LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

MAREK CHŁODNICKI

The petrographic analyses of the Neolithic pottery of Central Sudan

In recent years the research on pottery technology has turned more and more in the direction of petrographic analyses. These include the analysis of materials being a potential base for pottery production as well as the mineralogic and petrographic analyses of the products themselves. The goal of these studies is the identification of the place of origin of the pottery, the sources of the materials used in its production and a precise definition of the models of pottery production present in a given community.

As regards the Neolithic pottery of the Central Sudan, we have at present at our disposal a small series of petrographic analyses, but it is to be expected that in the near future this number will increase rapidly. Analyses are being carried out on samples from new sites and at the same time the number of samples from complexes already analysed is growing. The results obtained so far gave rise to new questions which are still to be answered.

So far, the abbreviated results of analyses of the pottery from Shaheinab (Nordström 1972: 80) and Um Direiwa (Nordström 1981: 243) have been published. At our diposal are also the analyses of pottery from the Kadero site. Ten samples were investigated by Fekri Hassan and C. Van West, another ten were analyzed by M. Pawlikowski. Studies of this sort were also carried out for pottery material from Geili and Kadada, but they have not been published yet.

Different approaches to the subject taken by various scientists do not always render the results of their work comparable although they are to some extent complementary due to the emphasis put on various aspects of pottery technology by different authors.

On the basis of available analyses it is possible to determine that the Neolithic communities of the Central Sudan used Nile mud for the production of pottery. Silt formed 60 - 70% of the ceramic paste, although in extreme cases the figure fell to 40% or rose to 80%. The silt was weakened by admixture of sand, and only exceptionally was the pottery made of unweakened material. Predominant in the Kadero material was a sand admixture with grain coarseness up to 0.1 mm, rarely exceeding

0.4 mm, while grains with coarseness more than 1 mm occur only exceptionally (Fig. 1). In Shaheinab the admixture grain coarseness is usually up to 0.25 mm, never exceeding 0.8 mm (Nordström 1972: 80). In Um Direiwa grain coarseness of the admixture rarely exceeds 0.5 mm (Nordström 1981: 243). Variously set limits for particular classes of grain size make a detailed comparison of the granulometric differentiation of pottery from different sites impossible (the same is true for the samples analyzed by F. Hassan and M. Pawlikowski). Nevertheless, it is possible to state that the admixture used in pottery production of all the Central Sudanese Neolithic sites consisted mainly of fine and, at most, medium coarse sand.

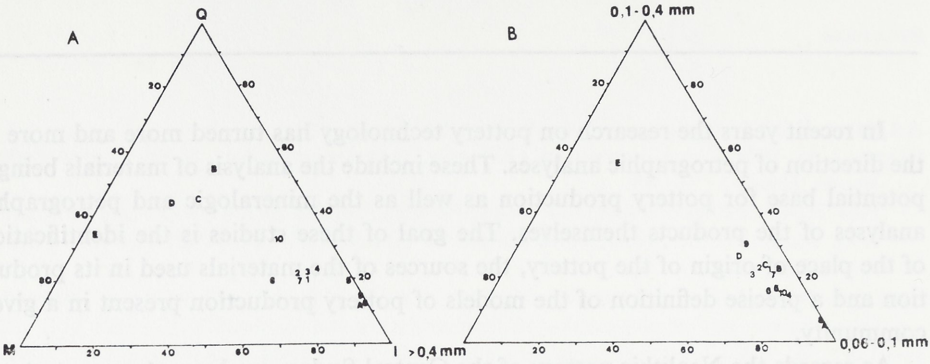

FIG. 1. Triangle diagrams of the mineral composition (*A*) and grain-size distribution (*B*) of th Kadero pottery and ceramic raw materials (in % of capacity)

1 - 10: Samples of the pottery; *A - E*: Samples of ceramic raw materials; *A*: Nile silt from Kadero; *B*: The soil from the surface of the site; *C*: The soil from the depth of 10 cm; *D*: The soil from the depth of 35 cm; *E*: The sand from the depth of 10 cm *Q*: Quartz; *M*: Fragments of metamorphic rocks; *I*: Clay mass

The texture of the ceramic paste is porphyritic with random distribution of grains a characteristic occurring in hand-made pottery. The grains are usually subangular or subrounded in shape. Analyses of soil samples from the Kadero site have shown that the sand used as an admixture may have been taken directly from the surface or from a shallow layer (samples B-D). Probably, three to four parts of mud were mixed with one part of sand.

The mineral most common to the temper is quartz. Feldspar and mica also occur, but in small amounts. Only in the Um Direiwa samples does feldspar occur in amounts approaching quartz contents (Nordström 1981: 243). Mainly it occurs as microline and plagioclase, while mica is identified as muscovite and biotite. Also noted in the pottery is the presence of orthoclase, tremolite schist and hornblende.

As important as the mineral composition and the granulometric definition of the pottery is the attempt to define the ceramic different technological groups which is very helpful in the cultural interpretation of the mineral, the defining of models employed in pottery production and the number of sources of ceramic material.

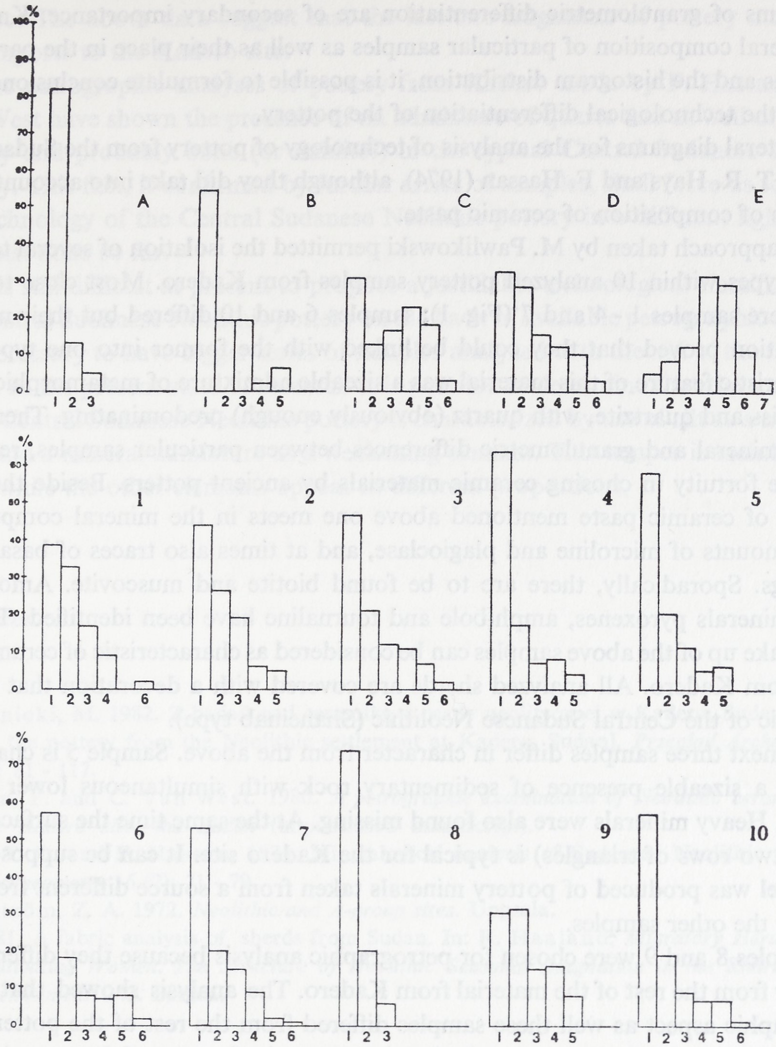

FIG. 2. Results of the granulometric analysis of the samples of pottery and ceramic raw materials from Kadero

1 - 10: Pottery samples; *A-E*: Ceramic raw material samples

Intervals of the admixture thickness

1: up to 0.06 mm; *2*: 0.06 - 0.1 mm; *3*: 0.1 - 0.2 mm; *4*: 0.2 - 0.4 mm; *5*: 0.4 - 1.0 mm; *6*: 1.0 - 2.0 mm; *7*: above 2.0 mm

For technological differentiation of the pottery a good method seems to be the way proposed by M. Pawlikowski. Of basic importance here is the tracing of similarities and differences between particular samples with the help of three mineralogic components and three granulometric groups as seen in the diagram (Fig. 2). The histograms of granulometric differentiation are of secondary importance. Knowing the mineral composition of particular samples as well as their place in the particular diagrams and the histogram distribution, it is possible to formulate conclusions concerning the technological differentiation of the pottery.

Trilateral diagrams for the analysis of technology of pottery from the Sudan were used by T. R. Hays and F. Hassan (1974), although they did take into account other elements of composition of ceramic paste.

The approach taken by M. Pawlikowski permitted the isolation of several technological types within 10 analyzed pottery samples from Kadero. Most close to each other were samples 1 - 4 and 7 (Fig. 1); samples 6 and 10 differed but their mineral composition proved that they could be linked with the former into one type. The characteristic feature of this material was a sizeable admixture of metamorphic rocks like gneiss and quartzite, with quartz (obviously enough) predominating. There exist certain mineral and granulometric differences between particular samples, resulting from the fortuity in chosing ceramic materials by ancient potters. Beside the components of ceramic paste mentioned above one meets in the mineral composition small amounts of microline and plagioclase, and at times also traces of basalt rock chippings. Sporadically, there are to be found biotite and muscovite. Among the heavy minerals pyroxenes, amphibole and tournaline have been identified. The mineral make up of the above samples can be considered as characteristic of ceramic material from Kadero. All analyzed sherds are covered with a decoration that is characteristic of the Central Sudanese Neolithic (Shaheinab type).

The next three samples differ in character from the above. Sample 5 is characterized by a sizeable presence of sedimentary rock with simultaneous lower quartz content. Heavy minerals were also found missing. At the same time the surface decoration (two rows of triangles) is typical for the Kadero site. It can be supposed that the vessel was produced of pottery minerals taken from a source different from that used for the other samples.

Samples 8 and 9 were chosen for petrographic analysis because they differed stylistically from the rest of the material from Kadero. The analysis showed that in the petrographic aspect as well these samples differed from the rest of the pottery. The different character of sample 8 resulted mainly from the fineness of the ceramic paste, which also had a larger content of sedimentary rock fragments, silty-dusty in character. It belongs to a vessel with a plastically modelled band just below the mouth, decorated with a dotted herring-bone pattern, which is a rarity in the Central Sudanese Neolithic pattern.

Sample 9 with a rough surface and impressed with hardly visible pattern different in character from others found at Kadero, has an admixture that differs most from the remaining pottery. These differences are visible in macroscopic examination (Chłodnicki 1982). The sample is characterized by a large admixture of rock fragments identified as being of granite-syenite group, with large amount of perthite — a mineral that does not appear in the remaining samples and analyzed materials from

Kadero. The above data suggest that the last two fragments of pottery may represent imports to the Kadero site.

The petrographic analyses of pottery from Kadero made by F. Hassan and C. Van West have shown the presence of an admixture of quartz and as well of crushed pottery and probably bone (or dahlite?) in the typical Central Sudanese Neolithic pottery. This fact, if confirmed by further series of samples, shall force us to look at the technology of the Central Sudanese Neolithic pottery in a different light than it has been done so far.

It is still difficult at present to propose a justifiable technological classification of the Central Sudanese Neolithic pottery on the basis of available petrographic analyses. It is necessary to have bigger series of samples analyzed with the aid of the same methods. In the present state of research it is possible to determine that the technology of the Central Sudanese Neolithic pottery is characterized by use of silt as a modelling mass and a mineral admixture as a weakening element. This temper is mainly quartz sand, while the other elements appear in different proportions.

References

Chłodnicki, M. 1982. Z badań nad ceramiką z osady neolitycznej w Kadero, Sudan [Studies on the pottery from the Neolithic settlement at Kadero, Sudan]. *Przegląd Archeologiczny* 30: 81 - 117.

Hassan, F. and C. Van West. 1980. *A petrographic examination of Neolithic ceramics from the Kadero site, the Sudan* (unpublished manuscript).

Hays, T. R. and F. Hassan. 1974. Mineralogical analysis of Sudanese Neolithic Ceramics. *Archaeometry* 16 (2): 71 - 79.

Nordström, Z. A. 1972. *Neolithic and A-group sites.* Uppsala.

— 1981. A fabric analysis of sherds from Sudan. In: R. Haaland, *Migratory Herdsmen and Cultivating Women. The Structure of Neolithic Seasonal Adaptation in the Khartoum Nile Environment*: 243. Bergen.