materials indicated recent cultivation near a trash disposal area, confirmed by residents. At − 47 to − 57 cm b.d., there was a large charcoal feature, the residue of a fire event in the context of dark reddish-brown soil (OSM 3.9 for photo). A charcoal sample from this natural feature yielded an AMS date of 3652 calBC (Table 5, row 6). This charred feature predates the deepest Kansyore sherd from − 50 cm b.d. It seals and postdates the lithics found − 58 to − 102 cm b.d. The preceramic component at NYA-1A thus is distinct from any later Kansyore ceramic deposits. Below the charred feature, there was a cache of quartz and gneiss blocks in a circular arrangement (OSM Fig. 26) at − 72 to − 78 cm b.d., manuports of raw materials favored at other sites such as Rusoona-1 in the earliest, preceramic deposits. The gneiss pieces at NYA-1A were associated with gneiss and quartz lithics. While there was no indication of tool manufacturing within this particular context, we have

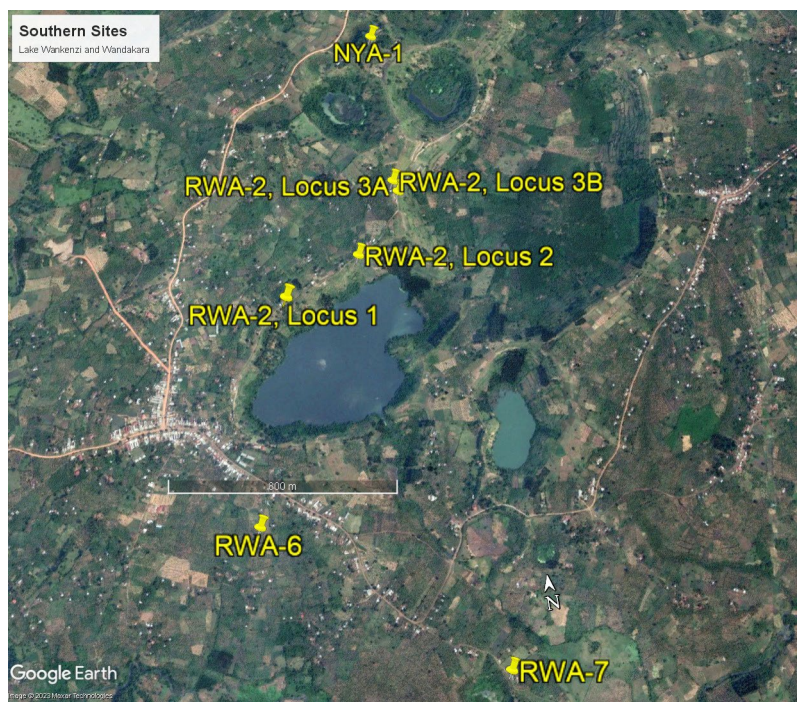

Fig. 23 Lake Wankenzi and the Nyakabungo -1 (NYA-1) site, the Rwankenzi-1 and -2 sites, and the Rwankenzi-6 and -7 sites investigated from 2014 to 2019. Google Earth Image

Table 5 AMS radiocarbon dates from Nykakabungo-1, Rwankenzi-1, and Rwankenzi 2, Locus 2, Locus 3A, and Locus 3B

Item # & Lab #	Site & year collected	Sample ID & source	14C age uncalBP	68% low/high	95% low/high
1. AA106855	Rwankenzi-2 (2015)	RWA-2 Locus 3A *Tooth*	1645 ± 29	354 to 426 calAD	333 to 534 calAD
2. GAAMS 58,847	Rwankenzi-2 (2019)	RWA-2 Locus 3B *Bone*	1610 ± 20		416 to 538 calAD
3. AA106857	Rwankenzi-2 2015)	RWA-2 Locus 2 Area 1 *Tooth*	1681 ± 38	266 to 409 calAD	251 to 426 calAD
4. AA115400	Rwankenzi-2 (2019)	RWA-2 Locus 1 *Bone-rib*	861 ± 23	1174 to 1218 calAD	1053 to 1257 calAD
5. AA106854	Rwankenzi-7 (2015)	RWA-7A Fea. 1 *Bovid tooth*	11,297 ± 44	11,240 to 11,145 calBC	11,303 to 11,120 calBC
6. AA104754	Nyakabungo-1 (2014)	NYA-1A *Charcoal feature*	4889 ± 60	3761 to 3636 calBC	3892 to 3526 calBC

documented other finds of MSA cores and preforms made on gneiss, showing an MSA presence on the landscape, the signatures of which remain faint.

Ceramics

There were a few decorated ceramics: two Bigo period sherds and two Kanysore sherds, one with rows of punctates and the other with stab-and-drag applications. Three other Kansyore ceramics, identified by temper, paste, and color, were located in the uppermost stratum, once again pointing to a light footprint on the landscape as people likely moved their residences while practicing slash-and-burn forest clearance. The presence of sandy loam at − 102 cm b.d. and the absence of artifacts indicated a sterile deposit, confirmed with a 50 × 50 cm test unit excavated to a depth of − 137 cm b.d.

Lithics

The lithic profile at NYA-1A provides insights into the preceramic phase of human activity in this once-forested environment. Consistent with other NCLR sites, lithic materials were relatively sparse ($n = 24$), but they take on added importance because of the aceramic component below − 50 cm b.d. Formal tools make up 8.3% of the assemblage on quartz and chert. The two shaped tools were a composite scraper made of chert and a utilized flake and drill made of quartz, with evidence of Levallois-like technology (OSM 2.5 for lithic profile and OSM 1.2, Fig. 1-f for Levallois example).

Fauna

As the area had been used as a domestic refuse dump during the lifetimes of current residents, the faunal remains in the top stratum (0 to − 40 cm) were recent deposits. The presence of skeletal elements of cows, caprines, and chicken are not surprising. However, the presence of warthog (NIPS = 1; MNI = 1) introduces the possibility that even recent populations may have taken advantage of wild animals with the repopulation of the region during the last seventy years. The most important faunal evidence is found in −70 to −80 cm, where the gneiss and quartz nodules cache was documented. In this preceramic context, we documented a juvenile cow and bush pig. The fragment of a juvenile cow likely migrated via rodent transport, as it is at least a millennium older than the oldest domestic animals documented in Kansyore deposits at Wadh Lang'o (Prendergast, 2010). The bush pig, however, may be

part of early MSA or ELSA subsistence, though we must consider rodent transportation as a possibility.

Rwankenzi-2, Locus 2

During 2014, part of our initial regional survey focused on the caldera rims around Lake Wankenzi. We started on the eastern side of the lake at RWA-2, Locus 1, where we located a significant Bigo period site alongside Kansyore and Boudiné ceramics. We continued our survey along the western rim and documented a series of locales—RWA-2, Locus 1, and Locus 2—that were marked by LSA lithics and Kansyore ceramics. These sites were continuous scatters of artifacts, thus their designations by locus. In 2012, we initially identified RWA-2, Locus 2 during a reconnaissance survey. We encountered several human skulls and long bones piled up in groups after being removed from burials by farmers. We observed similar artifacts in 2014 as field investigations continued from the Wankenzi caldera rim upward 400 m to RWA-2, Locus 3, where we observed large Kansyore ceramics embedded in a footpath. The transect ended at the swampy caldera south of the Nyakabungo-1 site. In 2015, the RWA-2, Locus 2 (see Fig. 23) was revisited to explore the possible association of LSA lithics and Kansyore ceramics with the human skeletal elements previously observed. This presented challenges as hoe agriculture had reached the tuff layer, and erosion at the hill crest had displaced most of the soil. We selected a location contiguous to a small tree where it appeared there was less disturbance. The 1.5×1.5 m test unit (RWA-2, Locus 2A) reached soil mixed with significant tuff fragments at -15 cm b.d. Excavation continued to -28 cm where we encountered solid tuff. The upper two strata were homogenous, loose soil differentiated by color, with a shift from black to brown soil in the last 8 cm. This was a deflated setting, much like the western sectors of Rusoona-1 and Kabata-1.

Ceramics and Associated Burial

Kansyore ceramics were abundant along the eastern edge of the 40 m wide caldera rim, but the southern part of the small plateau, where this test was located, yielded only one stamped Kansyore ceramic among seven Bigo period sherds, of which three had PGR decoration. Such a sparse assemblage does not indicate a Bigo period occupation, yet mid-second millennium AD populations certainly used the area.

A transect survey using 2 m spacing located a recently disturbed burial on the western lip of the Lake Wankenzi caldera. This was once a zone of intense internment, given our observations during the 2012 reconnaissance. The skeletal elements, including skull fragments, were scattered over a 1×2 m area (OSM 3.10 for photo). We mapped, photographed, and collected surface skeletal elements and then troweled to sub-soil in a 1.5×2-m exploratory unit without locating in situ remains. Kansyore and Boudiné ceramics were recovered (Fig. 24), but other ceramic traditions were absent. We see this as additional evidence for the contemporaneity of Boudiné and Kansyore in the NCLR. This strong association and an AMS date of 251–426 calAD (Table 5, row 3) on a tooth affirms, also given the dates on burials at Locus-3A and 3B (see below), the earlier presence of Kansyore populations in the NCLR.

Iron

There was one modern iron tunic buckle in the first stratum.

Fauna

Faunal remains were recovered from surface and subsurface contexts in the zone where we documented human skeletal elements. Such remains appear in an early first millennium calAD context in which only domesticated animals were represented, with cows (NISP = 10) and caprines (NISP = 7) in association with the human elements.

Rwankenzi-2, Locus 3A Burial

A large decorated Kansyore rim embedded in a footpath documented in 2014 became a focus during the 2015 season (Fig. 25). We relocated the ceramic extrusion on the edge of the path overlooking a large dry caldera north of Lake Wankenzi and placed a 1×1 m test over the feature. As we opened a 10 cm level, the exposed ceramic sherd was associated with other fragments of a large vessel and a burial. Within the first excavation level, we defined a partially damaged skull near the surface immediately to the west of the path. The burial was in a flexed position on

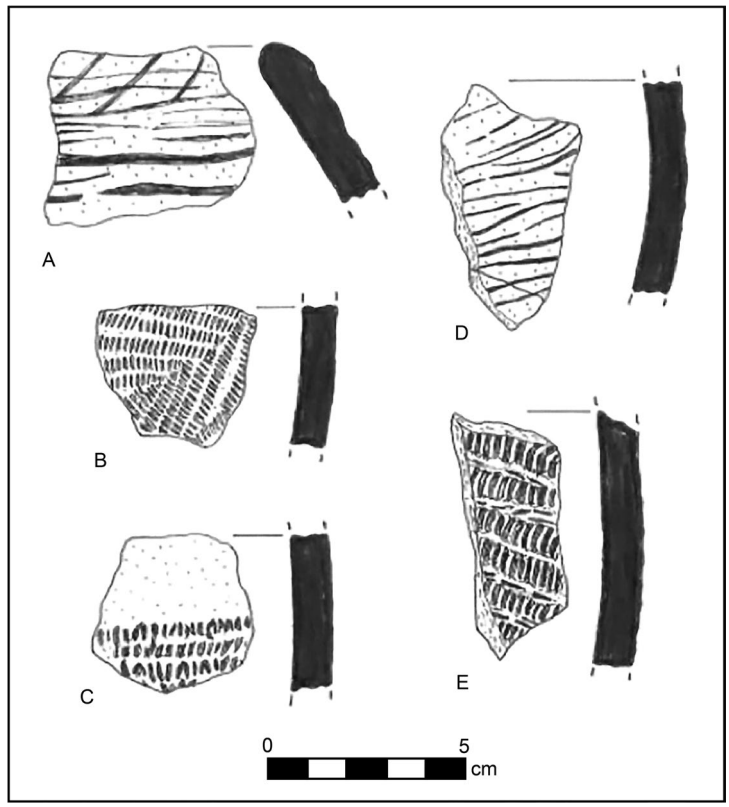

Fig. 24 Ceramics from the disturbed burial at RWA-2, Locus 2; **A** and **B** are Boudine (TU). Kansyore sherds **B** and **C** have rows of punctates, and **E** has rows of stamping with a carved cylinder

its right side, oriented toward the west (head pointed north), with the legs drawn up to the chest and the head bent downwards, resting on the lower arms and hands (Fig. 26).

The left side of the cranium was missing, but the maxilla and mandible were in situ, as was most of the post-cranial skeleton. The coccyx was missing, and degeneration of the posterior part of the ilium may be linked to taphonomic influences such as battering by hoe agriculture (Echoru, 2017). Parts of the humerus and surgical neck of the femur showed signs of reactive bone tissue, and recovered cranial bones showed signs of porotic hyperostosis. There was also clubbing at the distal and proximal ends of metacarpals and phalanges, suggesting arthritis of the hands between the carpal and metacarpal joints and also between distal inter-phalangeal joints of the fingers (Echoru, 2017). There were no signs of trauma or cut marks, except cut marks on one patella attributed to hoe impacts.

As we removed soil from the skull, vertebrae, and pelvis, we observed more decorated Kansyore ceramics, some arranged vertically behind the hips and back (Fig. 26). There was a heavy, flat base of a vessel lodged between the arms and the ribs of an adult female who was 1.62 m in stature. A tooth was dated to 333–534 calAD (Table 5, row 1). The purposeful placement of upright ceramic fragments of a large vessel behind her back shows that the vessel was broken before burial was completed and placed meticulously around the back of this woman to create a crib-like enclosure in what proved to be a compact grave (OSM 3.11 for grave profile).

Funerary Vessel and Discussion

The vessel buried with this individual is distinctive yet very much within the Kansyore tradition. The vessel (Fig. 27-a) is a huge necked urn—large bodied—with its modest neck decorated by converging and crisscrossed stamped decorations in bands bordered by a horizontal row on top and bottom; interlocking and convergent stamps occur in the design element (Fig. 27-b). The vessel aligns with other Kansyore ceramic technology—micaceous clay and a rough paste with very large quartz tempering (< 5 mm),

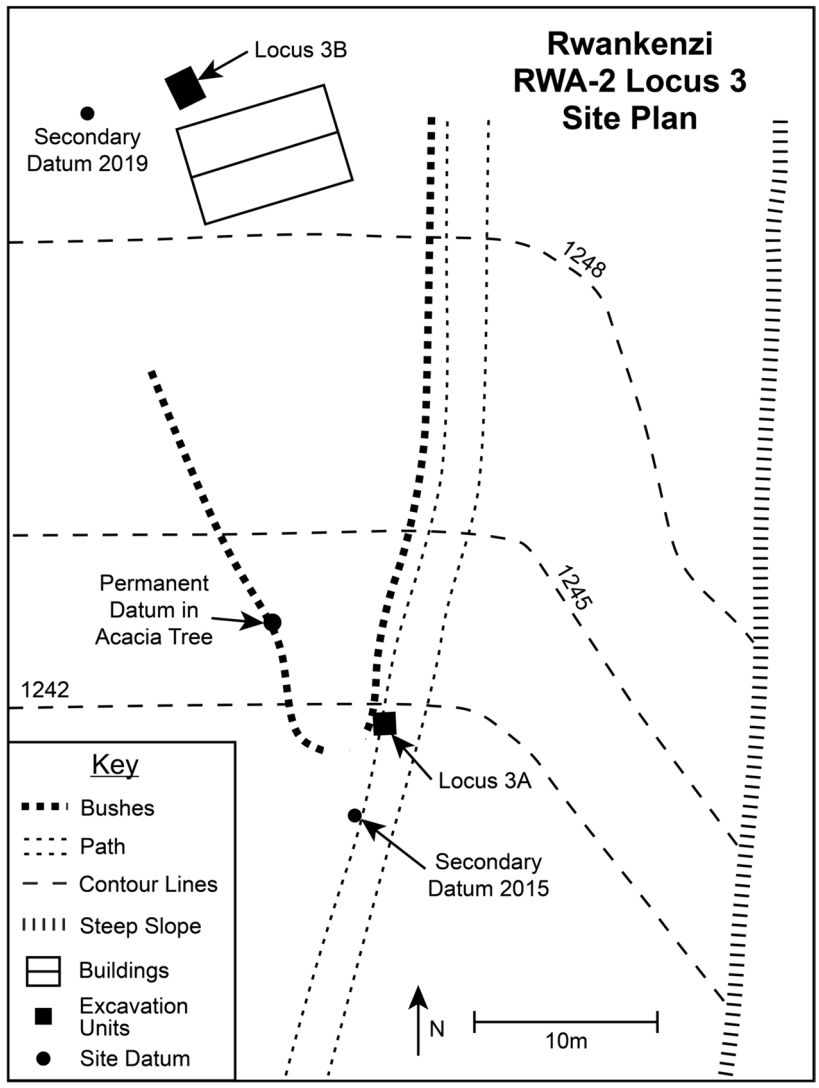

Fig. 25 Site plan for Rwankenzi 2, Locus 3 site, (RWA-2, Locus 3). The site has changed since 2019. The hedges are recent and the house has been replaced with a larger structure several meters to the south

sometimes exceeding 1 cm in diameter. The decorated base of this large vessel found in situ between the ribs and arms is significant. The flat base is decorated with elongated finger impressions that are vertically oriented—a distinctive feature (Fig. 28a & 27b).

This vessel recalls decorations found on the bases of several Boudiné burial vessels at the KA-1 site (KA-1A, KA-1B, KA-1D) and decorations on the base of Kansyore vessels at KYA-2A and RU-1C. Such observations suggest close social interaction among the groups (Kansyore- and Boudiné-associated) responsible for ceramic production, not to mention sharing landscape use, ideas, and cosmological beliefs. Such crossovers in ceramic technology and decorative applications are congruent with dating in the NCLR for each tradition, which shows them to be overlapping in time and thus occupying and sharing the same environment and social spaces. Additionally, the vessels and burials provoke us to recognize parallelists at work (sensu Kusimba, 2005, 2013)—those who adopt elements of another, dominant culture to gain acceptance and forge identities with longer-term residents—(the so-called Kansyore) whose cattle, caprines, and crops Bantu-speaking later arrivals also adopted.

This vessel contributes immeasurably to our knowledge of one of the primary vessel types in the NCLR Kansyore assemblage. The total weight of ceramics in this grave is 5.6 kg, far in excess of any other Kansyore ceramic feature in the region,

Fig. 26 (left) Female burial at RWA-2, Locus 3A; the curved line behind her back, running down to her femora, are upright sherds from the large vessel interred at the time of burial. A finger-impressed vessel base is under her chin and over her ribcage; (right) after removal of some skeletal elements and ceramics, except those behind her. Photos: by author

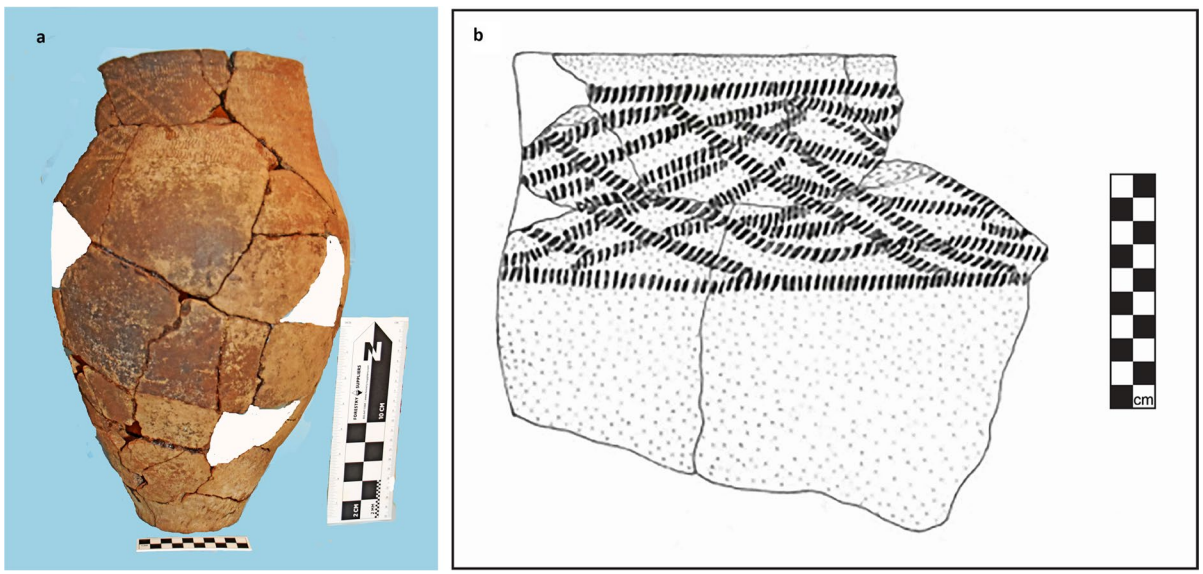

Fig. 27 **a** Kansyore urn-like vessel, with flat base, a grave good broken and placed around the back of the female individual, RWA-2, Locus 3A; **b** decorative details of convergent/crisscrossed stamping on rim. Photo: by author

including the ceramics documented at KYA-2. The other noteworthy ceramic attribute is the presence of a large chunk of pyrite (< 8 mm) in this burial vessel, some so large as to be exposed on the ceramic surface and certainly after being broken in the grave, a find that parallels pyrite in similar ceramics at KYA-2.

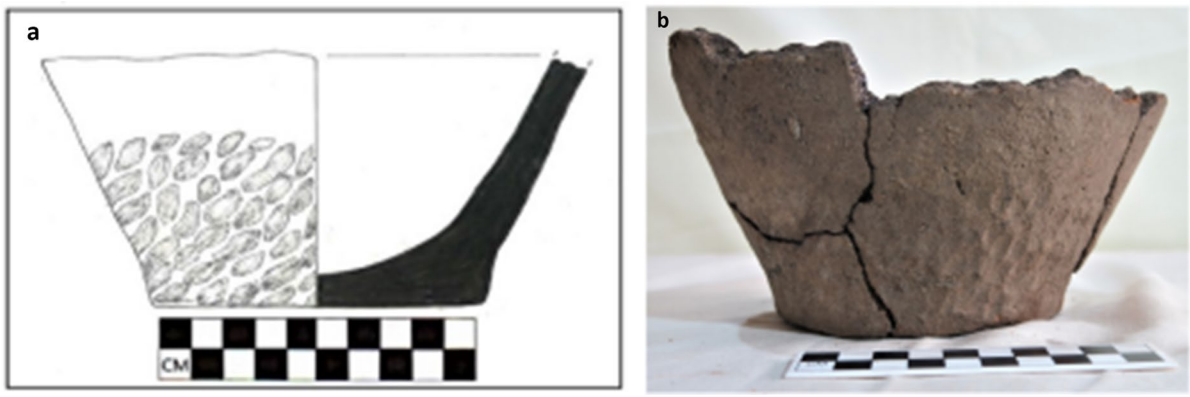

Fig. 28 **a** and **b** Base of the large Kansyore urn with finger impressions, buried with a female at RWA-2, Locus 3A. Photo: by author

This sparkling mineral inclusion and the highly micaceous clay in these vessels lend them a bright, highly reflective quality. Notably, these graves and grave goods are situated on the western rim of a caldera, hit by the first rays of the rising sun. This is not coincidental. It is a purposeful agency that integrates cosmological principles that tie the after-death to solar cycles that continually renew: a life-giving force that reverberates with the bright, sun-like reflective properties of the objects buried with the individual.

Ritual renewal associated with a celestial body was also practiced in Great Lakes new moon ceremonies during the second millennium AD, during which polities were ritually brought back from impending extinction and given new life. As new moon rituals also included deceased leaders (Schmidt, 2017), such rituals affirm and resonate with ritual concepts of solar renewal. As we have shown in the case of burials at KA-1 and RWA-2, Locus 2, burials are situated on the western rims of calderas as are the burials at other sites such as ND-1 (Ndali Lodge), RWA-2, Locus 1, and even RU-1 Locus 2A, the last situated on the NW remnant cone of Lake Mwamba. All of these burials are later, suggesting heritage memory of sacred space over long periods. This associative process—creating identity through physical contiguity—is also seen in Buhaya, where time was collapsed by juxtaposing temporally separated activities within a spatially sacred setting to create a sense of continuity. There is little in the region's ethnography to suggest other reasons for such burial places (Schmidt, 2018). The Nuer avoided bushy areas, considered dangerous or evil (Evans-Pritchard, 1949), but this does not account for the western placement on calderas.

Lithics

There were two quartz cores in the burial fill. In the center portion of the burial, near the ribs, there was one backed crescent made of quartz, an association also observed at RWI- 1 (see below). Given the placement of this lithic tool, it appears to be a purposeful addition to the burial, similar to the burial at RWI-1. We may imagine that it was intended to carry symbolic potency linked to heritage values—a gesture to cultural practices that valued lithics as part of daily life, in other words, a lived heritage taken to the grave.

Rwankenzi-2, Locus 3B

During the 2019 season, as part of our goal to identify and rescue threatened burials, we located a burial in the house's forecourt near the RWA-2, L3A burial, just discussed. Exposed by hoe agriculture at an abandoned homestead, a descendant identified this burial. We immediately launched an investigation, fearing further damage to the burial. We first conducted transects at 1 m spacing to document a 25×35 m area in front of the small house (since removed). Only skeletal elements were found in a concentrated area. The soil was dark grey sandy loam dense with tuff fragments. The general area was deflated by cultivation and erosion. We placed a 1.5×2 m unit (28.94 m @

349° from permanent datum) over the few visible bones and excavated to a depth of − 9 cm.

In the first excavation level, we documented three sherds with PGR of the Bigo period. Two centimeters into the next level, a human cranium was exposed (OSM 3.12 for photo). The excavation in this next level exposed one MIA sherd and most of the remaining skeletal elements, of which approximately 40% remained in situ. Most of the cranium was preserved until schoolchildren vandalized the site. The damage was unfortunate, but the displacement of skeletal parts did not affect the context of the find. We had collaborated continually with local authorities to inform people about the sensitive quality of our research and with schools in particular, so this was a disappointment. The severely deflated soil conditions, shallow setting, and recent disturbances suggested that the few later ceramics could not be taken as marking cultural affiliation.

This burial was quite different in its treatment from RWA-2, L3A to the south. This male individual was buried on his back without grave goods except for one quartz flake. This practice was also observed at RWA-2, Locus 3A, where a backed crescent was associated with the burial near the base of the urn, and RWI-1A, where a backed blade was buried with the deceased. This particular association may be incidental, an inclusion resulting from backfill containing lithics. The presence of formal tools in the other contexts, however, inspires the idea that lithics may have been valued as heritage items to be revered and conferred with ritual meaning in the realm of the ancestors. Also important, this individual was buried on the western rim of a caldera, consistent with the other burials in the NCLR. AMS dating of this individual establishes that this burial was contemporaneous with the other Kansyore burials near the Lake Wankenzi caldera, 416- 538 calAD (Table 5, row 2)—slightly later but accordant with the Kansyore period female burial nearby.

Rwankenzi-2, Locus 1

This site was initially documented during our 2014 survey. Starting at this locale, there was a continuous light scatter of LSA lithics, Kansyore, and Bigo period ceramics running north to RWA 2, Locus 2 (see Fig. 23). We returned in 2019 to explore a burial pit in tuff that PRS observed during a 2018 visit along the western caldera rim, where a road had been constructed on exposed tuff overlooking Lake Wankenzi. A house platform was constructed in 2015 3 m east of the road. While clearing an area for a courtyard, Mr. Ambrose (the landowner) encountered a burial within the volcanic tuff (OSM 3.13 for photo). He removed most of the skeletal elements, packed them into a plastic rice bag that he buried, and left the grave depression exposed in his courtyard.

We returned in 2019 to exhume the rice bag and its contents, document the context, and conduct GPR survey transects along the caldera rim to locate more burials, especially in the roadway where agricultural disturbances had not occurred. As in other settings, the GPR failed to locate cultural deposits or burials. Every location where the tuff had been disturbed registered as an anomaly, be it a filled pothole in the road or tuff broken by earlier hoe agriculture. The recovery of the reburied individual was successful, though the context was erased, some skeletal elements were missing, and there were no associated artifacts. This individual was AMS dated to 1053–1257 calAD (Table 5, row 4), an intermediate, transitional date that indicates this part of the region continued to host populations between the Transitional Urewe and Bigo-related groups. Moreover, the location of the burial on the western caldera rim shows the continuity of practice, such as the destroyed burials observed in 2012 at RWA-2, Locus 2, and those documented at RWA-1, Locus 3A, and 3B.

Rwankenzi-6

During 2015, the RWA-6 site (see Fig. 23) was located by radiating transects from the Lake Wankenzi caldera, ~ 1172 m a.s.l. Positioned on a gradual slope 350 m from the lake's southern rim, the site was identified within a banana planting where a trench had been cut E-W across the farm (OSM Fig. 27). The base of a Boudiné vessel protruded from the western end of the trench profile, and scatters of Kansyore sherds were found in the excavated earth. After conducting transects spaced at 2 m intervals across a 60 × 60-m area south of a residence, bracketing the trench, we placed five STPs running E-W 2 m north of the trench. The results from STP2, where we documented Boudiné and Kansyore ceramics (convergent stamping and wavy line), guided our placement of a 1.5 × 1.5-m test unit, RWA-6A, contiguous to STP2.

Ceramics

Despite recent agricultural disturbance in this area, the RWA-6 excavation provides a firm cultural stratigraphy. Significantly, the assemblage is dominated by Kansyore and Boudiné ceramics. Being on the lower slopes of a large caldera lake, the location departs from other sites documented in our study—located mostly on the upper slopes of calderas or their rims. Another difference is the absence of classic Bigo period ceramics. There is no evidence of PGR decoration or red paint on MIA ceramics. The ceramics are distinctive, with grooving and slash incisions over TGR applications and impressed twisted grass treatments, similar to the ceramics from the upper part of the refuse pit at KYA-1D. Given the distinctive attributes of these ceramics in the NCLR and their limitation to the upper stratum, it appears that they represent occupation at the site by a mid-second millennium calAD group also present during the Bigo period at Kyakatama-1 and Lugembe-1.

Boudiné ceramics make up a sizable proportion of the assemblage in both the upper and lower strata, the transition in strata marked by a color change from black humus-loam to a dense dark brown loam at − 33 cm b.d. Of the eleven vessels with rims in stratum 1, 73% are Boudiné, and 82% (inclusive of Boudiné) are from the mid-first millennium AD. One Boudiné rim measured 30 cm in diameter, consistent with evidence from KA-1 and KA-3 for large urn-like storage vessels. Indicative of the variability seen among Boudiné vessels, one open bowl had a mouth diameter of 19 cm while a narrow-mouth bowl had a diameter of 14 cm, the latter a diminutive form similar to Kansyore narrow-mouth bowls.

Using MNV, the decorated ceramics and heavy bases in the lower stratum are entirely Kansyore ($n = 4$), Boudiné ($n = 5$), and TU ($n = 1$), suggesting that these artifacts, when found in the upper stratum, had been displaced from below. Sterile deposits were encountered at − 43 cm b.d., while the excavation reached sterile soil at − 52 cm b.d. Within the early components, we see distinctive attributes. One rim (from STP2) and a body sherd were recovered, both with wavy line comb decoration, an attribute that is a negligible part of the Kansyore repertoire in the NCLR and not to be taken as marking a direct connection with the Khartoum Nile region (cf. Kyazike, 2016). The integrity of the second natural stratum suggests that this zone on the lower slopes of the Wankenzi caldera merits additional investigations.

Fauna

One caprine long bone fragment, associated with the mid-second millennium context, was recovered from the top of the second stratum.

Lithics

We recovered two smoothed igneous rocks from surface soil, one of which was modified as a small, hand-held grindstone. At the top of the second stratum were 13 polished quartz river pebbles, two of which had surface modifications—one with a circular hole and the other with two rectangular holes. These are not intended for lithic reduction and may be modified to satisfy other, possibly symbolic purposes. One of the two tools recovered from the TU/Boudiné deposits—a thumbnail scraper—was made from a quartz river pebble with cortex present.

Iron

Two small, corroded bracelets were recovered from the top of stratum 1, both diminutive—one measured 24 mm in internal diameter. An iron ring of 14 mm (internal diameter) was found at the top of stratum 2. Its condition, proximity to the bracelet fragments, and the absence of iron from most first millennium AD contexts elsewhere in the NCLR point to a more recent origin.

Rwankenzi-7

Located 1 km ESE of RWA-6 at 1156 m a.s.l. (see Fig. 23), RWA-7 was documented during the radiating transect survey of 2015. It was observed as a small feature in the forecourt of a house atop the flat rim of a shallow dry caldera. The feature's fill and ceramic inclusions contrasted significantly with the reddish-brown clay subsoil. The surrounding soil was without artifacts, so we focused exclusively on the feature. It produced both Boudiné and Kansyore ceramics (Fig. 29), a probable okapi tooth (personal communication, O. Mbweni, Jan. 9, 2023) that dated to 11,303–11,120 calBC (Table 5, row 5), and a radius fragment from a cow. The latter reaffirms the

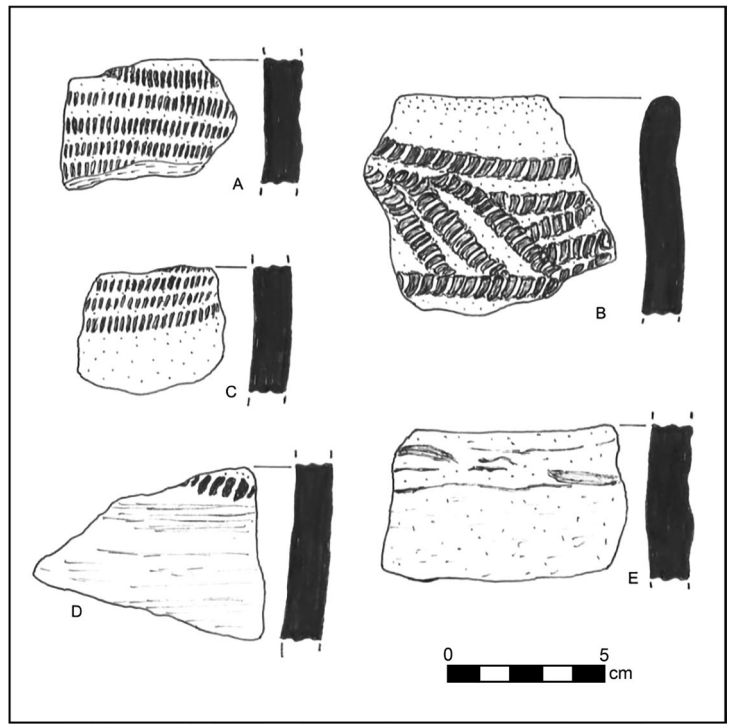

Fig. 29 Ceramics from the RWA-7 pit feature. **A/C** (one sherd) and **D** are Kansyore, with horizontal lines of linear, vertical punctates; **B** displays convergent stamping like RWA-2, Locus 3A, RU-1C, and KYA-2, which suggests a pan-regional type. **E** is a Boudiné body sherd

presence of cattle during the mid-first millennium AD, while the Okapi find presents an opportunity to establish the presence—as with our environmental studies (see below)—a forested environment in the twelfth millennium calBC. Forests are the favored habitat of the okapi, which are currently found only in eastern DRC forests.

The distinctive characteristics of this deposit initially seemed puzzling. How would an ancient okapi tooth end up in a small pit containing Kansyore and Boudiné ceramics? Current activities in the dry caldera offered a clue. The caldera was being actively mined on its southern side for peat used as fuel. The caldera's shallow profile allows ready access. It may have had a similar function in antiquity. After the initial volcanic activity in the region approximately 13,000 years ago, the landscape soon became forested (Kiage et al., 2017; Lejju & Yeko, 2019; Taylor et al., 1999), and thus ideal for forest-dwelling animals like the okapi. This shallow caldera may have been a mire where the animal perished, with the tooth recovered and valued 11,000 years later.

We are left with few other clues than a scenario that points to the use of the tooth as a meaningful part of a past world, buried with artifacts that identified the agent as a member of the Kansyore or Boudiné communities. The purposeful placement of Kansyore and Boudiné ceramics in this small pit speaks to a local perspective on the relatedness of the two ceramic expressions, agency that diminishes any doubt about the contemporaneity of the two communities and their close social relations.

North of the Study Area:

Nkuruba-1, Locus 2

The Nkuruba-1 site came to our attention by serendipity. It was the location of our field camp in 2019. Nkuruba Crater Lake lies 4 km to the north of the edge of our study area (Fig. 30 & Fig. 1). A well-preserved lake due to the presence of a nature preserve and eco-tourism camp, Nkuruba, presented an opportunity to explore reports of threatened human burials. Though two reports proved impossible to verify, a third report identified a possible burial near a power pole and 8 m from an old guest house. We placed a 1.5 × 1.5-m test unit (NK-1, Locus 2A) near the utility pole, only to encounter guywires among human

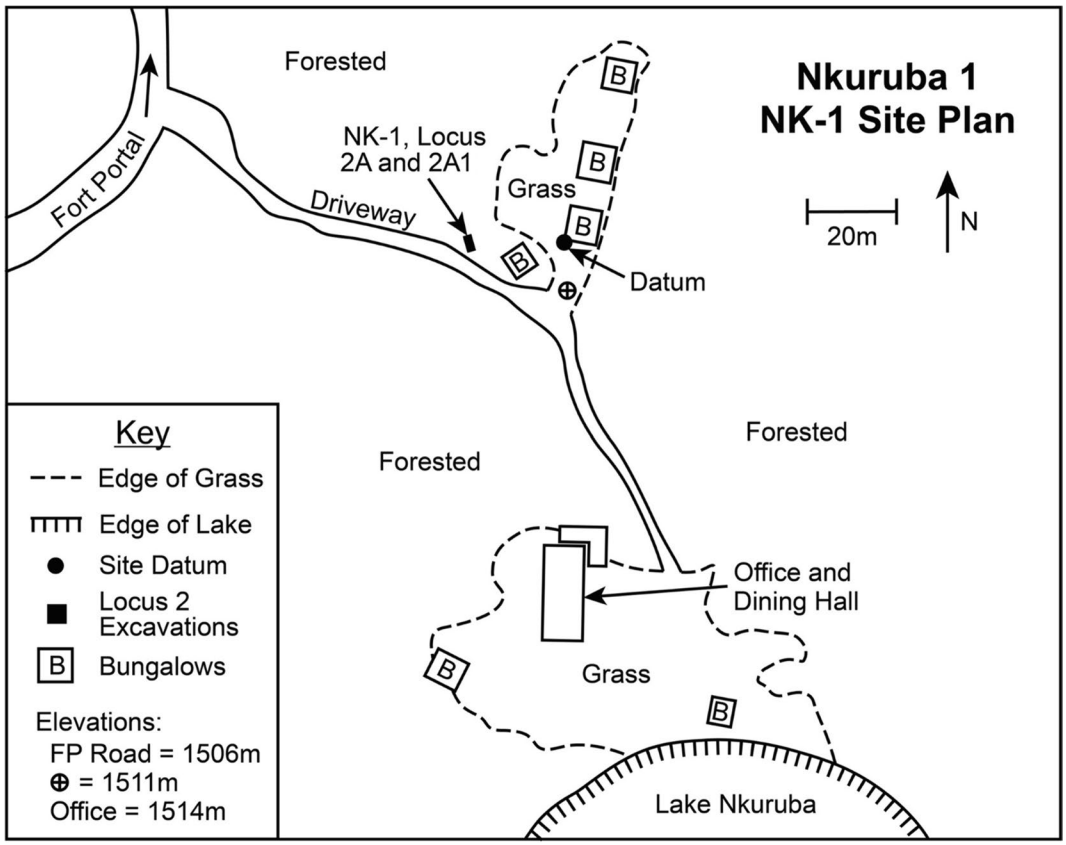

Fig. 30 Site plan of Nkuruba-1 (NK-1)

skeletal elements, including a sternebrae, phalange, and metatarsal. Finding it impossible to continue deeper than − 50 cm b.d., we opened a contiguous unit (RU-1, Locus 2A1) on the edge of the driveway embankment that revealed funerary-like Bigo period pottery (OSM Fig. 28).

An AMS date on the human metatarsal produced a date of 1641 calAD (median probability of 309 bp, Table 6, row 1), more than a hundred years younger than the early sixteenth century calAD Bigo period burial at Ndali-1. The presence of specialized funerary-related ceramics is similar to the Bigo period burial at RU-1, Locus 2A, where diminutive vessels with painted red vertical stripes over bands of plaited roulette were present in the burial, affirming this association. The two excavation units yielded primarily Bigo ceramics, indicating that this area—contiguous to a small but accessible lake—is an occupation significantly later than the other dated Bigo sites. Despite the advent of the Little Ice Age, approximately AD 1500 AD, resilient communities continued after its onset. As Bigo period populations polluted lakes and degraded soils (Russell et al. 2009), a setting like this low-lying level plateau near a small crater lake likely provided alternative opportunities for farming in more stable conditions.

Ceramics

Ceramics from the surface and first excavation level of these contiguous units are mostly Bigo period. There were 12 decorated rim sherds in the top level, of which 92% were definitively Bigo-related, decorated with PGR, TGR, and sometimes painted and/or slash incised. Knowing that TGR-decorated ceramics are affiliated with Bigo-related populations, we see this manifest here as TGR rims that are painted and slash incised. Important in this assemblage of Bigo rim sherds is that all of them are diminutive except one. In other words, there is a lack of robust,

Table 6 AMS radiocarbon date from Nkuruba-1

Item # & Lab #	Site & year collected	Sample ID & source	14C age uncalBP	68% low/high	95% low/high
1. GAAMS60925	Nkuruba-1 (2019)	NK-1 Locus 2A *Bone, phalange*	270 ± 20		1523 to 1572 calAD (30.8%) 1630 to 1665 calAD (61.6%) 1785 to 1794 calAD (3%)

thick rims like those found in the upper stratum at LU-1A and the western part of KA-1. Instead, ceramics closely resemble the diminutive narrow-mouth bowls found in the context of the Bigo period burial at RU-1, Locus 2A. Rim sherds from deeper levels of excavation (− 10 to − 35 cm) were more diverse: 14, including two of Kansyore (one stamped, one with punctates) and two TU. However, this trace of the mid-first millennium occupation is dominated by Bigo period rim sherds.

Seventy-one percent of rim sherds' deeper assemblage ($n = 17$) are decorated with PGR, TGR, slash incisions, or paint. If we examine the entire assemblage ($n = 35$) using MNV and include undecorated Bigo period rims ($n = 9$), a dominant Bigo assemblage emerges at 86% frequency (OSM Fig. 29). If we consider all the decorated ceramics, the dominance of Bigo period specimens does not present a significantly different picture. Of the 64 decorated sherds, 91% are definitively Bigo ceramics (33% TGR, 58% PGR), with TU ($n = 2$), Boudiné ($n = 2$), and Kansyore ($n = 2$) comprising just 9% of the assemblage. This Bigo period occupation is situated within a topographic setting that differs significantly from multi-component sites like Kabata-1 and Rusoona-1 set on caldera rims where Kansyore and TU/Boudiné occupations were significant precursors to later Bigo period populations. Finally, some Bigo period burials—though disturbed in this case—are accompanied by narrow-mouth bowls, some painted with red stripes.

Fauna

Excavation units A and A1 are treated together as we first discuss the finds from the surface to − 10 cm b.d. A human sternebrae was found with skeletal elements (each 1 MNI) from a baboon, giant forest hog, bush duiker, African giant pouched rat, and spurfowl. Fragments of domesticated animal bones were also found, cows (NISP = 19; MNI = 2) and caprines (NISP = 10; MNI = 2). There were five adult cow body parts and one immature cow bone. Charred fragments among cow remains ($n = 5$) included long bone fragments as well as rib and vertebrae fragments. Four adult caprine body elements and one juvenile tooth were present. Like Bigo period preferences at KYA-1D, roasting appears to have been a cooking technique for caprine and cow long bones at this locale. The presence of giant forest hog and baboon—both more difficult prey for hunters—fits with Bigo period hunting practices at both KYA-1 and KA-1, though the presence of bush duiker also occurs in diets from the first millennium AD.

From − 10 to − 35 cm b.d., the assemblage yielded bones from vervet monkeys and suni. The suni antelope is represented by four skeletal elements, including a charred cranium fragment. Given that there are earlier mid-first millennium components (Kansyore and TU/Boudiné) on this site, these species more closely fit the wild animal profile of that era. Caprines (NISP = 18) are present with a greater diversity of caprine body parts than most sites, for example, long bones, vertebrae, a tooth, and a talus, with a metapodial—all bones likely associated with the same individual from the upper stratum. There was only one cut mark observed on a caprine long bone. Charring of bones occurred more frequently with caprine long bone fragments (n-4), again indexing a preference for roasting meat on long bones during what is predominantly a Bigo period occupation. The distribution of body parts of modest numbers of individuals (one adult and one immature cow and caprine each) speaks to the sharing of meat cuts across the community alongside the continued use of smaller wild mammals as supplemental to a domestic meat diet.

Lithics

NK-1 shows a diversity of raw material sources: chert, quartzite, quartz, and gneiss (the latter is a likely inclusion from the first millennium AD deposits). The later Bigo period use of quartzite led to

copious amounts of debitage and speaks to the flaking difficulties local technologists had with this raw material. Quartz was highly preferred, with most formal tools made from that material (OSM 2.6 for raw materials and tool types).

Paleoenvironmental Connections and the Historical Ecology of the NCLR

The NCLR presents a rich array of occupational histories and remarkable opportunities to articulate these histories to environmental histories—a primary goal of historical ecology. With the added advantage of a large number of dated burials that help fix the culture histories, we can trace the transformations induced in the physical landscapes and link those cultural interactions to deeper ritual and symbolic meanings. The use of space for occupations and for sacred activities shows remarkable continuities over time, while activities such as hunting wild animals for supplemental meat vary across time as a forested environment is first transformed into a forest mosaic and eventually to more open grasslands with forest remnants in the second millennium AD.

The NCLR and sediment-filled crater swamps that make up this landscape of western Uganda are excellent archives of past environments. The sediments from the swamps and crater lakes serve as proxies (e.g., pollen, fungal spores, phytoliths, charcoal, and diatoms) to reconstruct past environmental conditions. Previous studies (e.g., Bessems et al., 2008; Russel et al., 2009; Ryves et al., 2011; Saulnier-Talbot et al., 2014, 2018; Ssemmanda et al., 2005; Taylor et al., 1999) provided evidence of long-term human impact on the landscape, including extensive clearance of forests as early as ca. 4800 years ago (Hamilton et al., 1986; also see Taylor, 1990, 1992; Taylor & Marchant, 1994) in the highlands some 200 km south of the NCLR and about 4300 years ago near Kabata swamp (Kiage et al., 2017). No archaeological evidence can sustain any of these interpretations about human agency—either in the Rukiga highlands or Kabata Swamp—(see Nyiracyiza, 2012 for the Rukiga highlands; Schmidt et al., 2024). There also have been strong assertions of a major anthropogenic disturbance of natural systems dating to ca. 2500 years ago, attributed to iron producers during the EIA (Taylor et al., 1999) in the Kabata Swamp area.

Kabata Swamp

Our research in the NCLR shows that forest clearance did not result from iron producers but instead from LSA hunter-gatherer-fishers who made the first colonizing inroads into the humid tropical forest, followed by agropastoralists with a mixed economy (including fishing, gathering, and hunting). These Kansyore agropastoralists, later joined by small groups of Bantu speakers, accelerated forest clearance that appears to have increased during the first half of the first millennium AD, as seen at KA-3. Widespread primary forest clearance occurred in the mid-second millennium AD, with secondary forest regenerations thereafter and then successive waves of clearance evidenced by human-induced catchment erosion and a severe nutrient impact on lakes in the second millennium AD (e.g., Ryves et al., 2011; Schmidt et al., 2024). Here, we present evidence of vegetation dynamics and human interactions in western Uganda primarily based on phytolith and charcoal record assemblages from the Kabata swamp (Lejju & Yeko, 2019).

Sediment Sampling

We collected a series of overlapping sediment cores ranging from 4.5 to 6.5 m along a transect using a modified Russian Corer that yielded suitable sediments at a depth of 4 m. The upper 2 m of Kabata swamp was flooded. The floating vegetation had fibrous materials that were lost during the coring. Phytolith assemblages (see Bremond et al., 2008) in the Kabata sediment core are presented in a stratigraphic diagram (Fig. 31). The phytolith assemblage is based on eight zones (Kz1 to Kz8) derived from cluster analysis; the description of the vegetation types is based on the phytolith morphotypes (OSM 4.1 for methods).

Vegetation Dynamics During the Late Pleistocene ca. 10,000 to 9400 BC

This period is represented by zone Kz1 (650–640 cm, ca. 11,764–11,496 calBC), dating from the late Pleistocene to the early Holocene (ca. 10,041–10,737 calBC) (Table 7, KAB2 and KAB2.1). The zone

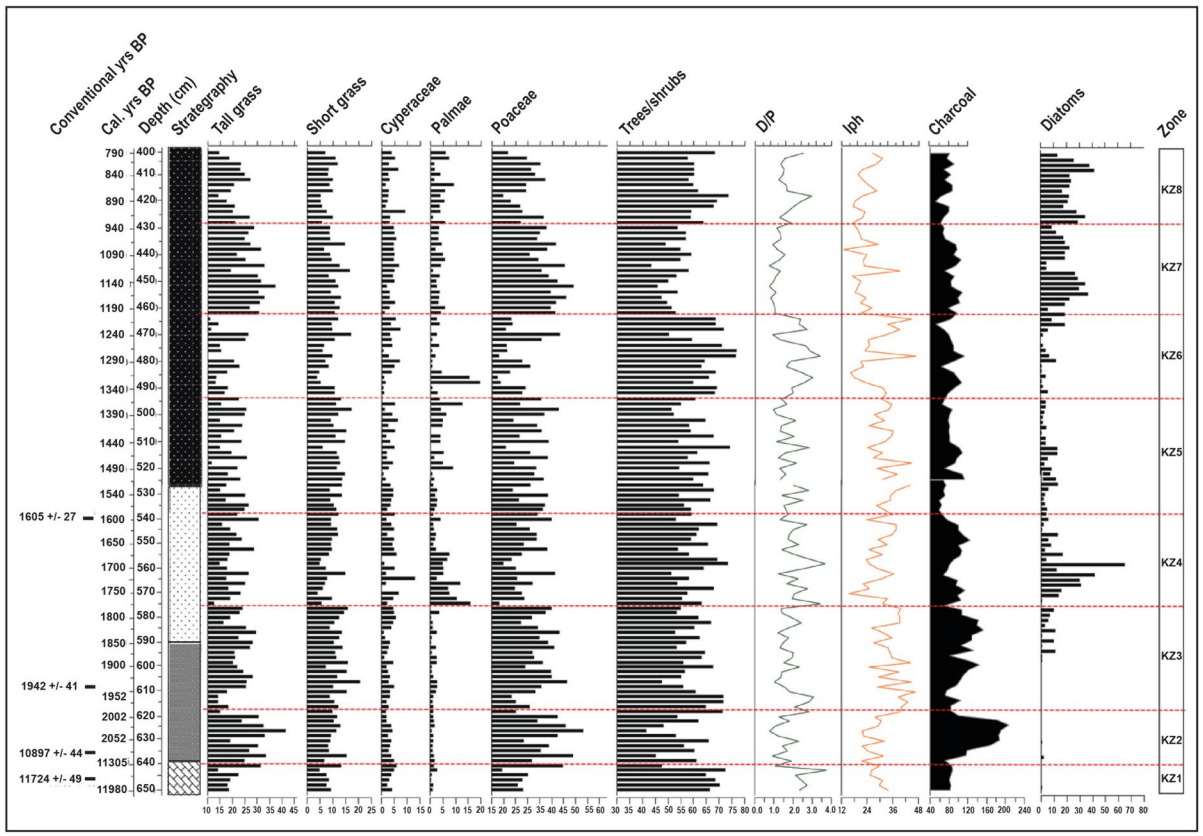

Fig. 31 Vegetation profiles, including charcoal and diatoms, from the Kabata Swamp core

is characterized by high proportions (65 to 74%) of forest taxa morphotypes from trees and shrubs. It is the earliest depositional record following the last volcanic eruption. Palmae morphotypes are relatively low in this zone, contributing less than 5% to the assemblage, indicating that palms favoring wet environments such as swamp margins were rare. The proportion of Poaceae (grasses) morphotypes is relatively low (< 30%) in this zone, mainly contributed by tall grass (17–23%) morphotypes that are characteristic of moist conditions, while the short morphotypes that characterize less moist environments account for less than 10% of the total count.

Cyperaceae (papyrus) morphotypes are also relatively low (< 5%) in this zone. The charcoal record is also relatively low. In general, this zone indicates a period of the forested environment in the catchment of Kabata swamp, supported by high proportions of tree and shrub morphotypes. The values of the vegetation index (D/P) are also high (ranging from 2.5 to 4.0), indicating a period of moist environmental conditions in the region. The trees and shrub morphotypes marked by spherical-rugose phytoliths are probably derived from medium-altitude evergreen and semi-deciduous forest taxa common in the region (Lejju, 2009).

Vegetation Dynamics from 150 calBC to 350 calAD

This phase is represented by zone Kz2–Kz4 (640–540 cm, ca. 150 calBC to 350 calAD; Table 7, KAB2.2), a later period that is preceded by a hiatus in the sediment record from ca. 11,305 year BC, an anomaly that was also encountered in an earlier core reported from Kabata swamp (Taylor et al., 1999). At first glance, it is puzzling, but two different phenomena may explain this gap. The first explanation is the practice of mining peat from swamps for fuel, an activity that occurs nowadays, especially during arid episodes. The second possible explanation is incidents

Table 7 AMS radiocarbon dates from Kabata Swamp sediments

Sample Ref & Lab. #	Depth (cm)	Dated material	14C age uncalBP	Calibrated Age (cal. yr. BC/AD) 95%
KAB2 AA104749	646–648	Bulk	11,724 + 46	11,764–11,496 calBC
KAB2.1 AA106853	634–636	Bulk	10,897 ± 84	11,041–10,737 calBC
KAB2.2 AA106625	608–610	Bulk	1942 ± 41	46 calBC–128 calAD
KAB2.3 AA104748	538–540	Wood	1605 ± 27	399–537 calAD

of small-scale volcanoes that populate the region and are known to have erupted periodically (Livingstone, 1967). The latter cause may have incinerated exposed peat in arid conditions, but we have not found a charcoal horizon to verify such an event. The appearance of this hiatus in two separate investigations affirms that the absence of a long, earlier record at Kabata is not coincidental to one investigation.

The first millennium of the Kz2–Kz4 sedimentary record is characterized by an increase in the proportion of grass (Poaceae) morphotypes to higher levels (55%) at the expense of forest taxa. If we examine Kz2, there was a significant pulse of charcoal deposition over several hundred years in the last four centuries BC. This cannot be related to continuous forest fires and instead points to sustained forest clearance by human activity, as documented at the KA-3A excavation and a fourth century calBC date on charcoal at KA-1B, sampled from the top of the subsoil.

Simultaneously, grasses are dominated by tall grass (C3/C4) morphotypes, contributing a maximum of 40% to the assemblages. Corresponding to these changes is a significant diminution in forest taxa, a clear relationship (Fig. 31). Given the tight relationship among forest taxa, grasses, and charcoal, and the proximity of the swamp basin to early human presence and resource use, anthropogenic causes for environmental change are evident. The Palmae morphotype remains relatively low (< 5%) in Kz2 before increasing to higher levels (20%) in Kz4, which suggests an increase in moisture. Palms are reported to occur in diverse habitats at different altitudes but are mostly restricted to wet habitats (Moore, 1973; Tomlinson, 1979). The most likely source of Palmae morphotypes in Kabata sediments is *Phoenix reclinata*, commonly found in western Uganda's riverine forests (Hamilton, 1991; Lejju, 2009).

In the Kz3 zone, between BC 0/AD 0 and AD 250, we see a variable forest cover with continued forest burning, but not at the frequency seen in Kz2. We suggest this marks continued forest clearance by Kansyore peoples engaged in grain agriculture and pastoralism in settlements close to the caldera lakes, a longitudinal process that created a forest-savannah mosaic over nearly a millennium. Percentage proportions of Cyperaceae morphotypes remain relatively low less than (< 5%) in the first three zones, perhaps pointing to local exploitation for domestic purposes, as is found in the cultures of Uganda during historic times.

Generally, zones Kz3 and Kz4 represent a phase of increased anthropogenic activities supported by reduced forest cover in the catchment, indicated by a low vegetation index (D/P) and a significant increase in the proportions of charcoal in the assemblage. This evidence suggests an increased fire regime in the region due to anthropogenic activities. This period is also characterized by an increase in diatom records (ca. 200–300 AD) that denote a phase of infilling of Kabata swamp during a period of wetter environmental conditions when those making TU/Boudiné pottery established themselves on this landscape alongside those making Kansyore pottery. This intensified landscape modification likely contributed to increased infilling by the removal of vegetation. Moreover, increased moisture conditions may have attracted to the NCLR another pulse of peoples practicing a mixed economy of pastoral-agricultural-fishing-hunting-gathering from the drier steppes of South Sudan when a drying phase occurred at the change of the millennia.

Let us examine evidence from nearby Kifuruka Lake (Kiage et al., 2017), a kilometer east of Kabata swamp. We find corroborating pollen evidence for abundant forest cover during the earliest period (9610 calBC), when deposits were formed in that lake basin—slightly later than the formation of the Kabata Swamp. Thereafter, investigators say little about the next seven thousand years but surmise that forest clearance supposedly began about 2350 calBC and continued afterward. However, pollen profiles for forest trees (Kiage et al., 2017, Fig. 5, p. 1105) lack sufficient resolution to mark such a shift (Schmidt et al., 2024). Moreover, a summary graph (Kiage et al., 2017, Fig. 6, p. 1106) that includes forest pollen shows the opposite—an increase in forest taxa at 2350 calBC. Recognition of these data throws doubt on interpretations of forest diminution. Additionally, they argue that several pollen grains of Cerealia—large pollen grains indicative of domesticated grasses rather than wild grasses—are observed in the first millennium BC.

This argument would have significant implications for links to grain agriculture and, if accurate, may point to the first agriculture in the NCLR. However, the pollen profile in Fig. 6 does not sustain this interpretation. The period when one might expect abundant evidence for Cerealia—the first half of the first millennium AD—when documented Kansyore-associated people were practicing grain agriculture alongside those associated with TU/Boudiné ceramics on the contiguous landscape—has no Cerealia. The resolution of Cerealia is insufficient (only several pollen grains) to document cereal agriculture. However, the Kifuruka results alert us to the possibility that cereal agriculture may have occurred in the first millennium BC, as Schoenbrun (1993) suggests from the historical linguistic study of the region.

The most significant correspondence between the Kifuruka and Kabata evidence is the significant increase in grasses during the early first millennium AD when groups making Kansyore pottery were present. The Kifuruka core also shows a high frequency of charcoal at approximately AD 300, when Kansyore peoples settled in this area, burying their dead on the crater rims. Faunal evidence from excavated sites such as KA-1 and RU-1 affirms the presence of mid-first millennium AD grasslands and forest mosaic, with the hunting of small to medium-size mammals such as suni, bush duiker, and impala that favor brushy grasslands and forest fringes.

Vegetation Dynamics from AD 350 to 1160

This period is characterized by increased proportions (50 to 75%) of forest taxa ca. AD 400–800. Correspondingly, there is little settlement evidence for the Kansyore culture in the region after AD 600, a condition accompanied by the regeneration of forests at the expense of grasslands. This was followed between AD 800 and 950 by a phase of reduced forest cover, with increased grassland cover, the latter expanding to higher levels (30% to 50%). This phase is also characterized by increased levels of diatoms which remain high until ca. AD 1200, which suggests wetter environmental conditions. The *D*/*P* values represent the ratio of forest taxa (ligneous spherical-crenate and spherical rugose phytolith morphotypes) to grassland taxa (Poaceae phytolith morphotypes) (Alexandre et al., 1997; Barboni et al., 1999; Bremond et al., 2008; Lejju, 2009; Mercader et al., 2000). These generally range from 1.4 to 9.0, with Lejju (2009) recording a value of 1 to 8 to distinguish forested environments from savanna habitats in the Interlacustrine Region of western Uganda. This is a significant index that identifies change where grasslands dominate. Archaeologically, these changes correspond to Transitional Urewe/Boudiné settlement in the region (Table 7, KAB2.3), with the added caveat that groups making Kansyore-like ceramics either continued to live on high viewpoints or there were episodic movements into the region from the southern South Sudan, possibly facilitating intermingling with Early Iron Age peoples. While not a significant period of occupation, we must keep in mind that rapid forest clearance would have been enabled by an increased presence of iron-producing groups in non-volcanic and surrounding areas of the region and thus increased iron's availability through exchange.

If we turn to the Kifuruka core for this period, we find that charcoal deposits again peak ca. AD 550–600, when Kansyore and TU/Boudiné populations were coeval. Charcoal frequencies also increased at Kifuruka about AD 750–950. These high charcoal frequencies are linked to Transitional Early Iron Age (i.e., TU) populations and the environmental impacts they induced. This cultural association was missed at Kifuruka because archaeological evidence was not considered. This anthropogenic change is a primary point of agreement between Kifuruka and Kabata Swamp findings and helps portray human population's impact more accurately in the NCLR.

The last period captured in the Kabata core, ca. AD 1000–1200, shows increased proportions of forest taxa, supported by high vegetation index (D/P) values (2.0 to 3.5). High values of this index provide further evidence of forest conditions prevailing after the disappearance of TU/Boudiné-related peoples from the NCLR. At this point, our narrative about the Kabata core transitions to other paleo-environmental evidence from the region.

The pollen profiles from Kasenda Lake and Wandakara Lake (Ssemmanda et al., 2005) in the central and southern parts, respectively, of our research region provide important points of intersection. Around Kasenda, ca. AD 790–1000, medium altitude moist forest gave way to grasslands, a strong parallel with the Kabata data likely linked to the presence of TU/Boudiné agriculturalists. Unlike the Kabata environment, however, forests did not return, and grasslands prevailed until the early eighteenth century. This continuity in grasslands corresponds to two interrelated events: (1) a severe drought from 1250 to 1300 calAD (Saulnier-Talbot et al., 2014, 2018) that transformed the southerly NCLR landscape and the wider western part of Uganda, and (2) the rapid post-drought saturation of this landscape by Bigo-related settlements starting at AD 1300, as evidenced at KYA-1. This significant Bigo colonization of the NCLR frontier occurred during a wetter period for two centuries before the onset of the Little Ice Age at about AD 1500 (Mills et al., 2014; Stager et al., 2005), a development that Robertshaw and Taylor (2000) presciently hypothesized and that we now have archaeological evidence to sustain.

We gain additional insights from isotopic research into the history of Wandakara Lake (Russell et al., 2009), less than a kilometer SE of Wankenzi. The Wandakara research shows that we may distinguish human impacts from climate change impacts based on stable isotope analysis of the vegetation in lake cores. Isotopic analyses show an "increased flux of isotopically enriched N from the landscape during conversion of forest to grassland" (Russell et al., 2009, p. 321), which leads to the observation that significant shifts in δDC30 relative to δDC16 are linked to C4 grasslands that replace forests during a wet period, only possible through human agency rather than climate change. This is consonant with dense Bigo period populations in the area who left the landscape transformed and the lakes saturated with N over a prolonged period, ca. AD 1300–1600 (Schmidt et al., 2024).

The phytolith and charcoal assemblages from the Kabata Swamp provide evidence of long-term forest dynamics and human interaction in western Uganda. The late Pleistocene to Holocene transition is characterized by a pronounced grassland habitat with a variable forested environment despite a long sedimentation break. When observed in an earlier Kabata core, this hiatus was explained as a period "prior to 3070 + 50 BP [that] cannot be accurately dated because of the possible presence of sediment hiatuses and relatively poorly resolved dating control…" (Taylor et al., 1999, p. 313). Rather, we suggest that a small volcanic explosion may have contributed to a sedimentary disruption or that the hiatus resulted from the ancient mining of peat for fuel.

The dynamics of the vegetation record and the significance of the charcoal record provide evidence of anthropogenic fires and deforestation in the catchment, starting with forest disturbance at ca. 500 BC (Taylor et al., 1999; OSM 4.2 for effects of burning on non-aerobic phytoliths). We have no direct archaeological evidence linked to this change. We affirm that the change is not linked to Early Iron Age iron-producing activities, as some paleoenvironmentalists have speculated without any supporting archaeological evidence (cf. Kiage et al., 2017, 2021; Taylor et al., 1999). The archaeological record at Kabata, and more widely in the NCLR, testifies to forest clearance beginning during the last centuries calBC. This activity is marked by LSA/Kansyore period microliths associated with burning activity at the KA-3 site 150 m east of Kabata Swamp. Keeping in mind that our investigations are ongoing, land clearance by an LSA culture may have started centuries earlier, a possibility that arises from two burning events: one west of Kabata Swamp at KA-1, AMS dated to 1265–1057 calBC (Table 2, row 1), and a second dated to 1611–1442 calBC (Table 2, row 6). The presence of an aceramic LSA at Rusoona (RU-1A) and Nyakabungo (NYA-1A) also supports this interpretation.

Reprising Change

The first settlers in the NCLR would have been small groups that left ephemeral footprints. Christopher Ehret (1998) suggests that the Central Sudanic and Sog Eastern Sudanic speakers who populated this part of the western Rift during the first millennium

BC lived in dispersed, hard-to-identify homesteads. With time—as manifest at KA-1 and KA-3—population increased, along with an embedded identity with specific landscapes seen in mortuary sites along the margin of the Kabata Swamp in the fourth and fifth centuries calAD, a symbolic inscription on the landscape that imbues its historical ecology with distinctly human sensibilities. These convergent forms of evidence suggest that the first incursions into the humid forests of the NCLR registered a significant change in the first forest clearance near calderas. Through time, the severity of the human impacts on forest species diminished as once-forested areas along caldera slopes and proximal rivers were cleared at a reduced but still visible level. We see those variable impacts in the phytolith and charcoal records of the Kabata Swamp.

The archaeological record for a later Transitional Urewe/Boudiné is much more subtle than the earlier Kansyore and initial TU/Boudiné presence. The frequency of TU ceramics in excavations throughout the region suggests that settlement was less widespread than in Kansyore and during the Later Bigo period. However, environmental impacts are nonetheless clear for the end of the first millennium AD. At KA-1, KA-2, RU-1, and RWA-6, for example, there is a greater frequency of Transitional Urewe/Boudiné ceramics than at other excavated sites. A significant pulse of environmental change from AD 1250 to 1300 is attributed to climate change, after which moist conditions provided a refugium for Bigo period populations in the more arid grasslands to the east (Reid, 2015). Bigo period settlements continued into the mid-seventeenth century AD, severely impacting the health of nearby lakes. Though a drying period in the broader region started toward the end of the fifteenth century (Mills et al., 2014; Robertshaw & Taylor, 2000), the micro-environments found in the larger region from Lake Victoria to the Congo basin show significant variation during this drier and colder period, with some micro-environments (such as the NCLR) continuing with moister conditions that sustained Bigo period populations.

Historical Linguistics

Historical linguists working in eastern Africa have thrown significant light on the history of languages, particularly Nilo-Saharan (e.g., Fitzsimmons, 2020; Vossen, 1982), Afro-Asiatic, and Bantu languages (e.g., Ehret, 1982, 1998; Ehret & Posnansky, 1982; Schoenbrun, 1993, 1998). Most pertinent to the Ndali Crater Lakes region is the research conducted by Ehret (1982, 1998) and Schoenbrun (1993, 1998). Ehret's research is relevant to the question of the possible linguistic affiliations of the group(s) associated with Oltome ceramics or Kansyore ware. We have highlighted that Oltome entered usage in 1983 (Collett & Robertshaw, 1983; Robertshaw, 1982; Robertshaw et al., 1983) and better captures strong affinities among the so-called Kansyore sites on the eastern margins of Lake Victoria. Ehret (1998) uses these archaeological studies to unveil problems with labeling ceramics by the name of one site—Kansyore—when their occurrences are widely separated in space and time.

Ehret employs the Oltome designation for first millennium BC and first millennium AD Kansyore ceramics to identify the spread of Eastern Saheliansspeakers, including the "south Rub" and the Sog, called Sog Eastern Sudanic-speakers by Schoenbrun (1993). These people settled on the eastern, southeastern, and northeastern margins of Lake Victoria during the late first millennium BC and early first millennium AD. These Sudanic speakers were found as far west as the Albertine Rift, usually on the fringe of forested areas in savannah environments. Ehret argues that these migrants from northern Kenya and southern South Sudan practiced pastoralism (cattle, sheep, and goats) and engaged in grain agriculture. These linguistic interpretations parallel observations of affinities between the LSA ceramics of Eastern Equatoria in southern South Sudan and the margins of Lake Victoria mentioned above (Robertshaw, 1982).

Linguistic interpretations also show that population movements and interchanges in the northern part of the Albertine Rift (Lake Albert south to the Kagera River) were highly dynamic among Eastern Bantu speakers, Central Sudanic speakers, and the Sog Eastern Sudanic speakers (the last two are classified as part of Nilo-Saharan) starting in the first millennium BC and extending until the mid-first millennium AD, particularly in the region around the Rwenzori Mountains.

Through the study of loan words and by drawing on chronological principles of regular change

(with the caveat that varying lexical change is being addressed by computational methods to provide a more nuanced treatment (Grollemund et al., 2023, p. 16–19), linguists arrive at relative (not absolute) dates for the interaction of linguistic groups and their spatial relationships (Fig. 32). As approximations, these chronologies are useful guidelines, though sometimes too early for comparison with archaeological dating. Despite the disjunction between AMS dating and the relative dating of historical linguistics, these constructs help reveal significant intersection points. Linguistic reconstructions in areas near the Rwenzori Mountains point to important intersections with the archaeology and settlement history of the NCLR during parts of a two millennia span that brackets the BC/AD boundary.

Schoenbrun (1993) argues that Eastern Highlands Bantu speakers first settled the region to the west and southwest of the Rwenzori Mountains at the beginning of the first millennium BC, perhaps before 800 BC (Fig. 32a). That estimate appears to be earlier (by several centuries) than archaeological evidence for a Bantu presence in the region. The picture alters substantially for the degree of fit between historical linguistics and archaeology if we examine the map of linguistic groups showing that the distribution of Central and Sog Eastern Sudanic speakers corresponds to in situ archaeological evidence recovered in our study region. It is during the period after 500 BC and up to AD 100 that the area immediately west of the Rwenzori Mountains was populated by Central Sudanic-speakers who practiced pastoralism and grain agriculture (some linguists now posit that this language group may have broken up a millennium before the first Kansyore occupations in the NCLR and left Central Sudanic sub-groups in its tracks [e.g., Starostin, 2016]). Their occupation zone reached around the southern margins of these mountains and northward past Lake Edward as far as the NCLR landscape (Fig. 32b).

Simultaneously, Sog Eastern Sudanic speakers—practicing similar subsistence strategies—had penetrated the area to the east of the Rwenzori Mountains, supposedly in more open grasslands. This mosaic of different groups created an interaction sphere that led to shared vocabulary and subsistence practices with Highland Eastern Bantu speakers.

Schoenbrun's linguistic maps of the region provoke closer examination, for the presence of Sog-speakers was not limited to the less forested areas, as he argues by using words for sorghum and *Pennisetum* millet as well as contemporary farmers' preferences for drier environments. Rather, from 500 BC to AD 100 and AD 100 to 500, Sog speakers appear to have been contiguous to Central Sudanic speakers in the region east of the Rwenzori Mountains.

The presence of both groups in the region marked, we believe, by LSA lithics and Kansyore pottery, transformed the landscape by turning it into a mosaic of forests and grasslands, thus creating conditions ideal for pastoralism and grain agriculture. While linguistic maps convey a sense of definitive relationships, Schoenbrun (1993, p. 12) warns that the versatility afforded by such crops "to Central Sudanian farmers when choosing cultivation sites…makes it difficult to draw a line on a map defining clearly where they lived early in the last millennium B.C." This caveat alerts us to the likelihood that Central Sudanic and Sog Eastern Sudanic speakers were sometimes interwoven, with Central Sudanic speakers likely present in the NCLR.

The linguistic data also show a southern extension of Central Sudanic speakers as far as northern Lake Tanganyika and that "Other locations where Central Sudanians lived could have been in the lower altitudes in the north-western Kagera depression…." (Schoenbrun, 1993, p. 12). This includes Kansyore Island—on the edge of the Kagera Depression. We know from Central Sudanic loan words into Bantu that those groups who spoke Central Sudanic languages were cattle keepers who valued milk, an economic profile that agrees with our faunal findings in the NCLR.

Of equal interest are Sog Eastern Sudanic speakers, related to the contemporary Kuliak speakers of far northeastern Uganda, who are located approximately 100 km to the south of the Equatorial region of southern Sudan, though Kuliak is now considered by some scholars as a possible isolate (Dimmendaal & Jakobi, 2020). Schoenbrun suggests that Sog Eastern Sudanic farmers practiced agriculture along the eastern and southeastern littoral of Lake Victoria, where they raised sorghum and beans as well as cattle and small stock similar to their "distant cousins," the Central Sudanic speakers. Schoenbrun (1993, p. 15) observes that "southerly extensions of Kuliak-related people along the east and west of Victoria Nyanza seem to have disappeared in the last centuries of the first millennium AD," an interpretation that may

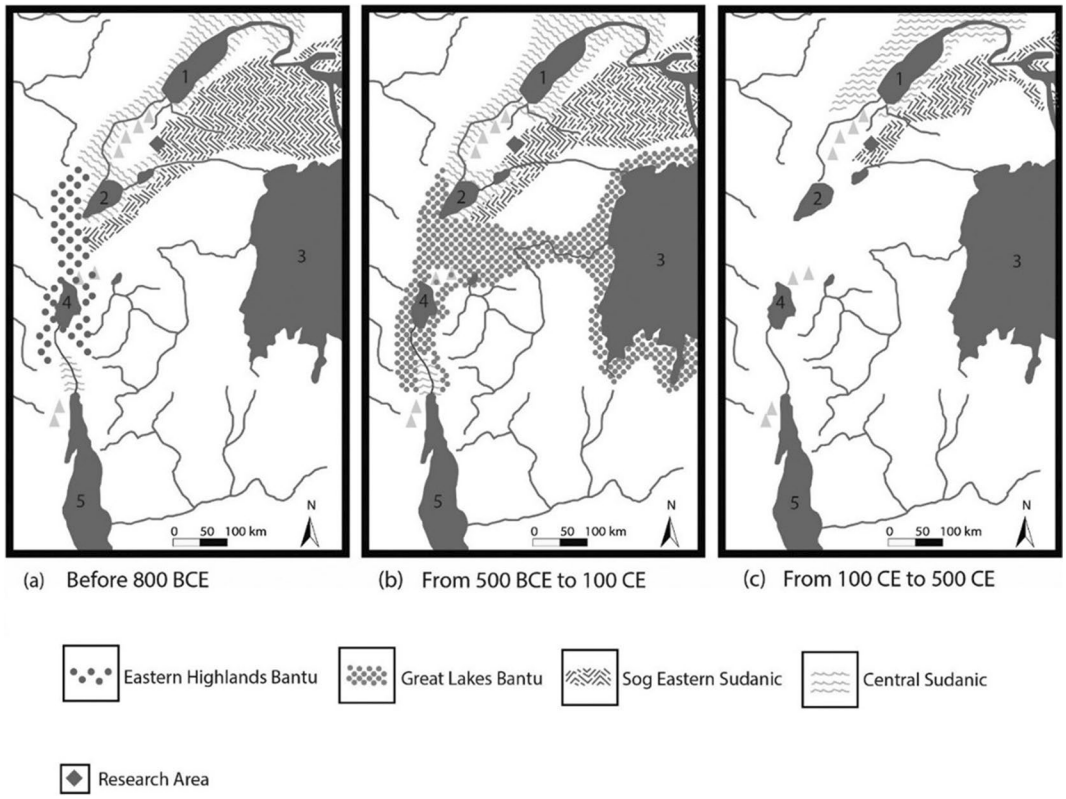

Fig. 32 Presence of language groups in the Great Lakes region, after Schoenbrun, 1993. By permission of Cambridge University Press

hold for the eastern and southeastern shores of Lake Victoria, but not the western shores, affirmed by the absence of Oltome sites along the southwestern littoral (Soper & Golden, 1969) and the western littoral (Schmidt, 1980, 1997a).

Ehret (1998) advances arguments about Central Sudanic speakers and what he calls Eastern Sahelians: Sog-speakers and Rub-speakers (formerly Eastern Sudanic). He argues that the economy of Central Sudanic speakers was practiced in both open grasslands and wetter environments, including wooded areas, with an emphasis on grain crops like sorghum and, later, finger millet. Accompanying pastoralism was engagement with fishing, hunting, and gathering, but with emphasis on fishing. A focus on fishing fits with so-called Kansyore sites located near waterways in western Kenya (Karega-Munene, 2002; Lane et al., 2007; Prendergast, 2010; Robertshaw, 1991). While most Kansyore sites in the NCLR are contiguous to crater lakes or within 0.5 km of streams, there is a paucity of preserved fish remains—a condition that suggests taphonomic processes may have skewed the record.

Rub speakers occupied the eastern and southern littoral, precisely where the Oltome/Kansyore sites are located, while Sog speakers lived in the far western part of the Victoria drainage, for example, the uplands of western Uganda (Schoenbrun, 1993). Ehret sees the southern Rub speakers and Sog speakers as grain cultivators ("porridge" is a significant loan word in Bantu, borrowed from agropastoralists who also kept cattle and sheep). Like Schoenbrun, Ehret interprets Central Sudanic speakers as residing near montane forests to the far western rift and "…making a pottery yet to be identified" (Ehret, 1998, p. 94). This observation provokes us to consider that Kansyore pottery in the NCLR was associated with this linguistic group. Simultaneously, we realize that Central Sudanic speakers were geographically proxemic to Great Lake Bantu speakers west of the Rwenzori Mountains and in the

NCLR. Bantu speakers with Urewe and Transitional Urewe pottery were present northeast of Lake Albert, in the NCLR, and at Kansyore Island. However, they are not present on the linguistic maps (Schoenbrun, 1993, p. 12) showing the Great Lakes Bantu distributions ca. AD 100–500, an invisibility that is enigmatic.

A recent construct in the ongoing debate about Bantu movements has most Bantu speakers moving east and far to the south of the Rwenzori Mountains (Grollemund et al., 2023). However, adherents remain for the Great Split, whereby the Eastern Bantu moved across the northern boundaries of the rainforest toward the Rwenzori Mountains, a route not denied by recent research examining genetic, linguistic, and geographic relationships (Gonzalez-Santos et al., 2022, p. 114). The two paradigms are compatible, as they capture the highly dynamic qualities of Bantu interactions with the landscape and other groups. The absence of classic Urewe ceramics in the NCLR sets aside the notion that Bantu speakers came from the south and somehow bypassed the attractive NCLR. We present compelling evidence that some of these people slowly trickled around the northern tip of the mountains as well as the southern margins, intermixing with Central Sudanic speakers who dominated the landscape with their livestock and agricultural practices.

As a minority group—like the Mbuti Pygmies who adopted Central Sudanic as their language—the newly arrived Bantu in NCLR adopted a Central Sudanic identity, taking on language, subsistence practices, and pottery technology, the latter expressed as Boudiné ware. Such a scenario brings to mind the Luo of western Kenya, who are genetically West African yet speak a Nilotic language (Tishkoff et al., 2009; personal communication, Sarah Tishkoff, September 9, 2022). This argument is amplified by evidence at Chobi (Soper, 1971), where first there was a Urewe presence in the deeper levels of site 14A that transitioned to a mixture of Boudiné and Urewe, a process of changing identity captured in the archaeological record. In the NCLR, these changes appear in association with TU/Boudiné. This may explain why there are no linguistic signatures for a Bantu presence between 500 BC and AD 500 in the NCLR, where Nilo-Saharan-speakers persisted on the landscape for nearly two millennia, assimilating Bantu-speaking immigrants. This goes beyond exchange relationships to close social interactions and admixture. The demonstrated differences between eastern Oltome/Kansyore ceramics and the Kansyore ceramics from western Uganda increasingly appear to be derived from different source areas in southern South Sudan.

Looking North for Archaeological Connections

Given the evidence from historical linguistics, the southern South Sudan and its limited but informative archaeology is of vital importance. Earlier research in that region points to significant archaeological connections with the NCLR. From 1979 to 1981, investigators from the British Institute initiated research in the region. The publications of those inquiries are important and provocative.

Multiple investigators were enlisted to participate in the research initiative in southern South Sudan. It began with a 1978–79 reconnaissance followed by excavations in 1979 and 1980, later published in *Azania* (David, 1982; David et al., 1981; Phillipson, 1981; Robertshaw & Mawson, 1981) and in a collection of linguistic and ethnographic essays (Ehret, 1982; Mack & Robertshaw, 1982). These and other contributions to the ancient history of southern South Sudan are summarized in a useful regional overview (Kay et al., 2019).

The potential of these investigations to unlock connections to our research area is significant. The most pertinent individual study is a report by Nicholas David and colleagues on their excavations in rock shelters in the southernmost regions. Lokabulo rockshelter is an important site. Located in the Irom Hills of Eastern Equatoria about 120 km ENE of Torit town, Lokabulo sits in dry acacia woodland and scrub then populated by Eastern Sudanic-speakers—the Larim and Toposa (David et al., 1981). The Lolabulo shelter is large, 35 m wide and 8 m deep. One of two test excavations yielded significant information about an LSA occupation, particularly ceramics decorated with comb impressions. Ceramics illustrated in David et al., (1981, Fig. 6) show close affinities with the Oltome sites of western Kenya (Robertshaw, 1982). Notably, most sherds at Lokabulo are small and tempered with quartz; most illustrated ceramics are small, narrow-mouth bowls with rim diameters of 12 to 22 cm decorated with composite panels of comb impressions.

Without the guidance of C14 dates, the authors conclude that the comb-impressed pottery "appears around 2000 BC" (David et al., 1981, p. 18) and that pottery in these deeper levels at Lokabulo "seems widespread in Eastern Equatoria," an observation that compels us to consider the possibility that Southern Rub speakers spread into better-watered regions to the south during the late first millennium BC. We are left without a clear picture of the economy, however, when the authors remark that the ceramics do "not appear to be accompanied by animal husbandry, nor is there any indication of agriculture or even the exploitation of wild grains" (David et al., 1981, p. 19). We contend that the specialized setting in a rockshelter and the absence of other archaeological analyses do not preclude an economy with grain agriculture and pastoralism.

Additional investigations in Western Equatoria in Mundri District add significantly to understanding the possible linkages between southern South Sudan and the NCLR. At Jebel Tukyi rockshelter, comb stamped pottery was documented in pre-Iron Age layers, though intrusive iron smelting and hearth-building activities in the last two centuries made it difficult to interpret the cultural strata. The comb-stamped and punctate-decorated ceramics (David et al., 1981, Fig. 13c, d, f, g, h, and i; also plate II) are open bowls said to dominate the ceramic assemblage, but the ceramic illustrations show a preponderance of narrow-mouth bowls. This is a dominant vessel form characteristic of the NCLR. High frequencies of punctate-decorated and stamped pottery in layer 3 (77% of the assemblage), the lowest layer, amplify evidence for a pre-Iron Age ceramic complex that has important affinities to the southwest (Fig. 33). The authors posit that the shelter "was first occupied by a ceramic LSA people who herded cattle and hunted" (David et al., 1981, p. 30). Like the NCLR, the lithic artifacts are often flaked from vein quartz and are few. David et al. (1981, p. 30) concluded that "This phase probably began early in the first millennium bc and continued into the first millennium ad…," an assessment that agrees with the recent recalibration of the radiocarbon date in level 3 to 773 calBC-260 calAD (Kay et al., 2019, p. 9).

This prescient diagnosis from 1981 fits with settlement evidence and forest clearance activities apparent from the late first millennium calBC to the mid-second millennium calAD in the NCLR. Jebel Tukyi is only 100 km north of moist forests that are part of the region's ecology. This suggests that LSA frontier settlers were historically familiar with forest settings as they moved south from Western Equatoria toward the NCLR.

The interpretations that arose from these investigations provoked speculations about material and social relationships in Eastern Africa that deserve to be revisited. Robertshaw's (1982) overview introduced a series of arguments that were a harbinger to a comparative analysis of Kansyore assemblages (Collett & Robertshaw, 1983) that affirmed that the Kansyore of western Kenya had more in common with Eastern Equatoria than western Uganda.

In his 1982 chapter and again in 1983 (Robertshaw et al., 1983), the "Lokabulo tradition," as documented from Eastern Equatoria, was compared with pottery from Gogo Falls and Kansyore Island. Robertshaw emphasized the affinities between the two regions, with a focus on stamped and punctate decorative techniques and their placement on vessels as horizontal and vertical bands. His Fig. 2 (Robertshaw, 1982 [OSM Fig. 30]) presents examples from both Lokabulo and Gogo Falls, illustrating affinities and showing that vertical bands are more common to Gogo Falls. He concludes, "Thus, there is a body of evidence, though far from unequivocal, linking Kansyore [sic: Oltome] and Lokabulo as possible related traditions" (Robertshaw, 1982, p. 93). As we revisit this evidence, we are struck by how germane these observations are for the eastern facies of Kansyore (the Oltome) and how they contrast with the western facies in Uganda.

In the space of two years, there was a marked shift from treating the ceramic assemblages from Gogo Falls and Kansyore Island as part of a Lake Victoria Kansyore complex to a much broader regional perspective that encompassed northeastern Uganda and southern South Sudan. The comparisons used—Lukabulo and Gogo Falls—feature vertical panels of comb stamping and punctates, including circular motifs. If we compare the ceramics from Jebel Tukyi in Western Equatoria to ceramics of the NCLR, we find a higher frequency of comb stamping and punctates arranged as horizontal bands, a clear affinity that appears to mark Central Sudanic-speakers. This observation also pertains to Kansyore Island, where similar decorative treatments occur.

The affinities Peter Robertshaw recognized in 1982 need to be highlighted, for they underwrite the idea

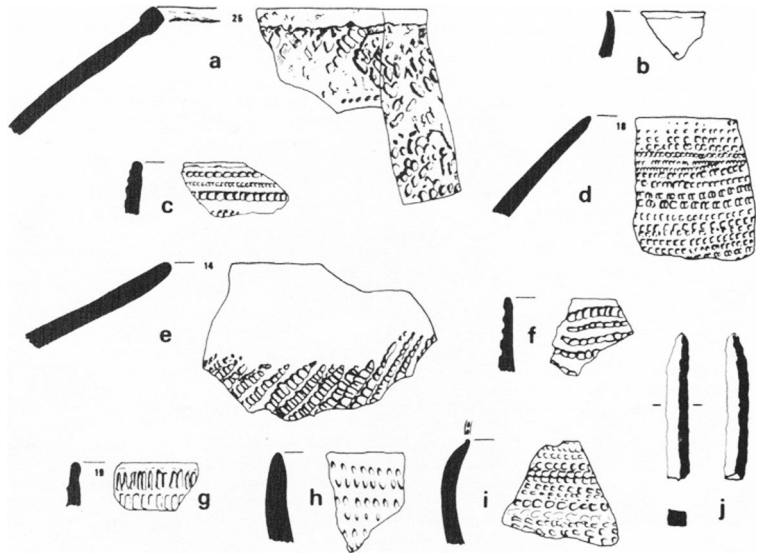

Fig. 33 Kansyore-like ceramics from Jebel Tukyi. Note the predominance of horizonal rows of punctates like the NCLR (e.g., **b**, **c**, **d**, **f**–**i**). By permission of the British Institute in Eastern Africa

that the eastern branch of Kansyore—the Oltome—traces its origins to Eastern Equatoria. On the other hand, the results of the Western Equatoria research (David et al., 1981) show greater affinities among the ceramics of Jebel Tukyi, the NCLR sites, and Kansyore Island. Thus, this western branch—Kansyore Island and the Ndali Crater Lakes sites—exhibits ties to Western Equatoria and interactions with Central Sudanic-speakers.

Looking to the Southeast for Archaeological Connections: Kansyore Island and Lake Victoria Margins

There have been few comparative treatments since Collett and Robertshaw (1983) engaged in comparative attribute analysis using the ceramics from Kansyore Island and sites from western Kenya. Here, we want to examine the Kansyore and Boudiné assemblages from Kansyore Island vis-a-vis those documented in the NCLR. We draw on published evidence about Kansyore Island (Chapman, 1967; Kyazike, 2016) to establish affinities and differences between the type site and our study area. What stands out most prominently is that Boudiné ceramics on Kansyore Island are often found in the same contexts as Kansyore ware. This association is mostly overlooked by other researchers whose standpoint is western Kenya and northern Tanzania.

Chapman discusses Boudiné ware and its contexts in passing, providing one illustration of a partially reconstructed pot and four other sherds (Chapman, 1967, p. 184). She explains that Boudiné ware was associated with burials, a context similar to the NCLR. Kyazike (2016) does not discuss Boudiné contexts but indicates that these ceramics constitute 1% ($n=48$) of her assemblage accompanied by 5.2% ($n=256$) Kansyore—a proportion of Boudiné that differs from the higher frequencies in the Ndali Crater Lakes. Kansyore ceramics from the island are mixed with Urewe ware and are difficult to sort out chronologically in Chapman's report. Her illustrations of Kansyore ceramics set the scene for later references and labeling of Kansyore in Kenya, yet few examples were provided. What emerges is that the type site is characterized by decorative elements that are dominated by punctate techniques, usually applied in rows. Of the 22 ceramics illustrated, 59% ($n=13$) have motifs arranged in rows, and 9% ($n=2$) have vertical and horizontal panels, the latter a dominant characteristic in the Kenya facies (Collet & Robertshaw, 1983). Ignoring Chapman's failed division into types and two misattributions, it is important to note that punctates—both dots and spatulate (82%; $n=18$)—prevail over stamping, which is seen on 36.4% ($n=8$) of the sherds. Vessel forms are less apparent, given the small sample. However, of the ten items illustrated, six vessels are narrow-mouth bowls, a primary characteristic of the NCLR facies.

Kyazike (2016) provides line drawings for fourteen Kansyore rim sherds, nine of which show a narrow-mouth attribute and five with everted rims ("pots"; see figs. 6.14, 6.15). Photographs are labeled as "banded motifs," "dotted lines," "rows of horizontal and impressed lines," and "dotted zig-zag lines." In this rendering, punctates are "dots," and stampings are "impressions." Fifty-nine sketches of decorative applications are presented without frequency indication and then lumped into fourteen categories (2016, Table 6.12). From the sketches, we deduce that 57.6% ($n=34$) are decorative elements, sometimes punctate or stamping alone and sometimes in combination—arranged in horizontal rows; 11.9% ($n=7$) have both vertical and horizontal applications, and 5% ($n=3$) have diagonal and convergent applications. The congruence between Chapman's and Kyazike's frequencies for horizontal rows and mixed vertical/horizontal applications affirms that these attributes characterize Kansyore at Kansyore Island.

The Kansyore-type site bears significant affinities to the NCLR facies in the application of punctates and stamping in horizontal rows or diagonal/convergent applications. Exceptions, as illustrated by Chapman's stamping applications, are an expected variation in the facies across the region. The one distinctive decorative attribute in the Ndali assemblage is the stamped and hanging hemispheres found in Stratum 2 at KYA-2A (Fig. 22b) and in the RWA-2, Locus 3A burial (Fig. 27a and Fig. 27b). These appear to be specialized treatments and may be associated with rituals. The inclusion of pyrite in ceramics at both these locales suggests that pyrite was intended to imbue the pottery with bright, sun-reflective elements.

If we look south of Lake Victoria, Oltome ware was found around Mwanza, documented by Soper and Golden (1969), who provided illustrations of comb-stamped ceramics without provenience. The motifs—clustered horizontal and vertical panels—share more attributes with western Kenya than with the NCLR or Kansyore Island ceramics. While the decorative technologies are similar, the application diverges in significant ways to suggest that the Mwanza ceramics are affiliated with the western Kenya sites. Also marking the ceramic assemblage as different is that vessels "consist exclusively of large hemispherical bowls with regularly tapered rims and narrow rounded lips" (Soper & Golden, 1969, p. 25), contrasting sharply with a diversity of vessel types in the NCLR that include a sizable proportion of narrow-mouth bowls with rolled or tapered rims. As might be expected from rockshelter settings, stone tools are far more numerous than at open-air sites of the NCLR, with formal tools making up 1.7% and utilized tools 3% of the collection at Nyang'oma, for instance. A radiocarbon date of 2640 ± 120 obtained in the LSA deposits at the site has since been rejected for lack of reliable association with Kansyore ceramics (Robertshaw et al., 1983).

The variations in decorative elements in so-called Kansyore ceramics are a vexing problem in the archaeology of eastern Africa. It is tempting to generalize from an assemblage at one site, projecting findings across millennia. In a meticulous study of Kansyore ceramics at Siror in western Kenya, Dale suggested, "punctate motifs of varying kinds, forming either *pairs of lines in rows* or horizontal rows of punctate impressions in panels, are key to the identification of Early Kansyore pottery. This suggestion also aligns with definitions of Kansyore pottery described by other East Africanists" (Dale, 2007, p. 251; emphasis added). Part of the description of punctates at Siror at approximately 7000 BC fits the assemblage profiles of Kansyore ceramics in the mid-first millennium calAD in the NCLR. This shows how tricky it is to characterize any period by design element or motif at one locale and the importance of a regional approach to seeking similarity and alterity.

We conclude that the ceramic facies of Kansyore found in the NCLR is strongly related to Kansyore Island and Western Equatoria in South Sudan. As a regional facies, it has distinctive characteristics unrelated to other regions during the late first millennium BC and first millennium AD.

The Boudiné Conundrum

Once enigmatic Boudiné ware, first defined by Hierneax and Maquet (1960), continued to puzzle archaeologists for two reasons: (1) it was not properly dated, more than six decades after its first documentation, and (2) it had a variety of expressions, ranging from exposed coils mixed with beveled rims in the Rwanda setting to exposed exterior coils with finger impressions, the imprints of which are prominent. As earlier noted, Nequin (1967) renamed Boudiné as "Dimple-Based" or Urewe.

Soper's (1971) survey and test excavations along the Victoria Nile in the Chobi sector of Murchison Falls National Park provide the best understanding of this ware within Uganda before the NCLR research. Soper's investigations produced mostly examples of open bowls and some narrow-mouth bowls decorated by finger-impressed exposed coils (Fig. 34). He argues that Chobi/Boudiné ware is contemporaneous with Urewe in the Chobi area. This conclusion is based on one test excavation at site 14A, where, in a deposit of 58 cm depth, he found Urewe and Chobi to be contemporaneous in the top 28 cm, with a 2:1 proportion of Urewe to Chobi (Boudiné) ceramics.

This shallow excavation is the only evidence presented for contemporaneity. Noting that Boudiné ceramics in Rwanda had "sausage"-like coils, with some beveled rims, Soper brings attention to ceramics with beveled rims (Soper, 1971, p. 57–60). These cross-over attributes are important. They indicate how social-economic interaction between two contemporaneous groups may change ceramics, with older attributes, such as faceted rims, continuing alongside other Boudiné characteristics, such as the strong affinities in temper and paste between the two wares. The frequencies of Boudiné and Urewe wares along that section of the Nile are modest (B = 12.3%; U = 10.2%) compared to rouletted wares that dominated assemblages in that region.

Graham Connah (1997) found that the so-called Chobi ware was concentrated on the southern shore of the Victoria Nile (sites 21, 34, 35, 36, 47, 51)—most of which had multiple surface ceramics. Sites were found along the eastern shore of Lake Albert: 15, 19, 29, and 32, all sites with low visibility and only a few Chobi (Boudiné) ceramics (Connah, 1997, p. 30, 45). Connah's survey strongly highlights that Boudiné ware has a distinctive ecological association—a riverine setting that may have been a route eastward for those departing the NCLR interaction zone. Moreover, the ware is generally associated with what Connah identifies as Urewe ware. His illustrations show these are not classic Urewe (with one exception) and should be recognized as *Transitional Urewe ceramics*, quite different from what Soper documented further to the east on the Victoria Nile and more like the associations of Boudiné with TU in the NCLR. The absence of any Kansyore ceramics from this survey suggests that these settlements present an important alterity, that is, peoples associated with Kansyore favored the better watered and more fertile lands of the NCLR, avoiding the northerly part of the drier Albertine Rift and eventually settling in and remaking the environment east of the Rwenzori Mountains.

Chapman's illustrations are helpful in making links to the NCLR (OSM Fig. 31). The largest vessel is a variation of Boudiné with vertical appliques over exposed coils; the remainder are all Boudiné, similar to the assemblage documented in the NCLR. Importantly, most of the Boudiné ceramics were located within the foundations of a partially constructed hotel. Where burials were encountered, Chapman lumped these ceramics into a "recent" category (representing

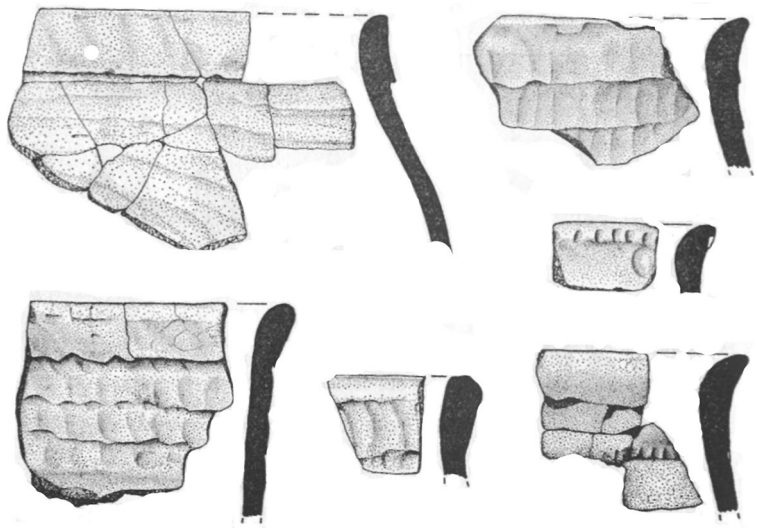

Fig. 34 Boudiné ceramics from the Chobi sector of the Nile (Soper 1971). Exposed coils were flattened by finger impressions that left a "piecrust" effect; finger impressions also appeared in the NCLR in different motifs. By permission of the British Institute in Eastern Africa

approximately 7.3% of the decorated assemblage). The presence of Boudiné is further affirmed by the presence of a flat, thickened base (Chapman, 1967, p. 187) common to Boudiné ware to the north.

Kyazike's (2016, 2019) study of Kansyore Island and nearby settings established the presence of Boudiné ceramics as less than 1% (0.9%) of the ceramic assemblage. The absence of excavations near the partial hotel foundation occludes an understanding of precisely how representative these inquiries were for documenting Boudiné ware. Boudiné is an important part of the ceramic assemblage at Kansyore Island. The frequencies are not parallel to the frequencies in the NCLR, but the association with burials strongly suggests other important parallels.

Boudiné ware appears to be limited to the Albertine Rift and southward into Rwanda. Yet, there are hints of Boudiné in other regions of western Uganda, for example, at Bweyorere in Ankole, where Posnansky (1961, Fig. 7.3, p. 194) identified a "pie-crust" ceramic. Also, in western Kenya, among "Kansyore" deposits at Siror, Dale (2007, p. 243–44) describes a Boudiné-like sherd with "pie-crust-like folds" and references Chapman's documentation of Boudiné found with Kansyore ceramics, assuming contemporaneity back as far as 6000–7000 years ago for the ware. This provokes questions about the significance of this find and whether this ceramic artifact is indeed Boudiné. Given what we know about Kansyore Island and its affinities with the NCLR, Boudiné is part of the TU assemblage and is contemporary with Kansyore. This scenario suggests that Siror and other sites on the eastern margins of Lake Victoria deserve deeper inquiry to determine if TU components with Boudiné may be present alongside the surface finds of Urewe at Siror and other western Kenya sites.

Boudiné, then, cannot be considered Urewe, but rather as a descendant ware that grew out of Urewe-associated people interacting with Indigenous groups, similar to the conditions in the NCLR. We believe similar, if not parallel, changes occurred in Rwanda as Bantu speakers came into contact with local Nilo-Saharan speakers—Central Sudanic in origin. Our thesis also applies to Rwanda and Kansyore ceramics, with the recognition that Hierneax's Type C, renamed by Nenquin as "C Ware," appears to share attributes with the western facies of Kansyore (OSM Fig. 32).

As these studies were published before or at the same time as Chapman's study, there was no recognized link between the two sub-regions. With our current knowledge, we suggest that Type C/C ware be reevaluated as possibly Kansyore, coeval with Boudiné and showing significant affinities with NCLR and Kansyore Island ceramics. Affiliated with the TU complex, Boudiné ware-makers adopted the Kansyore technology as well as decorative techniques, such as placing rows of punctates below the rim on open hemispherical bowls and adopting specialized Kansyore flat-based vessel morphology, alongside other attributes. These traits index processes of accommodation and change and they suggest parallelism with its adoption of traits from dominant groups across the larger region between different societies.

John Giblin's (2013) treatment of ceramics from sites in Rwanda captures the interwoven relationships among Urewe, TU, Boudiné, and C ware (for which there are photographs, see Fig. 5, p. 514) that suggest Kansyore influences or presence should be considered. A significant decorative element is rows of stabbed punctates, sometimes combined with incisions, attributes that beg for additional inquiry to clarify the range and characteristics of C ware in Rwanda. Giblin proffered two hypotheses: (1) that at the Masangano site, the makers of Boudiné pottery also made C ware, based on technological criteria, and (2) that C ware may be part of a Transitional Urewe process of change. These are useful hypotheses that arise from the Masangano data. Yet when we juxtapose them to the documented relationships in the NCLR, where there were multiple cross-influences among diverse groups co-mingling on the same landscape, we suggest those hypotheses be refocused to posit that Boudiné potters adopted Kansyore pottery-making technology in the region. This process is also marked by the adoption of ceramic decorative attributes by immigrant Bantu speakers, which created a sense of similarity or familiarity with dominant Central Sudanic speakers already settled in the region. Schoenbrun's mapping of Central Sudanic speakers shows them ranging far south to Lake Tanganyika through Rwanda, thus affirming similar accommodations in that more southerly region.

The Rwanda variant of Boudiné captures the prevalent Boudiné rim treatments across the Albertine Rift, yet significant variations occur across the wider region. Many variants were documented in the NCLR, including a wide variety of motifs being

placed across the exposed coils, themselves a decorative element. The foundational element is sometimes accompanied by slash-like incisions across exposed coils, incisions inscribed along coil breaks, fingers pulled across the coils or finger impressions below coils, and paddle-like scouring across the coils. All of these elements are found, for example, in the ceramic assemblage excavated at KA-3 in 2021 (Fig. 35). Whatever the variant, it appears to develop within a specific cultural context where immigrant Bantu speakers were sharing space and culture with Indigenous residents, Nilo-Saharan-speaking makers of Kanysore pottery.

As we cast our gaze more widely for intergroup interactions that led to Boudiné, we want to keep in mind that this ware resembles vessels with ridges and grooves, known as the Turkwel tradition (Lynch & Robbins, 1979) found on the western shore of Lake Turkana. The coil ridges of Boudiné ware are often smoothed in a manner to resemble the broad, shallow grooves of Turkwel (Lynch & Robbins, 1979, Fig. 3A), an affinity that accommodates the idea that Turkwel may be a regional variant of Boudiné. The dating of Turkwel in northern Kenya by Lynch and Robbins (1979, p. 324–25), which ranges from AD 450 (1500 ± 100) to AD 1080 (870 ± 80), generally agrees with the chronology of Boudiné ware in the NCLR.

Concluding Thoughts

The story about NCLR's historical ecology that emerges from archaeology, historical linguistics, and environmental studies unveils the lives of newcomers, Bantu speakers—who settled in a foreign land. We see a minority group accommodating to the presence of a dominant group that had already cleared tropical

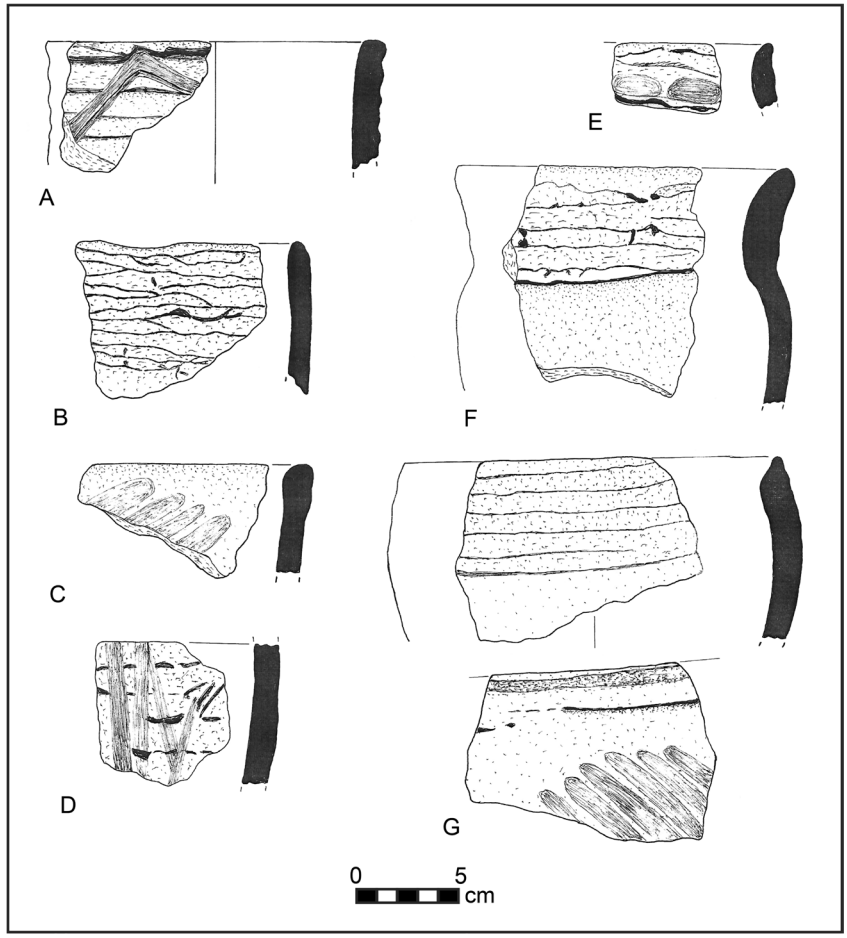

Fig. 35 Variations of Boudiné at KA-3: The most common treatment is evident in **B**, **F**, and **G**—exposed coils without embellishment, mostly on open bowls or necked pots. Slashes across the coils, made by a paddle (or similar tool) appear in **A** and **D**, while finger impressions characterize **C**, **E**, and the inside of **G**

forests and developed pasture lands and garden plots in a complex mosaic of the remnant, curated forests and grasslands. These Indigenous people were from southern South Sudan. They made pottery that we call Kansyore (based on a place, an island in the Kagera River) hundreds of kilometers to the south, with a history that runs along a similar path.

The resident farmers, who grew sorghum, pearl millet, and finger millet (likely earlier than the late TU in Rwanda: Giblin & Fuller, 2011) and who herded cattle and caprines colonized the most favorable settlement locales, with good viewsheds from caldera rims in a plentiful environment with lakes and highly fertile volcanic soils. There was relatively reliable rainfall that provided sustainable agriculture for centuries. These residents pastured their cattle and caprines on the open land they had carved out of the humid tropical forest. They captured small wild animals to supplement a meat diet mostly of domesticated animals.

The Bantu speakers who moved through the gap between Lake Albert and the Rwenzori Mountains, and also around the southern margins of the mountains, mixed with these successful Nilo-Saharan-speaking agropastoralists. They had been engaged with this region for a millennium and likely into the deeper past; their MSA and LSA ancestors were the first pioneers of the NCLR. Their successful agricultural practices must have impressed the Bantu immigrants, who readily accepted grains into their tuber-dependent, eclectic diet, which had already undergone modification from interaction with similar groups to the west of the Rwenzori Mountains. That these Bantu-speaking newcomers were disposed to a greater role of grains in their diet is seen when they earlier added pearl millet to their diets in the inner Congo River basin at the end of the first millennium BC (Kahlheber et al., 2014), dating consonant with late first millennium BC evidence from southern Cameroon (Kahlheber et al., 2009). Linguistic evidence also shows that among Central African speech communities in the first millennium BC, pearl millet was part of their tradition (Bostoen, 2007), even though the humid forest was not an ideal place for its cultivation. While the evidence for pearl millet is sparse, upon Bantu speakers' entry into the NCLR and its more established cultivars, knowledge about pearl millet would have more quickly driven its significant incorporation into the diet of the newcomers.

There appear to be two levels of interaction across the wider landscape already utilized by long-term residents. There were the immigrants who observed, learned, practiced, and then moved on, what we might call peripatetics (see Kusimba, 2005, 2013 for "peripatetics" and "parallelists"), those Bantu speakers who moved from north to south along the western flanks of the Rwenzori Mountains, engaging in exchange, observing, and adopting grain crops and domestic stock—quintessential economic opportunists. Then, there were those Bantu speakers who entered eastern Africa through a smaller northern corridor, including the NCLR. These immigrants became long-term settlers, occupying sites once favored by those who made Kansyore-like ceramics. They lived next door to one another, sharing social space and daily activities in neighborhoods of different origins. In this setting, the Bantu foreigners accommodated the dominant culture, adopting their lifeways and likely language in multi-lingual communities. These parallelists—taking on shared identities—we identify as those who produced Boudiné ceramics.

As they negotiated their way into these local communities, they adopted pottery technology, using similar clays and large quartz tempering and making flat-bottom urns. They borrowed decorative applications to adorn the bases of urns, using finger impressions and stab-and-drag punctates favored by those producing Kansyore pottery. The earlier Kansyore residents of established communities expressed their values through funerary rituals that interred their dead on the western rims of calderas precisely where the rays of the rising sun would first strike. This ritual placement ensured constant renewal amplified by funerary vessels that were highly micaceous and included golden, reflective chunks of pyrite—miniature suns enclosing the deceased. The Bantu-speaking immigrants adopted these ritual objects and processes; they practiced interment on the western rims of calderas and used large flat-base vessels as funerary offerings. The most important accommodation that some likely made in such intimate social space was to speak the local language, the most efficacious way to be accepted into a culturally different community.

We can measure the intimacy of interactions by these criteria and by looking at language and genetic interchange. Historical linguistics tells us that Bantu settlers permanently adopted words for key grain crops, which they embraced from the Indigenous

Nilo-Saharan speakers, some of which they earlier encountered along the western flanks of the Rwenzori Mountains. On their extended travels, they likely had contact with and procreated with local populations, such as the Mbuti, who once lived nearby or, at one time, possibly in the NCLR. As research continues, we intend to identify genetic evidence that may testify to such interactions. These Bantu settlers left behind material signatures of their presence and were more profoundly affected by the intimate social interaction with their Nilo-Saharan-speaking neighbors. They left the area sometime in the second half of the first millennium AD.

As we search for possible groups that may bear evidence of this experience in the NCLR (and to the north), we turn to the contemporary Luo of western Kenya. We might more precisely examine Luo subgroups and other nearby cultures for genetic markers linking them to the eastern Mbuti, thus placing them in the region near the Rwenzori Mountains. Looking more closely at the Luo, their language is Nilotic, while their primary genetic profile is West African (Tishkoff et al., 2009). As we draw this scenario, Bantu-speaking groups in the NCLR and elsewhere in the region developed an eclectic economy, adopted local ritual practices, and gradually became multilingual. When they departed the NCLR, apparently to the north, they passed through southern South Sudan and gradually made their way into Eastern Equatoria, where they may have encountered Nilotic speakers. Already predisposed to cultural malleability, these immigrants may have adopted the Nilotic language before moving southward into today's western Kenya. This process of eclecticism and malleability began, we posit, in a context where it was advantageous to do so in a welcoming environment like the NCLR, a major cultural crossroads of eastern Africa.

The remade environment that resulted from both groups practicing slash-and-burn agriculture was one of mixed forests and grasslands, with the latter ideal for pasturing herds of domestic stock. This forest-savannah mosaic prevailed into the second millennium AD when a severe climatic event created drought conditions in the region ca. AD 1250–1300. Even then, the NCLR remained attractive vis-à-vis the less watered regions to the east. The larger communities, like those possibly associated with Ntusi and Bigo, found the NCLR a hopeful refugium and established diverse communities on a landscape remade by earlier groups.

Starting in the fourteenth century AD, these Bigo period peoples began to practice intensive agriculture with herding of domestic stock and occasional hunting of larger wild animals. They also buried their dead on the western rims of the caldera and prominent ridges, thus practicing ritual values that persisted through deep time. By AD 1500, their dense populations and intensive agriculture had contributed to the loss of nutrients through soil erosion and stressful environmental conditions to the point where nearby lakes were polluted—an index to unsustainable conditions for the maintenance of stable communities, especially as the Little Ice Age began to impact the larger region. As communities began to diminish, some resiliently persisted, identifying ecological niches where soils had not been depleted and lakes were still vital—like the area near Lake Nkuruba—deep into the seventeenth century. The NCLR then gradually became reforested until waves of immigrants in the twentieth century restarted the processes of environmental degradation seen during the mid-second millennium AD.

Acknowledgements Over a decade of research in the NCLR, we have had the pleasure of warm working relationships with residents, government representatives, and service providers. We thank the Uganda Museum and its staff for their encouragement and support, for allowing us to use their facilities, for permits to conduct archaeological fieldwork, and to remove artifacts and samples for analysis abroad. Ms. Rose Mwanje, the former Commissioner of the Uganda Museum, was helpful at every turn. Other staff members—Catherine Ajiambo, Gonzaga Mutudi, Maureen Ampumuza, and Christopher Ssebuyungo—helped significantly with field research and sample management. We are grateful to the Uganda National Scientific and Technology Council for permits to conduct research. Collaborators who appear as co-authors have made this research possible. Thanks to Brian Haley, who valiantly tried to make GPR successful; Christine Ogola, who initiated faunal analysis; Rebekah Zinzer for graphic design; Philip de Barros (French abstract); Doug Kennett and Brendon Culleton, who facilitated an AMS date; and Julie Dunne for lipid analysis. Many teachers at primary schools in the region collaborated with our outreach team, particularly those at Mahoma Falls and Rusoona Primary Schools. We thank Aubrey Price of Ndali Crater Lodge and Lulu Sturdy for their support and material assistance, along with Julius Asaba and his staff at Nkuruba Nature Reserve, who made our stays in the field comfortable and safe.

Funding NSF grant No. 1238373 (Co-PI)**;** Palaeontological Scientific Trust (PAST) grants of March 27, 2014, and June 3,

2015; and National Geographic Society grant numbers NGS-55253R-19 and NGS-84266C-21.

Declarations The datasets upon which this study is based are on deposit at the Uganda Museum, Department of Museums and Monuments, Kampala, Uganda, upon reasonable request to the corresponding author and the Commissioner of Museums and Monuments.

Conflict of Interest The authors declare no competing interests.

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