

## CASE STUDY: COPPER INGOTS IN CENTRAL AFRICA

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## INTRODUCTION

Copper has played and still plays an important role both economically and symbolically in various regions of Africa. Particularly in Central Africa, it once had a value comparable to gold's in other parts of the world, and controlling its deposits was a major concern for many political entities. It was used alone, without alloys, until the arrival of European brass and bronze, and distributed mainly in semi-finished form that could assume a wide range of shapes (fig. 1), whether 'classic' ingots, cross-shaped ingots in southern Central Africa, or *ngele* in the Kongo area. For the sake of simplicity, I will use the generic term 'ingot' when not referring to a particular shape. This case study focuses on this type of object, but it is necessary to keep in mind that this is not the only form of copper in circulation. The metal can also circulate as, for example, wire, finished objects such as bracelets, and indeed as ore.

Studying these objects can reveal a variety of information, such as economic or political history and the reconstitution of metallurgical knowledge and processes. An ingot studied on its own reveals very little information – at best a clue about the copper's use in any given place and time and, possibly, its manufacture. To address research questions concerning the morphology or circulation of copper ingots, an entire set of objects is necessary, whether they come from a site or, most commonly, a region or larger area. Furthermore, to address questions concerning manufacturing techniques, the object will have to be taken as an integral part of the manufacturing process and thus studied as a step in the production. This will entail studying ingots above all from the perspective of the first question: circulation. The data used in this type of study come mainly from archaeology but can also be completed by historical and anthropological sources.

## CATALOGUING AND ANALYSING FINDS

Like all archaeological objects, the ingot has to be documented (description, photograph, drawing, context, etc.: see *ad hoc* chapter). Next, as with ceramics, object characteristics such as shape, weight and size can be studied. When a classification for the type of ingot already exists,

it is preferable to refer to it in order to avoid unnecessary multiplication of 'groups'. Otherwise, a new one will be created; the 'birds of a feather flock together' principle is generally the most convenient. Attention must be paid, however, to certain simple shapes, such as bars, which can be in use in far apart regions without being the result of contact. In this case, weight and size will be the discriminating factors. At this stage of the analysis it is possible to identify a potential standardization of the objects that suggests control over production on a certain scale (local, regional, supraregional, etc.). This analysis can also highlight an evolution of the shape according to places and eras. If it concerns a set in which all types were not found in an archaeological context, such as, for example, via surface collections, a relative chronology can be hypothesized.

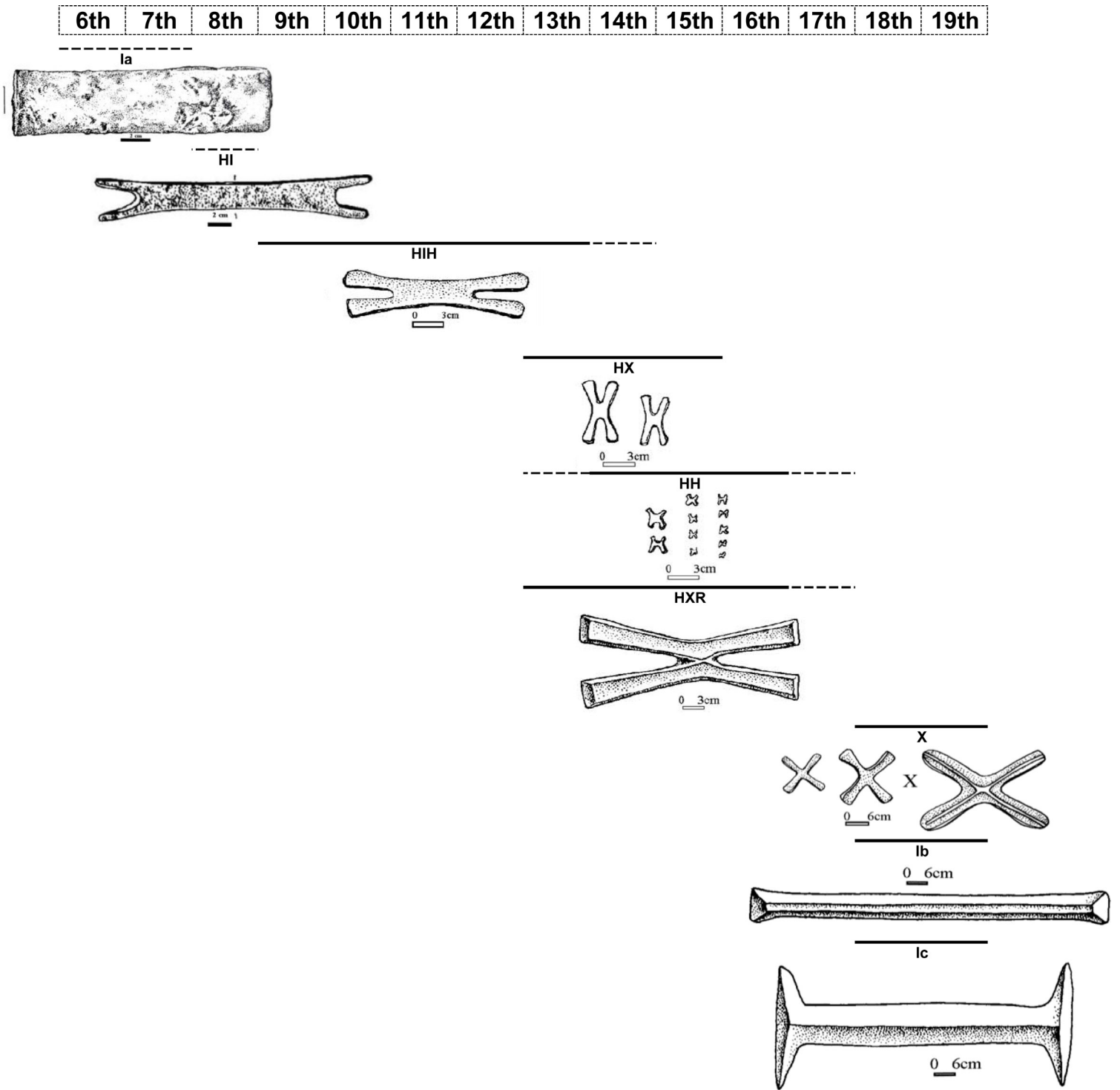
The study of cross-shaped ingots or *croisettes* in Central and Southern Africa by de Maret (1995) is a good example of this type of analysis. In this study, de Maret shows an evolution in the shape of cross-shaped ingots over time (fig. 2). According to this diagram, he hypothesizes that the undated ingots, types Ia and HI, may be the 'ancestors' of type IIIH *croisettes* based on their shape. Moreover, he observed a standardization of these ingots over time (de Maret 1981), by studying the size and weight of type IIIH, HX and HH *croisettes* from the Upemba Depression.

Obviously, the context of the object's discovery



Fig. 1. Examples of copper ingots. 1. cross-shaped ingots IIIH (top), HX (middle) and HH (bottom), Upemba Depression (Katanga, DRC); 2. *Ngele*, Makuti (Mindouli region, Rep. of the Congo); 3. Ingots, Nkabi (Mindouli region, Rep. of the Congo); 4. Crosses HH attached by a plant fibre, Upemba Depression (Katanga, DRC); 5. 'Treasure' of cross-shaped ingots HH (Katanga, DRC).

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**Fig. 2.** Evolution of the form of ingots and cross-shaped ingots produced in the Copperbelt. The first two types are not dated and the dotted lines indicate uncertain dating, mainly concerning upper and lower limits. This figure takes no account of geographic location differences. (According to de Maret 1995)

provides information concerning its use. Thus in the Upemba, in a funeral context, according to the position and number of cross-shaped ingots, we pass from the use as status symbols of type HIH *croisettes* (they are located next to the chest and usually only one is found) to a more monetary use of type HX and HH *croisettes* (they are often placed in a group next to the hip or hand). This use

is confirmed by the *croisettes* discovered in the form of ‘treasure’ or attached to one another (**fig. 1**). In absolute terms, group layouts could also reveal information on the population’s system of numeration (decimal system, duodecimal system, etc.).

Mapping information concerning ingots makes it possible to define the distribution of the major types over time

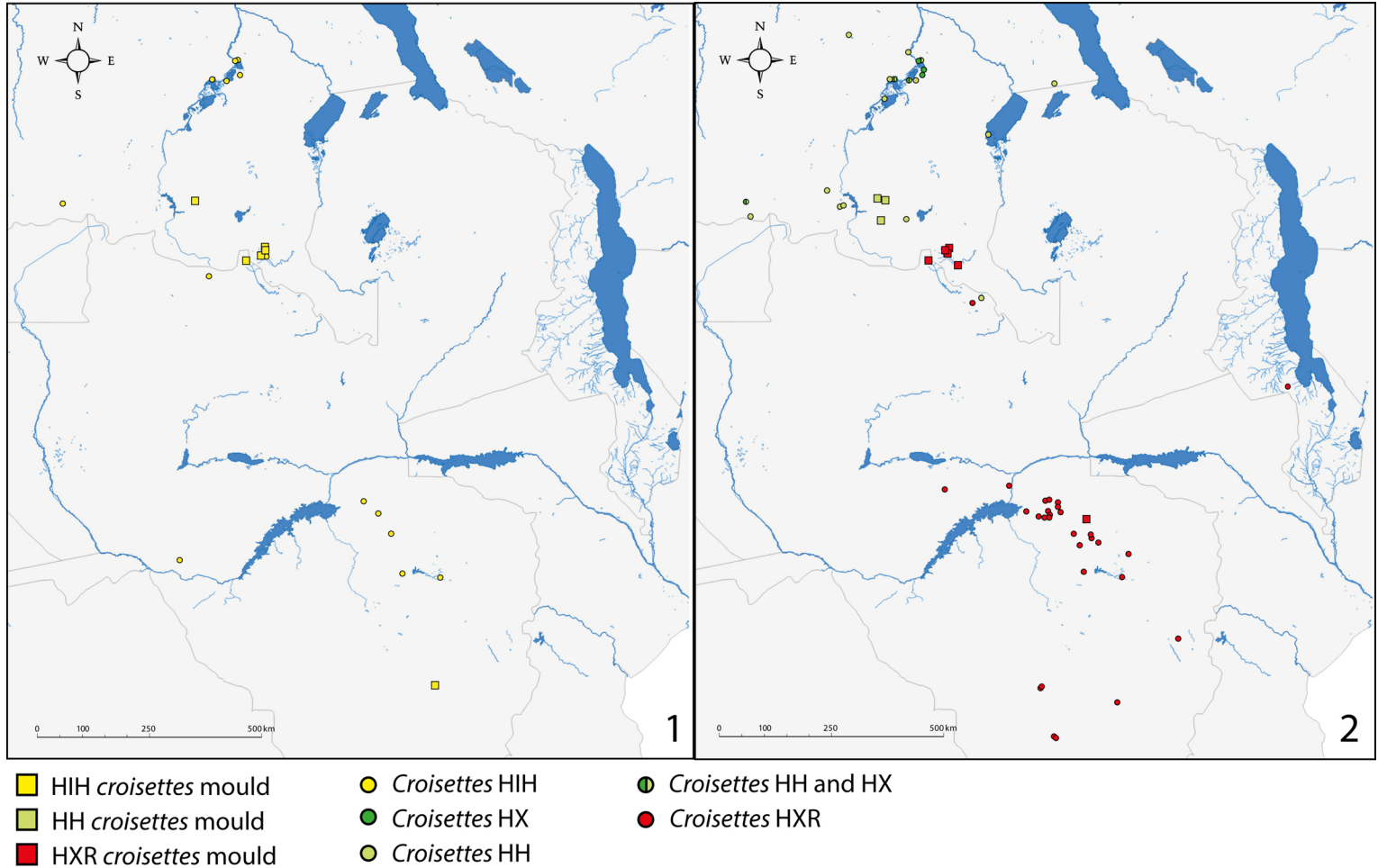


Fig. 3. 1. Distribution of cross-shaped ingots HIH during 9th-14th centuries and 2. crosses HX, HH and HXR during 13th-17th centuries.

and thus to clearly show socio-economic phenomena. Let us take the example of the distribution of cross-shaped ingots between the 9th and 17th centuries (fig. 3).<sup>2</sup>

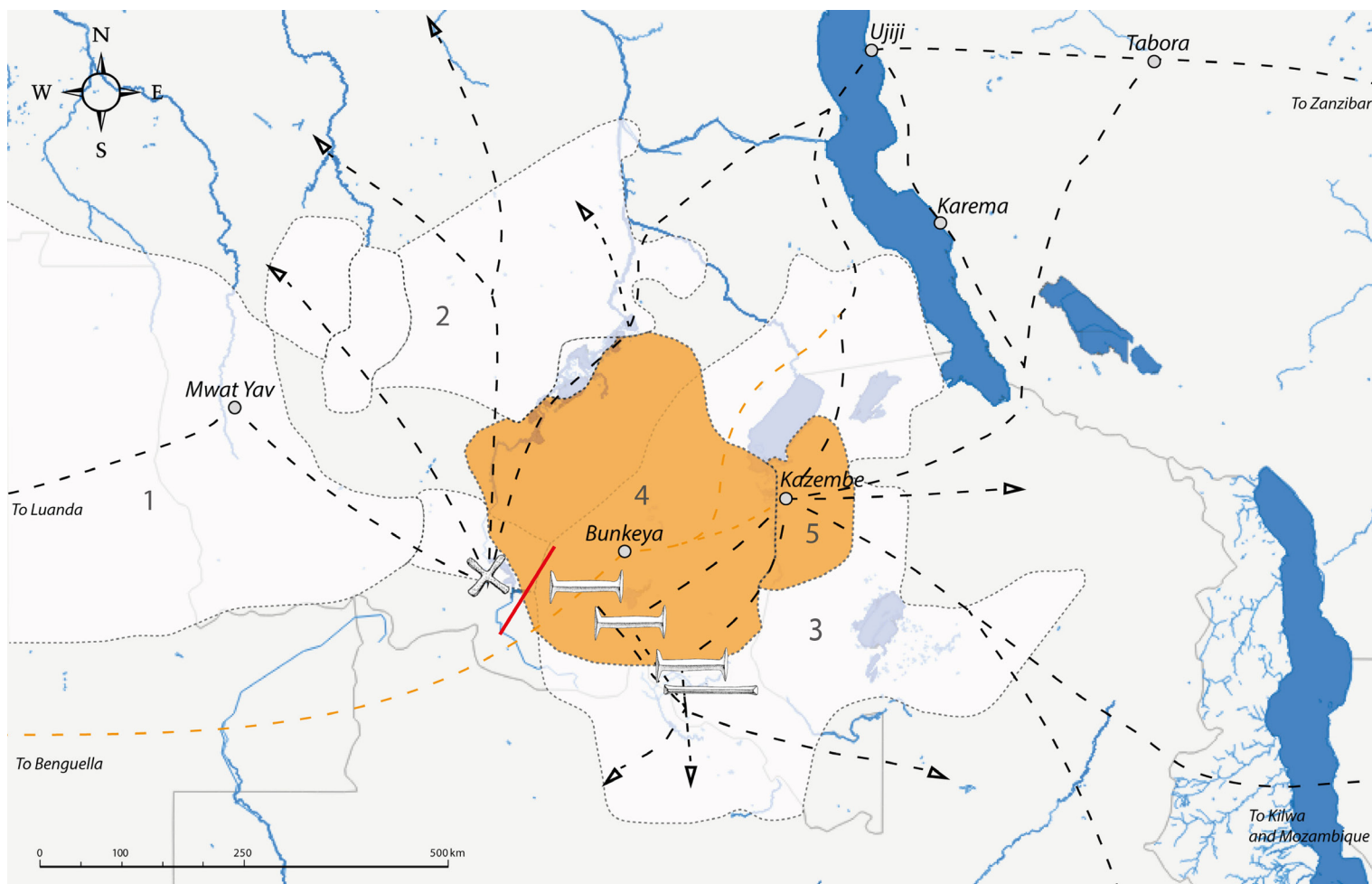
The first map in figure 3 concerns the distribution of type HIH *croisettes* between the 9th and 14th centuries. We observe that this type of ingot is present from the Upemba Depression (Katanga, DRC) to Great Zimbabwe and that its production, attested by the presence of moulds, is located both in the Copperbelt (southern DRC, northern Zambia) and at Great Zimbabwe. We can therefore hypothesize an economic and cultural link between these regions, given that the same form was in use. However, as the production took place in several distinct areas, there was not necessarily regular and direct contact between the peoples of these regions.

The second map shows types of cross-shaped ingots in existence between the 13th and 17th centuries. The situation is different compared to preceding centuries, as this

same area divides into two sets: in the south HXR type *croisettes*, and in the north HX type *croisettes* which evolve toward type HH. Likewise, production centres seem very distinct, with HXR type being produced in the east of the Copperbelt, in the region of present-day Lubumbashi and in the copper-bearing regions surrounding Great Zimbabwe, while HH type is rather produced in the centre of the Copperbelt. During this period, we therefore observe a clear demarcation, probably revealing the existence of two distinct zones of economic, cultural, and political influence, but also the regions toward which the production centres directed their trade.

Studying the geographic distribution of ingot types is thus already in itself extremely interesting. Ease of access to GIS (geographic information systems), such as Quantum GIS, now makes it possible to easily map other information and superimpose several levels of data. Consequently, for ingots, we can compare spatial-temporal data with historical, political, linguistic, etc., data and even with other aspects of material culture such as ce-

<sup>2</sup> For a detailed interpretation of the phenomena presented here, see de Maret 1995; Swan 2007.



**Fig. 4.** Copper ingots and their trade routes in the 19th century compared with the boundaries of major political entities (1. Mwat Yav; 2. Luba; 3. and 5. Kazembe; 4. Yeke). The arrival of the Yeke in the second half of the 19th century and the decline of the Kazembe modify trade routes.

ramics. This makes it possible to visualize phenomena that would have been difficult to detect if data were considered in isolation.

In this way, for example, by examining the distribution of different types of ingots produced in the Copperbelt in the 19th century and their circulation routes, we observe, as in the preceding example, a boundary between X type *croisettes* and ingots Ib and Ic and that the routes taken to trade them diverge to some extent. By comparing this map with that of the major political entities of the time, it is clear that this boundary corresponds to two zones of influence, on one hand that of the *Mwat Yav* and Luba for the X type *croisette*, and on the other that of the Kazembe for the Ib and Ic bars. Furthermore, we see that the convergence of the circulation routes for different types is located outside these zones of influence and is explained by the fact that they join the Arabo-Swahili trade routes.

Nevertheless, it is necessary to avoid falling into certain

traps in interpreting the data. The presence of the same type of ingot in several regions, sometimes spanning long distances, does not mean that populations had direct contact or migrated. An object, and all the more an object endowed with a certain commercial value, can travel via step-by-step exchanges over a long distance without the object's producer meeting its final holder. Likewise, some forms can be reproduced in regions far from the extraction centres by recycling old copper objects, as was observed for X type *croisettes*: some copper objects were remelted to cast new ingots in areas far away from the deposits (de Maret 1995).

Increasing use is being made of physical and chemical analysis of ingots, which can answer questions concerning, on one hand, the manufacturing process (especially possible additives to the ore as smelters) and, on the other hand, the metal's origin. Several methods exist to trace the ore's source, be it researching trace elements or – cur-



rently the most frequently used – analysing lead isotopes in the metal.<sup>3</sup> Objects of the same elementary or isotopic composition could have been manufactured using the same ore. However, things are not always as straightforward in practice, and many phenomena can skew the analysis: copper recycling, the addition or elimination of certain chemical elements during the metallurgical process, similarities of trace elements or isotopes between deposits, etc.<sup>4</sup> It is therefore recommended to perform these analyses with someone who knows the methods' limits and their applicability to archaeology. Moreover, when the goal is to solve a problem presented by archaeological data, it is essential, prior to undertaking costly analyses, to master the archaeological context.

#### REFERENCES

- Baron, S., Tamas, G. & Le Carlier, C. 2013. 'How mineralogy and geochemistry can improve the significance of Pb isotopes in metal provenance studies'. *Archaeometry* 56 (4): 665-680.
- Cattin, F., Guéntette-Beck, B., Besse, M. & Serneels, V. (eds). 2009. 'Lead isotopes and archaeometallurgy'. *Archaeological and Anthropological Sciences* 1 (3), special issue.
- de Maret, P. 1981. 'L'évolution monétaire du Shaba central entre le VII<sup>e</sup> et le XVIII<sup>e</sup> siècle'. *African Economic History* 10: 117-149.
- de Maret, P. 1995. 'Histoires de croisettes'. In L. de Heusch (ed.), *Objets-signes d'Afrique*. Tervuren: Musée royal de l'Afrique centrale, pp. 133-145.
- de Maret, P. 1995. 'Croisette histories'. In L. de Heusch (ed.), *Objects-signs of Africa*. Tervuren: Royal Museum for Central Africa, pp. 133-145.
- Pollard, A.M. & Heron, C. (ed.). 2008. *Archaeological chemistry*. Cambridge, UK: Royal Society of Chemistry, 438 p.
- Swan, L.M. 2007. 'Economic and ideological roles of copper ingots in prehistoric Zimbabwe'. *Antiquity* 81: 999-1012.

<sup>3</sup> For more details, see: Pollard, A.M. & Heron, C. 2008 or the special issue of *Archaeological and Anthropological Sciences* 1 (3) (2009).

<sup>4</sup> Concerning certain limits of the method based on lead isotopes, see Baron, Tamas & Le Carlier 2013.