

**1   Pikunda-Munda and Batalimo-Maluba**

**2   Archaeological Investigations of the Iron Age Settlement History of the  
3   western and northern Congo Basin**

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**6**   **Abstract** The spread of pottery-producing communities into the Congo rainforest is  
**7**   commonly linked to demic diffusion, driven by the so-called 'Bantu Expansion'. It is  
**8**   considered the primary linguistic, cultural, and demographic process in Holocene sub-  
**9**   Saharan Africa. A key region in reconstructions of this process is the western Congo  
**10**   Basin. This paper presents, for the first time, a coherent picture of the archaeological  
**11**   settlement history in the western and northern Congo Basin, uncovered by fieldwork of  
**12**   the late 1980s along the rivers Ngoko, Sangha, Likwala-aux-Herbes, Ubangi, andLua.  
**13**   Archaeological research of the *River Reconnaissance Project*, directed by Manfred  
**14**   K. H. Eggert from 1977 to 1987, produced a pottery sequence for the Congo Basin.  
**15**   Archaeological features and findings uncovered during the project's field campaigns  
**16**   in the northern and western Congo Basin have only recently been studied in detail.  
**17**   The present analysis provides the only reliable source for the a reconstruction of  
**18**   the cultural dynamics within the region due to lack of subsequent archaeological  
**19**   fieldwork. Archaeological data and the sequence of pottery styles within the western  
**20**   Congo Basin, along the Sangha river, cannot support the claim that this region, due to  
**21**   a climate-induced extension of savannas, played a unique role as a 'corridor' within  
**22**   the expansion of putatively 'Bantu' speaking groups during the latter half of the 1st  
**23**   millennium BCE.

**24**   **Résumé** La propagation des communautés productrices de poterie dans la forêt trop-  
**25**   icale du Congo est généralement liée à une diffusion démique, entraînée par ce qu'on  
**26**   appelle "l'expansion Bantoue". Il est considéré comme le principal processus lin-  
**27**   guistique, culturel et démographique de l'Afrique subsaharienne de l'Holocène. Une  
**28**   région clé dans les reconstructions de ce processus est l'ouest du bassin du Congo. Cet  
**29**   article présente, pour la première fois, une image cohérente de l'histoire des peuple-  
**30**   ments archéologiques dans l'ouest et le nord du bassin du Congo, découverte par des  
**31**   travaux de terrain menés à la fin des années 1980 le long des rivières Ngoko, Sangha,  
**32**   Likwala-aux-Herbes, Oubangi et Lua. Les recherches archéologiques du *River Recon-*  
**33**   *nnaissance Project*, dirigées par Manfred K. H. Eggert de 1977 à 1987, ont produit une

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34 séquence de poterie pour le bassin du Congo. Les caractéristiques archéologiques et les  
 35 découvertes découvertes lors des campagnes de terrain du projet dans le nord et l'ouest  
 36 du bassin du Congo n'ont été étudiées en détail que récemment. La présente analyse  
 37 constitue la seule source fiable pour la reconstruction de la dynamique culturelle au  
 38 sein de la région en raison du manque de travaux archéologiques ultérieurs sur le  
 39 terrain. Les données archéologiques et la séquence des styles de poterie dans l'ouest  
 40 du bassin du Congo, le long de la rivière Sangha, ne peuvent pas étayer l'affirmation  
 41 selon laquelle cette région, en raison d'une extension des savanes induite par le cli-  
 42 mat, a joué un rôle unique de "couloir" dans l'expansion du pays. groupes de langue  
 43 putativement "bantou" au cours de la seconde moitié du 1er millénaire avant notre  
 44 ère.

45 **Keywords** Congo Basin · Pottery · Iron Age · Settlement History

## 46 **Introduction**

47 The archaeological sequence in the Inner Congo Basin or *Cuvette centrale* has been  
 48 studied in detail (Wotzka 1995), while finds from the adjacent western and northern  
 49 fringes of the Congo Basin were analyzed only recently (Seidensticker 2021). This re-  
 50 gion is critical as prevailing models of the spread of sedentary lifestyle in sub-Saharan  
 51 Africa, regularly derived from linguistic reconstructions of modern languages, pro-  
 52 pose it as the route for substantial migrations (Bostoen 2018, 2020). Relying on  
 53 phylogenetic modeling and coupling their results with evolutionary genetic research,  
 54 historical linguists favor rapid expansion, driven by demic diffusion, into and through  
 55 the equatorial rainforests (Currie et al. 2013; Bostoen et al. 2015; Grollemund et al.  
 56 2015; Koile et al. 2022; Grollemund et al. 2023). Regularly, these findings are coupled  
 57 with an intensification of archaeological remains yielding ceramics in the second half  
 58 of the 1st millennium BCE (de Saulieu et al. 2021; Seidensticker et al. 2021).

59 While the key objective of the research summarized here, was to reconstruct  
 60 the settlement history of the northern and western Congo Basin, by establishing  
 61 a chrono-typological framework of pottery development (Seidensticker 2021), this  
 62 paper addresses three additional research questions: it gives a critical review of the  
 63 "Sangha River Interval" (SRI) Hypothesis including the archaeological ground-truths,  
 64 i.e. the missing signature of hypothesized migrations along the Sangha river valley  
 65 during the 1st millennium BCE (Currie et al. 2013; Bostoen et al. 2015; Grollemund  
 66 et al. 2015; Koile et al. 2022; Grollemund et al. 2023). Furthermore, this paper  
 67 addresses the decline in archaeological finds between the end of the Early Iron Age in  
 68 the 5th to 6th century CE and the onset of the Late Iron Age in the 10th century CE,  
 69 specifically a so far overlooked potential recess in human activity in the Congo Basin.  
 70 At last, this study examines regional differences in pottery finds along the Ubangi  
 71 river, hinting at a prolonged 'fuzzy border'.

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72 History of Research

73 Among the first archaeological finds from the northern Congo Basin are partially  
74 polished lithic artifacts, found during colonial times between Libenge, Dongo and  
75 Gemena (Bequaert 1937, 1938, 1940, 1946). A first excavation was conducted at  
76 Batalimo on the Lobaye river, a tributary of the Ubangi river, by Roger de Bayle des  
77 Hermens (1969, 1971, 1975). The site was first discovered in 1966 during construction  
78 works, and a 2 × 3 m big trench was excavated in 1968. The site was revisited in 1981  
79 by Pierre Vidal and most notably between 1987 and 1990 by Lassina Koté (1992).  
80 More recent excavations directed by Alfred Jean-Paul Ndanga et al. (2010) focused  
81 on re-evaluating the cultural layer discovered by de Bayle des Hermens (1975), and  
82 the debated co-occurrence of partially polished lithic artifacts and ceramics (Eggert  
83 1987, 137). In the early 1970s, Francis van Noten (1977) conducted fieldwork in the  
84 Ubangi region. Two notable sites were excavated, the rock-shelter of Hau, to the west  
85 of Gemena, and Motenge-Boma on the middle Ubangi river (Fig. 1). The excavation  
86 at Hau revealed three distinct layers, each characterized by a specific inventory. The  
87 lowest layer contained lithic artifacts in Levallois technique and was thus dated into the  
88 Middle Stone Age (van Noten 1982c, 27,30). Above that was a layer with microliths,  
89 associated with the Late Stone Age, while the uppermost layer was characterized  
90 by potentially Iron Age pottery (Bahuchet 1992, 31). Unfortunately, three charcoal  
91 samples, one from each layer, were unsuccessfully radiocarbon dated, ending all  
92 studies of the material as the site was deemed disturbed (van Noten 1982c, 27,30).  
93 Motenge-Boma, the second site excavated by van Noten (1977) yielded a few remains  
94 of pottery, all showing carved roulette (van Noten 1982a, Fig. 40) and dating into the  
95 Late Iron age.

96 Between 1977 and 1987, extensive boat surveys along the tributaries of the Congo  
97 river were performed in the context of the *River Reconnaissance Project*, directed  
98 by Manfred K. H. Eggert (1983, 1984, 1993, 1996). A detailed analysis of this  
99 project's discoveries in the Inner Congo Basin, south of the Congo river, has been  
100 published by Hans-Peter Wotzka (1993). Wotzka's reconstruction of the settlement  
101 history of the *Cuvette centrale* relies on a sequence of 35 pottery styles that span the  
102 last two-and-a-half millennia and pertain to six stylistic traditions. Four more local  
103 stylistic traditions, named after their main region of distribution "Luilaka", "Tshuapa",  
104 "Busira", and "Maringa" show interconnections that were indicative of them sharing a  
105 common ancestry within the "West tradition" (Wotzka 1995, 219–225 Fig. 4). Wotzka  
106 (1995) condensed this evolutionary development into the "Equator-Co style tradition",  
107 applying the concept similar to Rouse (1957), Huffman (1970), Schmidt (1975), Vogel  
108 (1978), and Hall (1983). The initial phase of pottery in the Congo Basin dates from  
109 400 to 200 BCE and is represented by the Imbonga style (Wotzka 1995, 59–68). The  
110 expansion continued into the 16th century CE, and the first settlers did not penetrate  
111 the entire region at once. Instead, the settling of the Inner Congo Basin occurred in  
112 multiple successive waves of upriver expansions (Wotzka 1995, 226–241). Wotzka  
113 (1995, 290) concludes that "the explored parts of the Inner Congo Basin constitute a  
114 remarkably self-containing ceramic sphere in the course of the last 2 400 years" and  
115 that "all [encountered] pottery styles could be traced back to the Imbonga group".

116 Aiming at uncovering the northern extent of the Imbonga style, fieldwork of the  
 117 *River Reconnaissance Project* was extended along the Ubangi river and its tributary,  
 118 the Lua river, in 1985 (Eggert 1987). The survey traversed the equatorial rainforest  
 119 up to the tropical savanna (Fig. 1). The roughly 850 km long exploration of the  
 120 Ubangi yielded 44 sites, of which only the site of Motenge-Boma had been published  
 121 prior (van Noten 1977, 1982b, 75). Four additional sites were discovered along an  
 122 approximately 100 km long stretch of the lower Lua river, most notably Maluba, where  
 123 multiple pit features were excavated. The only other site with an equally distinct record  
 124 like that uncovered at Maluba is Batalimo on the Lobaye river (de Bayle des Hermens  
 125 1969, 1971, 1975).

126 After the surveys along the Ubangi and Lua, which did not yield pottery associated  
 127 with the earliest styles from the Inner Congo Basin, the campaign of 1987 focused  
 128 on the western parts of the Congo Basin (Fig. 1; Eggert 1992). The nearly 600 km  
 129 long survey of the Sangha river, from its mouth at Mossaka – around 220 km south  
 130 of Mbandaka – up to Bomasa at the border triangle of the Republic of the Congo,  
 131 Cameroon, and the Central African Republic, yielded 38 new sites. A survey along a  
 132 roughly 80 km long stretch of the Ngoko river, which joins the Sangha north of Ouezzo,  
 133 added another eight sites. The last survey, the *River Reconnaissance Project* conducted  
 134 in 1987, covered the Likwala-aux-Herbes river, which runs in-between the Ubangi  
 135 and Sangha and is characterised by a very distinct ecology (Philippon et al. 2019).  
 136 The Likwala-aux-Herbes, not to be confused with the Likwala-Mossaka running  
 137 further west, is characterised by a swampy bush- and grassland. Higher vegetation  
 138 only appears multiple kilometres away from the river. Thus, a vast floodplain can  
 139 be found at each river bank, unlike along the Sangha river, where the rainforest  
 140 vegetation reaches directly to the river bank. The 530 km long survey yielded another  
 141 23 sites. The entire region surveyed was archaeological *terra incognita* before 1987.  
 142 The project's discoveries, including preliminary results from the western and northern  
 143 Congo Basin, were outlined in a well-known paper concerning the archaeology of the  
 144 equatorial rainforest (Eggert 1993). The survey and excavation finds were partially  
 145 summarized (Seidensticker 2016) until the detailed analysis was published recently  
 146 (Seidensticker 2021).

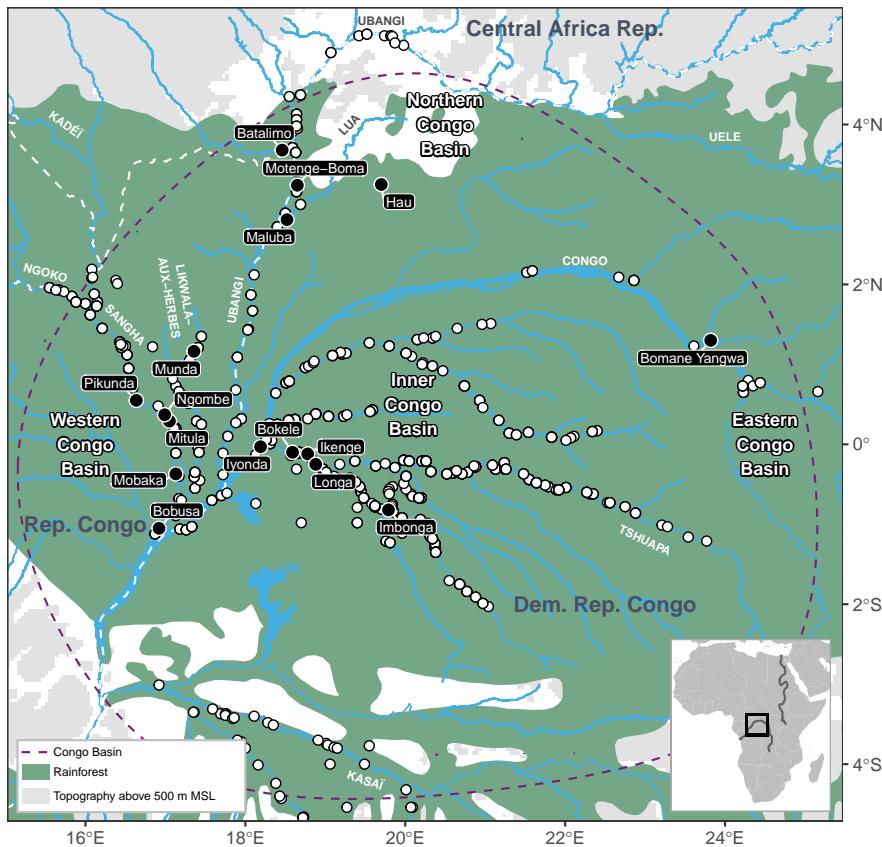
147 Fieldwork in the region re-commenced during the past decade. Contrasting earlier  
 148 endeavours is the prevalent integration of paleo-ecological research. Focal points of  
 149 research have been the Ngoto forest reserve in the south-western parts of the Central  
 150 Africa Republic (Kiahtipes et al. 2011; Lupo et al. 2015; Kiahtipes 2016; Lupo et al.  
 151 2021), the northern parts of the Republic of the Congo (Gillet 2013; Morin-Rivat et al.  
 152 2014; Morin-Rivat 2017), the north-eastern parts of the Congo Basin (Cornelissen  
 153 et al. 2013; Livingstone Smith et al. 2011, 2017), as well as the Inner Congo Basin  
 154 (Neumann et al. 2022).

## 155 Material culture and language

156 A defining paradigm when working with pottery finds from Central Africa concerns  
 157 the imposed link between this category of material culture and languages. The prevailing  
 158 model of the spread of sedentary lifestyle proposes a 'migration' of Bantu-speech

communities through the rainforest, often identified by the presence of pottery finds (Currie et al. 2013; Bostoen et al. 2015; Grollemund et al. 2015; Koile et al. 2022; Grollemund et al. 2023). At the core of an intense academic debate surrounding the term 'Bantu' (cf. Oliver 1966; Vansina 1979, 1980; Robertson and Bradley 2000; Eggert 2005, 2016) lies a profound conceptual trend in which a "purely technical [term] without any non-linguistic connotations [that] was transformed into a designation referring indiscriminately to language, culture, society, and race" (Eggert 2005, 302). Research of the modern, about 300-600 languages spoken in sub-Saharan Africa summed up within the Bantu language family (Nurse and Philipson 2003; Bostoen 2018), resulted in two main models aimed at explaining their dispersion: an 'early split' of languages with predicted migrations on the northern fringes of the rainforest and through it, and a 'late split' model with migrations through the rainforest and subsequent diversification (Bostoen 2018, 2020). Pakendorf et al. (2011) claim that evolutionary genetic research on modern communities points towards demic diffusion as the driving force behind the expansion of Bantu languages in favor of the distribution of languages and technologies (Bostoen and Gunnink 2022). The proposed migrations are conceptualized as the exclusive driver for the initial spread of Bantu speech-communities. Any effects of recent population dynamics (cf. Vennetier 1963, 83) are equally omitted by such over-simplified reconstructions as setbacks in human activity (Oslisly 1998; Oslisly et al. 2013; de Saulieu et al. 2017, 2021; Seidensticker et al. 2021). Lipson et al. (2022, 1) point out that "the structure of ancient populations cannot be robustly reconstructed based solely on genetic data from present-day people" due to disruptions by "demographic transformations", including "colonialism, imperialism, enslavement, and modern sociopolitical reorganization". Fortes-Lima et al. (2023, 7) found "a marginally significant negative correlation between linguistics and genetic data [...] after controlling for geography [...] whereas both [individually] correlate strongly with geography". This finding points at "separate histories underlying the genetic and linguistic data" (*ibid.*) and consequence localized events shaping the overall process.

An unfortunate but common practice in order to 'date' nodes in linguistic reconstructions of modern Bantu languages is 'calibrating' them using archaeological data: An unfortunate but common practice in order to 'date' nodes in linguistic reconstructions of modern Bantu languages is 'calibrating' them using archaeological data, claiming that changes in material culture can be equated with changes in languages (see Bostoen et al. 2015; Grollemund et al. 2015, 2023; Koile et al. 2022). This false assumption perpetuated the trope that early Bantu-speakers can be equated with the earliest pottery production in a given region (Bostoen et al. 2015, 355, 362, 364). It further suffers from disregarding the (dis-)continuities of a single facet of material culture in a given region and their relations to any historically identifiable human society. In a nutshell, the procedure of adopting opportune archaeological results for underpinning linguistic reconstructions by Grollemund et al. (2015) and Bostoen et al. (2015), which was subsequently adopted by Koile et al. (2022, SI) without any critical review, and reiterated by Grollemund et al. (2023) represents another facet of a long-standing tradition in circular reasoning (Ehret 1973; Phillipson 1976a,b, 1977; Heine et al. 1977) that has been reviewed in detail by Eggert (2005, 2016, 82). Such approaches induce 'procedural puzzles' and fail at linking linguistics with "the



**Fig. 1** Map of the Congo Basin. White dots are known sites with pottery finds (dark dots representing sites mentioned in the text). Green shading shows the modern extent of the equatorial rainforest (White 1983). The purple dotted line shows the extent of the Congo Basin (Runge 2001, 11), and grey shading the topography above 500 m ASL.

205 authentic material evidence of archaeology" (Eggert 2016, 88). de Maret (1989, 129)  
 206 made clear that, from a methodological point of view, 'Bantu' is a linguistic term and  
 207 that the 'mute' archaeological finds are not 'Bantu'. In consequence, it can only be  
 208 acknowledged that "non-written languages do not leave material traces" (Eggert 2016,  
 209 85).

## 210 Landscape and Geography

211 The study area is a series of north-south transects through the rainforest west and  
 212 north of the Congo River, as most surveyed rivers run north to south. It covers the  
 213 tropical savanna climate ('Aw'-climate according to the Köppen-Geiger systematic)  
 214 in the north, followed by the tropical monsoon climate ('Am'), while the bulk of  
 215 sites is located in tropical rainforest climate ('Af'; Peel et al. 2007). At the heart of

216 the study area lies the Congo Basin, which is dominated by the Congo river and its  
217 many tributaries. The catchment area of the Congo river covers the entire area of the  
218 Democratic Republic of the Congo (DRC) as well as large parts of the Republic of the  
219 Congo, south-eastern Cameroon, the southern Central African Republic and adjacent  
220 areas further east, south-east and south of the DRC (Eggert 2017, 60 Fig. 1). The  
221 Congo Basin is generally limited to a topography below 450 m ASL (Runge 2001,  
222 11) and characterized by quaternary geological deposits (Persits et al. 1997).

223 For this review of the settlement processes, the study area is represented best when  
224 subdivided into the “western Congo Basin” (rivers Ngoko, Sangha and Likwala-aux-  
225 Herbes) and the “northern Congo Basin” (region of the Ubangi and Luá rivers)  
226 (Fig. 1).

## 227 Materials and Methods

228 The research is based on inventories of 122 sites along the rivers Ubangi, Luá,  
229 Sangha, Ngoko, and Likwala-aux-Herbes (Fig. 1). The study area covers an area of  
230 about  $500 \times 700$  km. In total, the studied collection is comprised of around 10.500  
231 individual objects, including roughly 4.200 vessel units and a similar amount of highly  
232 fragmented ceramic sherds (Seidensticker 2021, 23–43). At five sites, 14 features  
233 were excavated. Most of the excavated features were pits. Additional pit features were  
234 sampled at four sites. Only about a third of the studied ceramics was discovered during  
235 excavations or deliberate sampling of clearly identifiable features.

236 Morphologically and ornamentally similar vessel units are summarized as pottery  
237 styles, following the established conceptualizations of Wotzka (1995, 52–57). The  
238 styles describe a specific and recognizable way ceramics are produced and decorated.  
239 Throughout the text, the term ‘group’ is used synonymous for ‘style’. Additionally,  
240 early investigations into clay sourcing, conceptualized as macroscopic pottery fab-  
241 rics (Seidensticker 2021, 60–69), were included in the morphological description of  
242 ceramic styles.

243 The study’s main objective was to develop a spatio-temporal reference frame  
244 work for the area based on pottery groups derived from the ceramics’ technological,  
245 morphological, and ornamental characteristics found either on the surface or during  
246 excavations. Twenty-four new ceramic style were described for the northern and  
247 western Congo Basin combined. Furthermore, five styles found mainly within the  
248 Inner Congo Basin and described by Wotzka (1995) could be identified.

249 Established concepts were adopted (Eggert 1983, 295; 1984, 250, 257; 1988, 28–  
250 31; Wotzka 1995, 217–225) to describe the change and development of pottery in the  
251 study area. A sequence of subsequent pottery styles that share clear indications that  
252 one was derived of the other are regarded as ‘pottery traditions’ or ‘style traditions’  
253 (Rouse 1957; Willey 1945), while contemporaneous sets of closely related pottery  
254 styles are summarized as ‘style horizons’ (Kroeber 1944, 108–111).

255 All data and computer code produced are available here: <https://github.com/>  
256 [dirkseidensticker/PikundaMunda\\_BatalimoMaluba\\_AAR](https://github.com/dirkseidensticker/PikundaMunda_BatalimoMaluba_AAR)



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**257 Radiocarbon Dating**

258 In total, 21 conventional radiocarbon samples were dated in the 1980s (Tab. 1). All  
259 dates were obtained from charcoals found within the respective feature. Two additional  
260 samples from bone material were AMS dated in 2014 (Seidensticker 2021, 355–356  
261 Appendix 2). All dates are also available via the aDRAC online repository (<https://github.com/dirkseidensticker/aDRAC>; Seidensticker and Hubau 2021). Four  
262 samples obtained off food crusts from the interior of ceramics were AMS dated,  
263 providing for the first time direct and precise dates associated with the usage of  
264 the pottery (Tab. 2). Stable carbon and nitrogen isotopes were also measured to  
265 compensate for fresh-water reservoir effects.

**267 Bayesian Phase Modeling**

268 The previously determined chronological ranges of the radiocarbon-dated pottery  
269 groups (Seidensticker 2021; Seidensticker et al. 2021) were further examined using  
270 Bayesian phase modeling. While Crema and Kobayashi (2020) relied on the OxCal  
271 software to run their model, an implementation that is available via the nimbleCarbon  
272 R-package was used (Crema and Di Napoli 2021; Crema and Shoda 2021). The code  
273 used to define the model was derived of the vignette provided with the nimbleCarbon  
274 software. A simple Bayesian chronological model was fitted to all radiocarbon dates  
275 of a given pottery style that showed sufficient archaeological contextualization and  
276 have not been discarded as potential lab errors in prior studies (Seidensticker et al.  
277 2021, 9) and posterior probabilities for its onset and end were recovered (Fig. S1). To  
278 compare these with the conventional estimations provided in earlier studies (<https://github.com/dirkseidensticker/aSCAC>; Seidensticker et al. 2021, Data S2),  
279 the median age value of the posterior distribution was extracted (Tab. S1).

**281 Results****282 Early Iron Age (200 BCE – 500 CE) in the Western Congo Basin****283 *Imbonga* style**

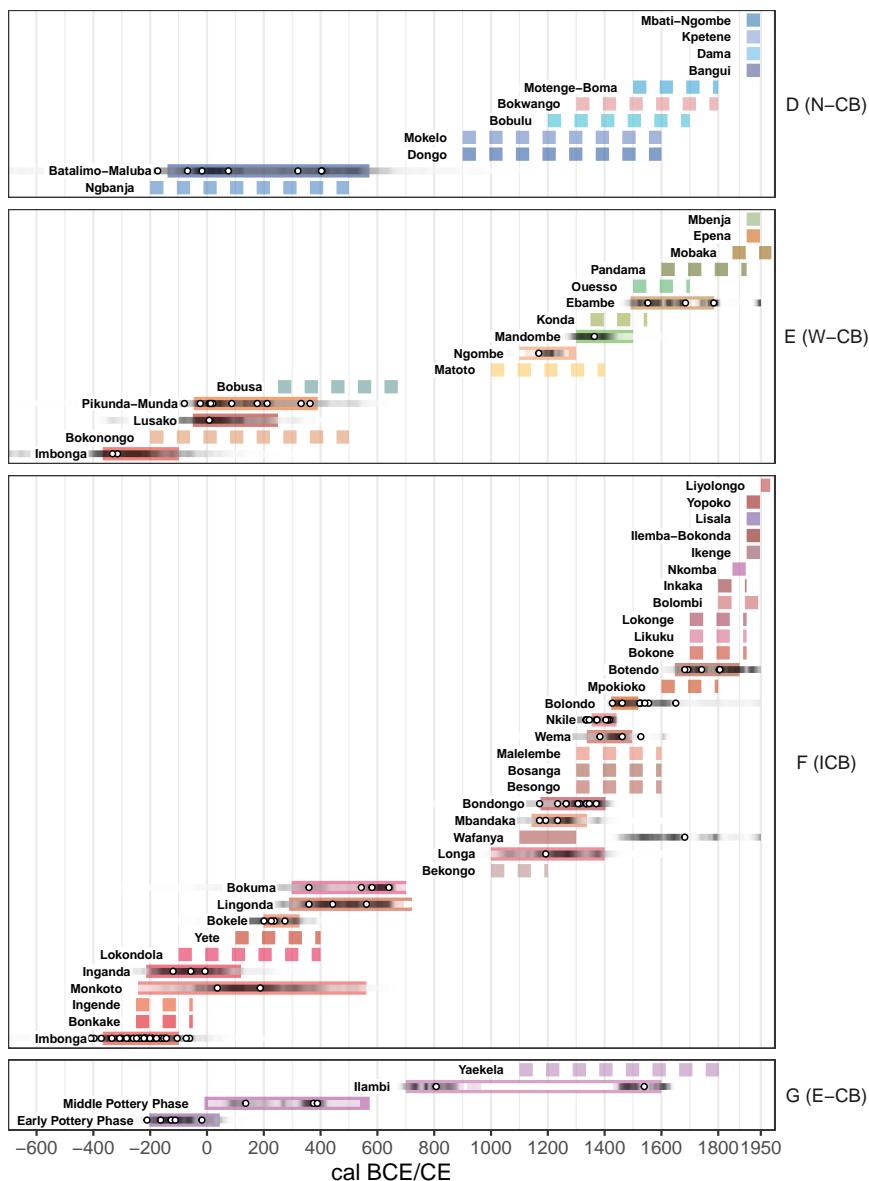
284 Remnants of the oldest ceramics in the western Congo Basin are found at two sites  
285 along the lower Sangha river, at Mitula and Mobaka (Fig. 1; Seidensticker 2021, 169–  
286 172, 306–307). At both villages, fragments of diagnostic vessels were found partially  
287 embedded in the soil, indicating eroded remains of pit features. During the pottery's  
288 extraction, charcoal was found and subsequently radiocarbon dated. Charcoal from  
289 inside the vessel at Mobaka dates to the 8th to 1st centuries BCE (KI-2894; Tab. 1),  
290 while the sample from underneath the vessel at Mitula dates to the 6th to 1st centuries  
291 BCE (KI-2895; Tab. 1; Fig. 2). Both conventional radiocarbon dates show substantial  
292 standard errors and thus cover long timespans after calibration. These dates correspond  
293 to the age of the *Imbonga* style from the Inner Congo Basin, dated to the 4th to 1st  
294 centuries BCE and constituting the initial phase of settlement history in the Congo

295 Basin (Fig. 2; S1; Tab. S1; Wotzka 1995, 59–68). The Imbonga style is characterized  
 296 by vessels with flat bases that either show round bellies, pronounced shoulders, and  
 297 profiled rims or are wide-mouthed bowls. Its decoration patterns comprise of rocker-  
 298 stamping on the lower half, often combined with horizontal grooves and incised  
 299 or plastic ornamentation on the vessels' shoulder regions (Seidensticker 2021, 196  
 300 Fig. 93.1–4). The two mentioned vessels found on the lower Sangha river do not  
 301 represent classic Imbonga characteristics but show striking similarities to vessels  
 302 associated with the Imbonga style (Seidensticker 2021, 170 Fig. 84): the vessel found  
 303 at Mitula resembles another from Iyonda (Wotzka 1995, 441 Pl. 7.7) while the vessel  
 304 from Mobaka matches one found at Bokele (Wotzka 1995, 453 Pl. 19.10). These  
 305 relatively isolated finds indicate an area of influence the Imbonga group had west of  
 306 its previously known boundary.

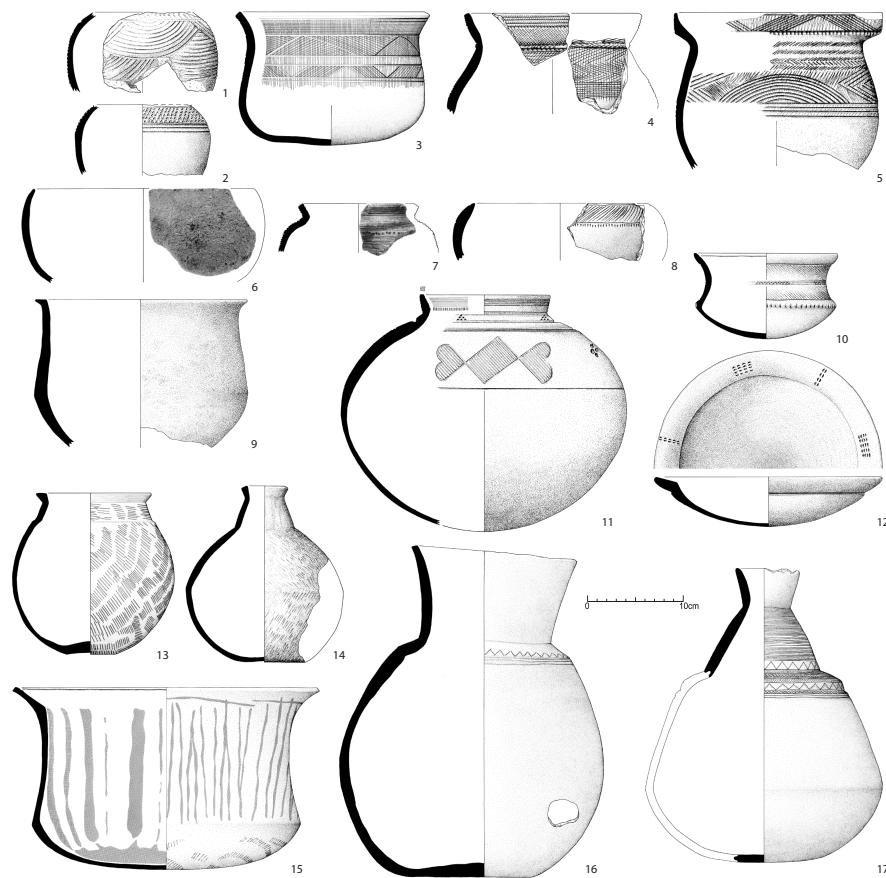
307 *Pikunda-Munda style*

308 The Pikunda-Munda group represents the earliest pottery style in the western parts  
 309 of the Congo Basin (Eggert 1992; Seidensticker 2021, 114–120). It shows substantial  
 310 similarities to the contemporaneous groups in the Inner Congo Basin regarding pottery  
 311 technology and decorations. However, concerning vessel shapes, there are consider-  
 312 able differences (Wotzka 1995, 107 Ftn. 4). The Pikunda-Munda style is represented  
 313 best through the inventories of pit features excavated in 1987 at the two eponymous  
 314 sites: Pikunda on the middle Sangha river and Munda on the upper Likwala-aux-  
 315 Herbes river (Fig. 1). The excavation at Pikunda detected two features: one about  
 316 3.4 m deep pit dating from the 4th century BCE to the 3rd century CE (KI-2877;  
 317 RICH-30864; Tab. 1; 2) that's been intersected by a considerably younger pit (Sei-  
 318 densticker 2021, 288–300). The older pit contained two nearly complete vessels and  
 319 around 160 sherds that can be attributed to the Pikunda-Munda style, as well as one  
 320 rim sherd of the Lusako style known from the Inner Congo Basin (Eggert 1992, 18  
 321 Fig. 4.1; Wotzka 1995, 104—107). Four sherds show a considerably different fabric,  
 322 shape, and decoration similar to that of the Ngbanja pottery known from the middle  
 323 Ubangi river (Seidensticker 2021, 296 Tab. 34). At Munda, two pits and a metallurgy-  
 324 related feature yielded inventories of the Pikunda-Munda style (Seidensticker 2021,  
 325 321–339). All features dated between the 1st century BCE and 4th century CE (Fig. 2;  
 326 S1; Tab. S1). The inventories from these pits are quite different compared to the  
 327 one excavated at Pikunda, whose pottery is heavily fragmented. The pits at Munda  
 328 contained complete vessels intentionally deposited either upside-down or lying on  
 329 their side; a practice reminiscent of the depositions in pits in the Inner Congo Basin  
 330 (Wotzka 1993). Overall nearly 550 vessel units are attributed to the Pikunda-Munda  
 331 style, with two-thirds of the assemblage originating from the excavations mentioned  
 332 above at the two eponymous sites.

333 Pikunda-Munda pottery was found along the Sangha river from its mouth into  
 334 the Congo river in the south up to the village of Ikelemba, around 65 km south-east  
 335 of Ouezzo, and along the entire stretch of the Likwala-aux-Herbes river (Fig. 4B–D;  
 336 Seidensticker 2021, 119 Fig. 49). A vessel from Ingonda Bosopela along the lower  
 337 Lulonga river (Wotzka 1995, 119 Ftn. 4, 531 Pl. 97.5) and a few isolated sherds found



**Fig. 2** Temporal distribution of known radiocarbon-dated pottery styles (solid colored bars) and styles with estimated 100-year bins derived from stylistic resemblance (dashed bars; Seidensticker et al. 2021, Data S2) in the Congo Basin over the past 2600 years separated by regions (Seidensticker et al. 2021, Fig. 1): D) Northern Congo Basin, E) Western Congo Basin, F) Inner Congo Basin, G) North-Eastern Congo Basin. Circles represent the highest probability of calibrated calendar age of each pottery-linked 14C date. The intensity of grey-shading is proportional to the summed probability of the calendar-age windows of all pottery occurrences by type. Colored bars represent the phase duration of radiocarbon dated pottery styles. For groups with more than two associated radiocarbon dates, the median start and end dates of the phases were calculated using a Bayesian phase model (Fig. S1; Tab. S1).



**Fig. 3** Ceramic vessels from the western Congo Basin – along the rivers Ngoko, Sangha and Likwala-aux-Herbes – that are representative for the following pottery styles: 1–2) Imbonga; 3–4) Pikunda-Munda; 5) Bokonongo; 6–8) Bobusa; 9) Matoto; 10–12) Ngombe; 13–14) Ebambe; 15) Mobaka; 16–17) Epena (Seidensticker 2021, 114–144, 162–172).

338 south-east and north-east of Ouesso (Gillet 2013, 114 Fig. 42) can be attributed to the  
339 Pikunda-Munda style as well.

340 The main characteristic of the Pikunda-Munda pottery are wide, open-mouthed  
341 bowls with approximately cylindrical walls, flared rims and rounded bases (Fig. 3.3;  
342 Eggert 1993, 311–314). Ornamental motives are based on linear elements produced  
343 through incisions or grooves, as well as occasional rocker-stamp decoration (Seiden-  
344 sticker 2021, 362 Appendix 4.12). Utilizing of these decoration techniques and  
345 motives corresponds to contemporaneous practices in the Inner Congo Basin. Especially  
346 concerning their decoration, there are considerable similarities between the Pikunda-  
347 Munda style and the styles Lokondola, Lusako, Lingonda, and Bokuma (Wotzka  
348 1995, 107). The main difference to the contemporaneous ceramics of the Inner Congo  
349 Basin is that among Pikunda-Munda pottery, only round bases are observed, while  
350 the ceramics further east unanimously show flat bases.

351 Irrespective of these morphological differences, in terms of macroscopic fabrics,  
352 Pikunda-Munda sherds and pottery from the Inner Congo Basin are practically in-  
353 distinguishable. Pikunda-Munda pottery is made from fine river clays that were not  
354 tempered (Seidensticker 2021, 66–67 Fig. 21). The used clays proved to be rich in  
355 sponge spicules (Seidensticker 2020). A small-scale pilot study on their shaping tech-  
356 niques showed that Pikunda-Munda vessels are roughed out by a version of drawing  
357 of a ring technique (Seidensticker 2021, 47–51 Fig. 13; 72–73 Tab. 13), and thus in  
358 a very similar fashion to the pottery production observed in the late 1970s and early  
359 1980s at Ikenge in the Inner Congo Basin (Eggert and Kanimba-Misago 1980).

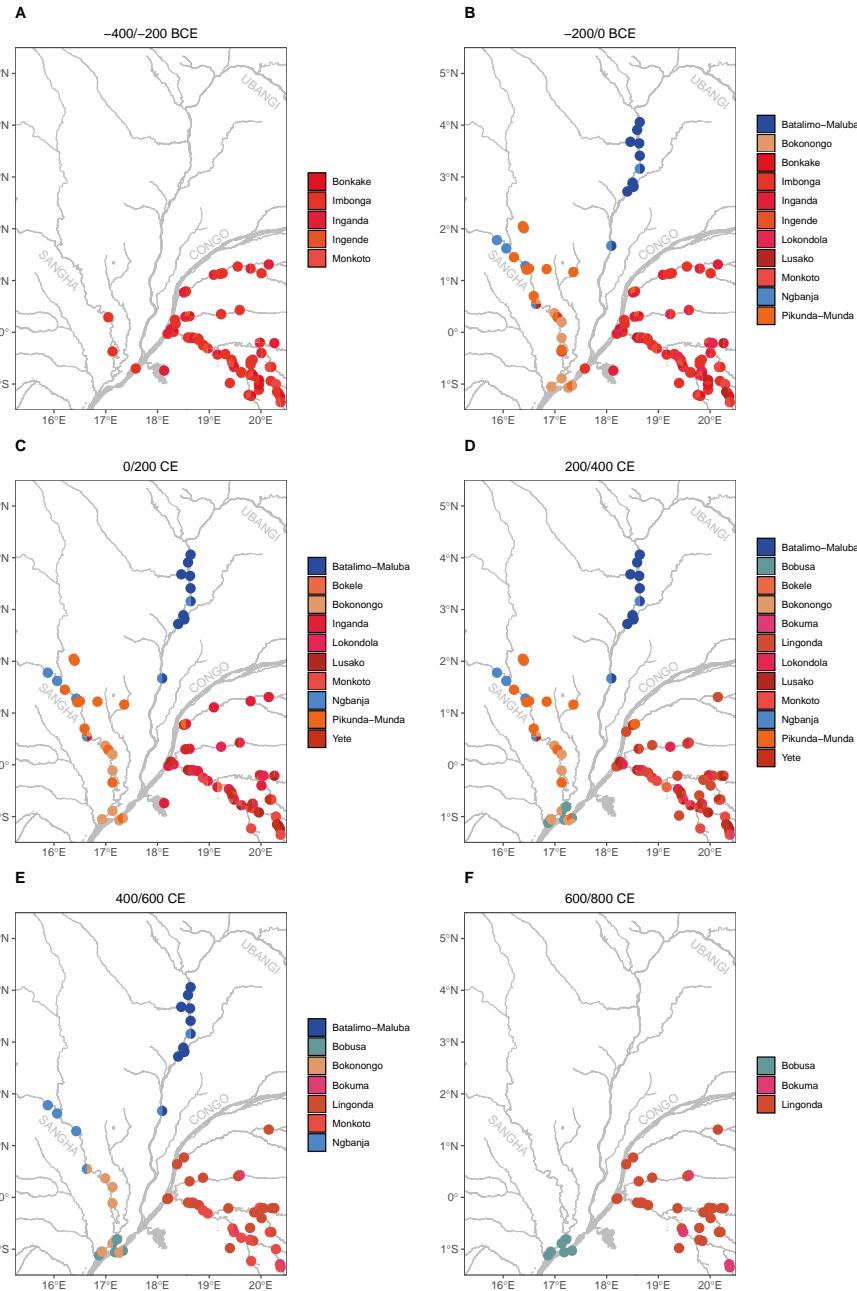
360 The oldest feature in the Congo Basin associated with iron metallurgy thus far  
361 pertains to the Pikunda-Munda group: the upper part of a pit at Munda on the upper  
362 Likwala-aux-Herbes river contained 7.5 kg of iron slag partially embedded in a hard-  
363 fired clay lining (Seidensticker 2021, 321–330). The feature also contained five nearly  
364 complete Pikunda-Munda bowls deposited laying on their sides (Seidensticker 2021,  
365 323 Fig. 157.A–E; Pl. 91.1–5). Two radiocarbon dates from that part of the feature  
366 date into the 1st to 4th centuries CE (Tab. 1: KI-2885, KI-2887).

367 Neither the precursor nor a potential successor of the Pikunda-Munda pottery is  
368 known. The precise association between the Pikunda-Munda style and contemporane-  
369 ous styles of the Equator-Co style tradition remains a subject for subsequent research.  
370 The present state of knowledge points to the Pikunda-Munda group being a remote  
371 sub-stream of the *Equator-Co* style tradition and no completely independent entity.

### 372 *Other Finds*

373 Several vessels from a partially eroded pit on the banks of the Likwala-aux-Herbes  
374 river at kilometer 186 have no comparison in the region in terms of vessel shapes  
375 and decorations (Seidensticker 2021, 165–168, 339–340). Time constraints during  
376 fieldwork only allowed a quick sampling of the pit, obtaining a nearly complete  
377 vessel, four larger fragments and 13 smaller sherds (Eggert 1993, 320 Fig. 16.15;  
378 Seidensticker 2021, Pl. 76.1–11). A charcoal sample dates this features between the  
379 2nd century BCE to the 3rd century CE (Tab. 1: KI-2893). The vessel has a flat base,  
380 convex belly, and a slightly elaborated shoulder leading to a concave neck and a flared  
381 rim. Its decoration consists of crudely made crossing grooves made with a comb  
382 on the shoulder and impressions beneath the rim. Further fragments show similar  
383 decorations. Overall, the vessel's shape is substantially different from those of the  
384 contemporaneous Pikunda-Munda style. Some aspects of the ceramics superficially  
385 resemble a vessel found at Gbadolite on the upper Ubangi river (Eggert 1984, 277–  
386 278 Fig. 7). Loosely similar in terms of vessel shapes, decoration technique and  
387 motives is the pottery of the Ngovo group of the lower Congo region (de Maret 1986;  
388 Seidensticker 2021, 167 Fig. 81).

389 The Bokonogo style is an interim term for an inventory of 19 vessel units from  
390 seven sites, including Pikunda on the middle Sangha river, that show very distinct  
391 characteristics: all vessels are either rather tall with convex bellies and concave necks  
392 ending in cylindrical rims or bowls with inverted rims (Fig. 3.4; Seidensticker 2021,  
393 120–123). Decorations consist of grooves beneath the rim and on the neck and shoul-  
394 ders, mainly forming horizontal, chevron or crossing motives. About half of the in-



**Fig. 4** Time-sliced maps of occurrences of pottery styles from both surface and excavated locations in the northern and western Congo Basin dating between the 4th century BCE to 8th century CE. If multiple contemporaneous pottery styles were recorded at a site, the colored icon is divided following Seidensticker (2021, 218–244 Fig. 100–107). Colors correspond to Fig. 2.

395 ventry showed a fabric similar to that of the Pikunda-Munda group, while a quarter  
396 showed grog tempering. At the same time, the remainder contained a heterogenous mix  
397 of quartz and grog. All finds are surface finds and not associated with any indications  
398 of their dating. The only loose comparison in terms of morphological characteristics  
399 and decorations can be made towards the Oveng pottery found in north-western Gabon  
400 (Clist 2004, 615–618) and on the island of Corisco (Equatorial Guinea) dating into  
401 the 1st to 7th century CE (Clist 2004, 555 Fig. 7–14; González-Ruibal et al. 2011;  
402 2012; Sánchez-Elipe 2015, 217–221; Sánchez-Elipe et al. 2016, 351–355).

403 Close to the mouth of the Sangha river, in the very south of the study area, a unique  
404 kind of pottery was found that is characterized by predominant grog tempering and  
405 small globular pots with short everted rims or convex bowls with slightly inverted  
406 rims (Fig. 3.6–8; Seidensticker 2021, 162–165). This group is named after the site of  
407 Bobusa, located near the mouth of the Sangha river. While there are no radiocarbon  
408 dates available for this pottery group, some of its characteristics show similarities to  
409 pottery found on the Île des Mimosas in Kinshasa (Eggert 1984, 279–280).

#### 410 Early Iron Age (200 BCE – 500 CE) in the Northern Congo Basin

411 The 1985 survey along the Ubangi river from its mouth into the Congo river south of  
412 Mbandaka up to Kouango and along the Lua river (Fig. 1) yielded a first glimpse into  
413 the variability of ceramics in the northern parts of the Congo Basin. The distribution  
414 of pottery groups in the northern Congo Basin is separated into three distinct regional  
415 lines of development (Seidensticker 2021, 183–185): only along the middle part of  
416 the Ubangi river, from around 180 to 240 km upstream of its mouth into the Congo  
417 river up to Bangui, pottery dating into the late 1st millennium BCE to 1st millennium  
418 CE was uncovered.

#### 419 *Batalimo-Maluba style*

420 In the region between Impfondo and Bangui, henceforth referred to as the middle  
421 Ubangi river, the ceramic sequence starts with the Batalimo-Maluba style (Seiden-  
422 sticker 2021, 75–82), named after the eponymous sites Batalimo on the lower Lobaye  
423 river and Maluba on the lower Lua river (Fig. 1). Excavations at Batalimo were con-  
424 ducted by de Bayle des Hermens (1975), Vidal, Koté (1992) and Ndanga et al. (2010).  
425 The initial excavation indicated a coexistent of partially polished lithic artifacts and  
426 ceramics (Aumassip 1975). This was not supported by later excavations at the site  
427 (Ndanga et al. 2010), nor excavations at the other eponymous site Maluba (Eggert  
428 1987). The pottery of the Batalimo-Maluba style was found at 18 sites, with a core  
429 distribution area between Dongo near the mouth of the Lua river and Mokelo, about  
430 30 km downstream of Bangui. The most southern find was uncovered at Ngbanja near  
431 Impfondo (Fig. 4B–E; Seidensticker 2021, 81 Fig. 25). Only in Batalimo and Maluba  
432 excavations yielded pottery of this style. The other sites associated with this group  
433 originate from surface finds. Available radiocarbon dates and one thermolumines-  
434 cence date (OxTL-154a-4), indicate that the Batalimo-Maluba pottery dates between



**Fig. 5** Ceramic vessels from the northern Congo Basin – along the rivers Ubangi and Luá – that are representative for the following pottery styles: 1–3) Batalimo-Maluba; 4–5) Ngbanja; 6–7) Bobulu; 8–9) Mokelo; 10–13) Motenge-Boma; 14–15) Bondongo; 16) Mbandaka; 17–18) Bokwango; 19–20) Dama; 21–22) Mbatis-Ngombe; 23) Bangui; 24) Kpetene; 25) Botendo (Seidensticker 2021, 75–114, 172–181).

435 the 2nd century BCE and 6th century CE (Fig. 2; S1; Tab. S1; Seidensticker 2021, 80  
436 Fig. 28).

437 Batalimo-Maluba pottery is characterized by well-structured, flat-based globular  
438 pots and wide-mouthed bowls that are elaborately decorated using cross-hatching,  
439 impression motifs and incised or grooved lines organized in alternating horizontal  
440 and vertical zones (Fig. 5.1–3; Eggert 1993, 306–308; Seidensticker 2016, 118; 2021,  
441 75–82).

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442 *Ngbanja style*

443 Closely related to the Batalimo-Maluba style is the Ngbanja style, which shares similar  
444 general characteristics (Seidensticker 2021, 82–86). The primary vessel types are  
445 globular or slightly ovoid pots or beakers with everted rims (Fig. 5.4–5). Decorations  
446 are based on grooves and impressions, and while they show similar motives as the  
447 Batalimo-Maluba style, they are restricted to the neck or inside of the rim.

448 Ngbanja pottery is strongly related to the Batalimo-Maluba style, and Eggert  
449 (1987, 141) suggested it as a predecessor of the Batalimo-Maluba group. Besides the  
450 stylistic connections, the only chronological fixpoint for the Ngbanja style is a sherd  
451 of this style found in the deep pit at Pikunda (Sangha river). Two radiocarbon dates  
452 (Tab. 1: KI-2877; Tab. 2: RICH-30864) date the feature to the second half of the 1st  
453 century BCE to the late 3rd century CE. The sherd exhibits a coarse fabric instead of the  
454 delicate fabric common to the Pikunda-Munda style, and its decor consists of a ledge  
455 with comb impressions on it. A nearly matching sherd was found during surveys at  
456 Ngbanja on the middle Ubangi river (Seidensticker 2021, 83 Fig. 26.7–8). At Pikunda,  
457 this sherd must be considered a foreign but contemporaneous type within the closed  
458 Pikunda-Munda inventory. Three other sherds with coarse fabric and a decoration  
459 different from the Pikunda-Munda style were also found. These associations allow for  
460 the possibility that Ngbanja pottery is contemporaneous not only to Batalimo-Maluba  
461 pottery but also to the Pikunda-Munda style and dates between the 2nd/1st century  
462 BCE and the 5th/6th century CE (Fig. 2; 4B–E).

463 *Hiatus (500–1000 CE) in the Congo Basin*

464 In both regions, inventories dating between the end of the 6th century to the early 10th  
465 century CE are currently unknown, leaving a gap within the regional sequences of at  
466 least 300 years (Fig. 2; 4F–6A; S1). A detailed review of chronological indicators for  
467 the 32 pottery styles described by Wotzka (1995, 59–212) revealed a similar pattern:  
468 no pottery could be dated between the end of the Bokuma and Lingonda styles, which  
469 end towards the end of the 7th centuries CE, and the onset of the widespread Bondongo  
470 style at the beginning of 12th century CE (Fig. S1; Tab. S2).

471 In the north-eastern Congo Basin, around Kisangani (Fig. 1), a similar interrup-  
472 tion between ceramics designated to the Early and Middle Pottery Phase and styles  
473 pertaining to the Late Iron Age has been observed (Livingstone Smith et al. 2017,  
474 Fig. 2; S1). Technological analyses of the shaping techniques revealed a distinction as  
475 well: the pottery of the Early and Middle phases is exclusively shaped via a drawing of  
476 a ring technique, while all Late Iron Age pottery is shaped by pounding in a concave  
477 mold. Only certain stages of the *chaînes opératoires* of the Late Iron Age ceramics  
478 still adhere to principles followed during earlier times, indicating a certain continuity  
479 (pers. comm. Livingstone-Smith 2021).

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<sup>480</sup> Late Iron Age (1000–1850 CE) in the Western Congo Basin

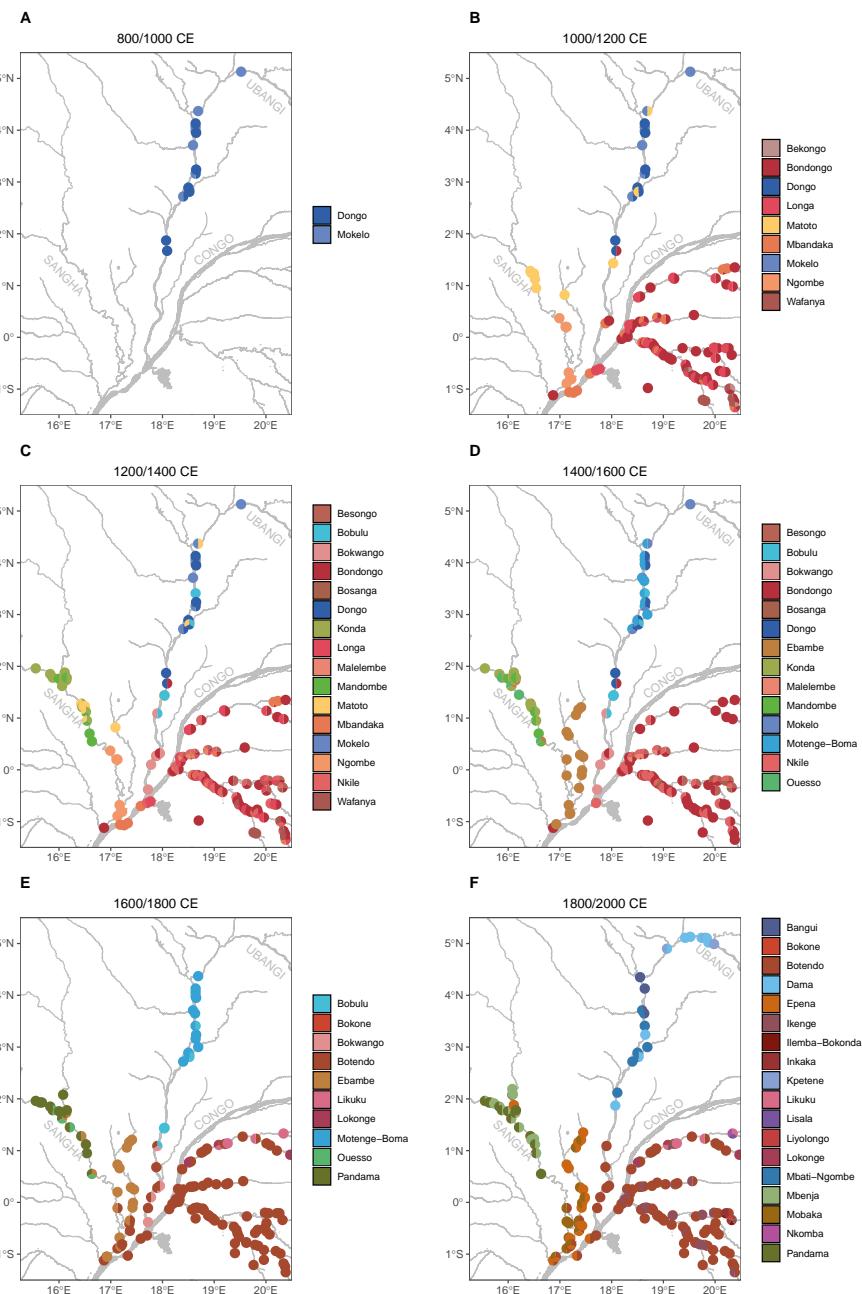
<sup>481</sup> After the interruption of pottery sequences during the 6th to 10th century CE, ceramics  
<sup>482</sup> re-appear within the archaeological inventories of the region in the 10/11th century  
<sup>483</sup> CE (Fig. 2; 6A–B; S1). During the late Iron Age in the western Congo Basin, a clear  
<sup>484</sup> distinction appears between pottery styles associated with the adjacent Inner Congo  
<sup>485</sup> Basin and an independent stream summarized as Ngoko style tradition.

<sup>486</sup> *Ngombe style*

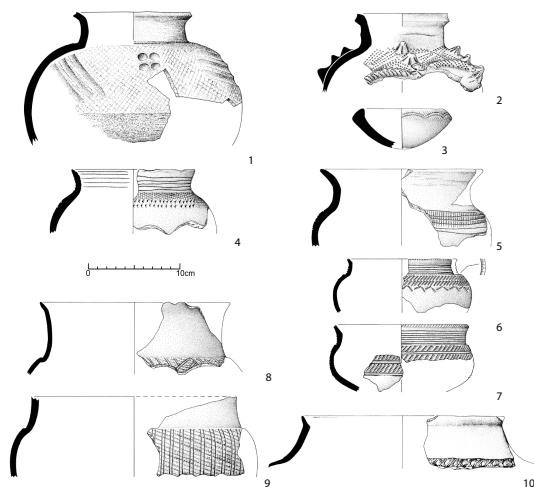
<sup>487</sup> The re-emergence of ceramics in the western Congo Basin at the onset of the Late  
<sup>488</sup> Iron Age is marked by the Ngombe style (Seidensticker 2021, 125–128), which is  
<sup>489</sup> rooted in the Equator-Co tradition of the Inner Congo Basin (Wotzka 1995, 222 Fig.  
<sup>490</sup> 4). The ceramics of this type are found mainly on the lower Sangha river, with the  
<sup>491</sup> eponymous site of Ngombe constituting the northernmost extension of its distribution  
<sup>492</sup> area (Seidensticker 2021, 127 Fig. 54). In total, 56 vessel units from 15 sites are  
<sup>493</sup> associated with the Ngombe style. They are similar to the Longa and Mbandaka styles  
<sup>494</sup> (Wotzka 1995, 121–128, 139–143) of the Inner Congo Basin but show equally inde-  
<sup>495</sup> pendent characteristics. The defining inventory of the Ngombe style was discovered in  
<sup>496</sup> a partially eroded pit at the eponymous site on the middle Sangha river (Seidensticker  
<sup>497</sup> 2021, 305–306). It yielded an inventory of two plates, a big bowl, and a carinated  
<sup>498</sup> bowl, all surrounded by fragments of a large vessel with a convex belly, a tapered  
<sup>499</sup> shoulder and a short, flared rim (Fig. 3.10–12; Seidensticker 2021, Pl. 42.15–44.2).  
<sup>500</sup> The Ngombe style shows only rounded bases. Decorations consist of grooves and  
<sup>501</sup> impressions on the upper parts of the vessels. A new radiocarbon date obtained off  
<sup>502</sup> a food crust from the bottom of the main vessel found at Ngombe dates into the late  
<sup>503</sup> 12th to mid 13th century CE (RICH-30867; Tab. 2). This corroborates the previously  
<sup>504</sup> proposed age of this pottery in relation to the Mbandaka and Longa styles of the Inner  
<sup>505</sup> Congo Basin (Fig. 2; 6B–C; S1; Tab. S1; Seidensticker 2021, 126–128).

<sup>506</sup> *Ebambe and Epena styles*

<sup>507</sup> Modern pottery production in the western Congo Basin shows two styles being present  
<sup>508</sup> along the Likwala-aux-Herbes river: upstream dominates the Epena style, while down-  
<sup>509</sup> stream, the Ebambe style is more present, but with vessels of both styles being found  
<sup>510</sup> along the entire length of the river (Seidensticker 2021, 131–141). Only the Ebambe  
<sup>511</sup> style has been found along the lower Sangha river. A potter in Boleko, on the lower  
<sup>512</sup> Likwala-aux-Herbes river, was still producing pottery of the Ebambe style in 1987  
<sup>513</sup> using a drawing of a lump technique combined with additional coiling for the neck  
<sup>514</sup> (Eggert in prep.). Diagnostic shapes include tall vessels with tapered necks, bottles  
<sup>515</sup> with think necks and bowls with parallel rims (Fig. 3.13–14; Seidensticker 2021, 132  
<sup>516</sup> Fig. 57). All vessels of the Ebambe style show flat bases. A diagnostic feature of the  
<sup>517</sup> Ebambe style is the consistent use of *banfwa-nfwa* decor on nearly all parts of the  
<sup>518</sup> vessel, including occasionally the inside of the rims. *Banfwa-nfwa* is the characteris-  
<sup>519</sup> tic decoration technique employed by potters at Ikenge (Eggert and Kanimba-Misago  
<sup>520</sup> 1980, 399) and can be found on most of the pottery of the Inner Congo Basin after



**Fig. 6** Time-sliced maps of occurrences of pottery styles from both surface and excavated locations in the northern and western Congo Basin dating younger than the 9th century CE. If multiple contemporaneous pottery styles were recorded at a site, the colored icon is divided following Seidensticker (2021, 218–244 Fig. 100–107). Colors correspond to Fig. 2.



**Fig. 7** Ceramic vessels of the Ngoko style tradition – along the rivers Ngoko and Sangha – that are representative for the following pottery styles: 1–3) Mandombe; 4–5) Konda; 6–7) Ouesso; 8–9) Pandama; 10) Mbenja (Seidensticker 2021, 145–162).

the onset of the Late Iron Age (Wotzka 1995, 109–111). It is created by whipping the leather hardened clay with the narrow side of a chip made from the rib of a palm leaf, leaving short, mostly lancet-shaped impressions (Fig. 3.13–14; 5.16,25; Eggert 1980, 386 Ftn. 5).

A rich inventory of Ebambe style vessels was excavated in Munda on the upper Likwala-aux-Herbes river (Seidensticker 2021, 311–321). New radiocarbon dates on food crusts from two vessels found within the pit (Tab. 2: RICH-30865–RICH-30866) corroborate the existing conventional date (Tab. 1: KI-2884). All three dates cover the 16th century CE onwards.

The pottery produced at Epena on the upper Likwala-aux-Herbes river shares similar morphological features with the Ebambe style, especially their flat bases and tall vessels with tapered necks (Fig. 3.16–17; Seidensticker 2021, 137–141). Production was documented in 1995 by Léopold Mpika Ngoma (1996, 25–33). Epena ceramics – labeled 'Jeke' in Seidensticker (2016, 119 Fig. 6.3) – were shaped via drawing of superimposed rings. Most vessel shapes show relatively straight walls with slight tapering on the largest diameter and everted rims (Seidensticker 2021, 138 Fig. 60). Decorations are usually reserved for the shoulder and neck area. The rims are regularly undecorated, and – unlike the Ebambe pottery – bellies are not decorated with *banfwa-nfwa*. There are no chronological indicators for the onset of the Epena style available.

#### Ngoko style tradition

Between the 13th to 15th centuries CE, a set of ceramics emerged that showed no connection to the Equator-Co tradition and constituted an independent style tradition (Fig. 7). Two out of the five pottery styles forming the Ngoko style tradition are

dated: the Mandombe style (Seidensticker 2021, 145–148), which was defined after the inventory excavated in the upper pit at Pikunda, dates into the 13th to 15th century CE (Tab. 1: KI-2891), and the Mbenja style (Seidensticker 2021, 158–162), which represents the modern pottery along the upper Sangha and the Ngoko. The other three styles that are part of the Ngoko style tradition can – thus far – only be dated relative to these two groups (Seidensticker 2016, 121–123 Fig. 6.5): the Pandama style (Seidensticker 2021, 155–158) shows considerable similarities with the modern Mbenja pottery, the Quesso style (Seidensticker 2021, 152–155) shows similarities to the Pandama style, and the Konda group (Seidensticker 2021, 148–152) shows similarities to the styles Mandombe and Pandama respectively. The proposed order of these pottery styles starts in the 13th to 15th century CE with the Mandombe style, followed by the Konda group and the Quesso group, which in turn are surpassed by the Pandama style, which links to the modern Mbenja pottery.

All styles within the Ngoko style tradition share similar main vessel types: pots with convex bellies, concave necks, and short, everted rims. While decorations in the Mandombe style are based on grooves, often using a comb, and comb impressions, the lower halves of the vessels are consistently roughed up by a slurry or slip (Fig. 7.1–3). A diagnostic property are plastic decorations, such as knobs and ledges, that can only be found among vessels of the Mandombe style. While relying on grooves and impressions, the succeeding Konda style shows no elevated decoration (Fig. 7.4–5). The Quesso pottery shows decorations made through grooving and comb impressions, similar to the Konda pottery (Fig. 7.6–7). At the same time, the shape of the rims is similar to the Pandama style. The decorations of Pandama pottery are based on knotted strip, twisted string, and alternate knotted strip roulettes, which are sometimes superimposed by grooves (Fig. 7.8–9). Roulette decoration was previously observed only in some vessel units associated with the styles Mandombe and Konda. This indicates a slow and staged introduction of roulette within the developed system of the Ngoko style tradition (Seidensticker 2016, 120–123). Within the modern Mbenja style, vessel shapes become more heterogeneous, while the shape of the rims persist. Concerning decorations, Mbenja pottery shows carved roulette only and decor is restricted to a single band on the vessel's shoulder (Fig. 7.10). None of the ceramics associated with the Ngoko style tradition show fabrics indicative of the usage of fine riverine clays (Seidensticker 2020). Sherds contain substantial quantities of quartz and organic temper. Pottery of the Mandombe style excavated at Pikunda, and modern pottery produced in Pikunda in 1987, decorated with knotted strip roulette, was produced using coiling. All these styles show inherent commonalities and, at the same time, substantial differences to any pottery linked to the Equator-Co style tradition of the Inner Congo Basin (Wotzka 1995). The fieldwork of the *River Reconnaissance Project* in 1987 only uncovered the southern margins of the Ngoko tradition, which reached as far south as Pikunda on the middle Sangha river (Fig. 6C–F). Its upstream or northern extent can only be revealed during future fieldwork in the south-east of Cameroon and the south-west of the Central Africa Republic respectively.

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587 Late Iron Age (1000–1850 CE) in the Northern Congo Basin

588 During the younger part of the pottery sequence in the northern Congo Basin the  
 589 three-way split of regional ceramic development persists: on the lower part of the  
 590 river, up to 180 to 240 km upstream, all observed ceramics are part of the Equator-Co  
 591 tradition of the Inner Congo Basin. Inventories from sites in that region are dominated  
 592 by the newly described Bokwango style and the already established styles Bondongo,  
 593 Mbandaka, and Botendo (Seidensticker 2021, 96–98, 172–181). The area further  
 594 upstream, up to Bangui, showed a complex set of pottery styles described below.  
 595 Upstream of Bangui, only very young pottery has been identified as of yet. A key  
 596 characteristic of the pottery styles pertaining to the Late Iron Age along the Ubangi  
 597 river is the introduction of roulette decoration in an equally staged and slow process  
 598 as in the Ngoko style tradition.

599 While excavations in this area are rare, only pits with Batalimo-Maluba pottery at  
 600 Maluba were sufficiently excavated during the *River Reconnaissance Project*, there are  
 601 no adequately documented inventories known thus far that yielded pottery dating into  
 602 the Late Iron Age. Therefore, all lines of reasoning are based on stylistic developments  
 603 within survey inventories. Modern pottery production documented at four sites on the  
 604 middle and upper Ubangi river are the only points of reference.

605 At Mbati-Ngombe on the middle Ubangi river, the production of short-necked  
 606 vessels and bowls with round bases (Fig. 5.21–22) shaped via coiling was observed  
 607 (Seidensticker 2021, 109–121). Bowls show inverted rims, while the vessels usually  
 608 have a short cylindrical neck and very short, everted rim. Most distinctive is the  
 609 systematic decoration of vessels of the Mbati-Ngombe group using either knotted  
 610 strip, twisted string, or alternated knotted strip roulettes (Livingstone Smith et al.  
 611 2010, 88–105) in a single band below the rim or occasionally on the inside of the rim.

612 Further upstream, ceramic vessels were produced at Dama 1, Sidi and Boduna by  
 613 pounding in a concave mold (Seidensticker 2021, 69 Ftn. 101). Dama style pottery  
 614 (Seidensticker 2021, 104–109) consists of either smaller pots with rounded bases and  
 615 short everted rims but without a defined neck area or substantially bigger vessels with  
 616 pronounced convex shoulders and everted rims (Fig. 5.19–20). The primary means of  
 617 decoration within the Dama style are carved roulettes, consistently applied in a single  
 618 band on the vessel's shoulder. Only rarely is the roulette accompanied by grooves or  
 619 impressions.

620 The Kpetene style summarizes a set of ethnographic vessels whose production was  
 621 not documented. This style is comprised of ovaloid vessels and bowls with round bases  
 622 that are extravagantly decorated with multiple bands of carved roulette (Seidensticker  
 623 2021, 103–105). Near Bangui, modern vessels with flat bases and a decoration not  
 624 relying on roulettes are observed (Seidensticker 2021, 112–114). This group, named  
 625 after the capital of the Central African Republic, shows systematic roughing up of the  
 626 lower parts of the vessels with *banfwa-nfwa*. In contrast, the upper parts are decorated  
 627 with multiple bands of impressions and grooves (Fig. 5.24).

628 The most distinctive style among the precursors of these modern productions is the  
 629 Motenge-Boma group (Seidensticker 2021, 99–103), first discovered by Van Noten  
 630 (1977, 75, 1982b, 69, Fig. 40). The vessels of the Motenge-Boma group show convex  
 631 bellies, no pronounced neck areas and, most importantly, a particular variety of rim

shapes (Fig. 5.10–13). Often, the usually straight or slightly inverted rims show thick ledges. The spectrum of vessel shapes within the Motenge-Boma group also includes convex bows with thickened rims. A clear marker of the Motenge-Boma pottery is a decoration based on bands of carved or, in some cases, knotted strip roulette in combination with grooves and impressions on the bellies and shoulders of vessels. The rims are often also decorated similarly. No new pointers for the dating of the Motengo-Boma pottery have been obtained as studied ceramics of this style were found entirely as surface finds. Thus, until excavations uncover inventories pertaining to this style as well as datable material, the age of the Motenge-Boma pottery can only be estimated to be somewhere in the second half of 2nd millennium CE as suggested by Van Note (1982b, 69). The detailed surveys of 1985 could demarcate the distribution of this pottery along the Ubangi river quite well. Motenge-Boma ceramics are only found from the mouth of the Lua river in the south to Bangui in the north (Fig. 6D–E; Seidensticker 2021, 102 Fig. 37).

Evidence for pottery dating between the end of the Batalimo-Maluba style in the 6th century CE (Fig. S1; Tab. S1) and the onset of the Motenge-Boma group is scarce. The styles Dongo, Mokelo and Bobulu (Fig. 2; Seidensticker 2021, 86–95) are noteworthy as they date potentially between the mid of the 1st millennium CE and the middle of the 2nd millennium CE. The most diagnostic among these is the Mokelo pottery, distributed between the mouth of the Lua river and the bend of the Ubangi river further upstream. Its vessels often show tapered profiles (Fig. 5.8–9). While carved roulette decoration is occasionally present, the bulk of its decors is achieved utilizing incisions and bands of comb impressions.

Notably, no ceramics dating to before the 10th century CE were found along the lower stretches of the Ubangi river, south of Impfondo. All finds from that region pertain to pottery styles known from the Inner Congo Basin, such as Bondongo, Mbandaka, and Botendo (Fig. 5.14–16, 25; Seidensticker 2021, 172–181), with the only exception being the newly described Bokwango style (Fig. 5.17–18; Seidensticker 2021, 96–99). The ceramics of this group are an off-shoot for the Equator-Co style tradition (Wotzka 1995). The lower halves of Bokwango vessels are decorated with *banfwa-nfwa*, as is typical for styles from the Inner Congo Basin dating into the Late Iron Age but showing slightly tapered profiles.

## 664 Discussion

### 665 Settlement History of the Congo Basin

666 The results from the northern and western parts of the Congo Basin presented here  
667 complement the available data on the settlement history of the Inner (Wotzka 1995)  
668 and north-eastern Congo Basin (Livingstone Smith et al. 2017), enabling a synopsis  
669 of the settlement history of the region as a whole (Seidensticker 2021, 218–244). The  
670 earliest pottery group known within the entire Congo Basin thus far is the Imbonga  
671 style, dating into the 4th to 2nd century BCE (Fig. 2; S1; Tab. S1) that is found within  
672 the western half of the *Cuvette centrale* (Fig. 4A; Wotzka 1995, 59–68) as well as at  
673 two sites along the lower Sangha river.

674 The Imbonga style differentiates into multiple groups that still inherit substantial  
 675 morphological and decoration characteristics in the following phase, starting in the 3rd  
 676 and 2nd century BCE (Seidensticker 2021, 219–224). Initially, the later individually  
 677 described styles Bonkake, Ingende and Inganda (Fig. 2; S1; Tab. S1; Wotzka 1995,  
 678 68–84) were conceptualized as part of a broader ‘Imbonga horizon’ (Eggert 1983).  
 679 During this time, the settled area in the Inner Congo Basin slightly expanded upriver  
 680 along the lower Tshuapa, up to the region of the modern town of Boende, and on  
 681 the lower Luilaka (Fig. S2B). The development of ceramic styles in the Inner Congo  
 682 Basin around the turn of time is characterized by differentiation and regionalization,  
 683 with many of the successors of the Imbonga style being only distributed along certain  
 684 tributaries of the Congo river.

685 Also within this time period, the initial phase of pottery-producing communities  
 686 emerged in the north-eastern parts of the Basin, in the vicinity of Kisangani (Fig. S2A;  
 687 Livingstone Smith et al. 2017). The pottery of the Early Phase dates between the 2nd  
 688 century BCE and 1st century CE (Fig. 2; S1; Tab. S1). Livingstone Smith et al.  
 689 (2017, 110,115) propose a relation of this pottery to the contemporaneous Imbonga  
 690 style of the Inner Congo Basin, especially regarding the use of similar decorative  
 691 techniques. In a critical review it must be noted that the pottery of the Early Phase  
 692 (Livingstone Smith et al. 2017, 112 Fig. 24) lacks systematic rocker zig-zag on the  
 693 bottom parts of vessels as well as raised decorations such as ledges or ridges, vessels  
 694 shows no pronounced shoulders, all primary characteristics of the Imbonga style  
 695 (Seidensticker 2021, 170 Fig. 84.1–20). Pottery of the Early Phase is still attested  
 696 until the 1st century CE, while the Middle Phase pottery already commences (Fig. 2;  
 697 S1; Tab. S1; Livingstone Smith et al. 2017).

698 In the 2nd to 1st century BCE pottery-producing communities emerge in the  
 699 western and northern Congo Basin: along the Sangha and Likwala-aux-Herbes rivers,  
 700 the Pikunda-Munda style and along the middle Ubangi river, on the northern fringes  
 701 of the rainforest, the Batalimo-Maluba (Fig. 2; S1; Tab. S1) and the Ngbanja styles  
 702 can be found (Fig. 4B). It is essential to state that these groups share no fundamental  
 703 commonalities with the pottery of the Inner Congo Basin and must be regarded as  
 704 distinct and individual lines of development. Based on preliminary technological  
 705 analyses, a connection to the Inner Congo Basin’s contemporaneous ceramics can  
 706 only be postulated for the Pikunda-Munda group. Ceramics within the western and  
 707 Inner Congo Basin appear to have been shaped in either a drawing of a lump or a  
 708 ring technique. These ceramics have yet to be differentiated, especially regarding used  
 709 clays and the lack of tempering of the clays (Seidensticker 2020).

710 The first half of the 1st millennium CE sees a continuation of the described  
 711 patterns. In the Inner Congo Basin, multiple interrelated styles with only regional  
 712 distribution areas emerge (Fig. S2C–D). It should be remarked that during this time,  
 713 a slight retreat of settlement activity is discernible, with substantially fewer sites  
 714 compared to the centuries BCE being known along the Lulonga and Lopori rivers  
 715 (Seidensticker 2021, 224). This apparent plateauing of settlement activity has been  
 716 interpreted as a setback in human activity visible throughout Central Africa that  
 717 continued until the 10th century CE (Seidensticker et al. 2021).

718 Within the entire Congo Basin, only very few dated sites point to the presence of  
 719 pottery-producing communities between the 7th to 10th centuries CE (Seidensticker

720 2021, 225–231; Seidensticker et al. 2021, Fig. S4). The two predominant styles in the  
721 western and northern Congo Basin, the Pikunda-Munda and Batalimo-Maluba groups,  
722 end between the 4th to 6th century CE at the latest (Fig. S1; Tab. S1). The available  
723 dates for the Middle Phase pottery in the Kisangani region indicate that it ended  
724 around the same time. The earliest evidence for the Ilambi style, clearly pertaining to  
725 the younger Iron Age, dates to the 8th century CE. It must be stressed that this early  
726 date is challenged by another date also associated with the Ilambi style, dating into  
727 the 15th to 17th century CE, leaving a considerable discrepancy (Livingstone Smith  
728 et al. 2017, 98 Tab. 1).

729 Substantial human activity is attested for again by significant increases in sites  
730 yielding pottery dating to the 11th century CE and younger. Among these are the  
731 widely distributed Bondongo and Longa styles (Fig. 2; S1; Tab. S1; Wotzka 1995,  
732 121–139). While these groups are distributed across nearly all parts of the Inner  
733 Congo Basin that was surveyed during the *River Reconnaissance Project*, and in the  
734 case of the Bondongo group also along the lower Ubangi river, they are immediately  
735 followed by a distinct development of regional traditions (Wotzka 1995 221–223;  
736 Seidensticker 2021, 231–244; Seidensticker et al. 2021, 3–5). Along the lower Sangha  
737 river, the newly dated Ngombe group (Tab. 2) reflects an uptick in human activity.  
738 Starting in the 13th century CE, new components of pottery production commence  
739 along the Ngoko river and upstream parts at the Sangha river. These new elements form  
740 the foundation for the newly described Ngoko style tradition, whose onset is marked  
741 by the emergence of the Mandombe style. This group is later followed by at least three  
742 more pottery styles that lead directly into the modern potters' production in the area.  
743 Along the Likwala-aux-Herbes river, re-settlement is only attested for starting in the  
744 16th century CE, documented by newly obtained radiocarbon dates for ceramics of the  
745 Ebambe style (Tab. 2: RICH-30866). Within a similar time falls the Motenge-Boma  
746 style found along the middle Ubangi river. It is putatively preceded by the poorly  
747 attested Dongo, Mokelo, and Bobulu groups. The introduction of roulette decoration  
748 within the Ngoko style tradition, as well as among the groups on the middle Ubangi  
749 river, while being an easily observable marker, cannot be described as a watershed  
750 event but rather a process of slow adaption (Seidensticker 2016, 120–123). Similarly  
751 to these regions, roulette decoration becomes a prime marker of younger pottery styles  
752 in the Kisangani region (Livingstone Smith et al. 2017).

### 753 Refuting the "Sangha River Interval" (SRI) Hypothesis

754 The putative origin of ceramic-producing communities starting to settle in the Congo  
755 Basin in the 4th century BCE remains elusive. Linguistic studies propose rapid migra-  
756 tions through the rainforest (Currie et al. 2013; Whiteley et al. 2019; Koile et al. 2022)  
757 and suggest that the region of the Sangha river, in the western Congo Basin (Fig. 1),  
758 played a crucial role as a potential 'gateway' through the equatorial rainforest of the  
759 Congo Basin (Grollemund et al. 2015; Bostoen et al. 2015; Grollemund et al. 2023).  
760 In consequence, putative Bantu-speaking migrants are deemed to have followed a  
761 savannah-corridor, determined by the Sangha River Interval (SRI), in the latter half  
762 of the 1st millennium BCE (Grollemund et al. 2015; Bostoen et al. 2015). This hy-

763 pothesis is brought forward based on statistical analyses of present-day languages and  
 764 attempts to integrate archaeological data into the outcome of these statistical analyses  
 765 against the background of an ecologically identified "forest perturbation" (Bostoen  
 766 et al. 2015, 356) during the Late Holocene Rainforests Crisis (LHRC) (Vincens et al.  
 767 1994; Elenga et al. 1996; Raynaud-Farrera et al. 1996; Maley and Brenac 1998; Vin-  
 768 cens et al. 1998; Maley 2004; Ngomanda et al. 2009; Sangen 2009; Giresse et al.  
 769 2020).

770 The unique composition of the region along the Sangha river (cf. "W&E margins"  
 771 in Philippon et al. 2019, 7 Fig. 3A), linking plant and animal species from the  
 772 Sudanian and Zambezian savannas, was first brought forward in René Letouzey (1968).  
 773 This roughly 400 km wide region between 14 and 18°E "lacks some plant species  
 774 typical of dense humid forests present in both the lower Guinean and the Congolian  
 775 floristic domains in Cameroon-Gabon and the Democratic Republic of the Congo,  
 776 respectively" (Bostoen et al. 2015, 356). Remote sensing data corroborate the specific  
 777 ecology of the SRI (Gond et al. 2013; Philippon et al. 2019). Ground truths for  
 778 a widespread opening of the forest are severely lacking, especially those for the  
 779 1st millennium BCE during which such an opening is regarded as triggering for  
 780 a southwards migrations of Bantu-speech communities (Grollemund et al. 2015;  
 781 Bostoen et al. 2015). The existence of the SRI during the 1st millennium BCE was  
 782 recently critically reviewed based on a multi-proxy analysis, combining phytolith  
 783 assemblages with  $\delta^{13}\text{C}$  rations of the soil organic carbon from soil profiles within the  
 784 SRI (Bremond et al. 2017). Out of all 18 profiles, only four showed  $\delta^{13}\text{C}$  values higher  
 785 than -25‰ and can be related to past vegetation changes during the 1st millennium  
 786 BCE. The phytolith assemblages further corroborate these findings of only occasional  
 787 and rare forest openings (Bremond et al. 2017, 99). Following Bremond et al. (2017),  
 788 another review concluded "the increase of settlements [in Central Africa] clearly  
 789 began after 2350 yr BP, not before 2500 BP" (Giresse et al. 2020, 1) and "the SRI  
 790 [then being] mainly composed of pioneer taxa and open canopy forest formations with  
 791 low densities of large trees" (Giresse et al. 2020, 11) with the savannas of the interval  
 792 having disappeared. During the last millennium, the environment in the SRI shows  
 793 considerable stability (Giresse et al. 2023).

794 While Grollemund et al. (2015) and Bostoen et al. (2015) postulate large-scale  
 795 migrations of putative Bantu-speaking communities through the SRI, the compilation  
 796 of discussed sites in the Congo Basin by Bostoen et al. (2015, 356 Fig. 1) depicts  
 797 only the site of Imbonga on the Momboyo river. The entire settlement history of the  
 798 Inner Congo, which was published in detail (Eggert 1984, 1987; Wotzka 1995), has  
 799 been reduced to the putative and untested connection between the earliest pottery  
 800 style (Imbonga) and the earliest immigration of Bantu speakers (Bostoen et al. 2015,  
 801 366). The fundamentals of the settlement history of the western Congo Basin Eggert  
 802 (1992, 1993) were largely omitted. Bostoen et al. (2015, 364) reduce these reports  
 803 to a short note concerning the association of evidence for iron metallurgy with the  
 804 Pikunda-Munda pottery style. A review of the radiocarbon dates, which were already  
 805 published by Eggert (1992, 1993), shows an at least 200-year off-set between the oldest  
 806 dates in the heart of the rainforest (Imbonga) versus the oldest dates from within the  
 807 SRI (Pikunda-Munda; Fig. S1; Tab. S1). Thus, archaeological fieldwork in the western  
 808 Congo Basin, and the SRI in particular, have not revealed any precursors of the oldest

809 pottery of the Congo Basin, whose distribution is relegated to the western half of the  
810 Inner Congo Basin (Seidensticker 2021, 220 Fig. 100A). Based on evidence brought  
811 forward by Morin-Rivat et al. (2014), Seidensticker (2016), and Giresse et al. (2020),  
812 Clist (2022) reverts the prior hypothesis by (Bostoen et al. 2015) and concludes that  
813 "large-scale movement [of people at the end of the 1st millennium BCE occurred]  
814 mainly through the forest, and without using the SRI as it was stated a few years ago"  
815 (Clist 2022, 67).

816 In conclusion, the SRI has to be considered a patchy opening of the dense forest  
817 rather than a 'savannah corridor', and the fact that pottery-producing communities  
818 settled within it at least 200 years after the Inner Congo Basin was already settled  
819 dismisses the argumentation brought forward by Grollemund et al. (2015, 2023) and  
820 Bostoen et al. (2015).

821 (Dis-)Continuities of pottery traditions in the Congo Basin

822 Of equal importance to the onset of the settlement of the Congo Basin by pottery-  
823 producing communities is the persistence of these over the past 2400 years. Of special  
824 importance in that respect is the proposed setback in human activity during the second  
825 half of the 1st millennium CE (Seidensticker et al. 2021). Anecdotal evidence can  
826 be derived from local and regional studies, such as the discontinuation of settlement  
827 activities reported from central Gabon by Oslisly (1998, 101–103 Fig. 9, 2001, 112–  
828 113 Fig. 7.9). At the island of Corsico (Equatorial Guinea), research found that the late  
829 facies of the Oveng pottery, dating into the 7th to 8th century CE, coincides with "a  
830 period of social and demographic decline that lasts until the late first millennium CE",  
831 leading to "several centuries of depopulation" (Sánchez-Elipe et al. 2016, 355–356).  
832 Also at Dibamba in western Cameroon, with six hectares the biggest site in the region  
833 in terms of examined surface, showed a hiatus between the 4th to 10th century CE (de  
834 Saulieu et al. 2017).

835 The sequence of pottery styles in the Inner Congo Basin has been described as  
836 uninterrupted by Wotzka (1995). A detailed review of chronological indicators for the  
837 32 pottery styles described by Wotzka (1995, 59–212) revealed that no pottery could  
838 be securely dated between the end of the styles Bokuma and Lingonda, which come to  
839 an end in the 7th centuries CE at the latest, and the onset of the widespread Bondongo  
840 style at the beginning of 12th century CE (Fig. S1; Tab. S1; Seidensticker 2021,  
841 193–204). Wotzka (1995, 121–128) proposed for the Longa style to be potentially  
842 dated in-between the Early and Late Iron Age. Its characteristics show some links to  
843 the styles Bokuma and Bokele, both dating into first half of the 1st millennium CE,  
844 and strong links to the Bondongo style, dating between the 12th to 14th century CE  
845 (Wotzka 1995, 127). One feature discussed in that regard is the onset of *banfwa-nfwa*  
846 decoration during the times of the pottery styles Bokuma and Lingonda (Wotzka 1995,  
847 109–111, 117–118). *Banfwa-nfwa* is restricted to the inside of the rims within those  
848 styles. Vessels of the Longa style only rarely show *banfwa-nfwa* decoration, if so it is  
849 mostly on the inside of the vessels and only very rarely on the outside (Wotzka 1995,  
850 124). *Banfwa-nfwa* becomes the dominant decoration technique during the subsequent  
851 Bondongo style, extensively covering the outside of vessels (Wotzka 1995, 131–134).

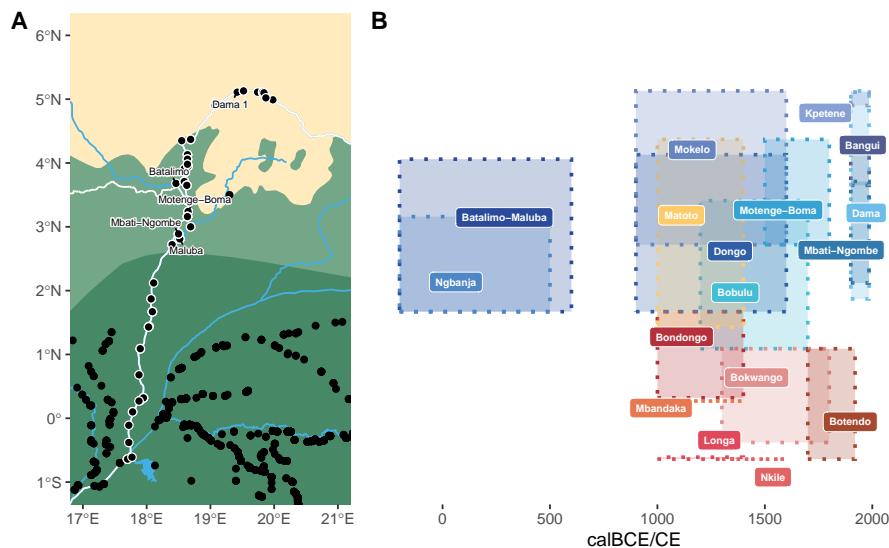
852 In consequence, the Longa style is regarded by Wotzka (1995, 125–128) as a 'bracket',  
 853 connecting better dated pottery styles from the end of the Early Iron Age and the onset  
 854 of the Late Iron Age.

855 None of the three radiocarbon dates associated with Longa pottery date into the  
 856 time-span between the 6th to 10th century CE though. Two somewhat older dates  
 857 (Hv-12611, Hv-12626) are discarded by Wotzka (1995, 127–128 Tab. 53) as not-  
 858 representative. The third available date (Hv-11572) covers the 11th to 14th century  
 859 CE. This last date goes very well with the close stylistic connections Longa pottery  
 860 shows to the Bondongo style, which is firmly dated between the beginning of the 12th  
 861 and the end of the 14th century CE (Fig. 2; S1; Tab. S1; Wotzka 1995, 138 Tab. 58).  
 862 This younger date for the Longa pottery is further supported by a new radiocarbon  
 863 date obtained from a food crust on the bottom of the enormous globular vessel found  
 864 at Ngombe on the middle Sangha river (Tab. 2: RICH-30867). The ceramics found  
 865 within this feature are the basis of the pottery style of the same name, which shows  
 866 strong similarities with the Longa style. This gives enough reason to propose the age  
 867 of the Longa style to be later than the 10th century CE, thus dating it firmly to the  
 868 Late Iron Age. This reassessment of the chronology of the Longa pottery leaves the  
 869 same 'gap' or 'hiatus' within the sequence of the Inner Congo Basin that has been  
 870 observed in several locations of Central Africa (de Saulieu et al. 2021; Seidensticker  
 871 et al. 2021). Consequently, the conceptualization of an uninterrupted sequence of  
 872 pottery styles starting with the Imbonga style and leading, similar to a network of  
 873 direct decedents, right to the local potters' producing ceramic today (Wotzka 1995,  
 874 65, 221, 274, 285) must be questioned.

875 Two recent papers firmly established a supra-regional pattern of putative demo-  
 876 graphic changes in Central Africa during the past three millennia, both showing strong  
 877 empirical evidence for a setback in human activity between the 6th to 10th century CE  
 878 (de Saulieu et al. 2021; Seidensticker et al. 2021). Clist et al. (2023) aim at critically  
 879 reviewing these independent results by listing regional research biases and urging for  
 880 more fieldwork. The arguments brought forward by Clist et al. (2023) are unfortu-  
 881 nately based on interpreting uncalibrated radiocarbon dates, neglecting the effort by  
 882 Seidensticker et al. (2021, 9, Tab. S1) in classifying the available radiocarbon dates  
 883 following tested principles of 'chronometric hygiene' (Spriggs 1989; Spriggs and  
 884 Anderson 1993; Pettitt et al. 2003; Napolitano et al. 2019), and lack formal testing of  
 885 the proposed biases (cf. Galletti et al. 2013; Gillespie et al. 2016; Jones et al. 2019;  
 886 Alwi Muttaqin et al. 2019; Boemke et al. 2023).

#### 887 Fuzzy Border at the Ubangi river

888 Another intriguing aspect concerns the importance of the surveyed river systems.  
 889 Particular focus is always laid on whether rivers constitute exchange barriers or,  
 890 instead, that they are preferred pathways for expansion and axes of contact (Russell  
 891 et al. 2014). The observed distribution patterns of pottery styles along the Ubangi  
 892 river, a consecutive 850 km long north–south transect, show a seemingly impermeable  
 893 border zone that existed for nearly two millennia (Fig. 8; Seidensticker 2021, 183–185,  
 894 184 Tab. 17). These zones are persistent and long-lasting, with ceramics rarely found



**Fig. 8** Map of archaeological sites along the Ubangi river (left) and chronospatial distribution of pottery styles documented within the region (right). Sites along the Ubangi show a white border, while other archaeological sites are demarcated as simple black dots. The green shading denotes the putative rainforest distribution during the 1st millennium BCE (dark green; Bremond et al. 2017; Maley et al. 2017) and today (light green; White 1983).

outside their specific region. This 'fuzzy' boundary is situated between 1° to 1.5° N, north of Impfondo. South of this region, all ceramics date into the Late Iron Age and are all associated with the Equator-Co style tradition of the Inner Congo Basin (Wotzka 1995). Further upriver, near the mouth of the Lwa river, the Batalimo-Maluba style is among the earlier potteries in the region. All pottery groups that follow afterwards 'respect' the southern border of the Batalimo-Maluba group (Fig. 8). This observation offers a unique view into a putative lack of social connectivity along one of the major rivers in Central Africa and needs more research.

### Conclusions

While pottery styles identified in the northern parts of the study area follow independent trajectories, the styles of the western parts of the Congo Basin show substantial similarities to contemporaneous styles from the Inner Congo Basin. These similarities start with the clay sourcing, resulting in very similar macroscopic ceramic fabrics. Furthermore, while vessel shapes are sometimes different, decoration techniques and motives are nearly identical. Concerning the Pikunda-Munda style, the oldest pottery widely distributed in the western Congo Basin, strong technological similarities stand in the way of several stylistic differences. So far, this style can only be loosely associated with contemporaneous ceramics of the Inner Congo Basin. Furthermore, the Pikunda-Munda style did not develop into an individual stylistic tradition, and after its end, there are no reliable links with any younger styles in the region. More critical

for the settlement history of the Congo Basin is the fact that the emergence of the Pikunda-Munda group can only be dated as about 200–300 years younger than the emergence of the first pottery production further east, in the Inner Congo Basin. This fact, also considering that it is the earliest widely distributed pottery in the "Sangha River Interval" and shows legitimate stylistic differences to the ceramics from the Inner Congo Basin, refutes any hypotheses of migrations through the Congo Basin via the "Sangha River Interval" (Bostoen et al. 2015; Grollemund et al. 2015, 2023).

After the setback in human activity during the 7th to 10th centuries CE, pottery groups such as the Ngombe style appear that show close stylistic ties to pottery from the Equator Co-Tradition and can be regarded as part of them. The same general association as western offshoots of the Equator Co-Tradition goes for the younger styles Ebambe and Epena.

The introduction of roulette decorations, which often govern decoration practices of modern-day ceramics, is equally vital for the region's settlement history. A gradual adoption and intensive use of this ornamentation practice can be observed within the Ngoko tradition. In the extreme south of the study area, another distinct line of pottery development was observed within the grog-tempered Bobusa group.

The settlement sequence of the northern and western Congo Basin sketched out within this study must, at least in part, be taken cautiously due to the limited sources available. Only new fieldwork and excavations can remedy this situation. Thus far, the available data constitutes valid proof for the chrono-temporal position of the early parts of the sequence during the Early Iron Age. However, available data from the middle of the 1st millennium CE onwards must be considered incomplete. Despite the extensive body of material obtained by the *River Reconnaissance Project* in the 1980s, the present work only provides a first insight into the ceramic variability of the region.

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All data and computer code generated during this research is available here: [https://github.com/dirkseidensticker/PikundaMunda\\_BatalimoMaluba\\_AAR](https://github.com/dirkseidensticker/PikundaMunda_BatalimoMaluba_AAR).

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