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Iron Age terracotta pestles in the Sahel area: an ethnoarchaeological approach

1. Introduction

Archaeologists who apply themselves to the task of interpreting ancient African remains always run into the same fundamental problem: that of the sources. Indeed, African history written by Africans themselves is post-colonial, whereas history preceding this period, written by "foreign" Arab or Western observers, is more often than not scanty and too frequently partial. As for oral traditions, they rarely instruct us on the direct understanding of archaeological remains and what's more generally deal with relatively recent archaeological periods. On the other hand, linguistics and particularly population genetics are helping to shed light on the understanding of African past, especially where population movements are concerned.

This lack of a "domain of reference" (such as historical sources, for instance) prompts the archaeologist to confront the past with the present, be it conscious or not. Resorting to ethnoarchaeology, archaeologists can take the liberty of projecting observations made on present-day populations with ancestral traditions into interpretations of ancient remains, especially on a continent of long-lasting traditions. Such a procedure is possible thanks to "regularities" expressed as general rules which depend on environmental or behavioural constraints that one can find between two groups of individuals - such as between two villages or two populations or even between a contemporary human group and a past one. Nevertheless, it is necessary to distinguish "general" regularities from "restricted" regularities. "General" regularities allow, for instance, identification of the technique used to assemble pottery by examining traces left by tools - whatever the culture or region. "Restricted" regularities can only be applied within a precise geographical or social context, such as the identification of an ethnic group from a particular type of pottery (Huysecom 1992).

We have been studying pottery manufactured by women potters in the Inland Niger Delta since 1989, within the "Mission ethnographique suisse en

Afrique de l'Ouest" (MESAO), carried out by the University of Geneva with the "Human Sciences Institute" and the "National Museum" in Bamako (Gallay & Huysecom 1989; 1991; Gallay et al. forthcoming). Such a study demonstrates that their ware presents certain "regularities" which can be explained thanks to examination of the mechanisms by which they are generated.

In this paper, our wish is to illustrate the possibilities ethno-archaeology offers in the clarification of an archaeological problem, taking as an example clay pestles. A first attempt at such an approach was carried out in 1992 (Huysecom 1991-1992). Since then, field-work has been done on another two occasions in Burkina Faso and Mali, thus bringing in additional information and allowing us to complete our study.

2. "Archaeological" tools

2. 1. Description

Terracotta instruments of a general truncated cone shape or even cylindrical have been found on a number of occasions on excavations or surveys. To make understanding easier, these instruments will be termed "terracotta pestles" of which there seem to exist two types.

Type I

Type 1 has the shape of a truncated cone. The small extremity, for prehension, is either cylindrical (Fig. 1: 5), shaped as a "cabochon" (Fig. 1: 1, 2) or as a truncated cone (Fig. 1: 6, 11). The top of this extremity is rounded (Fig. 1: 1, 6) or flattened (Fig. 1: 11, 13). All these tools have convex bases. A very particular discovery was a pestle found in Kebir Bosa, which has been incised and impressed with intertwining grooves (Fig. 1: 12). According to Fr. Treinen-Claustre, the bases can also be decorated with "small cavities, subcircular alveoles or irregular ovals arranged hasardously or in parallel rows" (Treinen-Claustre 1982: 123). These features are of great interest; they have left their blueprint on the inside of a certain number of vases found in association (see 2.3).

The thirteen published specimens have a mean height of 80 mm (ranging from 42 to 164 mm), have a maximum diameter at the base of 80 mm (ranging from 48 to 112 mm) and a maximum diameter at the top of 40 mm (ranging from 18 to 72 mm). Hence, their dimensions vary, the biggest being 164 mm in height. We also calculated two indexes: A, which is the diameter of the top divided by that of the base, multiplied by 100 and B, the diameter of the base divided by the height, multiplied by 100. The mean indexes A and B for type 1 is 49 (ranging from 29 to 84) and 108 (ranging from 68 to 155) respectively. This implies that the top is generally twice as narrow as the base; the diameter of the base is about the same size as the height.

Type II

Type II is cylindrical and rather thick-set. Its edge can be straight (Fig. 2: 1), slightly concave (Fig. 2: 8) or convex (Fig. 2: 10). Certain shapes are almost

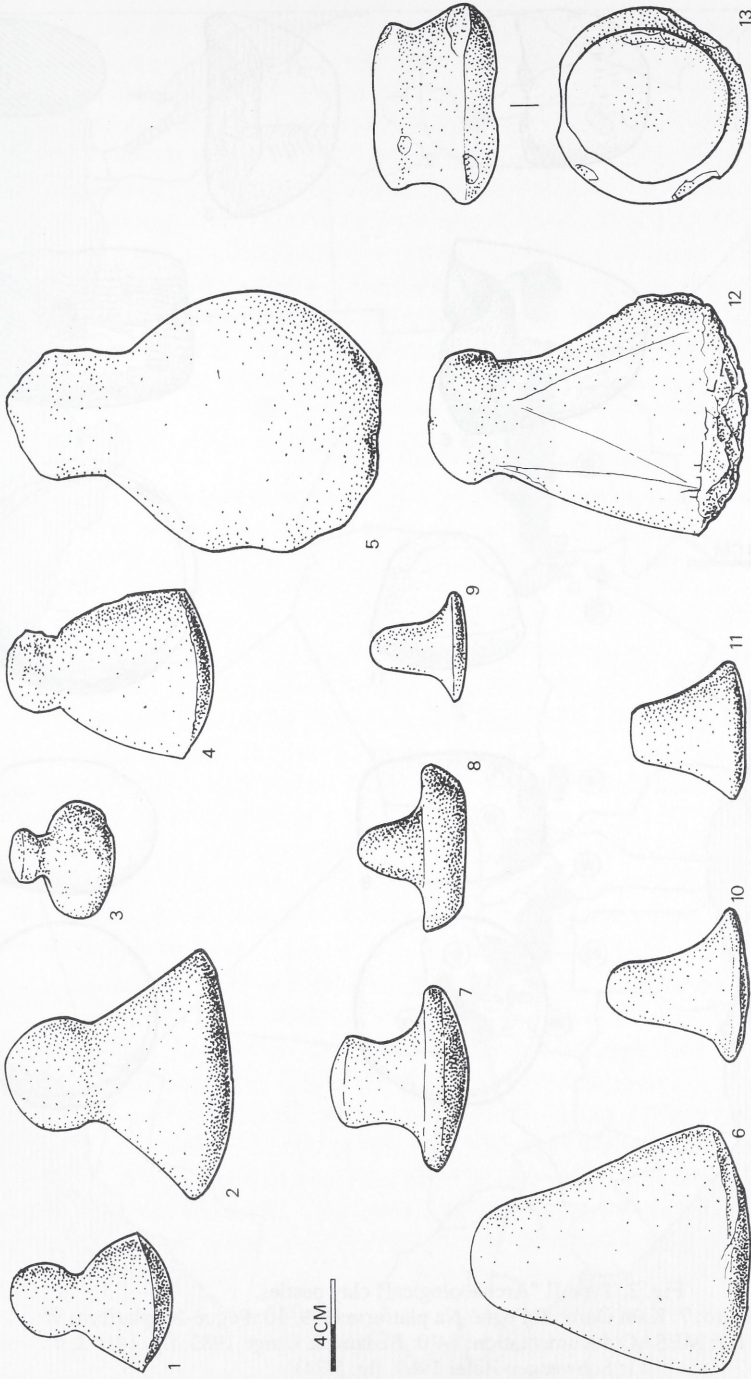


Fig. 1. Type I "Archaeological" clay pestles.

1: Toungour; 2, 12: Kebir Bosa; 3, 10, 11: Makari; 4, 5, 6: Maledinga; 7: Tegef N'Agar 74; 8, 9: Daima II; 13: Kain Ouro Koro (after: 1: Huard et al. 1963, fig. 2; 2, 12: Treinen-Claustre 1982, fig. 15; 3, 10, 11: Lebeuf 1962, fig. 20, 35; 4, 5: Huard & Bacquié 1963, fig. 2; 6: Treinen-Claustre 1982: 128; 7: Grébénart 1985, fig. 187; 8, 9: Connah 1981, fig. 7.5; 13: MESAO documentation).

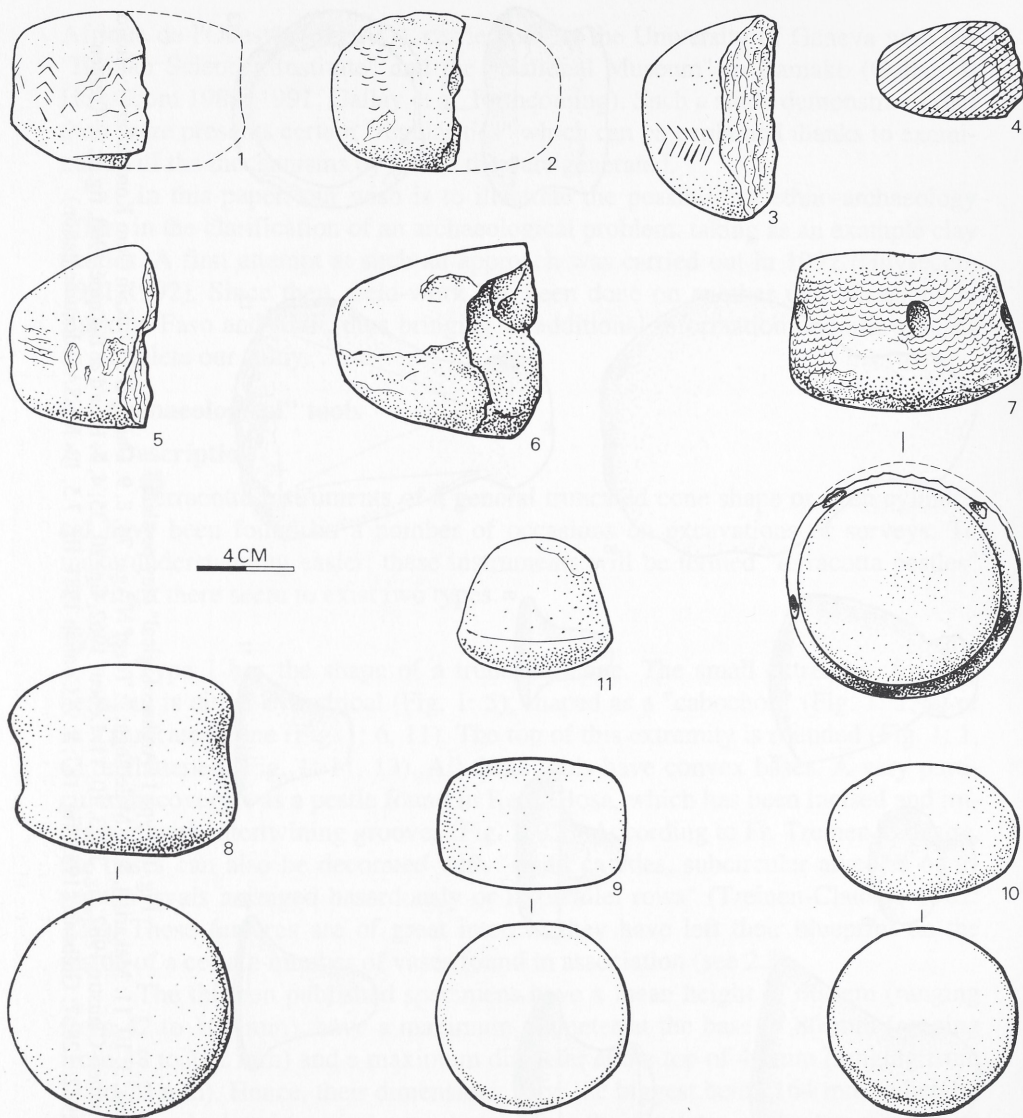


Fig. 2. Type II "Archaeological" clay pestles.

1-6: Kaïn Ouro Koro; 7: Kaïn Ouro; 8: Pégué-Na platform G; 9, 10: Pégué-Na platform W;
 11: Tou (after: 1-7: MESA0 documentation; 8-10: Bedaux & Lange 1983, fig. 14/1-2, 4;
 11: Schweeger-Hefel 1969, fig. 5/24).

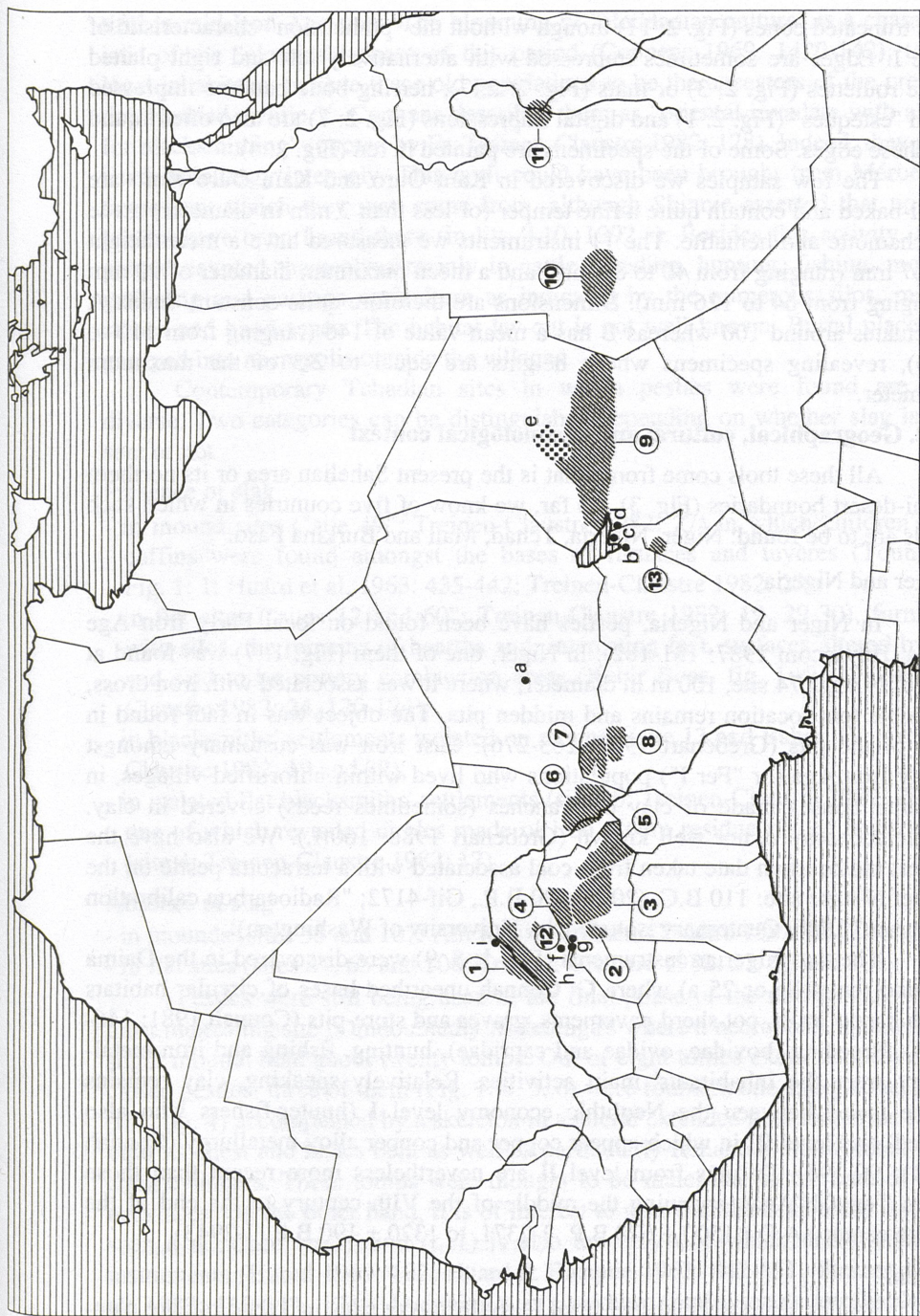


Fig. 3. Map of the distribution of clay pestles.

a. Area where the use of pestles was observed. 1: Inland Niger Delta (Fulani, Northern Somono, Northern Bambara, Songhai); 2: Lyela; 3: Mossi; 4: Kurumba; 5: Djerma; 7: Adarawa and Zorumawa; 8: Zamfara; 9: Haddad from Tchad; 10: Tama and other Darfur potters; 11: Omdurman potters from Darfur; 12: Samyéfé Dogon; 13: Potters from the Northern Cameroons. b. Archaeological sites where pestles were found. a: Tegef N'Agar 74; b: Daima; c: Makari; d: Goulfei; e: "Haddadian tradition" sites; f: Pégué-Na; g: Kain Ouro and Kain Ouro Koro; h: Tou; i: El Oualadji.

like truncated cones (Fig. 2: 11) though without the "prehension" characteristic of type I. Edges are sometimes impressed with alternatively left and right plaited fibre roulettes (Fig. 2: 3) or mats (Fig. 2: 2, 7); herring-bone patterns impressed with "estèques" (Fig. 2: 1) and digital impressions (Fig. 2: 7) are also often found on these edges. Some of the specimens are painted in red (Fig. 2: 4).

The few samples we discovered in Kaïn Ouro and Kaïn Ouro Koro are well-baked and contain quite a fine temper (of less than 2 mm in diameter) made of chamotte and hematite. The 11 instruments we measured have a mean height of 67 mm (ranging from 40 to 88 mm) and a mean maximum diameter of 90 mm (ranging from 64 to 126 mm). Dimensions are therefore quite constant. Index A fluctuates around 100 whereas B has a mean value of 146 (ranging from 110 to 210), revealing specimens whose heights are equal to 2/3 of the maximum diameter.

2. 2. Geographical, cultural and chronological context

All these tools come from what is the present Sahelian area or its northern semi-desert boundaries (Fig. 3). So far, we know of five countries in which such tools are to be found: Niger, Nigeria, Tchad, Mali and Burkina Faso.

Niger and Nigeria

In Niger and Nigeria, pestles have been found on local Early Iron Age sites (Huysecom 1987: 181-182). In Niger, one of them (Fig. 1: 7) was found at Tegef N'Agar 74 site, 100 m in diameter, where it was associated with iron dross, possible tent location remains and midden pits. The object was in fact found in one of the pits (Grébenart 1985: 263-276). Cast iron was customary amongst Early Iron Age (or "Fer I") populations who lived within unfortified villages, in circular houses made of clay or branches (sometimes reeds) covered in clay. Their economy is not well known (Grébenart 1988: 160ff.). We also have the oldest radiocarbon date taken from coal associated with a terracotta pestle on the Tegef N'Agar site: 110 B.C. (2090 ± 90 B.P., Gif-4172; "Radiocarbon calibration program" 1986, Quaternary isotope lab., University of Washington).

The two Nigerian instruments (Fig. 1: 8, 9) were discovered in the Daima mound (ca. 4 ha or 25 a) where G. Connah unearthed bases of circular habitats with banco walls, pot sherd pavements, graves and store-pits (Connah 1981: 146-163). Breeding (bovidae, ovidae and capridae), hunting, fishing and iron metallurgy were the inhabitants' main activities. Relatively speaking, clay remains were found between the Neolithic economy level I (hunter-fishers who also breed) and level III in which appear copper and copper alloy metallurgy (Connah 1981: 99-196). Datings from level II are nevertheless more recent than those from Tegef N'Agar, spanning the middle of the VIth century to the end of the VIIth century A.D. (1500 ± 670 B.P., I-2371, to 1320 ± 190 B.P., I-2943).

Tchad

Pestles seem to be absent from Early Iron Age sites in Tchad but are plen-

tiful in mid-Iron Age sites. The blooming of "Haddadian culture" is a characteristic of the "classical" phase of this period (Coppens 1969: 1420-142); today, local inhabitants believe these old populations to be the ancestors of the present-day Haddads while Y. Coppens describes them as "oriental invaders with a bent for blacksmithing" (quoted by Fr. Treinen-Claustre 1982: 178). Indeed, they practised metallurgy intensely. This craft could have been brought from Méroé, the town from which they may come from, although Shinnie asserted that no clay pestles have been found there (in litt. 9.10. 1992 -). Besides this activity, these people devoted themselves mainly to cattle breeding, hunting, fishing, mollusc gathering and perhaps agriculture as indicated by the numerous silos, milling stones and handstones. The habitat lay-out is not well known. Burial places are grouped into necropolis outside the villages.

Contemporary Tchadian sites in which pestles were found are very diverse. Two categories can be distinguished depending on whether slag is present or not.

Presence of slag

- in mound sites ("site 49": Treinen-Claustre 1982: 27) in which children's jar-coffins were found amongst the bases of furnaces and tuyères (Toungour, Fig. 1: 1; Huard et al. 1963: 435-442; Treinen-Claustre 1982: 23);
- in flat sites ("sites 12 and 60": Treinen-Claustre 1982: 19, 29-30), furnished with silos, the remains of hearths and, interesting fact, surfaces altered by fire and said to be pottery combustion areas (Kebir Bosa, fig. 1: 2, 12; Treinen-Claustre 1982: 24, 120-124);
- in blacksmiths' settlements isolated on mounds (site 13 and Bahali IV: Treinen-Claustre 1982: 19 and 32);
- in isolated flat blacksmiths' settlements (site 60: Treinen-Claustre 1982: 29-30), one of which revealed circles made of iron bloom residue placed horizontally (site 4: Treinen-Claustre 1982: 17).

Absence of slag

- in mounds (sites 55 and 107: Am Kouzi, Treinen-Claustre 1982: 26, 28 and 38);
- in flat sites (sites 47, 65 and 108: Treinen-Claustre 1982: 27, 30 and 38).

Pestles were still being used in the final phase of the mid-Iron Age. The most interesting site is undoubtedly Maledinga's where a necropolis, situated on a slight mound, held about twenty tombs. Out of eight tombs excavated, seven enclosed pestles; three of them (Fig. 1: 4, 5, 6) were found in one exceptional grave (t. 2, fig. 4) accompanied by a skeleton in a lateral extended position, arms folded onto its chest and knees bent as well as particularly remarkable perforated terracotta cylinders. These tombs were thought to be male, due to the lack of stone necklaces. On the other hand, it is of interest to note that the only tomb in which such a necklace was found (t. 1) is also the only one which didn't yield any instruments (Huard 1969: 192; Huard & Bacquié 1963: 442-451; Treinen-Claustre 1982: 110-114, 123). Assigning a sex to these tombs seems unreliable and,

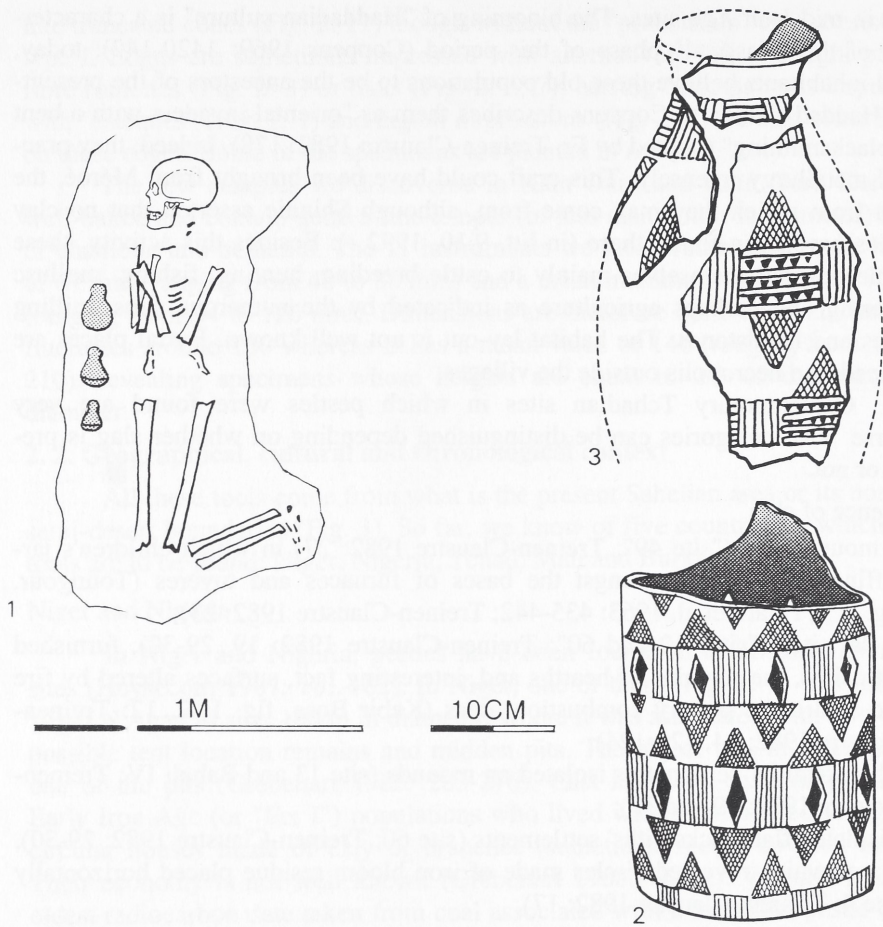


Fig. 4. Maledinga tomb 2 (after Huard, Bacquié & Scheibling 1963, fig. 1, 2).

though the carrying of stone necklaces is related to the absence of pestles, one could also conceive that men of the Tchadian Iron Age wore such ornaments in the other world, whereas women potters were buried with their instruments. Coal associated with pestles from three sites of the Tchadian mid-Iron Age, Bahali IV, Kebir Bosa and site 4, revealed six datings. They span the middle of the Vth and the end of the IXth centuries A.D. (from 1580 ± 100 B.P., Gif-4194, to 1170 ± 90 B.P., Gif-4199) and seem to be contemporary with those from level II in Daima, Nigeria.

Finally and still in Tchad but to the south of the lake, these instruments have been found in Goulfeï and Makari (Fig. 1: 3, 10, 11), two sites occupied during the Late Iron Age and the historical period (during the "Sao II" phase,

typified by urn burials, and at the time of the Kanuri and then the Kotoko (Wulsin 1932, fig. 269; Huard et al. 1963: 440; Lebeuf 1962: 27, 30, 44-45, 47-48, 63). In Makari, the site is a town of ten distinct quarters, amongst which the blacksmiths', surrounded by a defensive wall. The Sao are believed to have occupied this region progressively. Oral tradition says that black fishermen belonging to the "Sao II" phase came from the East, bringing with them the ritual of urn burials and other innovations such as the spinning and weaving of cotton (Lebeuf 1962: 126-127). Later, the arrival of the Kanuri, builders of fortified cities, coincided with the introduction of Islam. They were followed much later by the present inhabitants of the region, the Kotoko - fishermen who indulged in the "big commerce" of their prey.

Relatively speaking, the stratigraphy of sector III in Makari has shown that pestles were posterior to the phase "Sao II" typified by ground burials (Lebeuf 1962: 27). History and oral tradition situate "Sao II" typified by burial urns, between the Xth/XIth centuries and the XVIth century A.D., when the Kanuri came to settle. The Kanuri-Kotoko phase of Makari spans the end of the XVIth century to 1875 when the town was last abandoned.

Mali

Clay pestles seem to be found within two distinct contexts in Mali, in the Inland Niger Delta (El Oualadji) and on the Dogon cliff (Pégué-Na.).

In El Oualadji, one of these objects was dug out of a burial mound with chamber. This chamber, 13 to 15 m in length, 6 to 8 m large and 2.75 to 3 m in height, was surrounded by a stockade of Palmyra Palm, 2 to 3 m thick. A near-ellipsoidal dome, made out of wooden beams covered in straw, topped the chamber. One got access through a vertical pit of 0.80 m in diameter, situated at the western extremity of the chamber and which joined the top of the mound. The mound itself was about 65 m in diameter at its base and 12 m in height (preserved). Two skeletons lay on a bed of interwoven branches in the chamber. Besides ash containing animal remains and what is probably the cylindrical type clay pestle, excavators discovered a lot of other material. Bracelets and iron or copper rings, iron dagger blades, iron spear- and arrow-heads, copper, stone or glass beads, terracotta animal figurines, bone awls and needles, undamaged vases amongst which a big jar and a few sherds (Desplagnes 1907: 57-66; Desplagnes 1951: 1159-1173; Mauny 1961: 95-97; Lebeuf and Pâques 1970: 23-49). This pre-Islamic tomb is unfortunately badly dated. Though ancient descriptions, from El Bekri in particular (El Bekri 1913, 1: 330; 5: 219-220) can help to compare El Oualadji burial traditions with the ways and customs of Sudanese chiefs during the Xth and XIth centuries, certain archaeological elements hint a more recent date, such as some glass beads close to what is termed the "Venice" type.

In Pégué-Na, three cylindrical type II clay pestles were found on two platforms (G and W) on the Bandiagara cliffs. In both cases, they were associated with pottery amongst which entire vases. An iron peg was discovered on plat-

form W. These shelters belong to an ancient Tellem settlement - phase 2 or 3, corresponding to the end of the XIIth century to the XVIth century A.D. (the oldest dating: 895 ± 95 B.P., Gx-0470; Bedaux 1972: 129-130 and 137; Bedaux & Lange 1983: 14, 17, 25-26; Bolland 1991: 16-36).

Burkina Faso

Findings made in the West of Burkina Faso seem to be related to those of the Bandiagara cliffs.

Three kilometres from the village Tou, two slightly truncated pestles were found during an "excavation" in a small mound surrounded by six small rounded hillocks which formed a sort of circle of about 20 m in diameter. A very brief description of a 0.50 m stratigraphy has been done but the location of the pestles has not been given. They were found with pounding material, polished stone adzes, a ceramic cup, a few iron objects such as spear- and arrow-heads, coiled bracelets and rings. Excavating conditions were very bad but it seems to be an ancient place of worship used until recently by the forefathers of current Dogon villagers (Schweeger-Hefel 1969: 111-125).

Twenty km to the North of Tou, we were lucky to find 12 clay pestles in Kaïn Ouro Koro, an abandoned village. This site built on a large sandy dune stringer stands out thanks to a group of hillocks made of sherds and laterite gravel. These are situated next to refuse heaps full of iron dross and next to the bases of low furnaces for processing iron ore. Ten of these pestles belong to the cylindrical type II form and 2, to the truncated type I form. Furthermore, 10 of the clay pestles are in the slag zone or near the bases of the low furnaces; the other two were picked up on the edge of the settlement. All were found with numerous sherds. We also found a few iron or quartz beads and an iron arrow-head.

After questioning the leading citizens, blacksmiths and village chiefs of Kaïn and Kaïn Ouro, we found out that Kaïn Ouro Koro was in fact the primitive site of what is now Kaïn. Kaïn was founded by a Tellem-Kurumba by the name of Kaïn, after the reign of King Kanka Moussa (1307-1332). Incidentally, ethnic groups of this region believe the ancient Tellem to be the ancestors of the present Kurumba, stressing the fact that the latter used to live on the Seno plain and the cliffs of Bandiagara. Tellem means "the ancient" in a number of tongues in West Burkina Faso. After having founded Kaïn, Aléoué Guindo, a Dogon of a Dogon father and a Tellem mother, is said to have come from Koro - situated in the Seno plain - to settle in the region. This resulted in a war between the Dogon and the Tellem-Kurumba. After the latter's defeat, the Dogon stayed up to the XIXth century leaving shortly before the arrival of the French, around 1891. The Dogon moved a few kilometres down the road to found what is now known as the village of Kaïn. In 1970, part of the population, which had turned to Islam, seceded. They came to live near Kaïn Ouro Koro and founded what is presently the village of Kaïn Ouro. Such briefly recounted facts are very precious for the understanding of the peopling of this region. Furthermore, they allow us to attribute our

pestles to the Tellem-Kurumba or Dogon people of the XIVth to the XIXth century. A number of these objects were discovered just outside Kain Ouro village, out of an archaeological context. Indeed, present day women potters use pestles picked up from ancient sites.

2. 3. Accompanying pottery

In the following paragraphs, we will attempt to draw the principal characteristics of pottery found with the clay pestles mentioned above.

Painted "Haddadian" pottery has to be dealt with separately. It is thought to be one of the most outstanding successes of prehistoric sub-saharan Africa. These are narrow-based truncated goblets (Fig. 5: 7) and bowls, generally hemispherical in shape (Fig. 5: 6). They are painted in black with a red slip. Geometrical, or more rarely, figurative features frequently cover the whole of the body. They are never impressed. Sizes vary from 8 to 16 cm in height, 12 to 30 cm in maximum diameter and 0.4 to 0.8 cm in thickness. On studying the traces, one can see that this painted "Haddadian" pottery is made from fine coils wedged one on top of the other from the inside (Treinen-Claustre 1982: 95).

The more common pottery associated with pestles from Niger, Nigeria and Tchad all have hemispherical bases (Fig. 5: 1, 2, 3). Feet are absent and flat bases very rare. Some exceptional forms are found; the most surprising are perforated cylinders of the kind found in the Maledinga graves (Fig. 4: 2). Sizes vary from 10 to 40 cm in height and 10 to 50 cm in maximum diameter. The sides are thin, 0.3 to 1.5 cm - depending on the size of the recipient. The clay - when described - is generally well-kneaded, homogenous, prepared with a fine temper well spread into the bulk. Incised lines (Fig. 5: 1, 11; Tegef N'Agar, Daima and Toungour), rare comb impressions (Fig. 5: 2; Daima), very rare raised relief decoration (Fig. 5: 3, Daima) and twisted string roulette very slightly impressed (Fig. 5: 1, 3, in the different regions) can be observed on decorated vases. Decoration with a string roulette is usually limited to the upper part of the body (Fig. 5: 4, 8) but can exceptionally cover the bottom or even the whole of it (Fig. 12:1,3; Tegef N'Agar and Daima).

Traces have also been observed on the surface and inside the vases. Those visible on the outside are mat prints (Fig. 5: 2, 8, 9, 10). Such marks generally cover only the lower part of the body but can, on rare occasions, cover the whole of it as in the case of bowls. Small impressed cavities can sometimes be seen on the inside of vases (Fig. 5: 9; common pottery of the mid-Iron Age in Tchad). These impressions are made by clay pestles whose "active" surfaces are decorated (see 3.1.). Such traces seem to be limited to the lower half of the body.

Pottery found with clay pestles more to the West, in Mali and Burkina Faso, generally have different shapes. In Pégué-Na, Tou and Kain Ouro Koro, very characteristic cups with feet are found (tripods or quadripods, Fig. 6: 1, 5), frequently decorated with a knotted strip roulette or twisted string roulette. Bedaux took much interest in this type of vase and reflects that it is widespread in

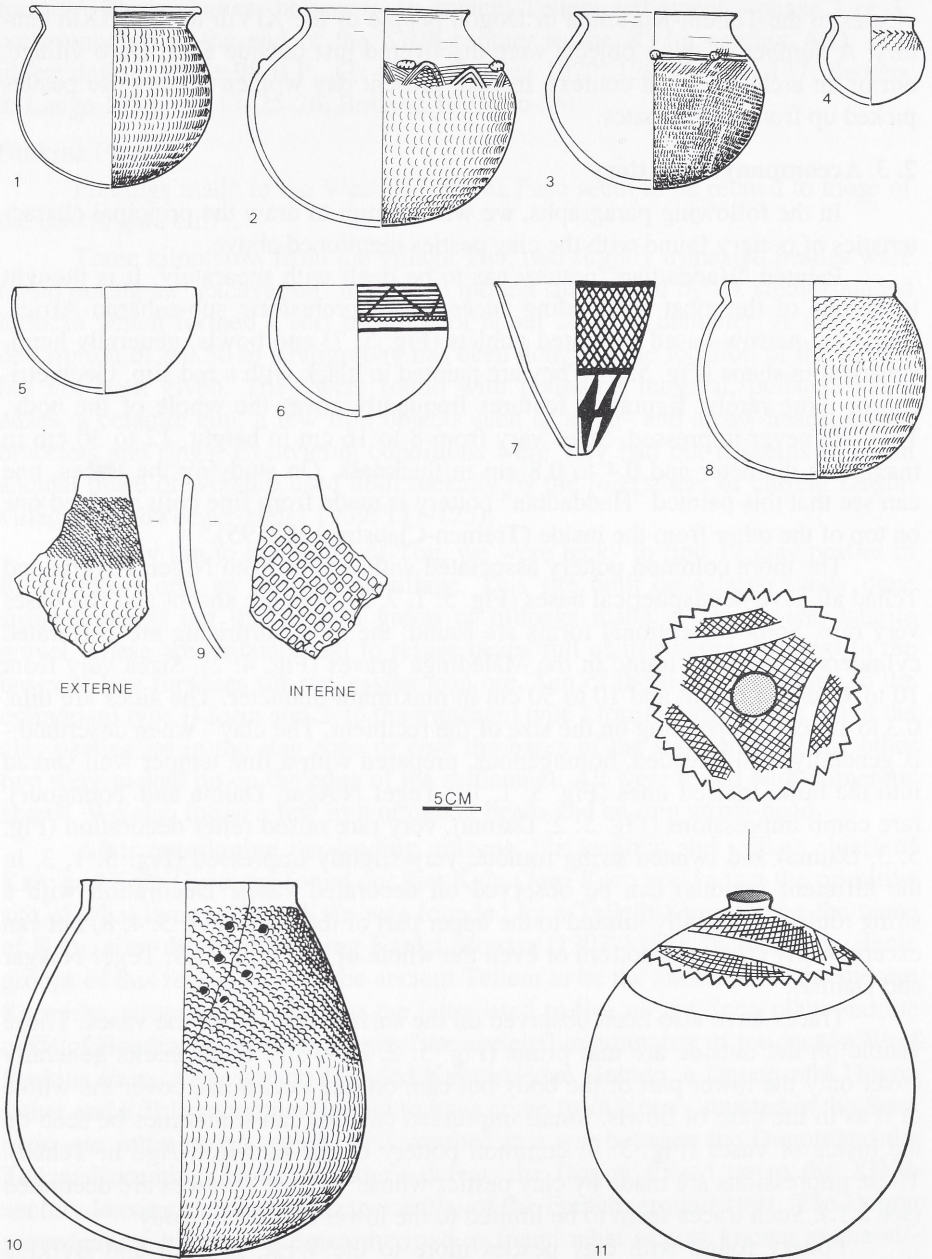


Fig. 5. Pottery associated with the "archaeological" clay pestles from Niger, Nigeria and Tchad.

1: Tegef N'Agar 74; 2-4: Daima II; 5-9: Kebir Bosa; 10: "site 13"; 11: Toungour (after: 1: Grébénart 1985, fig. 187; 2-4: Connah 1981, fig. 7.5, 7.6; 5-10: Treinen-Claustre 1982, fig. 1ff.; 11: Huard and Bacquéié 1963, fig. 2).

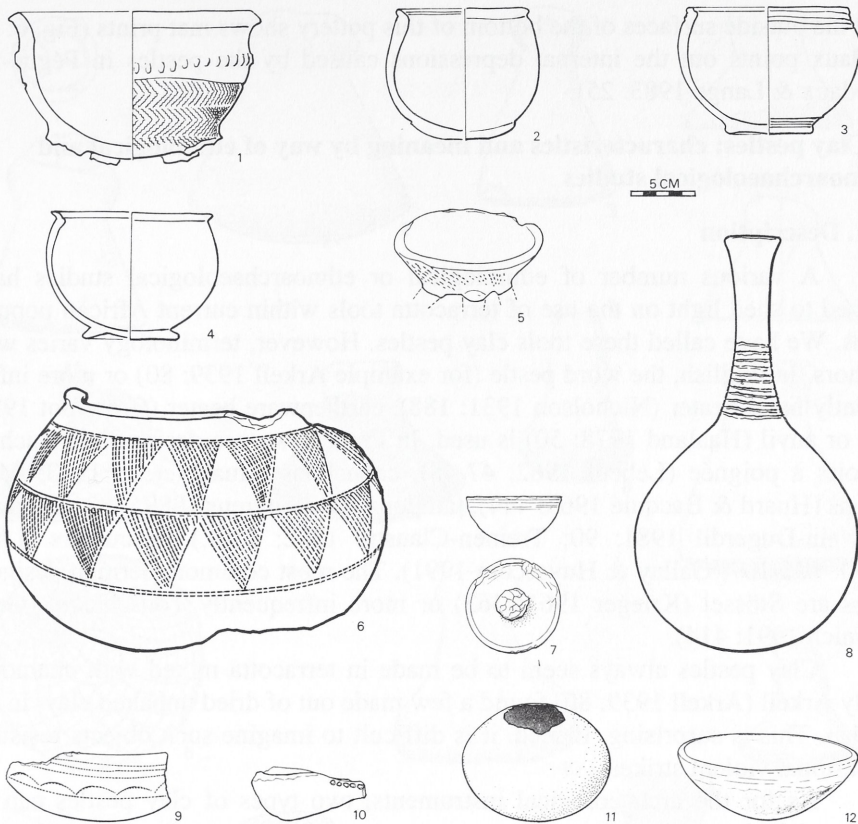


Fig. 6. Pottery associated with "archaeological" clay pestles from Mali and Burkina Faso.

1-3: Pégué-Na platform G; 4: Pégué-Na platform W; 5: Tou; 6-12: El Oualadji (after: 1-4: Bedaux 1982, fig. 3, 4, 10, 12; 5: Schweeger-Hefel 1969, fig. 5; 6-12: Lebeuf & Pâques 1970, fig. 24, 25, 27-32).

the whole of the Niger valley (Bedaux 1980: 247-258; Bedaux & Lange 1983: 19-24). These cups are found with small hemispherical vases to which a ring-shaped foot has been added (Fig. 6: 2, 4); the lip is often grooved. In Kain Ouro Koro, pottery is abundant. The most represented forms are big jars with an external lip. Decoration is done with twisted string roulettes, alternatively left and right plaited roulettes, wooden roulettes, incisions and mat impressions. The presence of cups with feet in El Oualadji is questionable; it seems that none were found in the grave. Pottery, customarily covered with a bright red coating, has a rounded base (Fig. 6: 6-12). Decorations can consist of impressions done with a twisted string roulette (Fig. 6: 6), grooves (Fig. 6: 8) or impressions done with a comb combined with a twisted string roulette (Fig. 6: 9). It is interesting to note

that the outside surfaces of the bottom of this pottery shows mat prints (Fig. 6: 6). Bedaux points out the internal depressions caused by the pestles in Pégué-Na (Bedaux & Lange 1983: 25).

3. Clay pestles: characteristics and meaning by way of ethnological and ethnoarchaeological studies

3. 1. Description

A various number of ethnological or ethnoarchaeological studies have helped to shed light on the use of terracotta tools within current African populations. We have called these tools clay pestles. However, terminology varies with authors. In English, the word pestle (for example Arkell 1939: 80) or more infrequently hand-beater (Nicholson 1931: 188), earthenware beater (Crowfoot 1924: 21) or anvil (Haaland 1978: 50) is used. In French, we use designations such as *lissoirs à poignée* (Lebeuf 1962: 47-48), *cabochons* (Huard et al. 1963: 440), *pilons* (Huard & Bacqué 1963: 444), *tampons* (Le Rouvreur 1989: 382; Gallay & Sauvain-Dugerdil 1981: 90; Treinen-Claustre 1982: 120f.), *percuteurs* (Llaty 1990: 106-107; Gallay & Huysecom 1991). The most common German designations are *Stössel* (Krieger 1961: 363) or more infrequently *Tonschlegel* (Geis-Tronich 1991: 414).

Clay pestles always seem to be made in terracotta mixed with chamotte. Only Arkell (Arkell 1939: 80) found a few made out of dried unbaked clay, in the Sudan. This is surprising. Indeed, it is difficult to imagine such objects resisting occasional violent strikes.

As for the archaeological instruments, two types of clay pestles can be distinguished.

Type I

Type I (Fig. 7, 8) is massive and looks like a truncated cone. Its section is always carefully circular. The small upper part - for prehension - is swollen into the shape of a *cabochon* (Fig. 7: 1, 2, 3); however, it can also simply be cylindrical (Fig. 7: 11; Fig.: 8: 3, 5) or even narrowed down to resemble a slight truncated cone (Fig. 7: 6, 8). The top is either rounded (Fig. 7: 1, 3, 13) or flattened (Fig. 7: 7, 9) and can be slightly cup-shaped (Fig. 7: 6, 8, 12). The base is always spherical, a large majority convex (Fig. 7: 1, 2, 3), some exceptionally concave (Fig. 7: 4, 5).

Sizes vary. However, we only have precise data from Mali, the Inland Niger Delta (42 items measured by MESA0), Dogon Sarnyé (2 instruments drawn by Gallay & Sauvain-Dugerdil 1981: Fig. 3) and North of Burkina Faso (4 pestles described by Llaty 1990: 106 and 2 others measured during MESA0). The mean dimensions of the pestles found in the Inland Niger Delta are the following: total height, 91 mm (ranging from 45 to 136 mm), maximum diameter of the base, 90 mm (ranging from 44 to 130 mm), maximum diameter of the upper part, 51 mm (ranging from 24 to 76 mm). The four pestles measured by

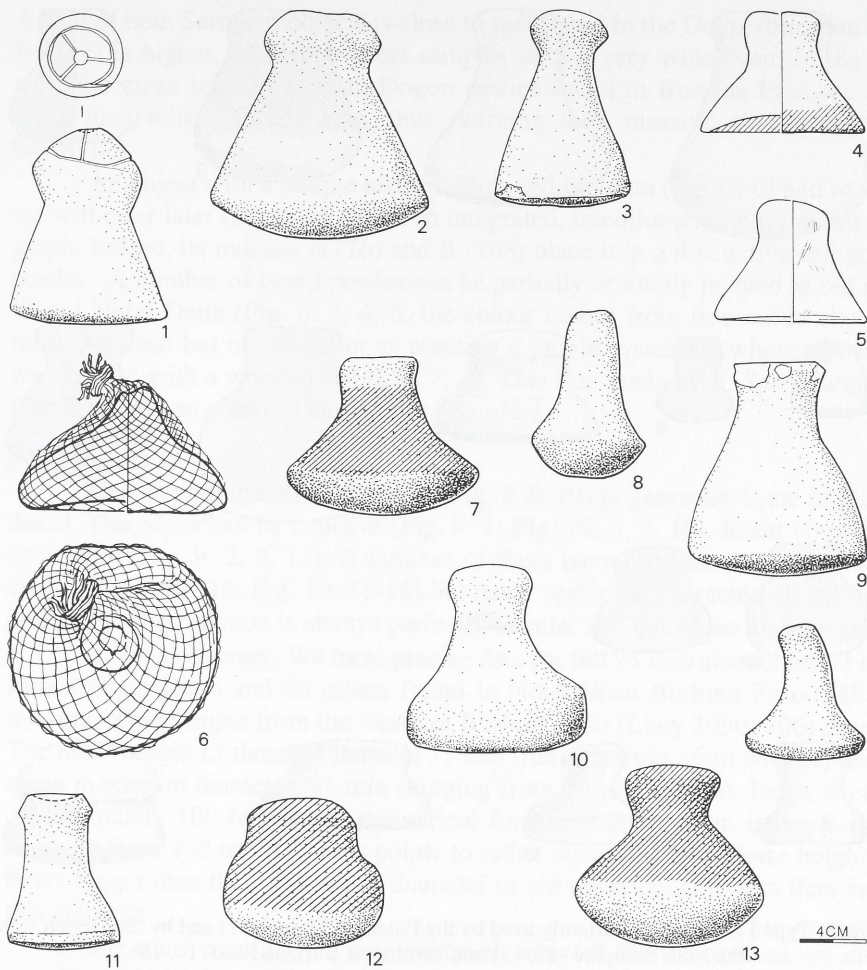


Fig. 7. Type I clay pestles currently used in the Inland Niger Delta area (Northern Bambara: 1-6; Northern Somono: 7-13).

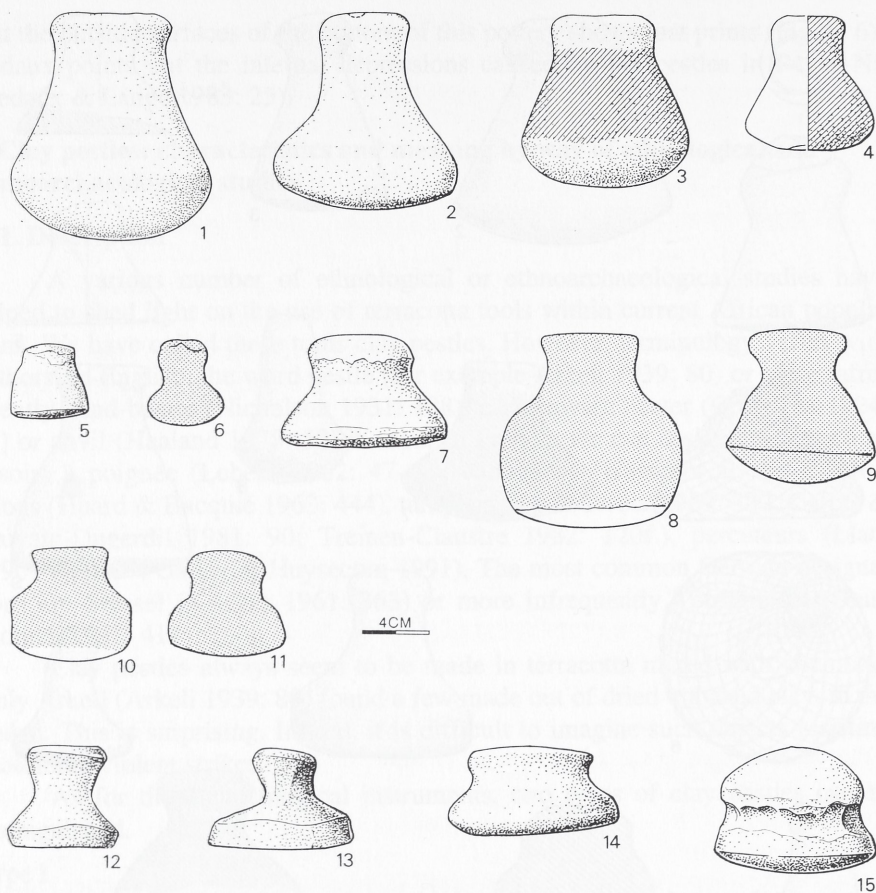


Fig. 8. Type I clay pestles currently used by the Fulani in Mali (1-11) and by the Dogon from the Mali Sarnyééré (12, 13) and Northwest Burkina Faso (14, 15).

Llaty in Burkina Faso have mean dimensions close to those of the Delta (respectively 108, 94 and 43 mm), the Dogon objects from Sarnyééré are smaller (respectively 60, 76 and 38 mm). The Dogon pestles we measured in Burkina Faso seem squatter than those from the Inland Niger Delta (respectively 64, 100 and 75 mm). The mean value of index A is 58 (ranging from 34 to 77), indicating pestles which have bases twice as large as their tops. The mean value of index B is 100 (ranging from 69 to 146), showing that these samples are generally massive, held within a cube and that their height is about equal to the diameter of their base. In Burkina Faso, the mean indexes described by Llaty are relatively close to those observed in the Delta: A=45 (values ranging from 44 to 46) and B=90 (values ranging from 73 to 110). On the other hand, though the mean index

A (51) of both Sarnyéré objects is close to that found in the Delta, the mean index B (127) is higher, indicating short samples with a very wide base. In the same way, the mean indexes of both Dogon pestles found in Burkina Faso are much taller than those of the Delta, thus ratifying their massive character (A=70; B=163).

An object with a unique history, form and function (Fig. 7: 6) and to which we will refer later (3.3.), has not been integrated, intentionally, into the last paragraph. Indeed, its indexes A (16) and B (168) place it in a distinctive category of pestles. A number of type I pestles can be partially or totally painted in red in the Inland Niger Delta (Fig. 8: 3, 4, 6, the colour comes from iron-oxide clay dilution). And last but not least, let us mention a unique specimen whose upper part was incised with a wooden rod (Fig. 7: 1). This was made by F. Serri-Tangara, a Bambara woman potter in the North of Saraféré.

Type II

The second type of clay pestle (Fig. 9 & 10) is generally squat and cylindrical. The edges can be concave (Fig. 9: 1; Fig. 10: 8, 9, 10), linear (Fig. 10: 5) or convex (Fig. 9: 2, 3, 11). A number of them have profiles close to truncated cones (Fig. 9: 13-14; Fig. 10: 15-16) but never reach the characteristic silhouette of Type I. Their section is always perfectly circular and their base always convex.

Dimensions vary. We have precise data for the 23 instruments found in the Inland Niger Delta and 30 others found in North-West Burkina Faso (MESAO mission). One sample from the North of Burkina Faso (Llaty 1990: 106) is added. The mean height of these 54 items is 71 mm (ranging from 46 to 94 mm) and the mean maximum diameter, 91 mm (ranging from 59 to 123 mm). Index A equals approximately 100 (due to its cylindrical form), whereas mean index B is 132 (ranging from 102 to 200). This points to rather squat objects, whose heights are never bigger than their maximum diameter or are never equal to less than half of this diameter.

One must mention the originality of some of the decorations on certain type II pestles. Mats (Fig. 10: 4) or fingers (Fig. 10: 2, 3, 8) are used to leave impressions on some edges. The upper parts are sometimes decorated with incisions or impressions left by fingers or a rounded rod (Fig. 9: 9-16). Women potters of the Inland Niger Delta told us that these marks were in fact signatures which allowed them to recognise their instruments. Pestles are often painted in red (Fig. 9: 1, 2, 4) or sometimes striped red (Fig. 9: 11).

At this point, a number of rules and trends can be stated, especially with regard to the shape (concave or convex) of the bottom of pestles. This depends on the technology used and will be described in chapter 3.3. (R8, R9 and T2).

Other slight variations do not seem to be related to precise type I populations or functions. For instance, F. Nyafu-Samasséku, a Northern Somono woman potter from Kobassa, makes clay pestles with "cabochon", cylindrical or truncated tops indifferently. Likewise, cup-shaped tops are made by Northern

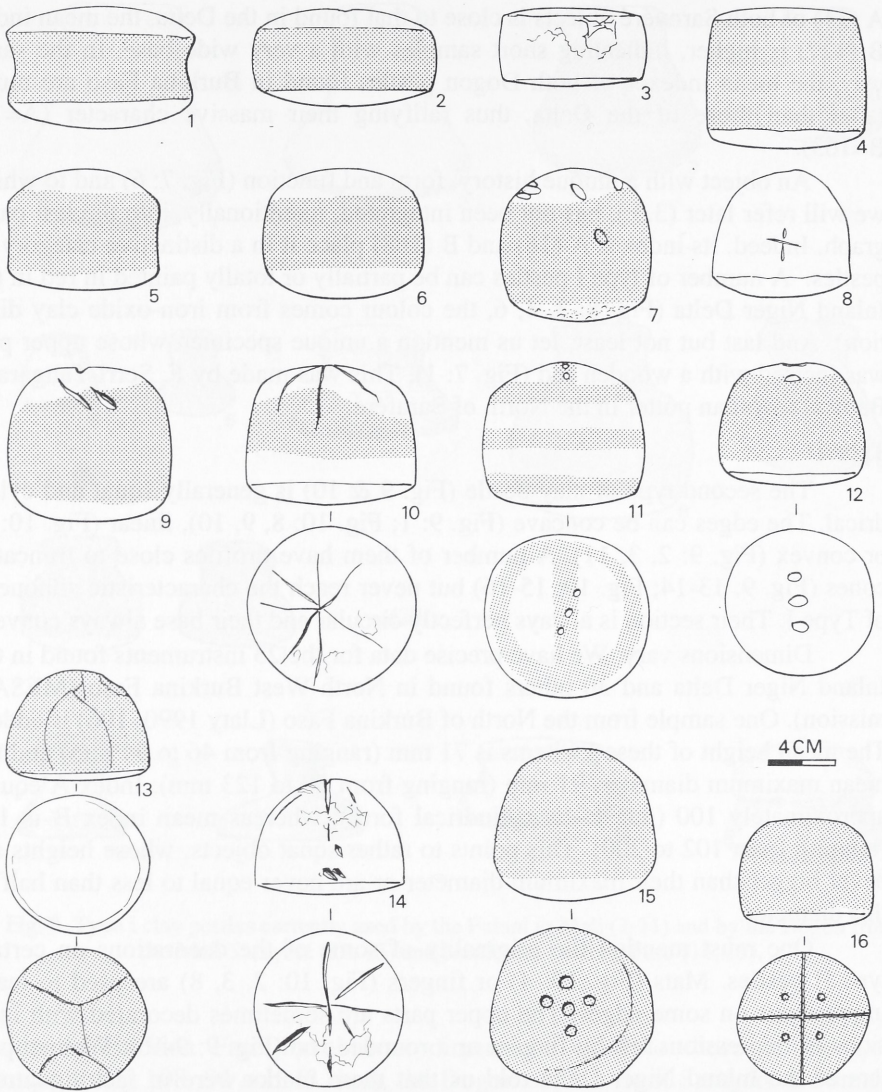


Fig. 9. Type II clay pestles currently used by the Fulani from the Inland Niger Delta.

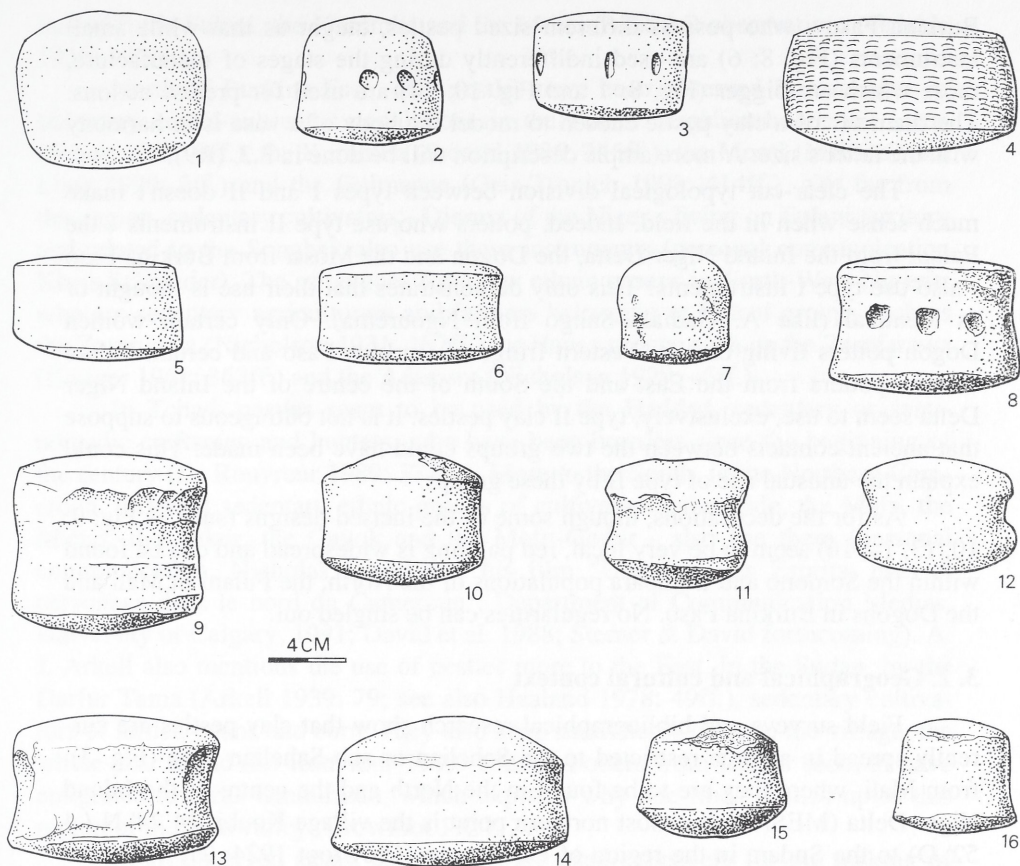


Fig. 10. Type II clay pestles currently used by the Dogon from the North-west fringe of Burkina Faso.

Somono craftswomen (F. Nyafé-Samasséku), Northern Bambara (F. Serri-Tangara) and the Fulani (T. Boccum-Sango).

Some of the measurements mentioned above show the diversity of sizes. No conclusion can be drawn showing some kind of relationship between the size of a pestle and a population. Take for instance the 19 pestles made by F. Kayentao-Gadiaka, a woman potter from Ngourema, which show great diversity almost spanning both extremes. In fact, it will be shown in chapter 3.3. that these variations are due to the different stages in the making pottery. A potter can use instruments of a different size by changing his or her movements, depending on the desired size of the recipient. A survey of women potters - in particular, K. Konaré-Konaré from Saraféré and F. Kéwé-Kéwé from Kakania-Bozo in Mali, and Y. Niangali-Bamadjo and Y. Niangali-Anguiba from Kaïn-Ouro in

Burkina Faso - who possess different sized pestles, taught us that while small instruments (Fig. 8: 6) are used indifferently during the stages of manufacture, those which are bigger (Fig. 8: 1 and Fig. 10: 14) are used for precise actions. The diameter of a clay pestle chosen to model the body of a vase is in harmony with the latter's size. A more ample description will be done in 3.3. (R9).

The clear-cut typological division between types I and II doesn't make much sense when in the field. Indeed, potters who use type II instruments - the Fulani from the Inland Niger Delta, the Dogon and the Mossi from Burkina Faso - also use type I instruments! This only demonstrates that their use is thought of as identical (like A. Gadiaka-Sango from Ngouréma). Only certain women Dogon potters living on the Western fringe of Burkina Faso and certain Fulani women potters from the East and the South of the centre of the Inland Niger Delta seem to use, exclusively, type II clay pestles. It is not outrageous to suppose that ancient contacts between the two groups could have been made. This could explain the unusual use of type II by these groups.

As for the decorations, though some of the incised designs (such as Fig. 9: 10, 13, 14, 16) seem to be very local, red painting is widespread and can be found within the Somono and Bambara populations of the North, the Fulani in Mali and the Dogons in Burkina Faso. No regularities can be singled out.

3. 2. Geographical and cultural context

Field surveys and bibliographical research show that clay pestles are currently spread in an area restricted to the Sahelian or sub-Sahelian zone (Fig. 3); from Mali, where they are to be found in the North and the centre of the Inland Niger Delta (MESAO, the most northern point is the village Koubi, 14 24' N / 4 52' O) to the Sudan, in the region of Omdurman (Crowfoot 1924: 21; 15 39' N / 32 25' E). Although surveys in the Southern part of the Inland Niger Delta and the savana (Mali, Northern Guinea and South-West Burkina Faso) revealed a total absence of this tool south of the Sahelian/sub-Sahelian border - at least in Western Africa. Such a widespread use of clay pestles in the Sahel zone implies that they are used by different populations (Drost 1967; Baumann 1979).

Thus, we found them amongst four populations in the Inland Niger Delta: the Fulani, the Northern Bambara, the Northern Somono and the Songaï. The Fulani are mainly cattle breeders, more or less sedentary since the beginning of the XIXth century. The Northern Bambara are essentially sedentary agriculturists, live in areas sheltered from floods and good for sowing cereal (Pâques 1954). The Somono and the Songaï fish and grow rice; they are generally sedentary but sometimes travel quite far (more than 100 km) to other fishing grounds.

In Sarnyé, pestles are used by the Dogons who live in a Fulani ethnical "isolate" and cultivate millet and sorghum (Gallay & Sauvain-Dugerdil 1981: 37ff.). More to the South, the Dogons who live on the North-West fringe of Burkina Faso also use clay pestles. Being mainly cultivators, they keep close con-

tact with the Fulani, the Kurumba and the Mossi (MESAO observations; Griaule 1938: 3-39).

North of Burkina Faso, clay pestles have been observed in a number of sedentary cereal-cultivator populations in the Fulani neighbourhood: the Lyela (Schott 1986: 9ff.), the Kurumba (Stössel 1986: 245ff.), the Mossi (MESAO and Llaty 1990: 2ff.) and the Gulmance (Geis-Tronich 1991: 414ff.). Not far from this region, sedentary cultivators - Djerma of the Niger - living on Fulani territory and related to the Songhai, also use these instruments (personal communication Klaus Schneider). The same goes for a few ethnic groups in North-West Nigeria, who are sedentary agriculturists and farmers belonging to Fulani groups such as the Zorumawa (Nicholson 1931: 187ff.), or Hausa groups such as the Zamfarawa (Krieger 1961: 362ff.) and the Adarawa (Nicholson 1929: 45ff.).

In Tchad, pestles seem to be used by the Haddad, sedentary or semi-nomadic craftsmen and hunters, who have been breeders since the beginning of the century (Le Rouvreur 1989: 377ff.). More to the South, in the Northern Cameroon, different sedentary ethnic groups of cultivators - the Hide, the Mafa, the Mabas, the Sukur, the Cuvok and the Mofu-Gudur - also use them (personal communication, Nicholas David and his film "Demeure des Esprits: pots et personnes dans le nord du Cameroun", Department of Communication Medias, University of Calgary, 1991; David et al. 1988; Sterner & David forthcoming). A. J. Arkell also mentions the use of pestles more to the East, in the Sudan, by the Darfur Tama (Arkell 1939: 79; see also Haaland 1978: 49ff.), sedentary cultivators of millet, beans and corn. They also keep small herds close to the village, the whole year round (Le Rouvreur 1989: 152ff.). Potters from Darfur seem to have emigrated towards Omdurman, which explains why one finds pestles up to this region of the Nile valley (Crowfoot 1924: 21).

In all observed cases, clay pestles are used exclusively for the making of ceramic recipients. Furthermore, this craft is usually done by the women (Northern Bambara, Northern Somono, Fulani, Songhai, Djerma, Dogon from Burkina Faso, Kurumba, Mossi, Zorumawa, Haddad, Tama, Omdurman and in the North of the Cameroon), on rare occasions by the men (Dogon Sarnyé, Zamfarawa) or by both (Gulmance, Lyela, Adarawa).

As a rule, blacksmiths' wives are potters and use pestles as is the case for the Songhai, Haddad and Sudanese Tama blacksmiths, the Mossi saaba, the Bambara numu of the North, the Dogon djémé from Burkina Faso, the Kurumba ayarba, the Somono kugukaïgu of the North, the few Fulani wayluBé and Northern Cameroon populations.

Women potters can also be weavers (the Songhai weavers, the Fulani maabuuBé and the occasional Haddad weavers), coopers (the few Fulani lawBé and perhaps some Haddad) and, exceptionally, cobblers (a few Fulani sakkeeBé and Haddad cobblers). When this craftsmanship is done by men, either independently or with the women, potters do not belong to what is called "casted" groups but their main activity is agriculture. Potters who use clay pestles and who are

from an environment in which this kind of work is exclusive to women belong to "casted" social groups whereas men potters accompanied or not by women belong to what the Africans call "noble" social groups.

Sites in which pestles were used are sedentary habitats, either villages or towns. Pottery can be made in the courtyard (Kirchamba), the entrance-hall (Sindegué), a room used as a specialised workshop (Korienzé), occasionally in one of the rooms (Babi), exceptionally in a lane opposite the house (Bango) or even in a specialised area outside the agglomeration, seen only once in Nemgéné. It seems therefore that the use of clay pestles is limited to sedentary settlements. Yet let us not jump to hasty conclusions, A. Le Rouvreur implied that such an activity took place on encampments ("... à l'abri d'une natte qui prolonge le toit de la hutte ou de la tente"; Le Rouvreur 1989: 382).

As a consequence of geographical scattering, a few regularities emerge:

R1: If in the presence of clay pestles, then the population belongs to the Sahelian or sub-Saharan area. Three regularities (R2, R3 and R4) emerge from a socio-economical study of clay pestle users:

R2: If in the presence of clay pestles, then these are tools used in the making of pottery.

R3: If in the presence of clay pestles within a blacksmith's, a weaver's, a cobbler's or a cooper's surrounding, then one is in a "casted" social group where pottery is exclusive to women.

R4: If in the presence of clay pestles used by men, then one is in a social group termed "noble".

Examples such as the Gulmance, the Lyela and the Adarawa force us to weaken affirmations we would be tempted to postulate, despite their exceptional character. We therefore present here a trend, that is to say a statement which cannot be considered as a regularity because one or more counter-examples are known, even though most of the observations converge. We then have to postulate a trend, and not a regularity, despite the exceptional character of examples from the Gulmance, the Lyela and the Adarawa. Indeed, though observations tend to converge, at least one counter-example is known: T1: If in the presence of clay pestles, then one is most probably in a group where there is a sexual differentiation in activities.

As for the relationship between clay pestles and habitat, we have never found clay pestles outside workshops. This is sometimes because of some kind of "taboo". The following regularity can be stated:

R5: If in the presence of clay pestles, then one is close to a potter's workshop. Before we infer a regularity which links these instruments to sedentarism, we are awaiting details from Tchad. In the meantime, we can state the following "restricted" rule:

R6: If in the presence of clay pestles within a habitat in Mali, Niger, Burkina Faso, Nigeria, the Northern Cameroons or the Sudan, then it is a permanent habitat.

On the other hand, it seems impossible to establish any kind of relationship between the presence of a clay pestle and the spot where it is used; this seems to depend on the time of day or the potter's mood. Finally, surveys led in a number of countries allow us to postulate the following "restricted" rule:

R7: If in the presence of clay pestles in Mali, Niger, Tchad, the Northern Cameroons and the Sudan, then one is in a habitat where one or more of the following trades are plied: blacksmith, weaver, cooper or cobbler.

3. 3. Technological context

As we have just mentioned, clay pestles are used exclusively in the making of pottery. Surveys lead within the "Mission ethnoarchéologique suisse en Afrique de l'ouest", (MESAO) revealed a number of distinct techniques (Huysecom & Mayor in press). We found that clay pestles were used for only two of these techniques, termed "pounding in a concave shape" technique and "casting on a convex shape" technique.

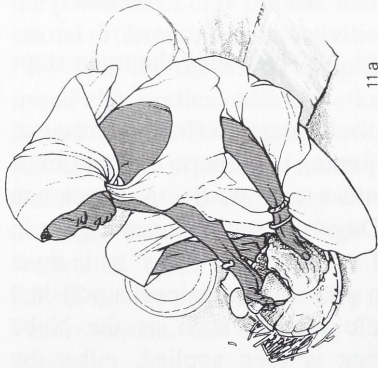
The "pounding in a concave shape" technique

This technique seems to be particular to many populations of the Sahelian area and the Nile valley, with a few variants. First, the potter prepares a ball of clay in which he or she adds a large amount of a fine temper (chamotte or dung depending on the region) so as to obtain relatively dry clay necessary for the pounding technique. Hammering with a clay pestle can improve the homogeneity of the clay ball.

Potters have previously dug out a depression in the ground. Its sides are neatly equalised and smoothed. The depression can be used as such (Mossi and Kurumba) or covered with matting (Songhai, Zorumawa, Haddad, Tama and on rare occasions the Fulani), fitted with a wooden cast (Fig. 13b; most of the Fulani, the Bambara of the North, the Songhai, a few Zamfarawa), a dried unbaked clay cast (Fig. 13c; all the Northern Somono, exceptionally the Northern Bambara and the Fulani), on rare occasions a terracotta cast (Adarawa, Zamfarawa, Fulani, Gulmance) and even the broken base of a vase (Dogon from Burkina Faso). On very rare occasions, a mat is spread flat on the ground (Fulani).

The actual assembly of the recipient follows, of which only the main steps are described.

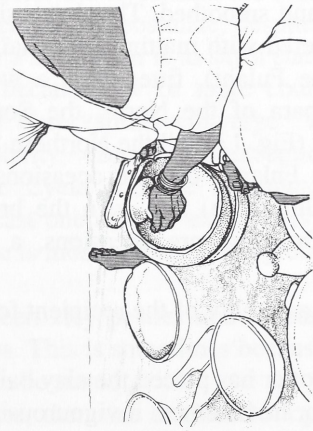
Once the potter has placed the clay ball in the depression (bare depression, cast or mat), she or he hammers it vigorously, thinning it to shape the bottom of the vase (Fig. 11a). This is done most often with a clay pestle. A potter can exceptionally use a handstone, as is done by the Dogon from the Sanga region in Mali (Bedaux 1986: 124), or a tool in the form of a "household bread" as is done by the Egyptian Fellah (Blackman 1948: 125). On very rare occasions, a polished wood pestle is used by certain Sudanese ethnic groups, such as the Nuba (Crowfoot 1924: 20). Less vigorous hammering is then applied, either by



11 a

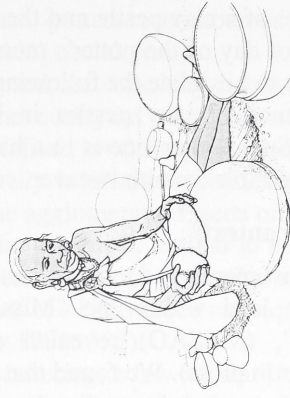


11 b



11 c

Fig. 11. Potters using the "pounding in a concave shape" technique.
 a. hammering of the clay ball, on a wooden cast, with the big extremity of the pestle (beginning of the assembly).
 b. hammering of the vase's body, on an unbaked clay cast, with a pestle.
 c. pestle used as an anvil while the top of the body is hammered with a wooden palette



12

Fig. 12. Potter using the "casting in a convex shape" technique by hammering a clay cake on upside down pottery.

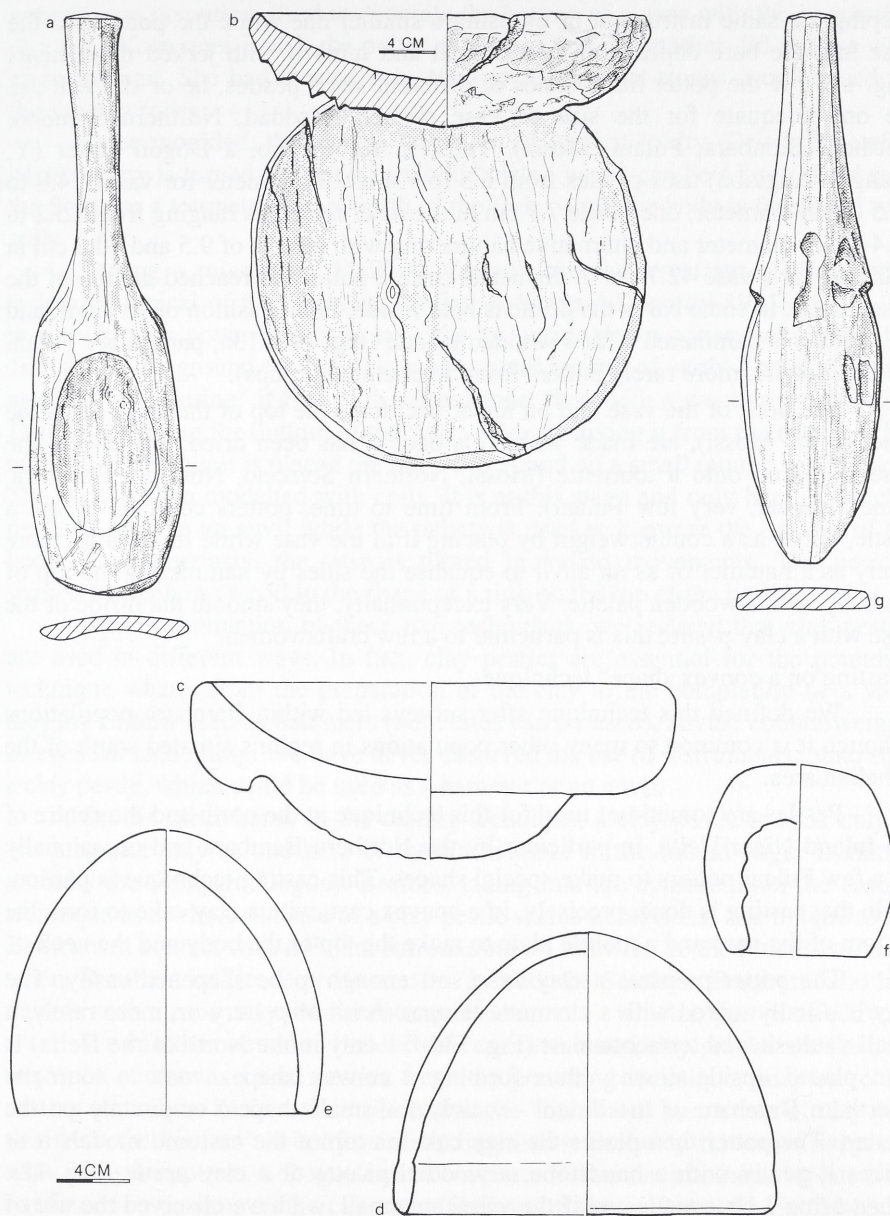


Fig. 13. Tools used in the making of vases with a clay pestle.
 a. wooden palette (Fulani); b. wooden cast (Fulani); c. unbaked clay cast (Northern Somono tradition); d. convex clay cast (Northern Bambara); e. convex clay cast (Northern Bambara); f. convex clay cast (Northern Bambara); g. wooden palette (Sarnyé Dogon, after Gallay & Sauvain-Dugerdil 1981, pl. 3).

keeping the same instrument or by using a smaller one while the potter tilts the vase into the bare depression, cast or mat and turns it with jerked movements (Fig. 11b). If the potter has a series of different-sized pestles, he or she will use the one adequate for the size of vase desired (Haddad, Northern Somono, Northern Bambara, Fulani, Mossi). Thus, in Kaïn Ouro, a Dogon potter (Y. Niangali-Anguiba) uses pestles from 6.3 to 7.4 cm in diameter for vases 14.8 to 19.5 cm in diameter, one pestle 7.7 cm in diameter for vases ranging from 25.2 to 26.4 cm in diameter and alternative hammering with pestles of 9.5 and 10.4 cm in diameter for a vase 42.7 cm in diameter. Once a potter has reached the top of the vase's body, in some cases the pestle is held inside, in the fashion of an anvil, and the outside is hammered with a wooden palette (Fig. 11c; 13a; particularly Fulani women potters, more rarely potters from other ethnic groups).

The neck of the vase and on fewer occasions the top of the body (as is the case for the Mossi), are made with coils once it has been dried. Sometimes the vase is placed onto a tournette (Mossi, Northern Somono, Northern Bambara, some Songhāï, very few Fulani). From time to time, potters continue to use a pestle, either as a counterweight by placing it in the vase while its turning, more rarely as a hammer or as an anvil to equalise the sides by hammering the top of the body with a wooden palette. Very exceptionally, they smooth the inside of the vase with a clay pestle; this is particular to a few craftswomen.

"Casting on a convex shape" technique

We defined this technique after surveys led within Bambara populations although it is common to many other populations in regions situated south of the Sahelian area.

Pestles are sometimes used for this technique in the north and the centre of the Inland Niger Delta, in particular by the Northern Bambara and occasionally by a few Fulani potters to make special shapes. This casting technique is particular in that casting is done, precisely, in a convex cast, with a clay cake to form the bottom of the vase and a mobile plate to make the top of the body and the neck.

The potter prepares a clay cake soft enough to be shaped easily. The clay is usually mixed with a chamotte temper. A bit of pottery or, more rarely, a small vault-shaped terracotta cast (Fig. 13d-f; f only in the North of the Delta) is then placed upside down - thus forming a convex shape - onto a tournette (Northern Bambara or the Fulani - mainly for small shapes) or directly on the ground. The potter then places the clay cake on top of the cast and models it or strikes it gently with a handstone, a wooden palette or a clay pestle (Fig. 12). When using a clay pestle and if the vases are small, we have observed the use of very characteristic concave-based pestles (Fig. 7: 4, 5) by the Northern Bambara and a few Fulani from Sénoussa and Saraféré. The use of a clay pestle is exclusive to this stage of the casting technique. We must also signal what seems to be the sole example of a unique object in the hands of a Northern Bambara woman potter (M. Dembélé-Balo of Bounga). It is a sort of "clay pestle" (Fig. 7: 6) of the

potter's own invention, used to decorate the bottom of a vase with the impression of a net. When questioned, the potter explained that her mother did not use such an instrument. She had created it in 1987 to replace flat stones usually used for the same purpose.

Once moulded, the vase is taken out of its cast to dry. Dried, the unfinished pottery is turned upright on a mobile plate - which can be a large sherd as in the South or a tournette in the North of the Delta - and the body is fashioned with coils.

During a mission in Mali, A. Gally observed a variant of the casting technique typical of the Sarnyéré (Gally & Sauvain-Dugerdil 1981: 86-91). To begin with, the potter places a clay cake on upside down pottery which itself is directly on the ground (as before) or on a small mound of earth. The clay is then moulded by "patting" it first with a handstone, then with a wooden palette (Fig. 13g) thus shaping the bottom of the vase. After removing it from the cast, it is left to dry. Once dried, it is placed the right way round on a small mound of dry earth. The body is then modelled with coils. It is at this stage and only here that a clay pestle is used as an anvil while the palette is used to hammer the outside of the body. Simultaneously, the vase is turned in jerked movements. The neck is shaped by applying a coil in the shape of a ring on the top of the body.

Upon examination of these two techniques, we realised that clay pestles are used in different ways. In fact, clay pestles are essential for the pounding technique where, from the preparation of the clay to the completion of a vase, they are in turn used as hammers (both ends can be used), anvils, counterweights or even for smoothing. We have never observed the use of instruments, other than a clay pestle, which could be used as a hammer or an anvil.

On the other hand, in the casting technique, a clay pestle is used only in one step and only as one kind of tool (a hammer in the Inland Niger Delta, an anvil by the Sarnyéré Dogon). Besides, taking into the consideration the casting technique as a whole, the use of a clay pestle seems exceptional and unique to the Bambara in contact with a Fulani surrounding or, likewise, to the Fulani in a zone where Bambara influence predominates. Indeed, the Southern Bambara who live outside such a zone only use handstones as hammers - which is just as effective.

We can thus be led to believe that concave-based clay pestles are the consequence of convex-based pestles from the pounding technique, adapted to the casting technique. In fact, we will see that the "Bambara" borrowing of clay pestles from the "Fulani" is confirmed by linguistics. Probably the same happened with Sarnyéré potters, a Dogon isolate within a Fulani environment, as has been confirmed by designs on their ceramic (Gally & Sauvain-Dugerdil 1981: 140).

A number of regularities can be drawn from what has been described. From the observation of the use of different forms and sizes of pestles, the following two rules can be stated:

R8: If a clay pestle has the profile of a concave base, then this instrument is used in the technique which consists of shaping the base of pottery on a convex mould.

R9: If a clay pestle with a convex base has large dimensions, then this instrument is used for the initial hollowing out of the clay or during different steps in the making of big vases.

In the future, it would be useful if the border between big and small instruments were defined, using for instance "the size of a clay pestle related to the size of the vase it is used for" combined with the vernacular used for each recipient (big vase, normal vase, small vase).

Furthermore, the following trends can be stated thanks to the exceptional use of some convex-based instruments during the casting technique:

T2: If a clay pestle presents the profile of a convex base, then this instrument is most probably used either as a hammer for the shaping of the base and the body of the pottery - by hammering on a concave surface - or as an anvil held inside the vase while the top of the body is being hammered.

Other trends can be stated but they cannot be considered as "regularities" because of a "counter-example" of the technique used by the Bambara and the Sarnyéré Dogon.

T3: If in the presence of clay pestles, then one is probably confronted with pottery made with the "pounding in a concave shape" technique.

T4: If in the presence of clay pestles, then one is most probably very close to depressions in the ground, used to make pottery.

Considering what has been said above, it seems apposite to state the following trend:

T5: If in the presence of clay pestles, then one is most probably in a social group situated within Fulani influence.

In the meantime, we do not know where the "pounding in a concave shape" technique originated; currently, this technique seems to be very frequently associated with the area covered by the Fulani.

3. 4. Associated ceramics

Since clay pestles are a characteristic of the pounding technique, we present here the ceramic forms obtained by it.

The recipients generally have simple forms with hemi-spherical bases (Fig. 14-15). They are sometimes finished off with feet (Fig. 14: 8; 15: 6), when potters use a mobile plate which is generally a tournette. Some pottery with a very particular role or meaning is also sometimes found - such as stools, hearths, oil lamps or recipients for a wedding trousseau.

Dimensions can be quite large, up to 45 cm high and 52 cm in maximum diameter. A survey led by A. Mayor on a sample of 573 vases from the Delta, made by the pounding technique gave a mean index "height multiplied by the maximum diameter and divided by two" of 24.78 (with values ranging from 8.5 to 47.4; Mayor 1991).

In return, the sides are always relatively thin, from 3 to 12 mm thin, depending on the size of the vase, with a mean value of 6.7 mm (measurement

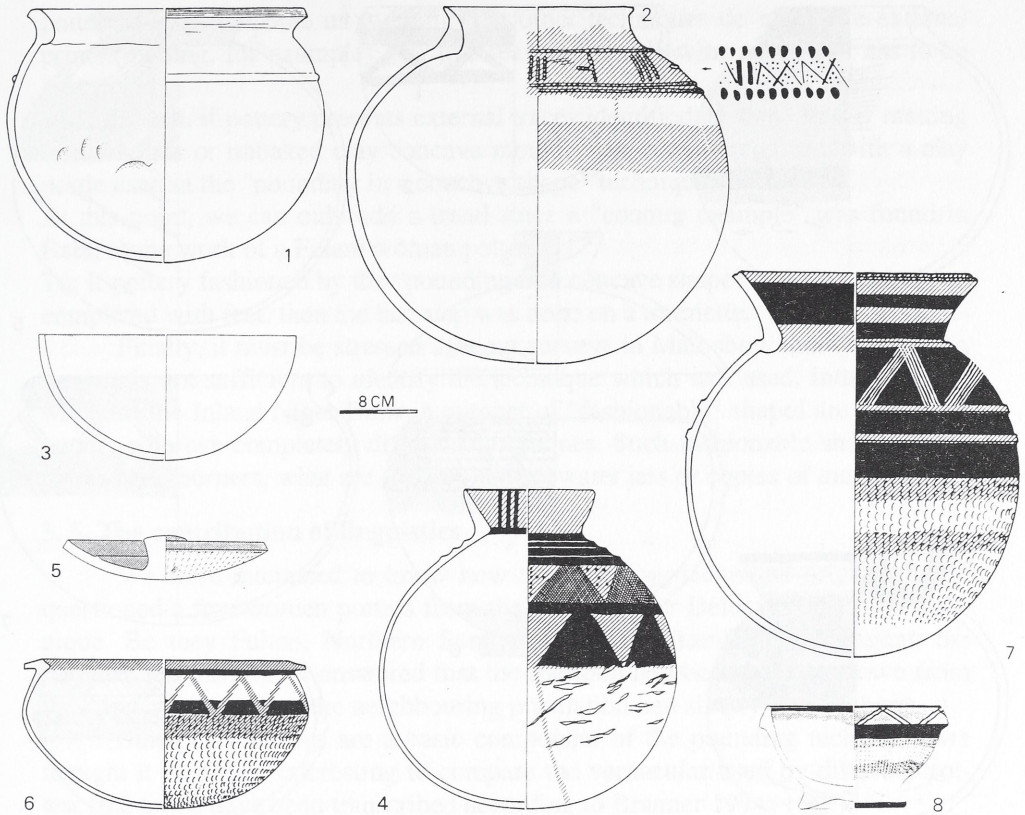


Fig. 14. Pottery from the Inland Niger Delta made using the "pounding" technique and with the use of a clay pestle (1-4: Fulani; 5-8: Songhai).

taken from the middle of the body from a sample of 140 vases of the inland Delta of the Niger). In fact, the pounding technique can make very fine pottery. The slimness of the sides and very dry clay generally do not allow decoration other than paint. Infrequently, necks or the bases of necks are impressed with a string roulette or a impressed flange. On very exceptional occasions, bodies can be slightly impressed with a string or plaited roulette (Northern Somono), or even with a spring (previously a plaited roulette) rolled on a thin layer of barbotine (Mossi). Such very dry clay needs special preparation; a large amount of very finely sieved temper is used - the grains are rarely more than 2 mm in diameter.

This pounding technique is readily identifiable on potsherds. Indeed, besides the flaky texture of the clay, wooden moulds or mats leave a number of embossed traces on the outside of the base and the body, which in the case of wooden or terracotta moulds are negative imprints of faults or fissures. Clay

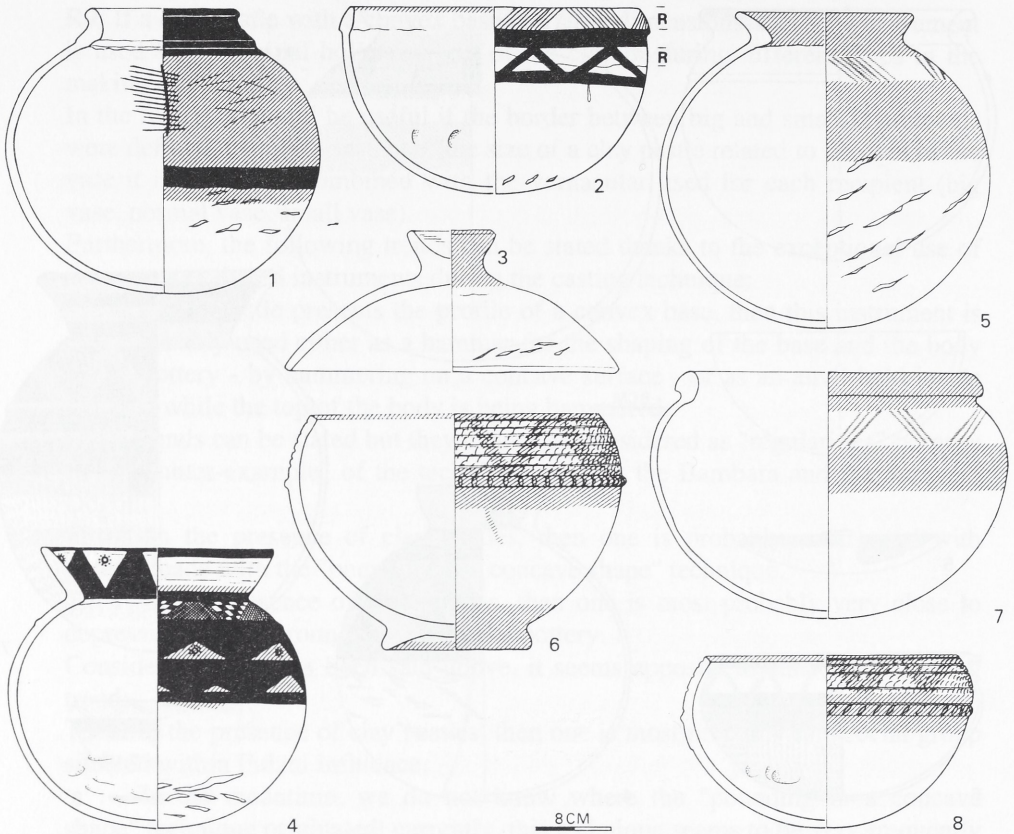


Fig. 15. Pottery from the Inland Niger Delta made using the "pounding" technique and with the use of a clay pestle (1-4: Bambara; 5-8: Somono).

pestles, on the other hand, leave hollow marks on the inside. However, if pottery has been fashioned on a new mould, then outside traces may not be left. In this case, only marks left by a clay pestle found inside the vase can identify the pounding technique. What's more, some vases made with the pounding technique and which have been set on moulds in good shape or carefully smoothed, are sometimes completely void of any significant trace. Only the thickness and the type of clay used, can then reveal the technique which was used.

The following two regularities can be noted from what has been said above. The first is "general":

R10: If pottery presents traces of concentric depressions on its inside (such as is the case for the vases represented in Fig. 14-15), then it has been fashioned with a clay pestle using the "pounding in a concave shape" technique. Unfortunately, a lack of detailed studies on the traces of manufacture left on the surface of African

pottery does not enable us to claim that other techniques do not leave external prints (matting, for example). For this reason, the following regularity has to be "restricted":

R11: In Mali, if pottery presents external traces identified as those left by matting or a wooden or unbaked clay concave mould, then it was fashioned with a clay pestle used in the "pounding in a concave shape" technique.

At this point, we can only add a trend since a "counter example" was found in Babi, in the work of a Fulani woman potter:

T6: If pottery fashioned by the "pounding in a concave shape" technique has been completed with feet, then the last step was done on a tournette.

Finally, it must be stressed that our surveys in Mali show that typology on its own is not sufficient to identify the technique which was used. Indeed, in the whole of the Inland Niger Delta, a number of "fashionable" shapes are copied by potters who use completely different techniques. Such fashionable shapes could be perfume-burners, what are called "doctor" water jars or copies of metal ovens.

3. 5. The contribution of linguistics

We were interested to know how the pounding technique originated and questioned a few women potters from the Inland Niger Delta who use this technique. Be they Fulani, Northern Somono, Northern Bambara or Songhai, the craftswomen invariably answered that the tradition had been brought down from their ancestors and that the neighbouring population had simply copied them.

Since clay pestles are a basic component of the pounding technique, we thought it would be interesting to compare the vernacular used by different potters (the terms have been transcribed according to Brauner 1974: 16ff.).

Most of the Fulani potters (29 out of 41 questioned in 17 different villages), belonging to the maabuuBé, sakeeBé, wayluBé or lawBé "castes", use the word *dunyèrè* sometimes associated with the epithet *mawdo* (big) or *pommeri* (small). In some cases, the words are accentuated in the middle, hence *dung-yèrè* (8 potters of 41, in 5 villages). To the north of the Delta, it can sometimes be pronounced *dunyarè* (3 potters of 41, in 3 villages). Only one Fulani potter from *Sindégué* in the centre of the Delta pronounced it *dunge*. Although it seems to have the same root as the other pronunciations, we have not found other examples. These designations are typically Fulani. R. Leger was kind enough to confirm this. He broke the word into *dunya* (world, ground, earth) and *re* (object) and according to him, it could mean "instrument which makes from earth".

The Northern Bambara use *dunyarè* mainly (6 potters out of 9 questioned in 8 different villages) which is equivalent to the Northern Fulani version. Only one potter used *dunyèrè* - the preferred designation of the Fulani from the Delta. A slightly different one is *dunungè* which seems to have developed within the western border of the Northern Bambara territory, for example in *Mayel Borgou* and *Fanabougou*. *Dunyarè* and *dunyèrè* have indeed been borrowed from the Fulani and neither sound like nor mean anything in Bambara. As for *Dunungè*,

though it sounds Bambara, it has no meaning in this language. It is probably a local adaptation of *dungè*, used by the Sindegué Fulani potter. We are therefore forced to note that the Northern Bambara do not have their own designation to describe the tool used in this technique. Though the Northern Bambara generally seem to have learnt this technique from the Fulani North of the Delta, some "western" families towards Mayel Borgou seem to have learnt it from Fulani potters in the Sindegué region - both regions are joined by the Niger river. Surveys should be lead for cross-examination and confirmation.

Songhaï potters use *dunyarè*, a variant of the "Northern" Fulani vernacular term (2 potters of 6 questioned in 6 villages). Nevertheless, there is a tendency to replace the prefix *dun* by *din* (*dinyarè*: 1/6; *dinyèrè*: 2/6). This is closer to the Songhaï pronunciation but has no meaning in their language. Though observations are few, it seems plausible to say that the Songhaï acquired this technique from the Fulani, North of the Delta where these two populations are in constant contact. One Songhaï woman potter from Banga used the word *dundunyè*; we have not been able to cross-examine this and it was impossible to determine whether it had a particular meaning in Songhaï. All we can say is that it has the same root as the Fulani one and that it is reminiscent of *dunugè* used by the "Western" Bambara from the North.

Finally, the Northern Somono, who also use the pounding technique, call a pestle a *dundébé* (2 potters of 4 questioned in 4 different villages), a *dunébè* (1/4) or a *dunabé* (1/4). A very brief survey showed that such a designation does indeed sound "bozo" (Somono language) but has no meaning. This has to be confirmed. Nevertheless, these designations also have the same root as the Fulani *dun* and it seems probable that the Somono also borrowed this term and technique from the Fulani potters. It seems, therefore, that in the Inland Niger Delta, the "pounding in a concave shape" technique is indeed of Fulani origin and has been borrowed by neighbouring populations.

We have little data from other regions where this technique is used. In Nigeria, the Zamfarawa use *dundunge* (Krieger 1961: 363) which is close to *dundunyè* and *dunugè*, used by some Songhaï and some Bambara from the Inland Niger Delta, respectively. In the Sudan, A. J. Arkell mentions that Tama populations use the vernacular *duggaga* (Arkell 1939: 90). According to R. Leger, *duggaga* and the Fulani *dunyarè* have the same origin. This could point to a common technological origin.

On the other hand, other ethnic groups use different designations, such as *mudagg* used by the Omdurman potters (Crowfoot 1924: 21) or *lungbali* by the Gulmance (Geis-Tronich 1991: 414). The Mossi from the Western part of Burkina Faso use *tibugo* (from *tibu*, meaning to tap softly), sometimes pronounced *tibga* (Llaty 1990: 106) and has become *tibgu* for their neighbours, the Kurumba (Stössel 1986: 246). The Dogons from the Western fringe of Burkina Faso use the word *tumo í* (literally "small stone") sometimes preceded by *legu* (literally "small stone in earth") and often used in a periphrasis such as *nya danga*

í ma tumo í ("small stone to make little pots for cooking tô"). Tumo í is also used by the Sarnyéré Dogon in a deformed way: tuoí (Gallay & Sauvain-Dugerdil 1981: 90). This should be studied in depth and analysis systematically carried out to understand the meaning and origin of such diverse designations.

Let us mention one last example of a Bambara woman potter who had been given a clay pestle by a Northern Somono colleague. This event is further described in 3.6. Not knowing the pestle's original designation, the Bambara potter baptised it da gosilan (literally "which hits pottery"). Such a periphrase is interesting and shows how difficult it is to create a new word in one's own language, in order to describe an object outside one's own culture. In the same way, the Bambara potter from Bounga who had invented a special concave-shaped pestle to decorate her pottery, named it da bumbunan ("which moulds pottery").

In the present state of research, we can postulate that the "pounding in a concave shape" technique used by Fulani castes from the Inland Niger Delta and a number of other groups in close contact with the Fulani, possibly travelled thanks to the displacement of Fulani themselves or by craftsmen who accompanied them in their displacements. This strengthens our trend, T5, relating clay pestles to the Fulani sphere of influence. As for the Sarnyéré Dogon, the instruments they use have most probably been borrowed from the Fulani tradition and their designation rebaptised into local dialect. Presently, we still have to solve the case of the Mossi, the Burkina Faso Dogon, the Kurumba, the Gulmance and the Omdurman potters.

3. 6. The causes of diffusion

Now that the ethnographical and ethnoarchaeological data have been described, it is interesting to understand the spreading of the use of clay pestles. We do not wish to present here a theoretical study of the different kinds of diffusion; instead, we will illustrate two kinds by describing explicit examples we observed.

Our first example is situated in the centre of the Inland Niger Delta, in Siratinti. In this village, the potter M. Konaté-Kumaré, both a blacksmith's (numu) daughter and widow, uses two completely different techniques depending on the desired form: the "casting on a concave shape and convex shape technique". Her ware is sold to the outside in a regional market in Djenné, 8 km from Siratinti. Around 1960, she met a Northern Somono colleague who gave her the kind of clay pestle she used in the pounding technique. Eversince, M. Konaté-Kumaré has been using this instrument in the casting on a concave shape technique. She first fashions the clay carefully in a ceramic cast placed on the ground. Whereas this is usually done with fingers, she uses a clay pestle. She then places the clay-coated cast onto a tournette and then proceeds in the traditional way. Unacquainted with the Somono vernacular for clay pestle, she baptised hers da gosilan (see 3.5.).

Here then is an example of diffusion between two women potters from two distinct regions, belonging to two different ethnic groups using two divergent modelling techniques. Nevertheless, this is a very restricted type of diffusion since only the tool was handed over but neither the name, nor the technique for which it was conceived, nor even its function. Indeed, its initial use was as a hammer or an anvil to pound dry and dense clay. Here, it is used as a "mixer" to fashion soft clay, without hitting it. This sole example only shows that such a diffusion has small chances of being of durable consequence. 70 year-old M. Konaté-Kumaré has never made copies of this tool and his daughters do not use it ("too unconventional" for them?).

Two complementary examples illustrate the second type of diffusion. Again in the centre of the Inland Niger Delta in the village of Kobassa, women potters from a Southern Somono blacksmith's caste (*kugukaïgu*) once made pottery only using the "casting on a concave shape" technique. Around 1935, F. Nyafu-Samasséku, a Northern Somono woman potter, herself a blacksmith's daughter, came to the village to marry. She is from Wandiaaka, a village 100 km North of Kobassa, where she learnt the pounding and casting techniques, as is the custom for the Northern Somono.

F. Nyafu-Samasséku brought with her three clay pestles. With them she fashioned pottery she called *wagniakwalu* ("Wandiaaka vase") common north of the Delta but unusual in Kobassa. This kind of pottery became successful amongst the Fulani in the surrounding areas and other Kobassa potters came and borrowed these pestles they then called *dunabé* (a contraction of the Northern *dundebè*) and learnt the pounding technique.

Today, a number of Somono potters from Kobassa also occasionally make pottery usually termed *mabwekwalu* ("Fulani weaver vase") of "Fulani tradition" which they sell exclusively to the Fulani, in markets (Djenné in particular), encampments, neighbouring villages or at their home. This was confirmed by one of our surveys in Hogel Kortji, one of the Fulani hamlets situated 5 km from Kobassa. A large number of these kind of vases were used (39% of the pottery) despite outrageous costs (5 to 10 times more expensive than a Somono vase of the same size, according to our informant). Hence, as a result of exogamy, we are faced with the diffusion of technology between a number of potters of the same ethnic group but from different regions, where one group masters an additional technology unknown to the other. The transfer is total. Indeed, not only the object, its name, its initial function and accompanying technique are passed on to the other women, but also specific shapes typical of the technique and which are spread in the neighbouring population. This diffusion is nevertheless restricted. In truth, these three pestles have for the one never been copied. Diffusion is thus done only by "borrowing" material. On the other hand, the resulting shapes are not used by the producers but only made for a small "expatriated" part of the population (in the concrete case of the Fulani).

The following and last example is the same kind of diffusion but has a totally different impact.

North of the Inland Niger Delta two neighbouring villages can be found separated by a wide ditch: Kakania-Bozo, populated by the Bozo and the Northern Somono, and Kakania-Peul, populated by the Fulani, mainly. Beforehand, the Somono potters from Kakania-Bozo only used the "casting on a concave shape" technique. Fishing was plentiful and Somono fishermen preferred to store the fish oil in the dense and waterproof-sided Fulani vases made with the pounding technique. Consequently, they went to buy a great number of these vases from a Fulani potter, established in Kakania-Peul and who practised the pounding technique using a clay pestle on a wooden cast. D. Kéwé-Bilakoro, equally a Northern Somono potter, came to Kakania-Bozo to marry around 1940. She came from Bango, a village 47 km to the North-East, where she learnt both the pounding and the casting technique. Her arrival seems to coincide with the beginning of the economical recession; fishing was less plentiful due to unfavourable climatic conditions. Accordingly, the Somono made less use of the Fulani vases for storing fish oil; they probably also had less money to buy them. Thereafter, potters from Kakania-Bozo sought the help of D. Kéwé-Bilakoro to introduce them to the pounding technique and indirectly to the use of clay pestles they called *dundebè*, as in Bango. Today, the pounding technique is widely used by the Somono potters of the village and production abundant within all compounds (a Somono compound, in which a count was done, produced 42% of Somono pottery assembled using the pounding technique). This is the same kind of diffusion as that found in Kobassa. However, the passing on of technology in Kakania-Bozo was more successful; clay pestles thrived and what's more production was adopted by the potters themselves. It is very probable that the Fulani vases' reputation of impermeability has a lot to do with it. Note that it needed the arrival of a potter from a fairly remote village but from the same ethnic group to spread a technology. Before, Somono potters never thought of copying the Fulani potter on the other side of the ditch, only 50 m away.

We thus conclude that different events have caused the diffusion of the use of clay pestles and indirectly the diffusion of associated technology, in particular contacts made at the market and the custom of exogamy. As such, transfer of technology is not assured of success. A number of factors play a part, namely ethnical compatibility, the existence of a potential market, different economical pressures or the acceptance of new products by the producing families.

4. The meaning of "archaeological" instruments and interpreting them

The following chapter is divided into two. To begin with, we will draw up a list of archaeological data. Then we will draw analogies between past and present cultural materials to interpret archaeological remains using the regularities and trends previously defined.

Instruments of interest were discovered on Sahelian sites in Mali, Burkina Faso, Niger, Nigeria and Tchad. Apparently unknown in Neolithic times, the oldest known pestle appeared in Niger at the end of the 1st millennium B.C. and was used by those populations who introduced iron technology to this part of Africa. Then from the V to the IX century A.D., these instruments were frequently used by populations of the Nigerian and Tchadian Sahel, especially by the people of "Haddadian traditions" who may have come from Méroé - where instruments of this kind are not to be found! All these populations were familiar with cattle breeding, hunting, fishing, probably agriculture and, above all, intensive iron metallurgy. These terracotta instruments were sometimes decorated on their base with embossed designs. They were found either in blacksmiths' workshops or in habitats, sometimes raised in the shape of mounds. Houses were circular, tents or banco houses close to pits used as silos or midden. Iron smelting was done in most villages. Tombs can be found inside habitats or gathered in a necropolis outside the village. It seems that those who used these instruments were occasionally buried with them; they did not wear stone necklaces and their tombs were grouped in a same place within the necropolis. These objects were used in Tchad by the Sao during the X/XI centuries and towards the end of the XVI century and then by the Kanuri-Kotoko from the end of the XVI century onwards. They belonged to the urban phases of these periods and have lasted up until now, within a framework of fishermen and breeders who also have a cotton industry.

It seems that it was at this period that clay pestles were also first introduced into the Niger valley. Thus present in El Oualadji possibly around the X and XI centuries, a rather peculiar form of pestle - type II - was used by Tellem-Kurumba populations from the end of the XII century. Following this episode, their use became widespread within the Sahelian region in Mali, Burkina Faso and Niger.

The fineness of the sides and the hemispherical bases of accompanying pottery must be stressed; feet were apparently unknown of.

Traces on the surface of the pottery hint that two assembly techniques were used at the same time. A technique using coils, as for the beautiful "Haddadian" painted ceramics, and a second technique which combines the use of pestles and matting. Both of these instruments left clearly identifiable traces on the inside and the outside of pottery. We compared these instruments with current clay pestles, in an attempt to identify and interpret them. Both types show the same shapes, proportions and silhouettes. This is substantiated by the similarity of the mean indexes A and B. However, average dimensions of type I archaeological objects are slightly smaller than current ones.

A certain number of present-day peculiarities are not found on ancient tools. None of the bases were concave and the tops were not cupped. On the other hand, the ancient type, whose active surface left a network of characteristic prints on the inside of vases, seems to be completely out of use nowadays. Considering

that these past and present instruments not only come from the same geoclimatic environment but also from populations who were at a same techno-economical level, we can compare these archaeological objects with current clay pestles.

Previously stated regularities and trends complete our interpretation. Convex-based clay pestles found on archaeological sites were indeed only used for the making of pottery (R2), most probably using the "pounding in a concave shape" technique (T3). In all likelihood, they were used as hammers, pounding the vase's base and body into shape or as anvils which were held inside the vase whilst the top of the body was being hammered (T2). Some of the big-sized pestles, measuring up to 164 mm in height, were used for the initial pounding of the clay lump or during different assembly steps in the making of large vases (R9). We can even specify that these pestles belonged to populations related to the Sahelian or sub-Saharan area (R1) and, what is more, probably to the Fulani sphere of influence (T5). There is probably sexual differentiation in craftsmanship (T1); most of these instruments found on sites where iron was crafted were used by women belonging to a "casted" social group (R3).

In permanent habitats, at least in Niger and Nigeria (cf. R6), where clay pestles were found, the chances of finding, at least in Niger and Tchad, blacksmiths', cobblers', weavers' and coopers' workshops, are high (R7). Potters' workshops must have been nearby (R5). They are probably discernable thanks to depressions in the ground, which were originally used to support pottery (T4). We have thus been able to give prehistoric pestles a social and technical meaning by resorting to ethnoarchaeology. Without this stratagem, archaeology alone could not have generated such an interpretation.

5. Conclusion

In this paper, we hope to have shown the importance of ethnoarchaeology - the science where a research worker actually interprets archaeological facts - in dealing with African prehistory, particularly during its last phase.

We thus believe that archaeologists should be aware, henceforth, of the problems which exist in trying to interpret ancient remains, so as to give ethnoarchaeologists the possibility of solving them, as long as the characteristic long-lasting traditions are still preserved in African cultures.

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