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PRESENT-DAY TRADITIONAL AND NON-TRADITIONAL POTTERY PRODUCTION IN AMOZOC, SAN MIGUEL TENEXTATILOYAN AND LOS REYES METZONTLA (CENTRAL MEXICO)

Abraham van As, Loe Jacobs and Gilda Hernández Sánchez

Abstract

This article presents the observations taken during a visit in the summer of 2010 to a number of pottery workshops in Amozoc and San Miguel Tenextatiloyan situated in the Mexican state of Puebla. Here, consumer pottery is still traditionally made. Our description of the activities of the potters is mainly focused on the production sequence (chaîne opératoire) of cazuelas (open mouth bowls with handles), ollas (jars) and comales (earthenware griddles). At the same time, we pay attention to the workability properties and fabric of clays used by the potters. In Los Reyes Metzontla, another community of potters in the region, traditional pottery is almost no longer made. Thanks to a governmental stimulating program, a new kind of ceramic art production, destined among other things for the tourist market, has been developed.

Introduction

In the context of the research project *Ceramics and Social Change. The Impact of the Spanish Conquest on Middle America's Material Culture*[1], the authors together with four students of Leiden University[2] visited Amozoc, San Miguel Tenextatiloyan and Los Reyes Metzontla situated in the Mexican state of Puebla (Figure 1). The reason for our summertime visit was to document the activities of potters who are still making consumer ware in a traditional way. Of the three pottery communities, however, this appeared to be the case in Amozoc and San Miguel Tenextatiloyan only. We had the opportunity to acquire a representative collection of traditional earthenware vessels from these locations, for the National Museum for Ethnology in Leiden. In Los Reyes Metzontla the potters had abandoned their traditional pottery production and had switched to the production of ceramic art objects intended for sale to the tourist market and other outlets.

In this article we describe the observations taken during our visit to a number of pottery workshops.[3] We pay attention to the production sequence (*chaîne opératoire*) of the consumer ware in Amozoc and San Miguel Tenextatiloyan, i.e. the entire manufacturing

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process from preparing the clay, forming, glazing and painting to drying and firing the pottery.[4] The pottery includes *cazuelas* (open mouth bowls with handles), *ollas* (jars for cooking, containing and transporting liquids), *piñatas* (vessels used for special occasions) and *comales* (earthenware griddles). In addition, we discuss the workability properties and fabric of the clay used by the potters through presenting the results of the analyses of the clay samples taken in some of the workshops. Finally, we give a brief perspective of the renewed non-traditional potters' activities in Los Reyes Metzontla.

Traditional pottery production in Amozoc

Amozoc is a town located ca. 17 km southeast of Puebla, the capital of the Mexican state of the same name founded as a settlement for Spaniards in early colonial times and famous for its Talavera ceramics, decorated tin-glazed earthenware (Majolica)[5],

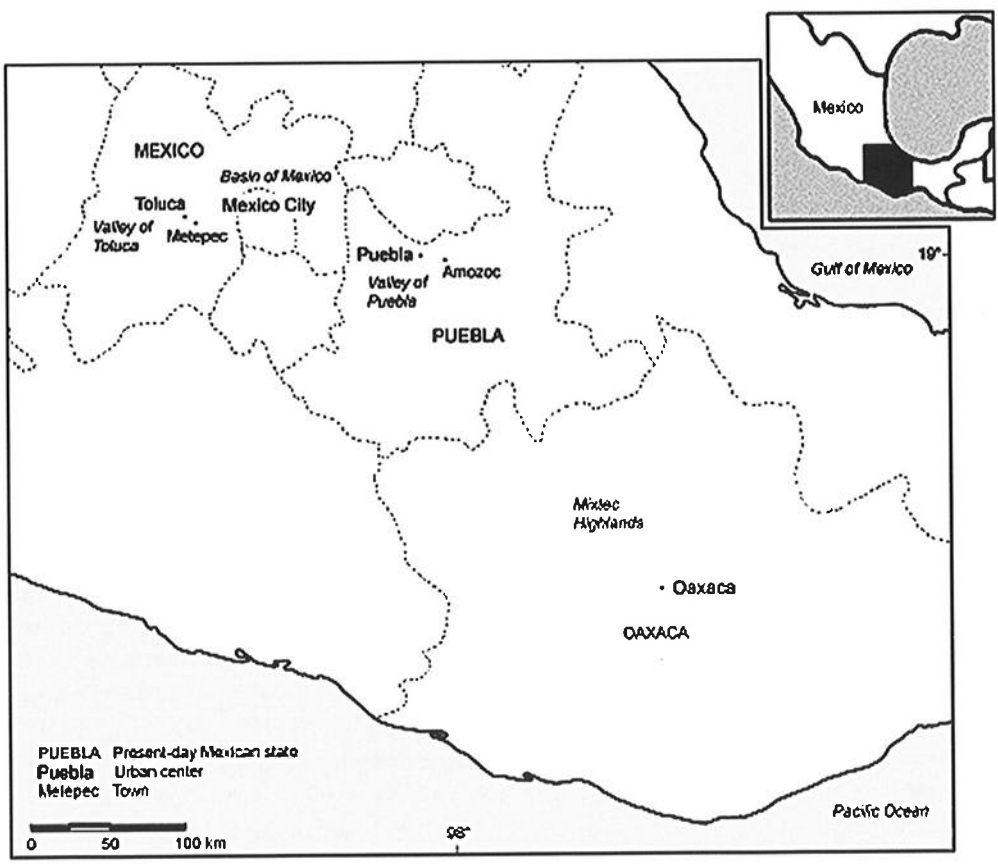


Figure 1. Map showing the pottery towns in Central Mexico amongst which the pottery towns mentioned in the text.

baroque architecture and numerous buildings decorated with Talavera tiles. Amozoc, together with many other towns in the Valley of Puebla, has existed since pre-Hispanic times. An earlier study of the potters of Amozoc (Hernández Sánchez 2007) deals with pottery made for utilitarian purposes. They use the two-chamber kiln and produce glazed earthenware vessels. The wheel however, may not be present or has only a secondary role.

"Potters work in familiar workshops, most of them full time and most of them are men although women and children relatives help in minor tasks. Usually the knowledge is transmitted in the family for generations.....Today the pots of Amozoc have a wide distribution. They are sold in Puebla, Mexico City, and in several regional markets of Central Mexico and parts of South Mexico. The vessels of Amozoc have found a niche in the present-day traditional Mexican gastronomy. They are used for cooking and serving typical Mexican food; accordingly they must look traditional. Surely, this is one of the main reasons that potters still use traditional manufacturing techniques, that young generations of artisans exist, and that workshops are well organized and allow one to earn a living" (Hernández Sánchez 2007: 162, 163).

Amozoc: workshop 1

The first workshop we visit in Amozoc was studied earlier by Gilda Hernández Sánchez (Hernández Sánchez 2007: 162-170). Here, Juan Antonio Sánchez together with two of his sons concentrates on the manufacture of *cazuelas*. These vessels are made to order in various sizes. In sequence from small to large: *ochito, diecito, tlaco, de a tres, de a dos, de a medio, de a real, dos reales. ¼ de campana, media campana, ¾ de campana, campana, campana y cuarta.* The most wanted size is *media campana* with a content of ca. 160 liter. The shape of a *cazuela*, dependent on the shape of the mold over which the vessel was made, can differ from one workshop to another. A workshop can also be recognized by the decoration motifs on the *cazuelas* and the intensity of the color of the painted motifs.

The family Sánchez is specialized in the manufacture of the enormous *cazuelas* for *mole* (a typical Mexican feasting meal consisting of a sauce of chillies, chocolate and other ingredients added to chicken or pork) and *carnitas* (pork meat cooked in oil) (Hernández Sánchez 2007: 165).[6] They sell their products directly to their customers. In other cases, if the potters do not have a truck to bring their products to the market the *cazuelas* are sold through middlemen. These people often buy large sets of custom-made *cazuelas*, sometimes unfired or only biscuit-fired.

The clay used by the Sánchez potters comes from the mountains not far from Amozoc and is transported in a small truck to the workshop where the family also has its living. Not only the clay, but also the glazes and the wood used as fuel for their kiln, situated in the workshop courtyard, is purchased.

The potters do not work on Sunday, because according to Juan Antonio "even chickens do not lay eggs on Sunday". On Monday or Tuesday the potters prepare their clay.

The rest of the week they are at work on the manufacture of the *cazuelas*. Their working schedule, however, is dependent of the weather. If it rains much the various drying phases in the manufacturing process take more time than during nice sunny days.

After mining 'fine' and 'coarse' clay, the clay is still humid. Once in the courtyard of the workshop the clay is allowed to dry. Next, the potters crush the lumps of dry gray/brown colored clay with a thick stick and mix the clay. They let the clay soak for ca. five hours. Hereafter, the potters start to knead the clay by trampling the paste bare-footed. Finally, they form blocks of clay and let them thicken and stiffen in the shade, sometimes as many as eight days. If it begins to rain and the blocks of clay are not yet dry enough, they are bought inside the workshop for further drying. Here, to save space the clay is smeared against the wall. As soon as the clay comes easily loose from the wall the consistency is fine.

The *cazuelas* in the workshop of the family Sánchez are made through molding and coiling. For shaping the lower part of a big *cazuela*, called *cajete*, Juan Antonio prepares the necessary amount of clay. Given the altitude (ca. 2200 m above sea level) of Amozoc this is a rather laborious job. He works on a concrete slab put on the workshop floor. Regularly powdering the slab with dry clay dust to prevent the clay sticking to it, he kneads the clay with his hands, lifts the lump of clay repeatedly up and smashes it with force on the concrete slab. Smearing, bumping and tapping the clay Juan Antonio forms the clay body into a circle-shaped heap of clay. He starts to knead the clay with his feet. Going around he pushes the clay from the center to the outside. Repeatedly rounding off the edge of the piece of clay, the unwanted coarse stones are taken out of the clay. After having turned the piece of clay, he tramples the clay into a slice of 1.5 to 2 cm thick with a diameter of ca. 1 meter. Finally, Antonio sitting on his knees flattens the clay and tightens its microstructure by tapping the clay with a stone (Figure 2).

In the courtyard we find a number of ceramic molds. Some of them present traces of use in the form of holes and cracks. Before using these molds again the holes and cracks are filled up with soft clay. Other molds are repaired with iron clamps.

Before molding a *cajete*, the mold is moistened and saturated with water in order to prevent an excessively strong suction and consequently fast dehydration. After the mold is turned upside-down and powdered with dust so that the clay cannot easily stick to the mold (Figure 3), the mold is covered with the flat piece of clay (Figure 4). If the piece of clay for shaping a large *cazuela* is too big to handle for one person, two of the potters cover the mold with it. Next, the clay is pressed against the mold and tapped with a *piedra cantera* (a piece of sandstone) (Figure 5). By piercing the clay wall with a piece of iron wire the potter controls the desired thickness of 1 cm. The mold covered with the *cajete* is put on a ca. 50 cm high pedestal existing of a drum of an old washing machine (Figure 6). During the drying process the potter taps the base part of the *cajete* still covering the mold with a flat stone. This way, the shrinkage tension in the drying clay is diminished and the correct pressure tension in the base is reached. By beating the clay the heat-shock resistance of the vessel is improved. This is important because

the *cazuelas* are used for cooking and stewing dishes. Then, the vessels are standing directly above an open flame that heats the base locally underneath. The heat is better divided than in a metal pan. For this reason, the food does not burn and tastes better. After beating the clay, the *cajete* is smoothed by rubbing the clay with a stone and a piece of leather or textile (Figure 7). Small stones still present in the clay are taken out. Next, the rim is horizontally cut with a wire (Figure 8). The new-formed rim is slightly loosened from the mold and with the use of moist cloth bended outwards. As a result, the rim has the appearance of having been made on the fast potter's wheel.

After about one day of further drying outside, the *cajete* is removed from the mold. The *cajete*, which is now strong enough to manipulate, is brought into the workshop and put on an old automobile tire (Figure 9). Because of the heavy weight of the *cajetes* the potters wear a broad renal support against backache. Usually, the shrinkage cracks in the wall are filled with clay. In some cases we saw potters stop such cracks by piercing two small holes at both ends of the cracks. In other instances the cracks are temporarily repaired with iron clamps. By doing so, the potters prevent the development of more cracks during forming the *cazuela.*

A large *cazuela* is formed by adding two coils of clay on top of a big *cajete*. The clay coils are rolled out on a concrete slab on the workshop floor. Since the diameter of the *cajete* is very wide, the potter has to use two thick coils. The coils are pressed next to each other on the flattened, roughened and moistened rim of the leather-hard *cajete* (Figure 10). The potter, while walking backwards and sometimes forwards around the *cajete*, forms the upper part of the wall by pushing the coil upwards between the balls of both hands (Figure 11). He smoothes the surface of the vessel with hands covered with wet slip, a rubbing stone and a kind of large rib. Finally, after a drying period the potter forms the rim by adding a less thick coil of clay. Walking around the *cazuela* he smoothes the rim with a piece of cloth or leather resulting in a continuous circular trace, which is almost identical to the traces of throwing on a fast potter's wheel (Figure 12). After a drying phase the rim is slightly roughened at places where the potter will fasten two rolled loop handles (Figure 13). The same clay as used for the vessel's body is suitable for making the handles. The joints are smeared with soft clay and smoothed by hand. According to Juan Antonio, experience allows him to know exactly how much clay he needs to roll a handle of the correct thickness and length. He also tells us that it should not be possible to mold a large *cazuela* in one time (without adding coils of clay) because of the risk of collapsing. Before glazing and painting, the *cazuelas* must first be dry and fired (biscuit fire). The drying phase, during which cotton bands are used against deformation, can take 14 days (Figure 14). If shrinkage cracks develop in the course of the drying process they are filled with clay or repaired with iron clamps. In the next workshop we have the opportunity to observe the glazing, painting and second firing (glaze fire) process. Before we leave the workshop of the family Sánchez, we notice the use of the fast potter's wheel in their workshop. Father Sánchez is one of the potters in Amozoc, who has elsewhere learnt to throw pots on the fast potter's wheel. Therefore, he is able to produce a large number of small vessels in

a short time although this does not belong to the pot-making tradition of Amozoc. Nor is it financially very lucrative because the price of a fast made vessel is low. Throwing on the fast wheel is not common and not preferred by the potters.

Figure 2. Tapping the clay with a stone.

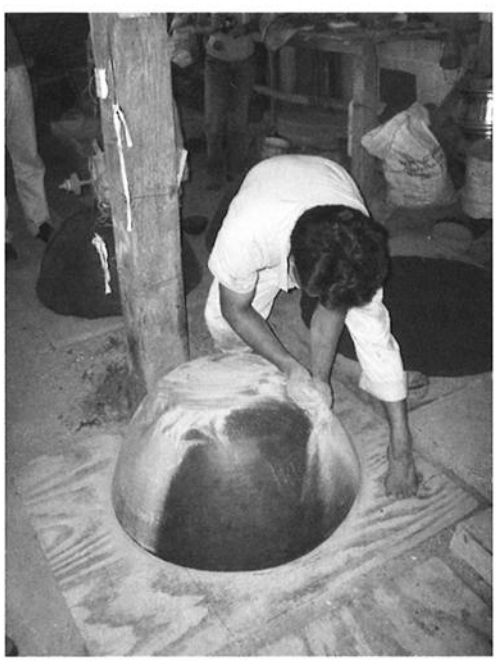


Figure 3. Powdering the mold with dust.

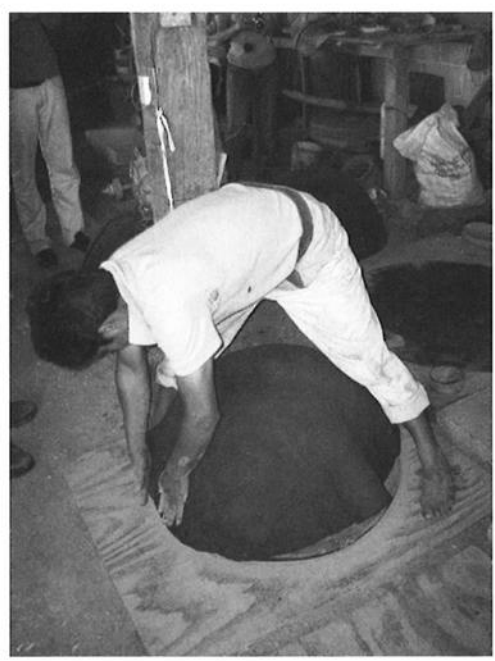


Figure 4. Covering the mold with the flat piece of clay.

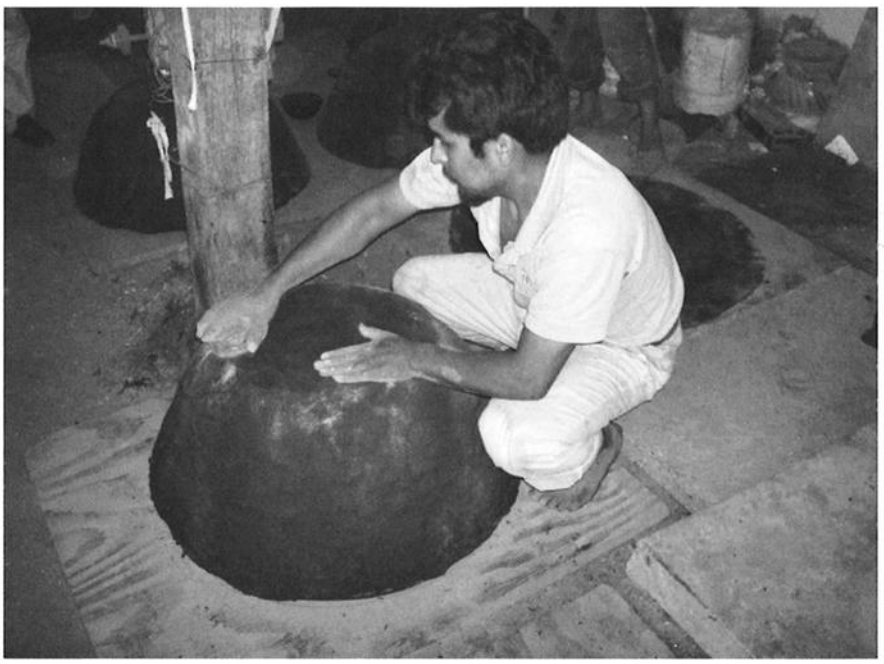


Figure 5. Tapping the clay pressed against the mold with a *piedra cantera*.

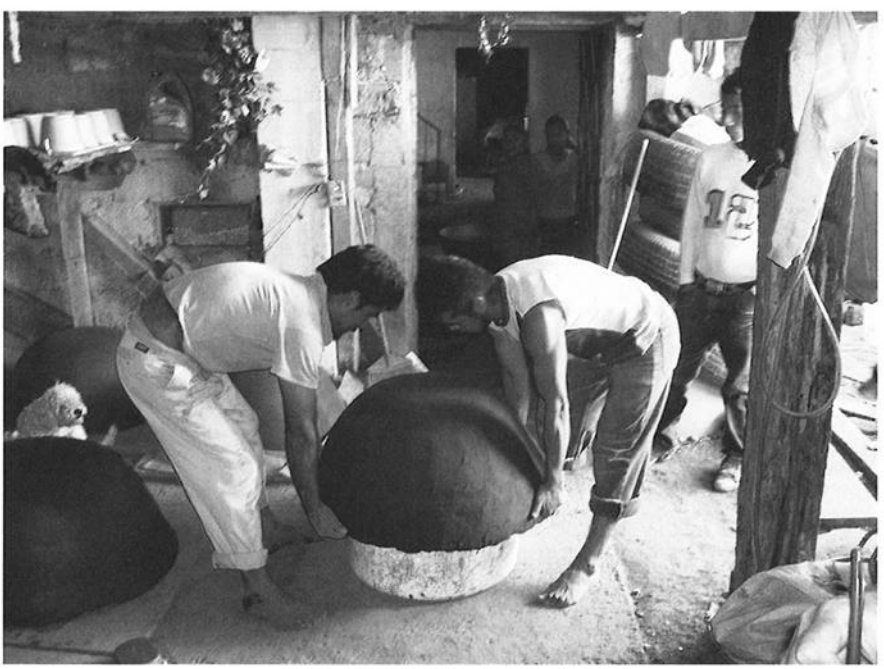


Figure 6. The mold covered with the *cajete* putting on a pedestal.

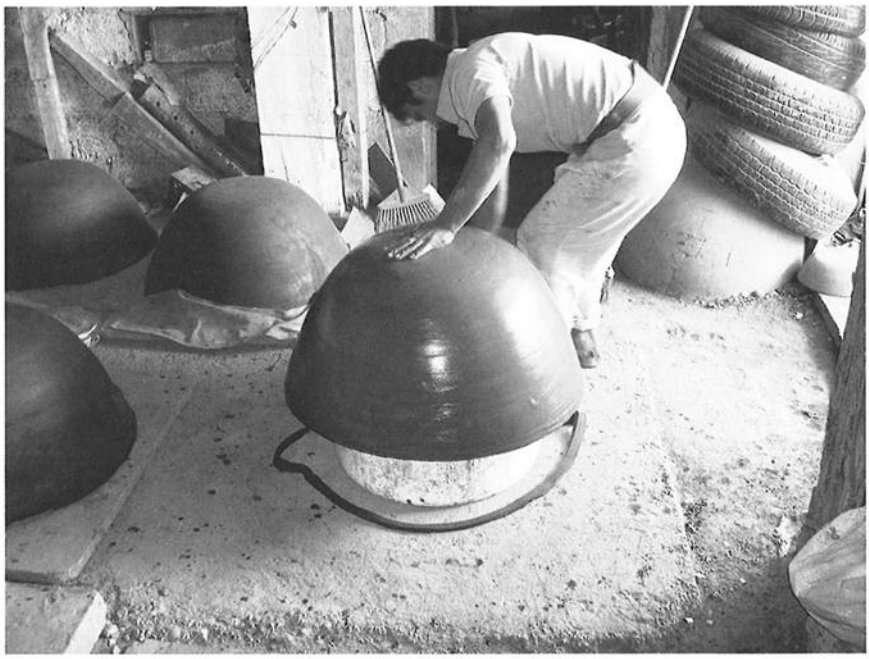


Figure 7. Smoothing the *cajete* by rubbing the clay.

Figure 8. Cutting the rim horizontally with a wire.

Figure 9. *Cajetes* put on old automobile tires.

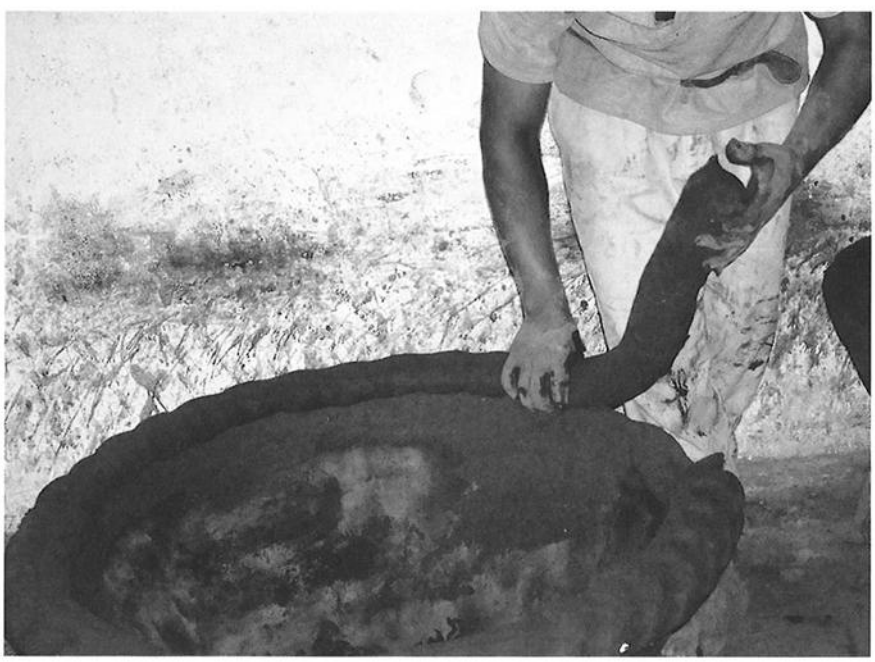


Figure 10. Pressing clay coils on the rim of the leather-hard *cajete*.

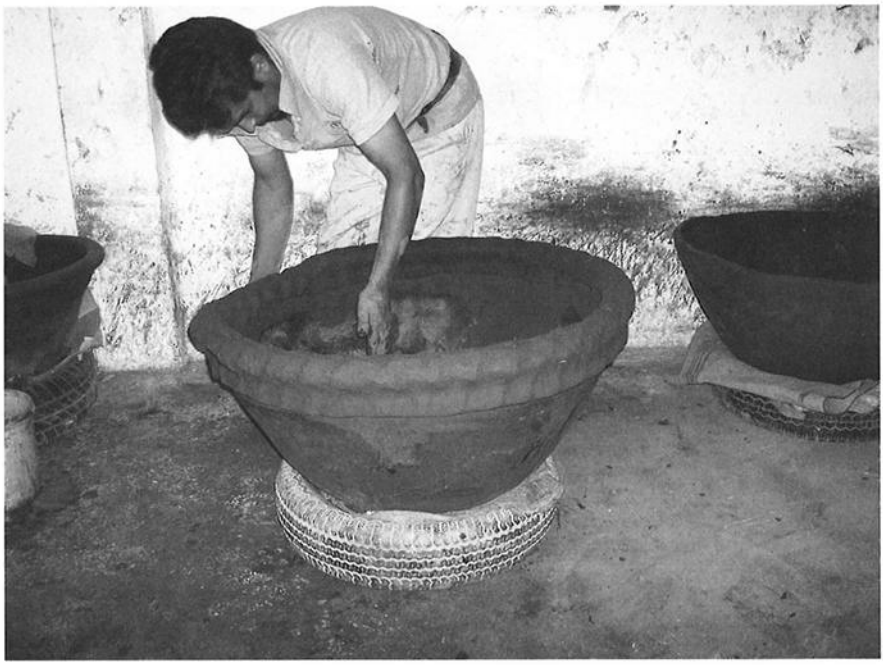


Figure 11. Pushing the coil upwards.

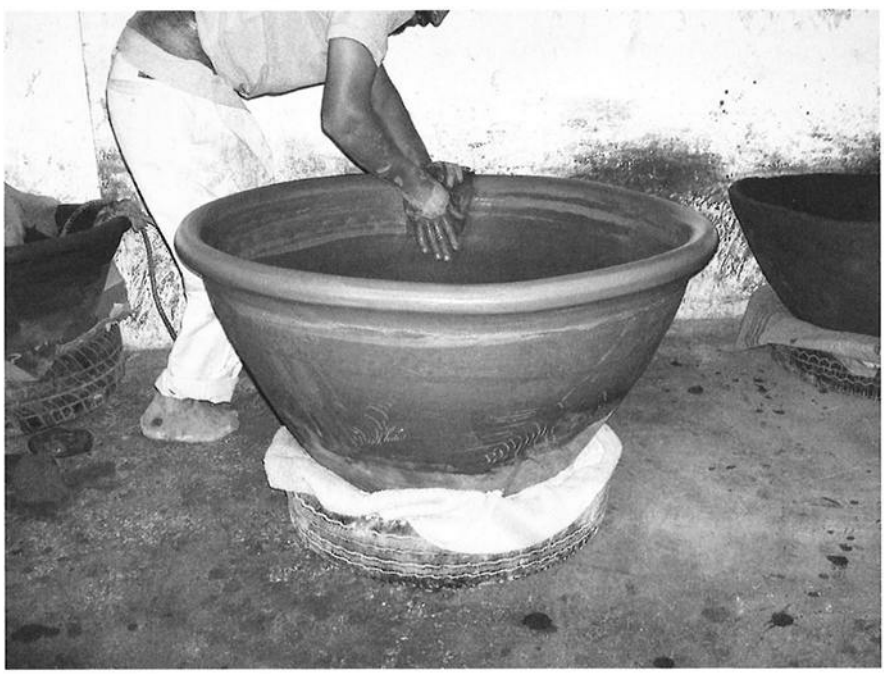


Figure 12. Smoothing the rim of the *cazuela*.

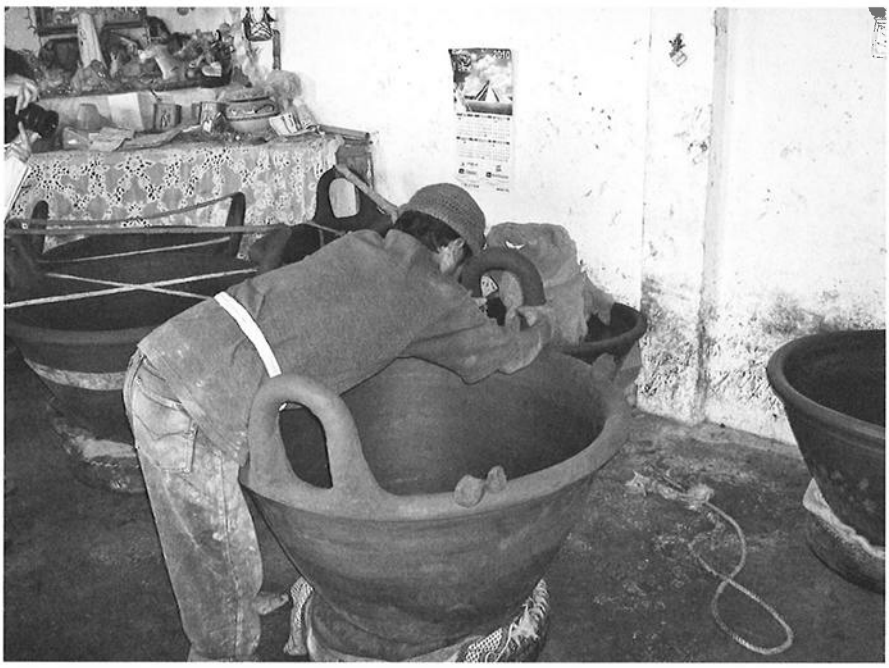


Figure 13. Fastening loop handles.

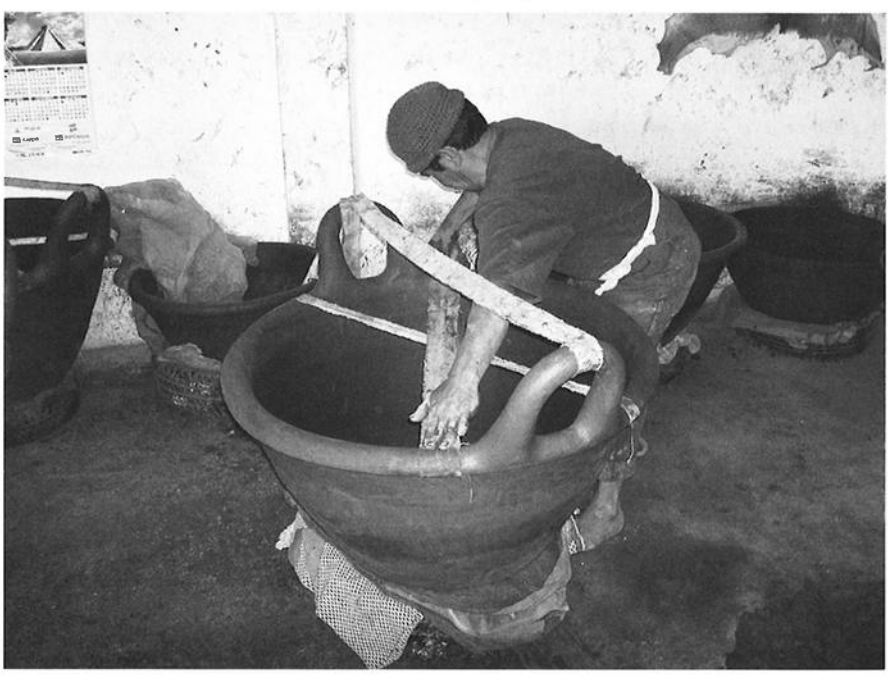


Figure 14. Cotton bands used against deformation.

Amozoc: workshop 2

In the second workshop biscuit fired *cazuelas* are ready to be glazed and painted. All potters in Amozoc use poisonous lead glaze. The ingredients, however, are probably fritted. A frit is "a part of a glaze recipe that has been melted and reground prior to its inclusion in the glaze slop" (Hamer 1975: 139; see also Hodges 1989: 46). The potters buy the orange-yellowish powder, much less intensive than the orange color of red lead, from a factory. This indicates that it has been fritted with silicon into a lead silicate, by which the danger of poisoning during the application of the glaze and during the use of the *cazuelas* in the kitchen is strongly diminished (see Hamer 1975: 177).

The large and smaller *cazuelas* are first glazed with a transparent lead glaze. Next, they are decorated with paint. In some cases, the smaller *cazuelas* are first painted. Usually, only the inside of the vessels is glazed. This makes it easier to handle the vessels to stack them in the kiln. The defects after the biscuit fire are repaired with a thick yellowish paste. The potter applies the glaze in the form of a fluid yellow slip by skillfully pouring the slip into the vessel, stirring it and pouring it off (Figure 15). This has to be done quickly because the porous biscuit fired *cazuela* absorbs the water very fast from the liquid slip mixture. For this reason, the glaze in solution should not come into contact with the pottery for a long time. Otherwise, the layer would become too thick locally.

A small watering can is used to apply the black manganese paint (Figure 16). Motifs that deviate from the current tradition are seldom painted. The potters are recognizable by the intensity of the black color caused by the amount of water they use to dilute the paint.

The *cazuelas* are fired in an open-top updraft kiln, three-quarters of which is dug into the ground. The fire chamber is accessible through a hatch and a ladder. The construction above floor level is made of stones covered with a largely broken layer of plaster. The potter, who wears a month cap, is loading the kiln with glazed and painted *cazuelas* (Figure 17). He uses pottery sherds to separate the glazed vessels to prevent them from sticking together during the firing process. While stacking the *cazuelas*, the dry glaze powder partly falls from the vessels because the glaze apparently does not contain much clay or binder. The potter's wife, daughter and son hand the *cazuelas* and some smaller vessels to the potter.

Since the biscuit fired *cazuelas* strongly absorb water from the glaze slip, the glaze becomes thicker in the course of the glazing process. As a result, the first glazed *cazuelas* have a thin glaze. The first glazed *cazuelas* are deliberately put at the bottom of the kiln because the vessels placed directly upon the grid are exposed to the highest temperature. The thick glazed vessels are put higher up in the kiln where the temperature is not as high as at the bottom. This is necessary because thick glaze melts earlier than thin glaze. As soon as the pottery chamber is completely fully loaded, the vessels are covered with sherds and wasters. In contrast to the biscuit firing, which takes – after heating the kiln – ca. four hours, the glaze firing lasts from two to two and a half hour.

Figure 15. Glazing.

Figure 16. Applying the paint.

Figure 17. Loading the kiln.

The maximum temperature will be ca. 800-900° C. The potter does not know the exact temperature, but he says he feels the right temperature. Once the glaze has sufficiently melted he knows that he does not need to further burn the fire. Normally the loss ratedue to firing is only one or two pots. Sometimes, however, the loss is much bigger. Demolished wooden pallets and wood flakes are used to fuel the kiln fire. As we left the workshop we see how a truck full of clay is emptied.

Amozoc: workshop 3

Clemente Sánchez Romero, the brother of Juan Antonio Sánchez who we met earlier, is the owner of workshop 3. Here, two potters are smoothing wheel-made *ollas* and *piñatas* (Figure 18). The *ollas,* which are glazed on the inside, are used for cooking beans. The recipe for the black paint exist of ¼ copper oxide, ½ manganese oxide and ¼ glaze ingredients. *Piñatas* are pots that are decorated with colorful paper and filled with fruits and candies, and then they are hanged and hit and broken by children in Christmas festivities or birthday parties (see also Papousek 1984: 158).

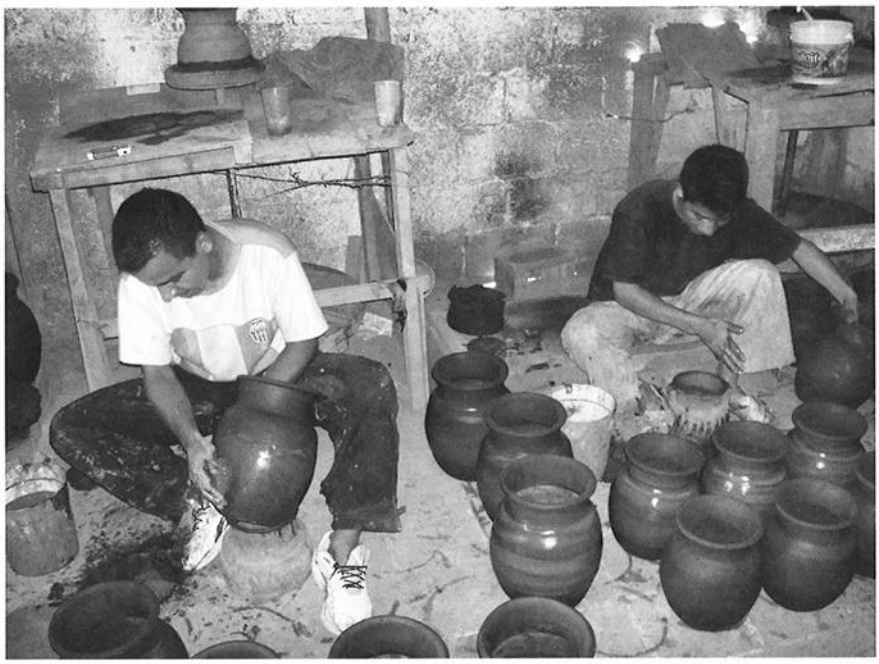


Figure 18. Smoothing *ollas* and *piñatas*.

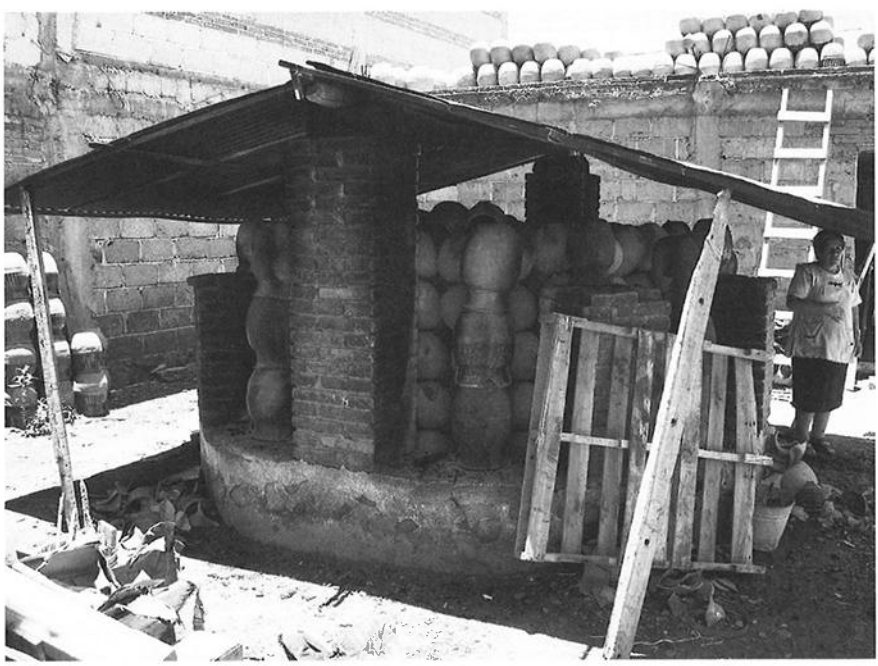


Figure 19. Kiln in the courtyard of Amozoc workshop 3.

The *ollas* are made of finer clay than the *cazuelas*. However, if the clay is too fine, the vessels will crack during the drying process and explode during firing. Vessels not complete intact after firing are sold as second or third rate products. In order to get a workable clay substance the clay is prepared by mixing the damp clay with dry crumbled (not powdered) clay. The crumbled clay does not entirely dissolve, but works as a kind of tempering material. The big stones in the clay are removed.

In the courtyard of workshop 3 we find the biggest kiln of Amozoc (3 m in diameter and 3.5 m deep) (Figure 19). The kiln is stoked up with wood from old pallets, which the potters buy for 25 *pesos* each. The use of old automobile tires and plastic as fuel is forbidden because of the dirty smoke it gives during the firing process. In addition, it should not be favorable for the taste of the food that will be prepared in the *ollas*. Before leaving the workshop the men demonstrate the strength of their pottery by standing on the vessels.

Amozoc: workshop 4

The last workshop we visit in Amozoc is property of the neighbor of Juan Antonio Sánchez. His name is Juan Robles. In his workshop the *cazuelas* are made in a combination of techniques. The lower part is molded, while the upper part is thrown on the fast potter's wheel. Since the clay used for these *cazuelas* contains less sand than used

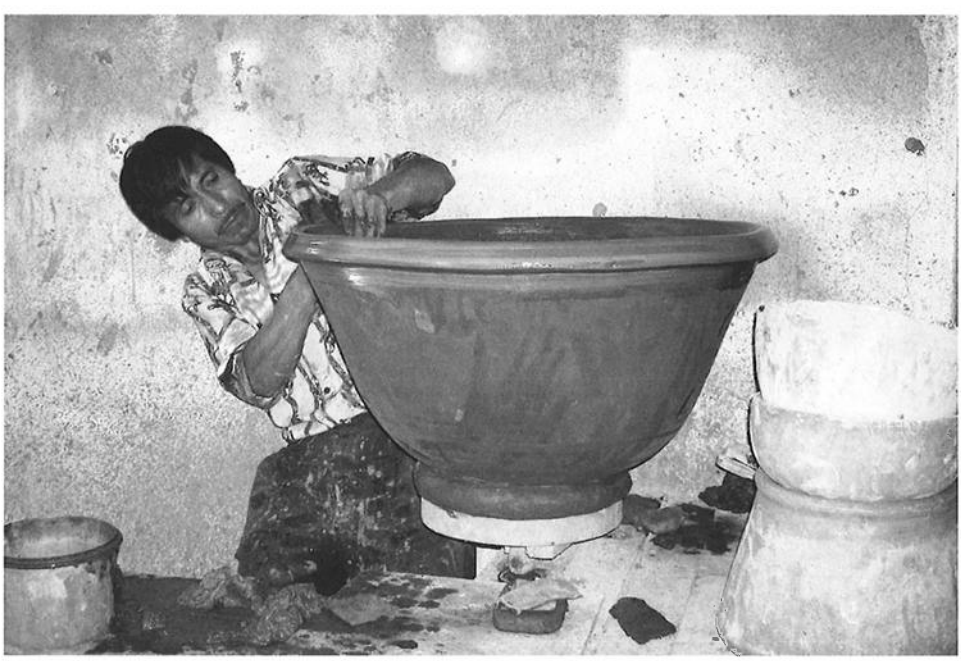


Figure 20. Lifting the clay wall on the wheel without use of the centrifugal force.

for the completely molded *cazuelas* there is more chance of shrinkage cracks during the drying process.

When we enter the workshop, the leather-hard mold-made *cajetes* are ready to be finished. The potter moistens the rim of the *cajete* with clay slip. Then, walking backwards around the *cajete* he skillfully presses two thick pre-shaped coils of clay on the rim and taps them with two stones. Meanwhile the potter repairs any cracks in the *cajete* by quickly filling them up with soft clay. Next, he puts the *cazuela* on the wheel, with its base precisely fitting in a chuck of clay covered with a rag. The potter's wheel is stable, not very heavy and easy to stop. Momentum is reached by the extra weight of the *cajete* and by continuously kicking the wheel. After having moistened the clay the potter lifts the clay wall without use of the centrifugal force (Figure 20). At the same time he scrapes the surface with a rib into a tight shape. If he sees little cracks he immediately repairs them. Since it is difficult to get a completely horizontal upper rim, he stops the wheel now and then and corrects the position of the *cajete*. Although this form of throwing is not as difficult as forming a vessel entirely on the potter's wheel sometimes the potter does not succeed. In this case, the wall of the *cajete* cracks and the entire vessel collapses.

Traditional pottery in San Miguel Tenextatiloyan

San Miguel Tenextatiloyan, located 105 km NE of Puebla is a community of potters who are, like in the majority of towns in Mexico, often related to each other. There are many individual workshops, almost in every house, although there is an incipient organization. On the road crossing San Miguel Tenextatiloyan traditional pottery and all kinds of fancy ware is sold. If it should not be clear that we have here a potters community it becomes evident by a sign on the building of the Jehova's Witnesses on which we read: *mi Dios cual buen alfarero* (my God is a good potter). We are cordially invited into ten workshops with potters very willing to tell us about their activities. Like in Amozoc we have the opportunity to observe various aspects of the pottery manufacturing process. The production sequence of *cazuelas* corresponds with the one we saw earlier in Amozoc. The local clay is prepared in a similar way. In some workshops a pug mill and electrical clay mixer, partly financed by the government, is used. Dry lumps of clay are pulverized in the pug mill, after which the clay powder is mixed with water.

San Miguel Tenextatiloyan: workshop 1

In the first workshop tree sizes (large, middle and small) of *cazuelas* are made. They are normally not sold by piece, but by load. Each load costs the same. The ordered loads, however, can be different and include *cazuelas* of various sizes.

The potter makes his own ceramic molds for the manufacture of *cazuelas* and *ollas* (Figure 21). He also sells molds to other potters. The potter first moistens the mold

over which he forms the *cajetes*. To prevent the clay from sticking to the humid mold he uses white finely grinded stone powder, called *popolla*. First a flat piece of clay is made in the shape of a pancake, beaten with a stone on a flat wooden table strewn with the same *popolla*. Then, the potter covers the mold with the flat piece of clay and forms the vessel. On the inside of the mold is a hollow in which the potter puts a piece of a broomstick. The broomstick is used as grip on which the mold can be rotated. As soon as the clay is stiff enough the formed vessel can be taken off the mold. For molding earthenware lids the potter uses lids of metal pans. He provides the lids with a knob using the wheel. After biscuit firing in a kiln stoked with wood, the potter sells the *cazuelas* to other potters to be glazed and fired for a second time.

Figure 21. Ceramic molds.

San Miguel Tenextatiloyan: workshop 2

In workshop 2 the clay for the manufacture of *ollas* is mixed in an electrical mixer. The *ollas* exist of two molded parts: the base and the neck (Figure 22). The potter, who is fastening both parts to each other, shows how she first roughens the rims of both parts, puts the parts on top of each other and finally firmly presses a coil of clay against the outer surface at the place of the joint (Figure 23).[7] She smoothes the inner and outer surface of the *olla* with a stone. Next, she attaches the handles made of different clay than used for the body. The lids are made in a mold on the wheel. After biscuit firing the *ollas* are decoratively painted with a mixture of copper oxide and manganese oxide and finally glazed with a lead glaze and fired again (glaze fire).

Figure 22. Two molded parts of an *olla*.

Figure 23. Fastening both parts of an *olla* to each other.

San Miguel Tenextatiloyan: workshop 3

The technique with use of a mold and broomstick as observed in workshop 1 is repeated in workshop 3. The clay is beaten with a stone into a flat piece. The potter puts the slab of clay over the mold, which is standing upside-down on the table and taps the clay, especially the bottom part with the same stone. Then, a long or short piece of a broomstick is inserted into the mold. At the rim of the clay slab the surplus clay is cut away with a wire. Depending on its length, the broomstick rests on the table or on the floor. Now it is possible to rotate the mold on the stick (Figure 24). The mold serves as a kind of turntable or *tournette*. The clay surface is smoothed on the rotating mold with a piece of cloth. As a result, the *cazuela* looks as if it been thrown on the wheel. The potter tells us that the broomstick technique has been in use for 15 years. In earlier years the potters kept the mold covered with clay on their knees during

Figure 24. Mold on the stick.

the entire forming process. As in workshop 1 old metal pan lids serve as molds for shaping the earthenware lids. For the handles of the vessels the potter first makes a ca. 40 cm long flattened and smoothed coil of clay. Then he cuts this coil of clay in equal parts, which are at one end fastened onto the vessel, bent, at the other end fastened and smeared away.

The potter has learnt to throw pots on the fast wheel. He considers throwing to be easier than molding. Nevertheless, he uses molds instead of throwing to make cooking ware that has to be strong and shock-resistant. These qualities are promoted by beating the clay during the molding process. The potter uses the fast wheel only for the manufacture of tableware and storage ware. The kiln was provided with a swing-back lid made of steel wire and space blanket material. With support of a governmental stimulus program the potters learn how to build and pay for the kiln.[8]

San Miguel Tenextatiloyan: workshop 4

In the courtyard of workshop 4 we witness the potter and her son empty the open kiln. They take the *cazuelas* out of the kiln with use of long sticks provided with a hook (Figure 25). As soon as the kiln is empty – the remaining heat of the kilns is used to dry chili – the potter begins to glaze the vessels one by one. First, she blows off the

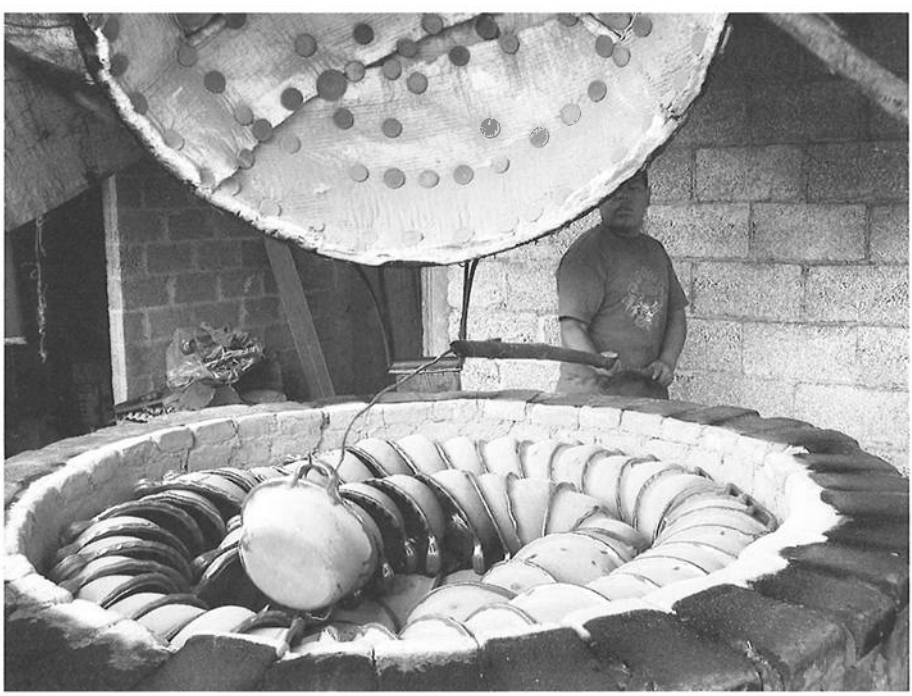


Figure 25. Taking *cazuelas* out of the kiln with lid.

remainders of the ash from the *cazuelas*. Then, she pours the glaze into the vessel with a small bowl, spins it around and pours if off. Hereafter, the potter puts the glazed *cazuelas* on the edge of the kiln wall waiting to be loaded and fired (glaze fire). The potters' activities do not stop the younger sons of the potter from playing football in the courtyard full with breakable *cazuelas*.

San Miguel Tenextatiloyan: workshop 5

Before the entrance of workshop 6, a 76 years old potter was seen loading pottery onto a truck with help of others. The pottery is intended to sell on the market and to be purchased by middlemen, who sometimes order more than 300 *cazuelas* at the same time. The potter was able to buy the truck with support of a governmental stimulating fund for potters. Thanks to this fund he also has a pug mill to mix the clay (Figure 26).

Figure 26. Pug mill.

During mixing the clay, water is frequently added and the potter regularly feels the clay to determine if it is plastic enough. After preparation the clay is wrapped up with plastic to be stored for some time.

During our visit the potters are not shaping vessels. However, they tell us about their pot making techniques. They do not throw pottery on the fast potter's wheel, but make their vessels with use of a mold and broomstick. The molds are made in their workshop and they prefer the long broomstick. One of the potters gives a demonstration of the work by glazing two *cazuelas* for us. According to the potter, the lead glaze is not poisonous. He also tells us that certain decoration motifs are painted upon request, for instance, motifs on vessels to be used during wedding parties. In the courtyard pots are drying and the kiln is burning. Wooden remainders of lumberjacks' activities in the nearby mountains and residues of sawmills are used as fuel.

San Miguel Tenextatiloyan: workshop 6

As in some other workshops, workshop 6 has also a pug mill used for the preparation of clay. The potter makes ca. 30 *cazuelas* per day by applying the mold/broomstick technique. She has only three or four molds. The rims of the large *cazuelas* are finished on a lightweight wheel. Pottery is produced for private clients as well as to sell at the market. To transport the clay and the end products they rent a truck.

San Miguel Tenextatiloyan: workshop 7

Workshop 7 consists of two workrooms, a living room and a courtyard in which a shed and potter's kiln are situated. From the courtyard a staircase leads to the first floor where on top of the living room another room is under construction. In one workroom two women form thin-walled *ollas* from two mold-made parts (using the mold/broomstick technique) that are fastened together. They use a mixture of two clays: some black (strong) clay and more yellow (less strong) clay. One woman makes the underside of the *olla* existing of the base and the bellow. The other woman makes the top including the shoulder and neck. The potters told us that working with four molds they make ca. 60 *ollas* a day.

For shaping the top of the *olla* a special mold is used. The mold has an extra rim underneath comparable with a foot ring. Like in the first phase of making the lower part of the *olla*, a pancake of clay with a diameter of ca. 35 cm is beaten with a round stone with a diameter of ca. 12 cm on a table covered with white stone powder (Figure 27). The flat piece of clay is pushed over the mold, beaten with a stone and smoothed (Figure 28). Now the grip is put in the mold so that it can be rotated (Figure 29). Next, the potter fastens a ca. 20 cm long rolled clay coil around the flat piece of clay later used to make the *olla* rim (Figure 30). With a metal tool she cuts a circle-shaped piece out of the clay slab on the spot where the clay slab lies over the foot-ring of the mold, the place where later the neck opening of the *olla* is formed (Figure 31). She loosens the clay a bit

Figure 27. The pancake of clay on a table covered with white stone powder.

Figure 28. The flat piece of clay is pushed over the mold.

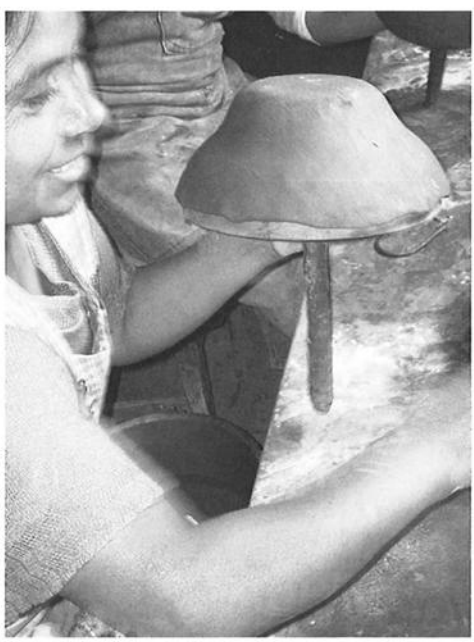


Figure 29. The mold can be rotated on the stick.

Figure 30. Fastening a clay coil around the clay.

Figure 31. Cutting a circle-shaped piece out of the clay slab.

Figure 32. Loosening the clay from the mold to finish and smooth the rim with a wet cloth.

Figure 33. Cutting a straight rim underneath.

from the mold to finish and smooth the *olla* rim with a wet cloth (Figure 32). Meanwhile the mold is rotating on the broomstick used as pivot. Finally, she cuts a straight rim underneath (Figure 33). The molded parts are directly put outside in the courtyard for a first drying phase in the sun. After some time they are brought inside the workshop to be assembled. In order to save costs for fuel here the *ollas* are mostly only biscuit-fired. Sometimes they also glaze the vessels and fire them again.

San Miguel Tenextatiloyan: workshop 8

During our visit there are no potters' activities in workshop 8. Pots are drying in the living room. The potter is quite willing to inform us about some aspects of her work. Because the fire in the pottery kiln has to become much hotter she uses better wood than for firing her stove in the kitchen. In the courtyard we find a mini-wheel, which according to the potter is used by her daughter for finishing the rims of vessels and for polishing (Figure 34). If you put the mini-wheel on a chair you get the correct working height. Before leaving we learn that the potters of San Miguel Tenextatiloyan do not have any other income.

Figure 34. Potter behind her mini-wheel.

San Miguel Tenextatiloyan: workshop 9

In workshop 9 a couple is kneading clay and molding *ollas*. The woman is decorating the rim of the *ollas* with finger impressions. At the same time, outside in the courtyard their daughter is stoking the open top updraft kiln, which is covered with *cazuelas*. It is a biscuit firing, which takes ca. two hours. She only uses wood as fuel. She adds dry branches and twigs, sawdust and shavings to further increase the temperature. Since some of the wood probably contains resin or oil, the fire burns up enormously emitting a thick black smoke.

San Miguel Tenextatiloyan: workshop 10

The potter in the last visited workshop makes *comales* (griddles) in various sizes on which *tortillas* are baked. The sizes of the *comales* are dependent on the sizes of iron or rubber rings used to make them (Figure 35). The big *comales* are rather thin and have

Figure. 35. The sizes of *comales* dependent of the sizes of the iron or rubber rings hanging on the wall.

a diameter of ca. 55 cm. The potter forms the *comales* by tapping clay placed between the rings on a flat board. To prevent the clay from sticking to the plank he first sprinkles river sand and grains of feldspar on it. According to the potter the use of feldspar provides a good heat diffusion and thermal conduction of the *comales* during use. With a wet cloth, the potter rubs the clay slab he uses to finish the rim. Then, he pushes the slab of clay from the plank and sets it on the floor to dry. After some time, he burnishes the top of the *comales* in various directions with use of a small pear-shaped bulb as tool. By doing this, sticking of the *tortillas* to the *comales* is prevented.

The clay used by the potters of Amozoc and San Miguel Tenextatiloyan

In total, seven clay samples were taken in Amozoc and San Miguel Tenextatiloyan. Sample nos. 1 and 2 come from Amozoc workshop 1, sample no. 3 was taken in Amozoc workshop 3. Sample nos. 4-7 were respectively taken in San Miguel Tenextatiloyan workshops 1, 4, 5 and 7. For each sample, we describe below the following aspects: (1) linear dry shrinkage, (2) linear shrinkage at 650°C (fired in oxidizing atmosphere), (3) color (Munsell Soil Color Charts/MSSC) of the dry clay, (4) color of the clay fired in an oxidizing atmosphere at 650°C, and (5) the workability properties. Finally, the results of the fabric analysis will be given.

Workability properties

The clay samples are mixtures of 'fine' and 'coarse' clay (coming from different layers of the same clay source) used as clay body for the production of *cazuelas*.

Sample 1
Amozoc: workshop 1

Linear shrinkage (dry):	7 %
Linear shrinkage (at 650°C):	7 %
MSCC (dry):	10YR5/3 (brown)
MSCC (at 650°C ox.):	7.5YR5/4 (brown)
Workability properties:	The clay body has enough "bones" because it contains enough fine sand. Therefore it can be worked in a rather soft condition. The clay is a bit sticky but is suited for pinching, coiling and molding.

Sample 2
Amozoc: workshop 1

Linear shrinkage (dry):	7 %
Linear shrinkage (at 650°C):	7.5 %
MSCC (dry):	10YR5/2 (grayish brown)
MSCC (at 650°C ox.):	7.5YR5/4 (brown)

Workability properties: The clay is has enough "bones" and is well able for pinching, coiling and molding. The dry clay is rather strong (green strength), which makes it easy to pile the dried big *cazuelas* in the kiln without the risk of collapsing. Because of its high amount of non-plastics inclusions, the clay cannot absorb much extra water and is therefore not well able for throwing on the fast wheel. For throwing father Sánchez uses only the fine clay.

Sample 3
Amozoc: workshop 3
Linear shrinkage (dry): 8 %
Linear shrinkage (at 650°C): 8.5 %
MSCC (dry): 10YR5/2 (grayish brown)
MSCC (at 650°C ox.): 7.5YR5/6 (strong brown)
Workability properties: The clay body has enough "bones" and is suitable for pinching, coiling and molding. N.B. The wheel-thrown *ollas* in workshop 3 are not made of this clay.

Sample 4
San Miguel Tenextatiloyan: workshop 1
Linear shrinkage (dry): 6.5 %
Linear shrinkage (at 650°C): 7 %
MSCC (dry): 10YR4/3 (brown)
MSCC (at 650°C ox.): 5YR5/6 (yellowish red)
Workability properties: The clay is well able for pinching, coiling and molding.

Sample 5
San Miguel Tenextatiloyan: workshop 4
Linear shrinkage (dry): 5.5 %
Linear shrinkage (at 650°C): 6 %
MSCC (dry): 7.5YR5/3 (brown)
MSCC (at 650°C ox.): 5YR5/6 (yellowish red)
Workability properties: The clay is suitable for pinching, coiling and molding.

Sample 6
San Miguel Tenextatiloyan: workshop 5
Linear shrinkage (dry): 6.5 %
Linear shrinkage (at 650°C): 7 %
MSCC (dry): 7.5YR5/3 (brown)
MSCC (at 650°C ox.): 5YR5/6 (yellowish red)
Workability properties: The clay is not very plastic, but has enough "bones' and is well able for pinching, coiling and molding.

Sample 7
San Miguel Tenextatiloyan: workshop 7
Linear shrinkage (dry): 7.5 %
Linear shrinkage (at 650°C): 8 %
MSCC (dry): 7.5YR5/3 (brown)
MSCC (at 650°C ox.): 5YR5/6 (yellowish red)
Workability properties: The clay has enough "bones" and is well able for pinching, coiling and molding.

Clay samples 1, 2 and 3 are grayish brown, while samples 4, 5, 6 and 7 tend towards brown. Oxidized fired at 650°C samples 1, 2 and 3 turn into brown and strong brown, while samples 4, 5, 6 and 7 change into yellowish red or in reddish yellow. Though these differences are small, they may indicate different clay sources.

Fabric

Firing the clay samples at 650°C results into a firm fabric (Figure 36). This means that the vessels could be fired at rather low temperatures, which saves costs for fuel.

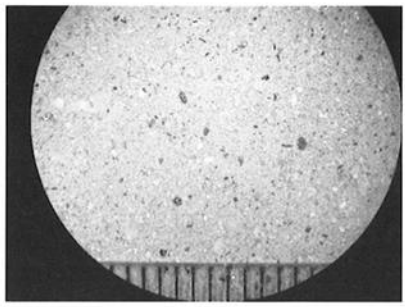
The fabrics of all clay samples are fine and well sorted (except sample 3 which is moderately sorted). Most of the included grains are around 0.5 mm. or finer. The coarsest grains are around 1 mm. (except sample 3, which has some coarser grains). The coarse grains are mostly angular and sub-angular. In all cases the total amount of grains was estimated between 25 and 35 %. These percentages are suitable for coiling and hand-forming techniques like pinching, coiling and molding. In contrast to the clay samples from Amozoc the clay samples from San Miguel Tenextatiloyan contain basalt inclusions.

Non-traditional pottery in Los Reyes Metzontla

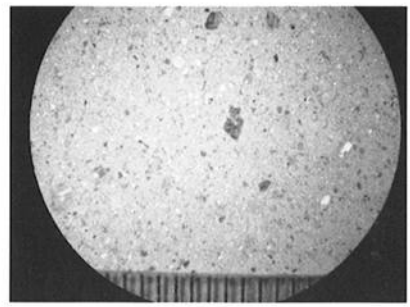
Los Reyes Metzontla is situated 150 km SE of Puebla. Through a region with high cactuses we reach this village where many potters are living. Some potters still make *comales*. However, most potters do not make traditional pottery any more. The present ceramic production exists of art objects and pottery for the tourist market.

Walking all-round the village we visit a school where women and young girls from the village and the surroundings learn how to make pottery in a pleasant atmosphere (Figure 37).

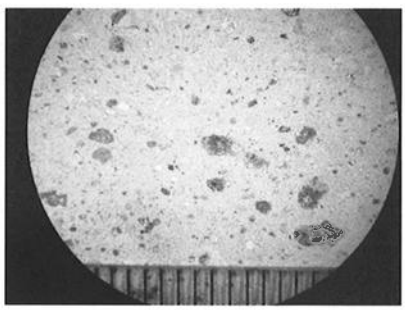
It belongs to a governmental stimulus program to reactivate the disappearing potter's craft. In this context, ceramic competitions are organized too. Potters have the opportunity to experiment with new techniques and glazes. Proudly, they show us the certificates, prizes and winning products of earlier contents, under which a ceramic model of two airplanes flying into the twin towers (9/11/2001) (Figure 38).



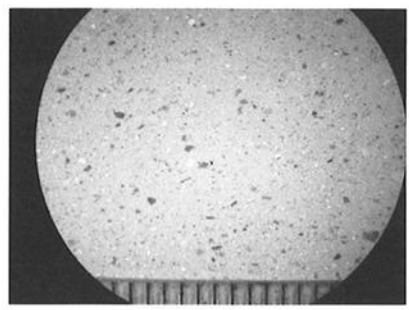
Sample 1.



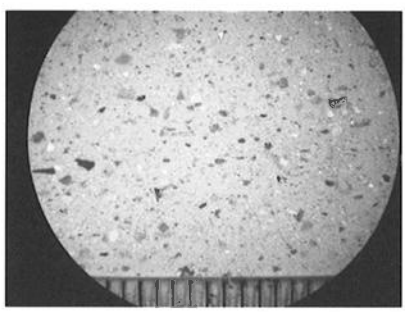
Sample 2.



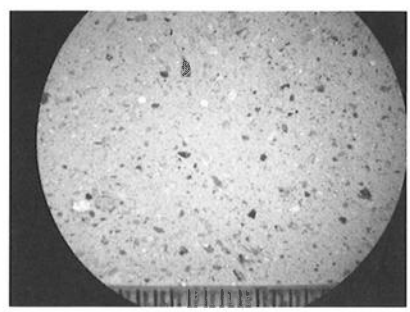
Sample 3.



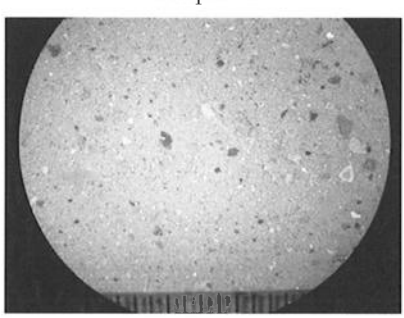
Sample 4.



Sample 5.



Sample 6.



Sample 7

Figure 36. Fabric of the clay samples.

Figure 37. Learning how to make pottery.

Figure 38. Ceramic model of two airplanes flying into the twin towers (9/11/2001).

Epilogue

In many countries the traditional potter's craft is rapidly changing or even disappearing (e.g. Annis 1985, 2007; van As et al. 2009; Lackey 1981; London 1998/1999). For this reason the ethnographic documentation of the activities of extant traditional potters is highly desirable (Kramer 1985: 97; Stark 2003; 221). In this article we described a visit we paid to a number of pottery workshops in Amozoc, San Miguel Tenextatiloyan and Los Reyes Metzontla in Central Mexico. We learnt that in Los Reyes Metzontla almost no traditional pottery is made any more. Although the pottery tradition is changing, the potter's craft is not disappearing. Most potters' products are nowadays destined for the tourist market. Young women are even trained how to make pottery that meets the present demand. In Amozoc and San Miguel Tenextatiloyan *cazuelas* (open mouth bowls with handles), *ollas* (jars) and *comales* (earthenware griddles) are still traditionally made. Although in certain regions of South Mexico the two-chambered kiln, the fast potter's wheel and the glaze are not used at all (Houben 2006), in the places we visited these three introductions of the Spanish conquest of Mexico in 1521 A.D. play a more or less important role in the manufacture of pottery. Here, the potters like most of the potters in Central Mexico use the two-chamber kiln, recognized for its technical advantages, especially firewood economy. Because of the scarce published information (i.e. Charlton et al. 2008; Winter and Payne 1976) little is known of the firing technology in Mexico during late pre-colonial times. We may assume that before the Spanish, pottery was fired in open bonfires or perhaps in simple one-chambered kilns. In this period the earthenware vessels for cooking, storing and transporting were handmade, without the use of the fast potter's wheel. Molding, coiling, pinching, or a combination was the current forming technique. The expensive wheel that required new motor skills was not widely accepted by the indigenous people and perceived as a risk (Foster 1960). As is the situation for most Mexican potters, the wheel in Amozoc and San Miguel Tenextatiloyan plays at the most a secondary role (see also Druc 2000; Foster 1967; Katz 1977; Lackey 1981). As in pre-Spanish conquest days, pottery was made with molds and coils. Despite the additional costs and large quantities of fuel required, the use of glaze, the third Spanish introduction, was adopted in some regions of Mexico, but not in others. In Amozoc and San Miguel Tenextatiloyan we have observed aspects of both pre-Hispanic pot making techniques and techniques introduced by the Spaniards. These observations done in the context of the research project 'Ceramics and Social Change' (see also Hernández Sánchez 2007, 2008, 2010) contribute to our knowledge of the impact of the Spanish conquest on the material culture in the indigenous Mexican society. The Spanish impact on pottery production among the indigenous population is not well documented in Spanish historical texts in contrast to other aspects of the society (i.e., Gibson 1964; Lockhart 1992; Terraciano 2001).

Acknowledgements

We cordially thank the potters of Amozoc, San Miguel Tenextatiloyan and Los Reyes Metzontla for their warm welcome and time they gave us to friendly answer our many questions and to tell us all about their work. Especially we thank the families of Juan Antonio Sánchez, José Orlando Ramírez Torres, Clemente Sánchez Romero and Juan Robles in Amozoc, and Pablo Bonilla Ortega, Manuel Saragoza Martínez, Elodia Lucas Hernández, Guadalupe Payno Allende, Atanasia Ramos, Alejandra Castillo, Emilia Juárez Hernández, Celeriano Hernández, and the families Aguirre Méndez, Luna Vallejo in San Miguel Tenextatiloyan. We would like to thank Gloria London for the correction of the English text.

Notes

1. This fieldwork season was part of the research project *Ceramics and social change. The impact of the conquest on Middle America's material culture* carried out under the support of an Innovational Research Incentive Scheme grant of the Netherlands Organization for Scientific Research (NWO), and the Faculty of Archaeology of Leiden University.

2. Paul van Akkeren, Michiel Esveld, Meliam Vigano Gasper and Andreia Kroezen.

3. The workshops in Amozoc were visited on July 30 and 31 and August 2, the workshops in San Miguel Tenextatiloyan on August 4 and 5 and the workshops in Los Reyes Metzontla on August 4.

4. Since the period of our visit was rather short we cannot present a complete picture of the potters' activities in the various workshops.

5. It is believed that the particular techniques for making this type of Majolica pottery were introduced in Puebla by immigrants form Talavera de la Reina, Spain.

6. For the biggest *cazuela de mole* (height: 1.60 m; width: 1.40 m) in the world see http://www.poblanerias.com.mx/cultura/12088-puebla–la

7. According to Loe Jacobs who was invited to do it himself, it certainly needs experience to fasten both molded parts of the *olla* to each other.

8. In San Miguel Tenextatiloyan we saw the same kind of kilns in some other workshops.

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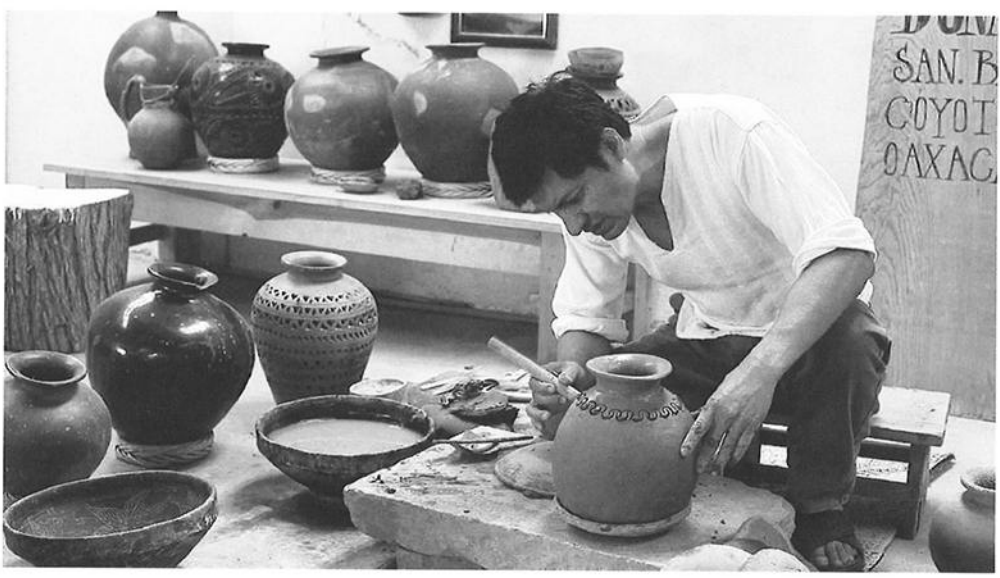
CÁNTARO DE COYOTEPEC: A SHORT INTRODUCTION TO A VIDEOFILM

Itandehui Jansen

Coyotepec is a small town in the South of Mexico, which is mainly known for its artisan production of black pottery. The pottery is particularly attractive because of its natural deep black color and shiny appearance. But the pottery of Coyotepec has not always been like this. In previous times the pottery in Coyotepec was grey and did not have a shiny appearance. In 1953 Doña Rosa, a celebrated local potter, discovered the black shiny quality of the ceramic. In the short video included in this volume of the *Leiden Journal of Pottery Studies*, her grandson explains how the discovery came about and shows how the ceramic of Coyotepec is made.



ARAB GEOMETRICAL POTTERY FROM TELL ABU SARBUT, JORDAN

Henderikus Eduard LaGro

Abstract

Archaeological knowledge of the Ayyubid and Mamluk periods is scant and the material poorly known. This is certainly the case for the pottery without a detailed typology or further subdivision in time. Excavations at Tell Abu Sarbut in the Jordan Valley, Jordan (1989-1992) resulted in a large corpus of pottery from these periods. It comes from phases of a partially excavated cane sugar production facility and from subsequent phases of village occupation. This article focuses on the results of a technological, stylistic and morphological study of the Arab Geometrical ware. The various forming techniques and the stability of the clay mixture used influenced the final shapes and possible varieties. The decorations show a clear development as regards their colors. Although changes in the design elements are scarcely discernible, the Sarbut repertoire establishes different styles, which for the first time permit a better understanding of this elusive material. The various styles and extensive catalogue with individual motifs will, however, eventually enable more direct comparisons of the decorative aspect with that found at other sites, when more detailed information becomes available. In addition, certain morphological characteristics indicate a chronological development.

Introduction

This report on Arabic Geometrical (AG) pottery is a slightly adapted, although not updated, version of a chapter of my unpublished PhD dissertation entitled "An Insight into Ayyubid-Mamluk Pottery. Description and Analysis of a Corpus of Mediaeval Pottery from the Cane Sugar Production and Village Occupation at Tell Abu Sarbut in Jordan" (LaGro 2002).[1] The aim of this study was to construct a typo-chronological framework of pottery excavated at Tell Abu Sarbut from the Ayyubid-Mamluk period. Ideally it would serve as tool for later research. Such a study would fit into the framework of the pottery studies at Leiden University and could benefit from previous work of Franken on Tell Abu Gourdan (Franken and Kalsbeek 1975; see also LaGro and de Haas 1988). For this purpose four excavation seasons took place in the period 1989-1992 (de Haas et al. 1989, 1992).[2]

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Tell Abu Sarbut (see also LaGro 2009: 64-65) is located on the eastern bank of the river Jordan in the central part of the valley, not far from Tell Deir 'Alla (Figure 1).[3] According to Glueck, who visited the site in 1942, "numerous Byzantine and mediaeval Arabic sherds were found on this mound" (Glueck 1951: 311). No previous regular excavations on the site are known. The pottery on the surface of the site indicated that the Ayyubid-Mamluk period was predominantly present.

In 1988, a preliminary excavation season to verify the extent of the deposits involved two operations: trial trench on the eastern part of the site and soundings on the western part. The results led to three subsequent seasons of excavations in 1989, 1990 and 1992 respectively (de Haas et al. 1992; see also LaGro 2009: 65-69, 95-98). In general it could be concluded from the soundings that of the Islamic periods only deposits ascribed to the Ayyubid-Mamluk period were present in situ. Excavations eventually revealed the top of layers of heavily packed clay ascribed to the Byzantine period. On top of these, were a number of phases ascribed to the Ayyubid-Mamluk period.

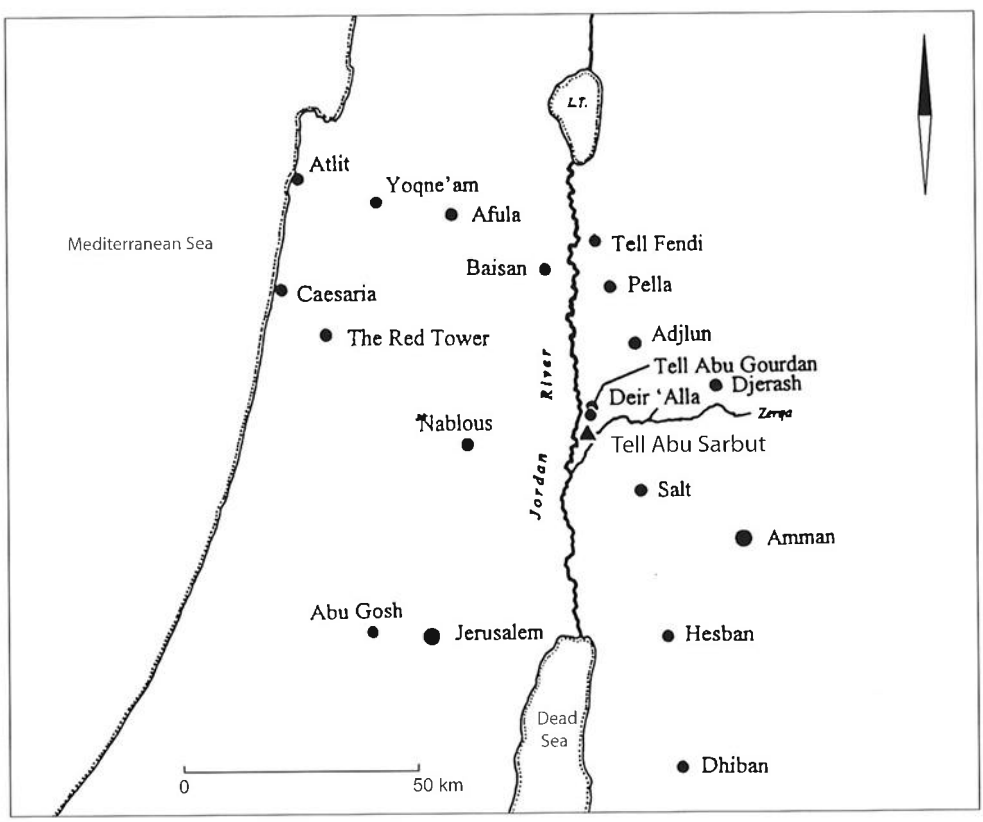

Figure 1. Location of Tell Abu Sarbut in the Jordan Valley, Jordan.

A stratigraphy of these phases relies mainly on square L, the only square excavated completely down to the Byzantine phase (Figure 2). For detailed information on the phases see LaGro (2009: 95-98). The relative chronology of the phases is difficult to link to an absolute chronology due the lack of readable coins and the rather widespread dates of the C14 dates available. From phase 50, a sample has a calibrated date of 1292-1448, which would imply that at least the earlier phases of village occupation date to the Mamluk period. For a sample associated with phase 100 the calibrated dates are 1434-1510 or 1598-1620, indicating either late Mamluk or the Ottoman Period. A geographical study based on late sixteenth century archives, however, does not mention a village occupation in that area, which can be considered to have been Tell Abu Sarbut (Hütteroth and Abdulfattah 1977). The presence in phase 100 of white slipped green glazed ware, which was in use in the Ottoman Period, cannot be considered an indication per se, since this material also occurred in the Mamluk Period. Tobacco pipes, which could signal the early 17th century, were not found at Tell Abu Sarbut nor were Ottoman Period coins. It is more probable then that the age of phase 100 is late Mamluk. The total of sherds which were used for an indication of developments of aspects of the pottery is given in Table 1.

Arab Geometrical ware

Definition

Arab Geometric pottery goes under various designations, e.g., hand-made decorated pottery (Franken and Kalsbeek 1975: 167 ff.), hand-made geometrically painted

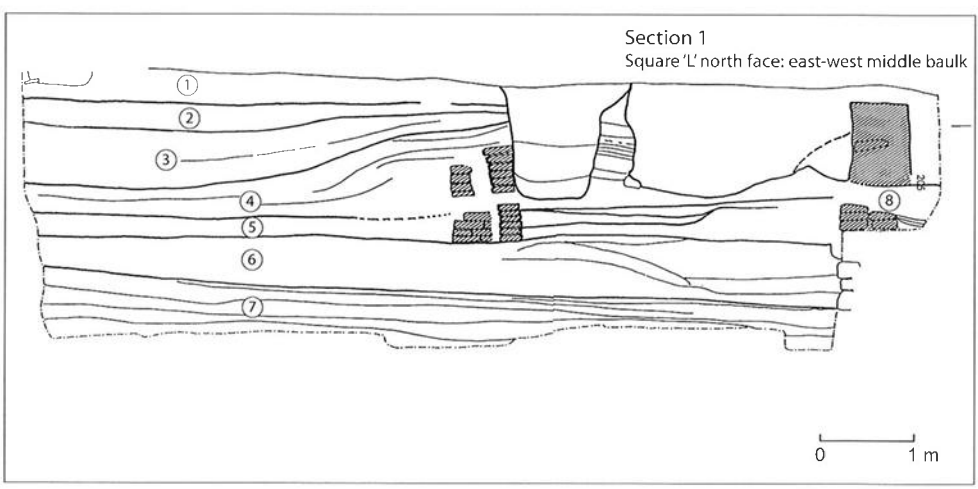

Figure 2. Tell Abu Sarbut: phases 70–100 (1 = phase 100; 2 = phase 60; 3 = phase 50; 4 = phase 40; 5 = phase 30; 6 = phase 20; 7 = phase 10; 8 = phase 70).

	phase 10		phase 20		phase 30		phase 40		phase 50	
	sum	col sum %	sum	col sum %	sum	col sum %	sum	col sum %	sum	col sum %
AG ware	143	1%	70	4.5%	98	5.8%	86	5.0%	222	4.4%
cooking pottery	50	.4%	288	3.4%	114	6.8%	85	5.0%	350	6.9%
unglazed decorated ware	0	.0%	0	.0%	8	.5%	2	.1%	22	.4%
glazed ware	31	.2%	79	.9%	62	3.7%	79	4.6%	396	7.8%
lamps	4	.0%	2	.0%	2	.1%	0	.0%	5	.1%
orange colored ware	8	.1%	64	.8%	55	3.3%	34	2.0%	69	.4%
thin red ware	110	.8%	215	2.5%	28	1.7%	92	5.4%	112	2.2%
sugar pottery	11932	88.5%	6310	74.5%	886	52.8%	774	45.4%	2175	42.9%
various undecorated ware	1193	8.9%	1133	13.4%	424	25.3%	554	32.5%	1717	33.9%
total	13480	100.0%	8468	100.0%	1677	100.0%	1706	100.0%	5068	100.0%

	phase 60		phase 70		phase 100		total	
	sum	col sum %	sum	col sum %	sum	col sum %	sum	col sum %
AG ware	170	10.7%	254	13.8%	704	20.0%	2056	5.5%
cooking pottery	129	8.1%	190	10.3%	318	9.0%	1531	4.1%
unglazed decorated ware	3	.2%	0	.0%	2	.1%	37	.1%
glazed ware	132	8.3%	150	8.1%	574	16.3%	1503	4.0%
lamps	0	.0%	1	.1%	2	.1%	16	.0%
orange colored ware	17	1.1%	11	.6%	18	.8%	276	.7%
thin red ware	28	1.8%	63	3.4%	88	2.5%	736	2.0%
sugar pottery	765	48.0%	834	45.3%	1380	39.1%	25056	67.1%
various undecorated ware	351	22.0%	338	18.4%	441	12.5%	6151	16.5%
total	1595	100.0%	1841	100.0%	3527	100.0%	37362	100.0%

Table 1. Total of sherds from the phased sample (square L).

wares (HMGPW) (J. Johns, personal communication), Ayyubid-Mamluk or Mamluk hand-made ware (Grey 1994: 60), and pseudo-prehistoric ware (Grabar 1978: 113) (Figure 3).

The name Arab Geometrical (AG) was likely first used by the excavators of Hama, where a large corpus of this pottery was found with a wide variety of shapes. They called it: "arabe géométrique ... une céramique d'une technique extrêmement primitive, mal façonnée, mal cuite, portant un décor gauche ... en couleur mate ... une poterie d'un grand charme..." (Riis and Poulsen 1957: 270). This observation refers i.a. to the main characteristic of the pottery, which is a decoration with numerous geometrical motifs in black and sometimes red.[4] In addition, there are some other features, which often can be observed with this pottery as well. The clay, for example, that was used to make this pottery can probably be considered a second characteristic, because it usually contained large amounts of grog and at times organic inclusions, which were added as a tempering material. A number of open shaped vessels at Tell Abu Sarbut were made of this fabric and not decorated, but these are nevertheless included in this article because of the fabric. Also the use of textile during the construction of the vessels, as was observed on a number of fragments, might be considered as a common attribute, although this feature is not omnipresent.

Distribution

The pottery is reportedly found at many sites in Bilad al-Sham, usually in post-crusader deposits. In the south, the extent of its spread is apparently constricted by the Sinai desert, where Petrie found this pottery at Tell el Ajjul (Petrie 1932: pl. XLI) and more recently it has been published from the Negev as well (Schaefer 1989: 46). In the west, the Syrian desert seems to have been the limit. In the north, however, the distribution is not yet clear. The pottery has been found at Apamaea, Hama, Aleppo and maybe even Raqqa, but according to Rogers it can also be found in Central Anatolia, although none has been published as such from that area (Rogers 1972: 263-264).

Whitcomb linked this general distribution of the pottery to the Crusader presence in Bilad al-Sham and suggested that it might have been a reaction to this occupation, a sort of popular symbol, which continued through the Mamluk period (Whitcomb 1997: 103).[5] Although this might be a possibility, other, economic factors, such as taxes on production and trade in pottery, an increasing scarcity of firewood, and the probably relatively low price of the ware might as well have contributed to its spread. These same factors likely led to developments in the pottery repertoire in general, and would account for a change which was observed more in the poorer countryside than in cities and strongholds.[6]

It is generally assumed that AG pottery started in the late twelfth century and was part of a development in which wheel thrown wares were largely replaced by handmade pottery, especially in the rural areas. In contemporaneous assemblages from cities and castles this was usually much less the case (Brown 1992: 246 ff.; Pringle 1985: 176).

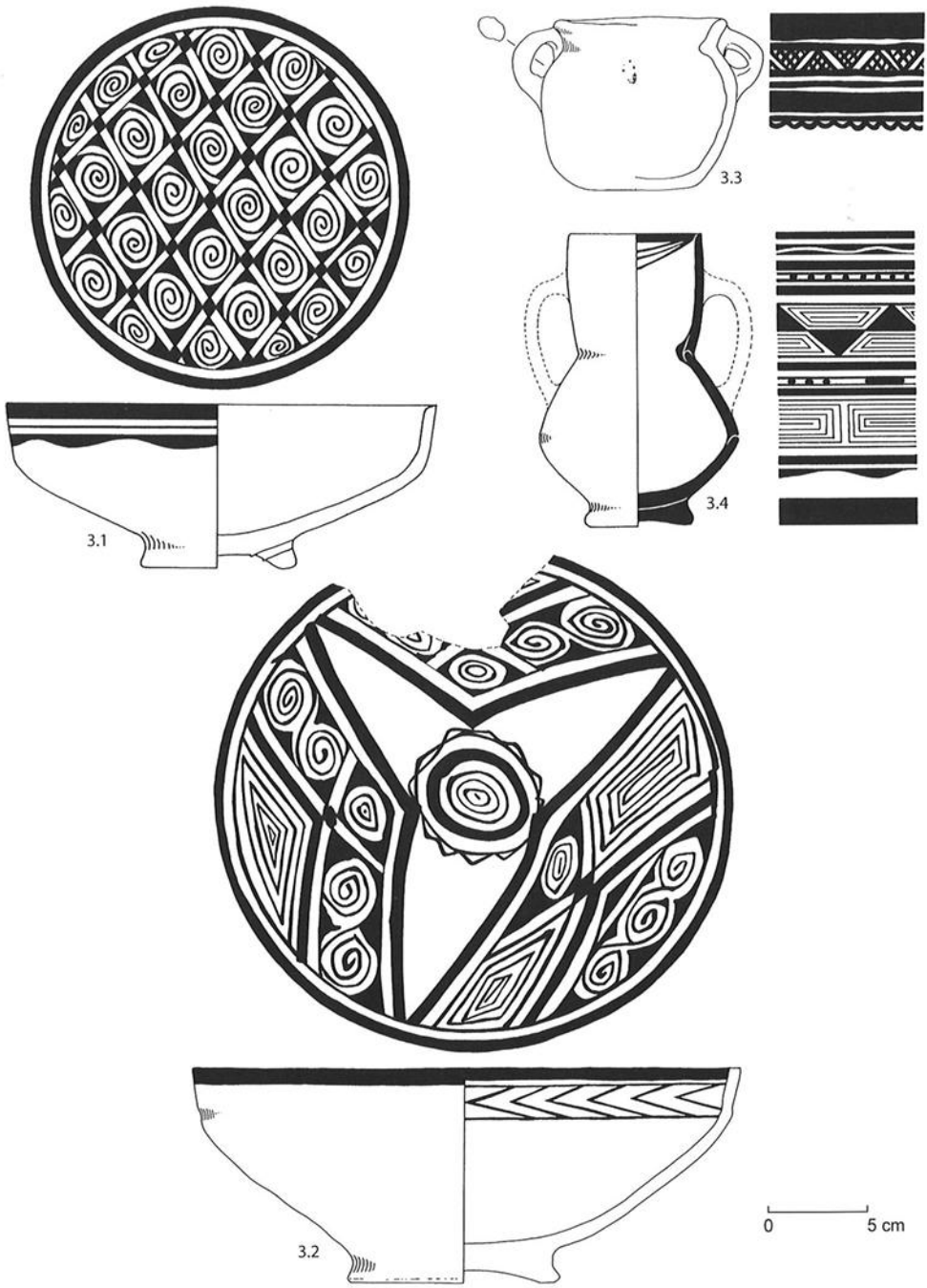

Figure 3. Some complete Arabic Geometrical vessels from Tell Abu Sarbut.

In some archaeological contexts, i.e. Aqaba (Whitcomb 1988: 216), Busra (Berthier 1985: 13), and al-Wueira the geometrical patterns were preceded by what Brown describes as "a linear style ... consisting of simple cross-hatching, zigzag lines and dots ... executed in monochrome red or red-brown paint, ... best represented in southern Transjordan" (Brown 1992: 244). According to her, the limited examples available as yet "do not establish an evolutionary progression, or even firm relationship, between the two painting styles". The AG ware was widely used until at least the sixteenth century. Whether the pottery decorated with geometrical designs which was produced in Palestinian villages in the first half of the twentieth century can be considered to be equivalent to or a direct continuity of the AG ware is not clear. Some features such as the use of grog and some shapes could point to such continuity. On the other hand, the absence of the use of textile in reported observations of pottery making, which date to the beginning of this century and the different, less intricate style of the geometrical decoration could point in a different direction. Unfortunately not much is known of the repertoire of the sixteenth and following centuries. According to Ziadeh, however, at Ti'innik "the hand-made geometrically painted ware became dominant only between the sixteenth and seventeenth centuries". This observation seems to be based on absolute numbers of sherds and not on relative occurrence. Nevertheless it is an indication that until additional material is published with a more precise dating, the duration of its use and its part in the overall repertoire remain difficult to establish (Ziadeh 1995: 210).

There is no certainty regarding who produced AG pottery. Suggestions range from itinerant potters or specialized centers (Franken, personal communication). Acording to Johns, it was also cheaper and maybe more attractive than the wheel-thrown wares it replaced, hence its popularity (J. Johns, personal communication. See also Franken and Kalsbeek (1975: 199). Others have suggested a pure village production, possibly by women, as a parallel with household production observed in the beginning of the last century (Brown 1992: 312 ff.; Pringle 1985: 176).

Origin of the ware

Regarding the origin of the geometrical patterns on AG pottery, three hypotheses have been put forward: an imitation of patterns found on ancient wares (MacAlister 1926: 196); influences from North Africa; and an imitation of contemporaneous designs on baskets and textiles (Franken and Kalsbeek 1975: 172-173; Homès and Franken 1984: 244).

A direct relation between certain "protohistoric" potteries and present day Berber pottery has been postulated by Camps, who concluded that there was a continuity with only slight changes, a line of thought not shared by all, but still considered valid by more recent authors (Camps 1955: 350; Camps 1961: e.g. 221, 228 and 387). For more recent studies see Gruner 1973: 170; Fayolle 1992: 13 and 263. A similar continuation of earlier types of pottery in Bilad al-Sham is more difficult to accept, given

the lengthy interval between the known use of such patterns of decoration. Older wares with geometrical motifs are, however, easy to be found on the surface of many archaeological sites so that an inspiration of some sort cannot be precluded out of hand, considering the predilection for geometrical motifs in Islamic art in general.

The suggestion of a possible origin in North Africa was inspired by the still ubiquitous presence of geometrically painted pottery there these days, which might have been present in earlier periods as well. Relatively few publications refer to excavated material from the mediaeval period in cities and villages in North Africa. At the 'Qal'a des Banu Hammad' (approximately eleventh century) only a few sherds with simple painted motifs were found, probably belonging to thrown ware (Golvin 1965: 216).[7] At Al-Basra (roughly 800-1100) 5% of the pottery was handmade, but this refers to cooking pots which had not been painted (Benco 1987: 63). Handmade ware from Qsar Es-Seghir (1190-1458), constitutes 5% of the total number of sherds found. There, grog had been added to the clay and the lower part of a number of vessels was formed in a base mould in which cloth was used to separate the vessel from the mould, as was indicated by traces of woven impressions on fragments. The upper part was built in coils. Apart from one fragment, however, these vessels were not painted (Myers 1984: 38, 81-82).[8] In the villages the percentage of handmade wares in these periods is mentioned as being larger, up to 40%, but no mention is made how these were produced or to what extent they were painted (Redman 1983-1984). Mediaeval decorated pottery from the area of Valencia has been compared with that produced at present in the Berber region in North Africa in order to study a possible connection (Delaigue 1983-1984). Although the decorations show a similarity, the pottery from Valencia was mainly thrown ware and the influence of Berber pottery could not be conclusively established, although the distance between both areas is rather short and the area of Valencia had a Berber population in former times. As far as could be deduced, a frequent combination of geometrical designs on handmade pottery, whether or not constructed with the use of textile, could not be established, although these aspects are found separately.[9] A direct link of Arab Geometrical ware with contemporaneous, decorated pottery on the south-western coast of the Mediterranean basin, therefore, seems unlikely at present, but this may change if more is known about mediaeval pottery from the countryside.[10]

As for designs on baskets and textiles as a possible source of inspiration, hardly any such material from the period in question is known and is insufficient to warrant conclusive indications that it served as a source of inspiration for patterns used on AG ware.[11]

Technological aspects

Construction

During the study of pottery from some sites, imprints of textiles were observed on a number of body sherds and base fragments which led to two hypotheses on how the ware was made. The first was based on material from Pella. According to Smith:

> "the potter filled a cloth sack with damp sand until it achieved approximately the form which he wished for the body of the vessel. He then pressed a roughly flattened sheet of clay around the bag of sand and left it to dry until it was leather-hard. ... the potter has covered the leather-hard moulded clay with another layer of clay which conceals the cloth-impression and makes the vessel twice as thick" (Smith 1973: 240).[12]

Such a construction method, known as "bag moulding", would imply that if no other techniques were used, closed forms were made in two halves which, then, had to fit together. This would need considerable precision while forming the two parts, which is difficult to attain with handmade ware. This method of constructing the vessel would probably also leave a trace on the inside of the pot where the two parts were joined, a trace which could not always be obliterated completely due to the narrowness of the neck opening. The potter would have difficulty in reaching the join to erase it. Also the joining would probably have left a slight thickening on the outside, where the two halves had been put together, if the potter added some clay to properly fix the two halves. No such traces have been found on the material excavated at Tell Abu Sarbut. Moreover, the covering of a clay body, which has dried leather-hard with a layer of fresh and wet clay full with grog could produce shrinking tensions during further drying, which should sometimes cause the two layers to come apart at places. Also this phenomenon was not observed on the material studied from Tell Abu Sarbut. It is unlikely that the construction method described by Smith was emplyed to produce the AG pottery found at Tell Abu Sarbut.

A second technique was described by Franken, who analyzed material from Tell Abu Gourdan (Franken and Kalsbeek 1975: 39 and 167). Pots were made using a bowl-like shaping dish lined with a textile to prevent clay sticking to the shaping dish and to the hands of the potter. In the shaping dish first a piece of textile was laid, then a lump of clay mixed with ample grog and water, and again a piece of textile. The clay was then pressed into the desired shape, forming the base of the vessel. After some drying, fresh clay was added between the two layers of textile to form the rest of the body and eventually the neck.[13] Finally, a ring base was added. Traces on the inside of the vessel point to the pulling away of the textile, when the vessel was still wet, leaving characteristic imprints. Occasionally, this was done when the vessel had already dried somewhat, leaving a clear imprint of the cloth itself. Wet-smoothing on the outside, and on the inside where possible, would have obliterated most of the traces of these imprints.

At Tell Abu Sarbut seven body sherds and eleven base fragments were found to have imprints of textile, all from closed shapes.[14] One fragment of a base has traces of textile on the outside of the ring base, which itself was a later addition, implying that in this case for construction of the ring base, a textile was used to press the clay into the desired shape. Another base fragment seems to confirm Franken's theory that textile was used to cover the clay mush on the inside of the shaping dish. Inside of this fragment were nearly vertical traces of textile on the plane of the fracture of the sherd. Probably, while the clay was pushed, the textile folded downwards and caused a separation of the clay inside the base. The potter must have drawn back the textile a little to

adjust it and then continued to push the clay further in shape. However, the effort failed and the base afterwards broke exactly where the textile had divided the clay previously.

It is not clear that textile was used to support the higher segment of the wall of the vessel while it was being formed, as was described by Franken. The clay should have dried, at least minimally and in order to not need this support anymore, if that was the aim, especially when forming the inward sloping wall of the upper part of jars. This area could usually not be wiped again by the potter. Therefore more sherds from that area should have been encountered with an imprint of textile had that been the case. Also the pulling away of a rather large piece of textile, muddy and heavy with clay, from the top of a jar, where a limited hole was left open to make the neck, would leave traces or could even cause damage to the edge of the hole, a damage which would have to be repaired. No traces were found at such an edge of mending or of a tear, which could indicate this. The inside of body sherds of jars and jugs from Tell Abu Sarbut, however, do often display the characteristics of wet textile, which was pulled away. Supposing that the freshly built wall of a jar could stand on its own, the reason for the use of textile on the inside of the upper part could as well have been to prevent the clay sticking to the hands of the potter when supporting the wall of the vessel. In this case no large piece of tissue was needed and a little lump of it would have been sufficient. This lump would leave the same kind of traces as were observed on the material from Tell Abu Gourdan and would not cause any damage to the rim.

Considering these observations of cloth imprints on sherds from Tell Abu Sarbut, it follows that the lower part of the vessel could have been formed with the aid of textile. For the upper part not enough indications for shaping between two layers of cloth are present. The upper part was probably made with coils or slabs of clay with a support on the inside of a lump of cloth. It seems then that in general Franken's technological explanation for the presence of textile imprints is more suitable for the material from Tell Abu Sarbut than the one put forward by Smith. The coexistence of different techniques to make this pottery is called by Brown an inter-site variation and is an interesting aspect of the level of contact and exchange of techniques within a small segment of the Jordan Valley (Brown 1992: 196).

No imprints of cloth have been found on fragments from open shaped vessels. If textiles had been used, the imprints would have been wiped away completely. Considering, however, the solidity of the clay and the angle of the wall it seems likely that part of these vessels were formed with the aid of a shaping dish if this technique was used for the closed shapes.

Textiles and the techniques of manufacture described here were not always employed to construct the AG ware. A number of flat bases, mainly of large open shaped vessels, have imprints of a mat on which the vessel was formed with the use of coils. The imprints of the mats all show a spiral like pattern with a coil-width of approximately one centimetre. Such imprints have also been reported from other sites like Ti'innik (Ziadeh 1995: 217). Other bases were formed on a flat or slightly concave surface and

then the rest of the vessel was formed. This technique was attested in all phases, but became more important in phase 100. These methods of construction are described below.

Temper

The clay that was used to make the vessels contained many inclusions of different sizes, which had been added as a tempering material. The most abundant additive is grog, crushed sherds. For this they did not only use fragments of contemporaneous pottery, but also 'older' sherds, probably from the Roman/Byzantine period (Smith 1973: 240). Whether this was because these are usually thinner and maybe easier to crush to fine particles, or they just happened to be most abundant on the surface is not clear. Potters in the first half of the twentieth century still used preferably this latter kind of sherds to produce the grog (Einsler 1914: 251).[15] Also organic material, such as straw and chaff, could be added. This was usually done with closed shapes, which were to serve as containers for water, because some degree of evaporation through the slightly porous fabric would keep the water cool.[16]

Smoothing, burnishing, and application of slip

The vessels were usually wet-smoothed at places, where the potter could still reach, i.e. the outside and part of the inside of closed shapes and the complete surface of open shaped vessels. Part of the vessels was also burnished. Of rim fragments belonging to open shaped vessels, 45% had been burnished on the inside, while 43% were not and the rest were indecisive. A high percentage (74%) of red painted vessels were burnished while far fewer (17%) of the black painted pots were burnished. Body fragments of closed shaped vessels had been burnished in 83% of the cases, while 1% was not and the remainder was unclear (Table 2). Also in this case the red painted body sherds had the highest percentage of burnishing. The presence of slip was more difficult to establish because it often has the same color as the body of the vessel. Of open

	brown		red		black		group total	
	n sum	col sum %	n sum	col sum %	n sum	col sum %	n sum	col sum %
burnished	660	86.5%	210	98.1%	465	73.1%	1335	83.8%
no burnishing	8	1.0%	1	.5%	6	.9%	15	.9%
unclear	95	12.5%	3	1.4%	165	25.9%	263	16.3%
group total	763	100.0%	214	100.0%	636	100.0%	1631	100.0%

Table 2. Closed shapes: burnishing and colors on the outside of body sherds.

shaped vessels, at least 23% of the sample shows a slip layer, while for 30% it was unclear. The remainder did not have a slip layer. Of the closed shaped vessels 61% had a slip layer, 24% was unclear and the remainder did not have slip (Table 3).

Through the phases, burnishing on the inside of open shaped vessels decreases rather regularly, from 94% in phase 10 to 26% in phase 100. Slip also became less frequent. For closed shaped slips seem to diminish through time, although the application of slip and burnish was generally less clear in the later versus the phases.

	brown		red		black		group total	
	n sum	col sum %	n sum	col sum %	n sum	col sum %	n sum	col sum %
no slip	98	12.8%	37	17.3%	108	17.0%	243	15.1%
unclear	197	25.8%	32	15.0%	165	25.9%	394	24.4%
slip	468	61.3%	145	67.8%	363	57.1%	976	60.5%
group total	763	100.0%	214	100.0%	636	100.0%	1631	100.0%

Table 3. Closed shapes: slip and colors on the outside of body sherds.

Firing

It is usually assumed that these vessels were fired in an open fire, because the color of the pottery can vary. As a result, one cannot expect to identify recognizable traces of pottery firing on a site. No traces of fires could be identified as such at Tell Abu Sarbut (Ziadeh 1995: 218).

The repertoire in general

The published forms of AG ware mainly consist of closed shaped vessels like jars and pitchers, open shaped basins and bowls, lids (or spindle bowls), and occasionally lamps. At Apamaea apparently only jugs and jars were found, while from Hama a number of additional, different forms has been published such as figurines and basket shaped containers (Riis and Poulsen 1957: 276 no's 1040-1046).[17] At Tell Abu Sarbut the repertoire consists, with the exception of two lamps, only of various jars, different sized bowls and lids (or spindle bowls).

To what extent there is a variation in general in the shapes of vessels such as jars is hard to establish. The variety in jar rims at Tell Abu Sarbut is limited to three basic shapes, which can also be found at other sites. This is a small number considering that these rims were hand formed; a larger variation could have been expected. This seems also to be the case on other locations where the number of published different rim shapes is equally limited. Apart from those published below, there seem to be only a few other recurring forms. One is a straight neck with a distinct splaying top of the rim. Another is a clearly inward sloping neck with a small straight rim.[18] If, indeed, the

number of rim shapes is limited, this could reflect a production on a small number of sites. It is also possible that the kind of clay used to make these vessels restricted the possibilities for variation within the rim shape. The variation in decoration on the other hand seems endless, pointing to a more individualistic trait.

Painted colors

The colors of the monochrome decorations are basically black, brown or red, but occasionally occur in combination (bichrome) on the same vessel.[19] The outline of a decoration was first painted and was then filled in. Thicker paint resulted in a darker color, implying that if paint was applied thin, it can appear as dark brown, while the red color appears as reddish brown if applied thick. It is therefore hard to establish to what extent brown was used as a specific color, nor if brown was an intentional or unintentional effect. Also the degree of porosity and the dryness of the surface of the vessel when it was painted would have influenced the eventual color, as did the firing circumstances (see also Franken and Kalsbeek 1975: 51). Often a (thick) layer of slip was applied beforehand, which could have been done on purpose to prevent the presence of scum on the surface from interfering with the paint (Franken and London 1995: 217).

The development of colors visible on the body sherds of jars and pitchers through the phases is shown in Table 4. In phase 10, red is the dominant color followed by brown with only one occurrence of black. This ratio changes in phase 20, when brown becomes dominant. From phase 30 onwards black starts to appear in greater numbers and becomes the dominant color from phase 50 onwards, with only an occasional occurrence of red. A similar observation can probably be made as regards the colors of

	brown		red		black		group total	
	n sum	row sum %	n sum	row sum %	n sum	row sum %	n sum	row sum %
phase								
10	18	38.3%	28	59.6%	1	2.1%	47	100.0%
20	25	50.0%	23	46.0%	2	4.0%	50	100.0%
30	17	60.7%	4	14.3%	7	25.0%	28	100.0%
40	17	60.7%	6	21.4%	5	17.9%	28	100.0%
50	19	35.2%	8	14.8%	27	50.0%	54	100.0%
60	28	51.9%	1	1.9%	25	46.3%	54	100.0%
70	32	32.7%	4	4.1%	62	63.3%	98	100.0%
100	71	38.0%	2	1.1%	114	61.0%	187	100.0%
group total	227	41.6%	76	13.9%	243	44.5%	546	100.0%

Table 4. Closed shapes: colors on the outside of body sherds.

the open shapes, although the number of fragments of open shapes is, especially for phase 100, too small in comparison with that of the closed shapes to draw a definitive conclusion.

Decoration

Structure of the decoration

On the closed shaped vessels the decorations are usually applied according to a number of main zones into which the surface had been divided, separated and delimitated by straight simple horizontal lines or more intricate decorations, i.e. the neck, the upper part and the lower part of the body. The decorations painted in these zones can either be built in a horizontal, vertical or diagonal arrangement and as such subdivide the main zones into smaller areas, which are then filled in in various ways. Also medallions filled with decorations can occur as isolated areas, mainly on the shoulder, but also in the other zones. The lower zone is not always decorated, probably because it is less visible, although the ring base proper often has a horizontal line of paint as decoration. The inside of the rim of the neck can be decorated as well, to an extent which depends on the diameter of the neck, which limits the area where the paint can be applied for the decoration and its eventual visibility. An exception is style D (see below), where a prior division into zones was not always made. Because of the scarcity of larger fragments it was difficult to register the buildup of patterns within these zones and no possible chronological development for that aspect could therefore be distinguished.

Open, more shallow shaped vessels have a decoration covering the inside, either completely or only along the rim, while on the outside the decoration is limited to the area close to the rim. The deeper vessels usually have only a decoration directly along the inside and outside of the rim.

Decorations on handles and bases of closed and open shaped vessels are usually not integrated in the general structure of the decoration and are treated separately in following paragraphs since their decoration is different. The same applies to the decoration of lids, or spindle bowls, which is treated separately in the paragraph on the lids.

Decoration of body and rim

A number of examples of motifs , and their combinations into patterns, have been published from Tell Abu Gourdan (Franken and Kalsbeek 1975: 170-171), Hesban (Sauer 1973: 55-56), Jerusalem (MacAlister 1926: 197-199); Vriezen 1994: 222-223), Rujm el-Kursi (Khadija 1992), and Ti'innik (Ziadeh 1995). They usually have been organized according to motifs such as spirals or triangles and without quantitative indications to trace a local contemporaneous predilection or a chronological development. Although the 'catalogue' illustrated in Figure 4 in combination with some individual motifs described below is extensive, others were probably present as well, but could not

be distinguished and described as such, because the fragments on which they occurred were too small or worn to indicate enough about a motif or a pattern of decoration.[20] This is especially the case with the decorations on the inside of bowl bases which were usually worn beyond recognition, but sometimes still show a 'checkerboard' decoration with spirals or alternatively filled in squares.

The decorations on AG ware display a large variation of motifs and combinations, but a partial comparison between those published by Franken and those from Tell Abu Sarbut showed that only about a third of those from Tell Abu Gourdan were also found at Tell Abu Sarbut.[21]

Only a few individual motifs occur more than ten times. Many motifs are single finds, further complicating the analysis. Therefore, they have been grouped as they were used as patterns and in different 'styles'. Styles A-C are shown in Figure 4, while the others are described separately below. In addition to these styles, some bichrome decorations in 'black' and 'red', some exceptional monochrome ones and medallion-like ones are described.

In Table 5 a diagram is given for styles B-E plus bichrome decorations (F) as they occur through the phases. Style B forms the majority in all phases, while style C starts clearly in phase 50 and style D as well, albeit in small numbers.[22] Style E and bichrome decorations (F) are clearly present in phase 100.

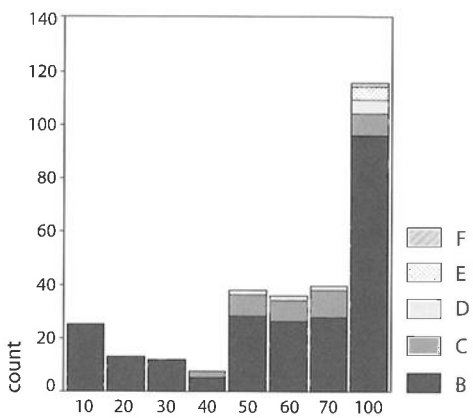

Table 5. Styles of decoration per phase.

Style A. 'Border decoration'

The motifs, which were used as a border decoration, can be divided, apart from a small varia group, into a group, which has a continuous curbed line (A1-A43), and one with parallel, horizontal lines (A60-A68). Both occur throughout the phases with a slight predilection for parallel lines in the phases linked with the sugar industry, rather than in subsequent phases. This development could be linked to the decreasing occurrence of open shaped vessels, which more often have parallel lines, and increas-

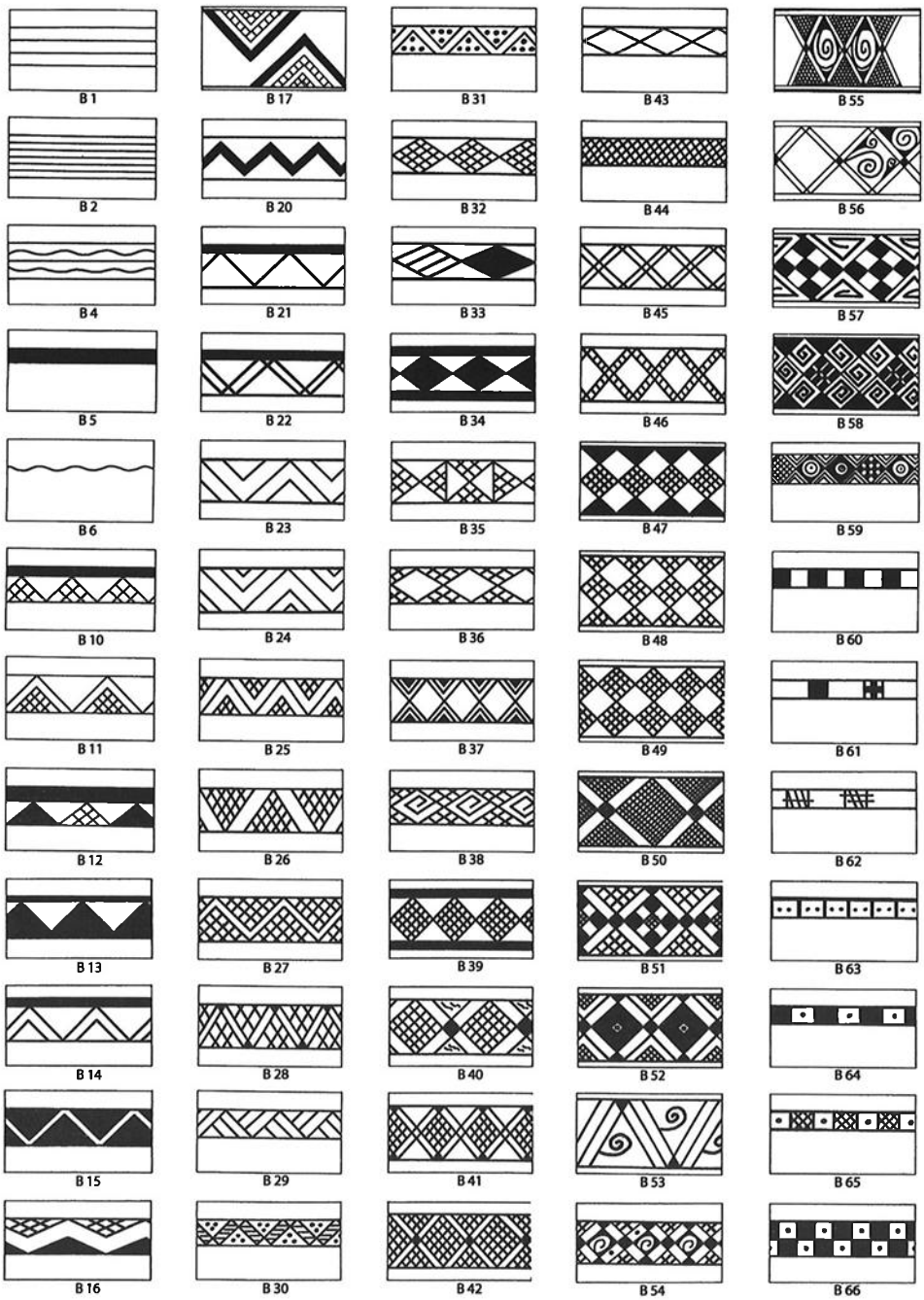

Figure 4 (cont.). Catalogue of motifs.

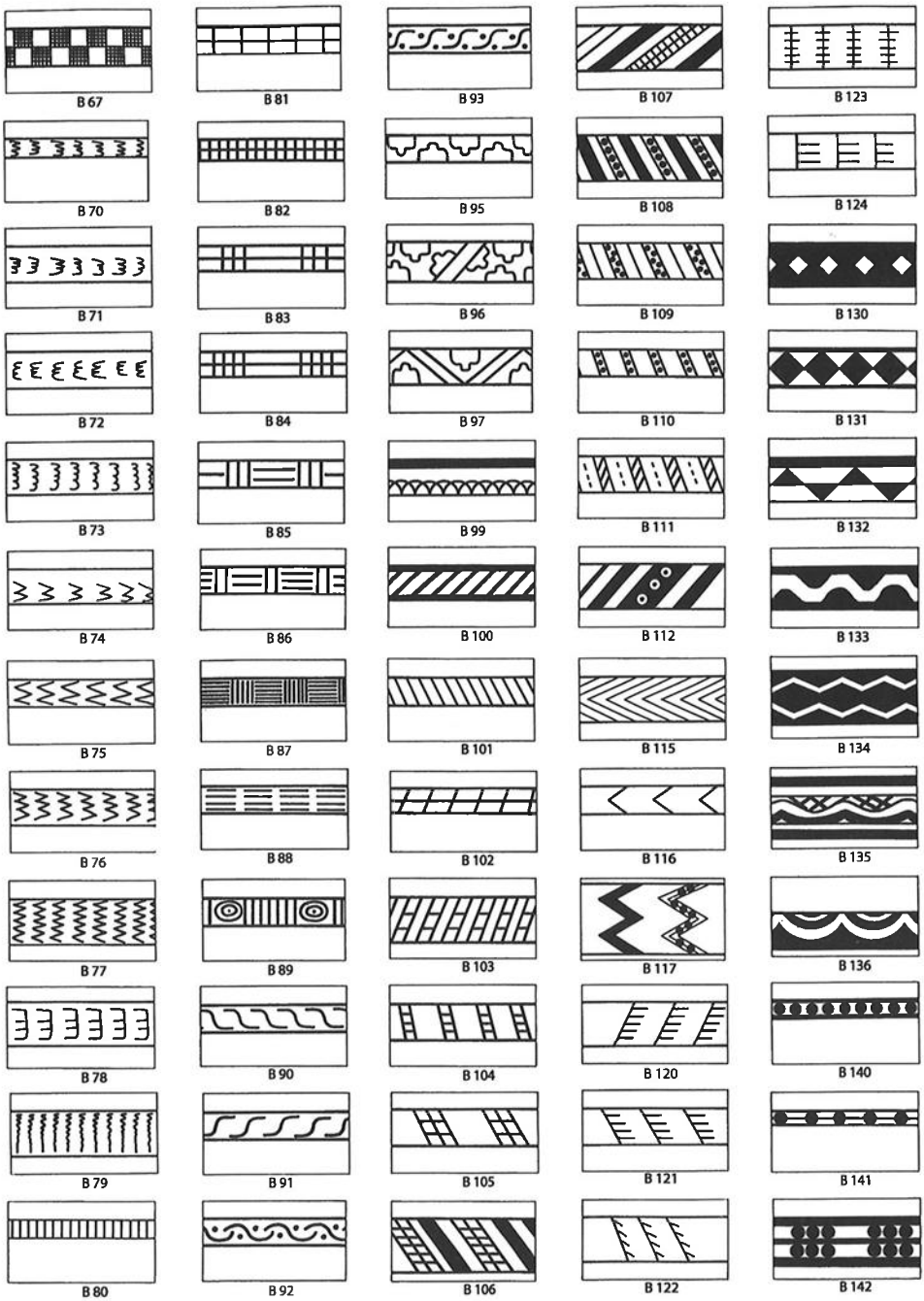

Figure 4 (cont.). Catalogue of motifs.

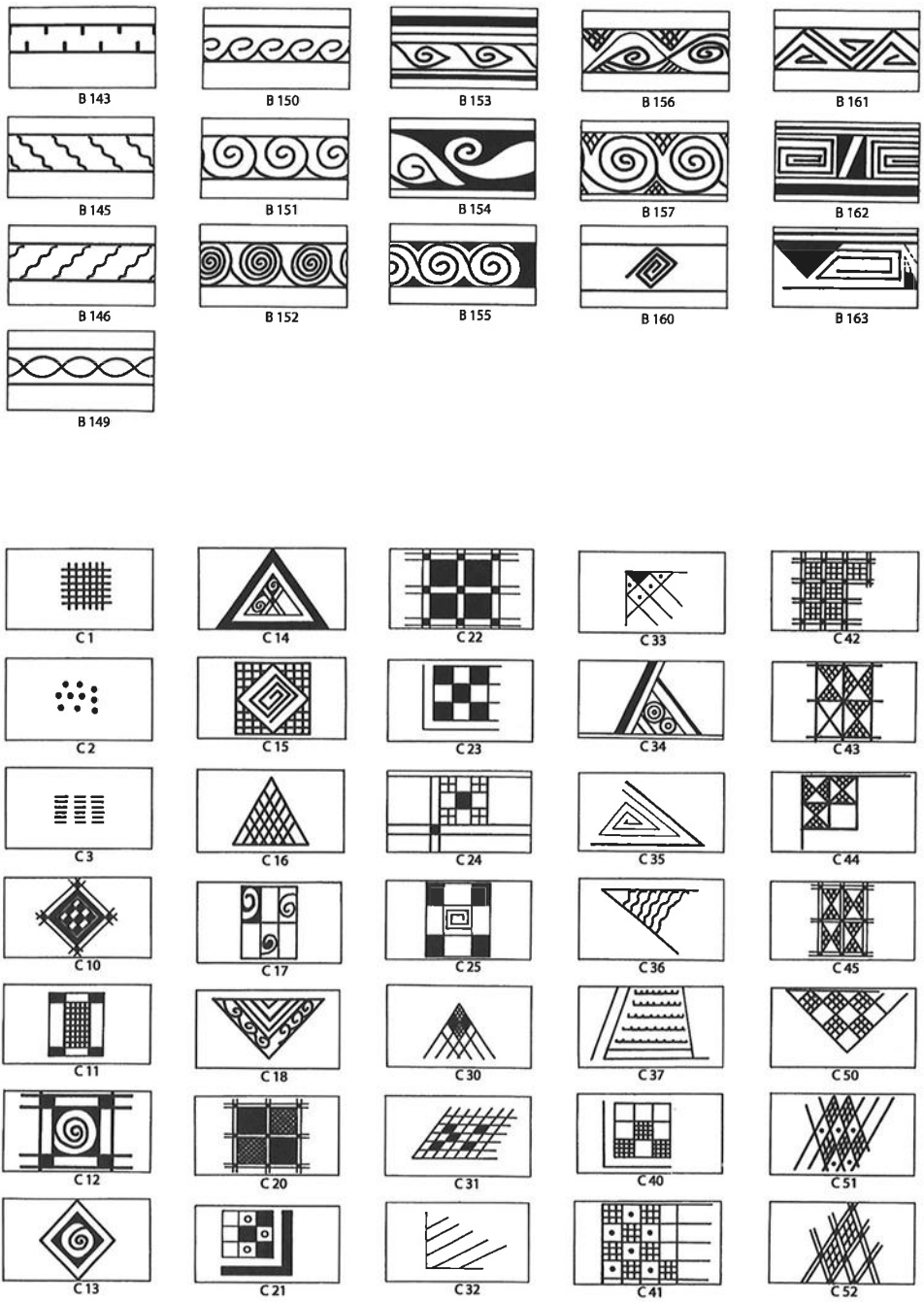

Figure 4 (cont.). Catalogue of motifs.

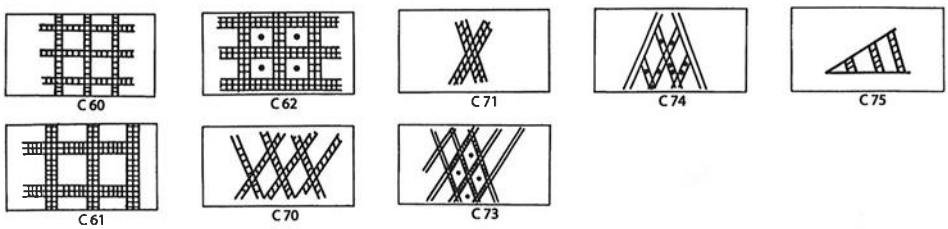

Figure 4 (cont.). Catalogue of motifs.

ing occurrence of jars in these latter phases (see below). Within the motifs ascribed to these two larger groupings only within the curbed lines group did a more specific development could be found. In the earlier phases A42 is mainly used, while in later phases mainly A5 and A10 occur, a development linked as well to the increase in closed shapes.

Style B. Repetitive motif between single parallel lines
The motifs in style B do not show a clear development through the phases at Tell Abu Sarbut. Therefore they have been tentatively grouped according to five possible main patterns to which reference is sometimes made in other publications to determine if this method is helpful.

- 'spirals', either round, square or triangular (SP)
- parallel lines (LL)
- vertical indented lines (EE)
- patterns having a triangle as a basis for decoration (TR)
- patterns having a tilted square as a basis (LO)[23]

Using these five clusters, no clear pattern of a change or development through the phases could be established. Within each group, only the one with spirals shows a development in the sense that the square and triangular spirals were limited to phases 10 and 20 plus a possible change in predilection from motif B155 in earlier phases to motif B156 in later phases. In addition, most of the remaining individual motifs of style B have been grouped in various ways as well, but no clear development through the phases could be distinguished. It seems then that based on these data from Tell Abu Sarbut, no overall and clear development of motifs, either individual or grouped according to a common trait, can be discerned, although in some cases a trend is visible. Some examples of combinations of motifs of style B on closed shapes are given in Figure 5.1-3.[24]

Figure 5.1-3. Decoration of body and rim (style B).

Style C. Repetitive pattern to fill in a zone.
The individual patterns of style C do not change or develop at Sarbut. Most patterns in style C could be ascribed either to a general design consisting of filled in squares or to one in which two parallel crossing lines were filled in.[25] When considered in this way, no clear development is discerned throughout the phases. The latter pattern occurs only on closed shapes, a trend that might develop into a more gneral pattern later.

Style D. 'Free style'
This so-called free style preliminarily refers to bold, thick lines which can constitute an undulating pattern of intertwined lines or bold, straight crossing lines. To what extent these were part of a more clearly definable larger pattern is not certain, because the fragments are so small (Figure 5.4). Sometimes the pattern is regular, but then the lines have been put with a bold stroke.[26] The illustrated example in Figure 5.5 is an exception as regards the accuracy of the thickness of the lines and their regular spacing.

Style E. Blank spaces between painted areas
Although it does not appear frequently and is not an exactly definable style, Style E deviates significantly from styles A-D by its application of the paint, which leaves the non-painted parts appear as motifs. A number of sherds have been ascribed to style E if the painted surface clearly exceeds that of the non-painted area and if a design of the non-painted places was observed.[27] A number of fragments with a bichrome decoration, see below, can, be ascribed to this style as well. At Tell Abu Sarbut, style E was only observed on fragments of closed vessels. Examples are given in Figure 5.6-7.

Bichrome decoration
A limited number of examples of bichrome ware come from several sites, but as at Sarbut, it was never common.[28] The following examples, all from closed shaped vessels and mainly single occurrences, display two distinct colors, black and red. They are 'bichrome' in the sense that these are not variations within one broader specter like light red and very dark brownish red caused by a difference in the thickness in applying of the paint. A number of fragments have bold black lines and red dots on a non-slipped surface (Figure 5.8-9). Others have intertwined circles that are partially filled up with a pattern of black lines and some red dots (Figure 5.10). A third variety consists of straight crossing lines with a subpattern executed in red (Figure 5.11-12).

Exceptional decorations
Some sherds belonging to AG ware have a decoration that differs from those described. For example, the main element of the decoration can consist of parallel bent lines with small motifs in the open spaces, which look like medallions. Several sherds (Figure 5.13-15) were probably all part of the same, thin walled vessel, which was made of a red firing clay and covered on the outside with a white slip. Other sherds

Figure 5.4-7. Decoration of body and rim (style D; style E).

Figure 5.8-12. Decoration of body and rim (bichrome decoration).

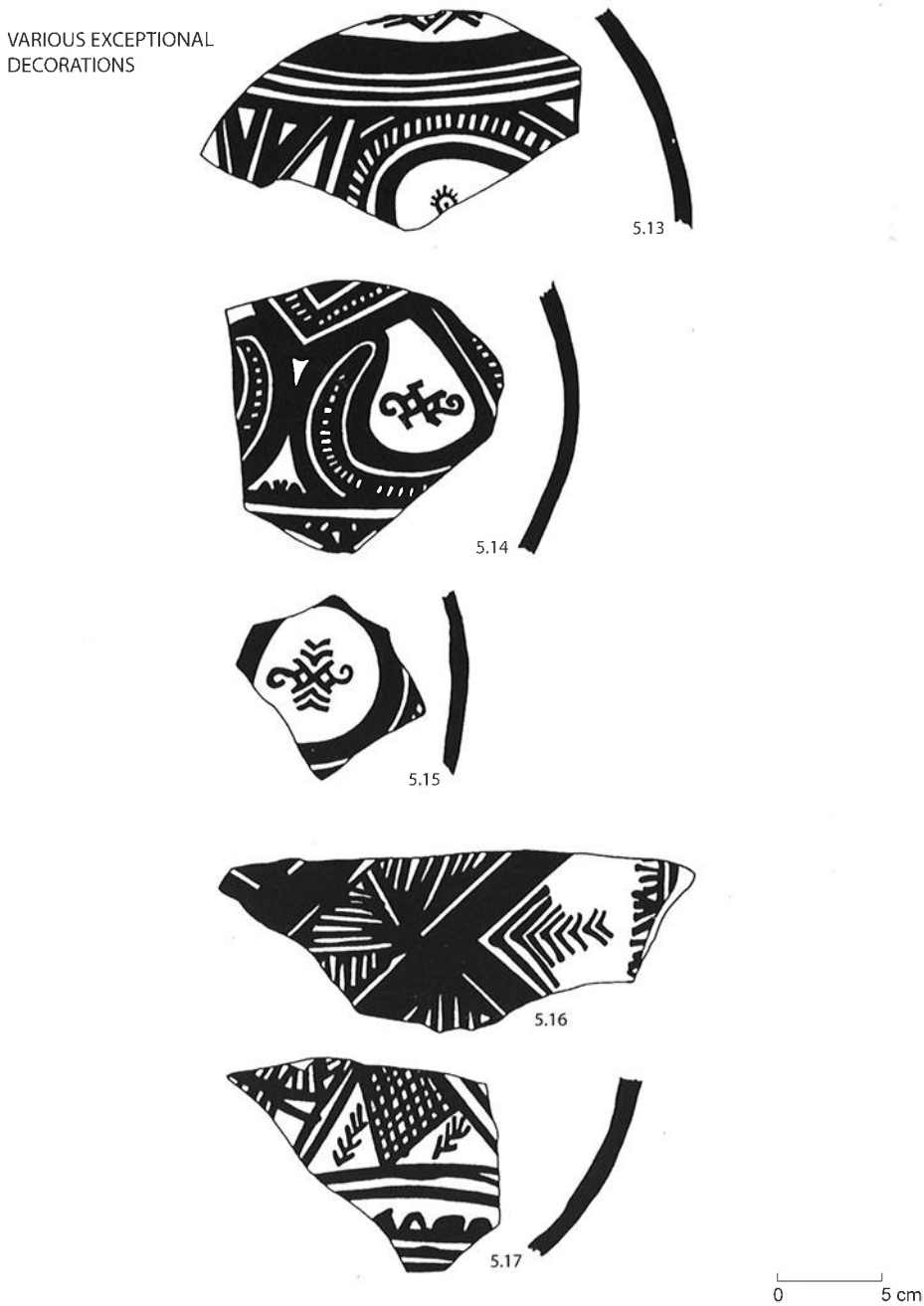

Figure 5.13-17. Various exceptional decorations.

(Figure 5.16-19) display less well executed lines, but also they are different in design than the rest of the material.[29] Another exceptional decoration is formed by composite triangles, which are used as a 'border' decoration or are part of a more complex decoration (Figure 5.20-21). Small designs (Figure 5.22-23) can occur in 'empty' areas within larger patterns. Sometimes, small enclosed areas within a larger design could be filled in as a medallion (Figure 5.24-26). Other exceptional decorations appear on an open shaped vessel (Figure 5.27-30).

Decoration on handles

Handles usually have an individual decoration, which is not integrated into the overall on the vessel body. The handle decoration is often separated by a line painted around the handle attachment. The individual motifs on the handles are illustrated in Figure 6. From their frequencies it can be deduced that there are a large number of motifs with only a few, more simple ones recurring more than five times. None were characteristic for a specific phase or phases. Some more intricate designs are illustrated separately (Figure 10).

Decoration of bases

Some ring base fragments have a decoration underneath or on the outside of the ring (Figure 7 and Figure 8). Decoration under the base occurs rarely and is limited to phases 10 and 20, with pattern O2 occurring six times and patterns O3 and O4 two times each. How and when this decoration would be visible is only clear in the case of dishes with one or more holes in the ring of the base to hang the vessel on the wall with the base turned outward. Not all decorated ring bases had holes. A jar base has a decoration underneath, making it difficult to imagine when this decoration would have been visible. Decoration on the outside, near the base, was found in nearly 50% of the cases and mainly consists of a simple line along the base ring proper of closed and open shaped vessels. Some other, more elaborate patterns occur only once or twice and were found in phase 100, see for an example Figure 9.1. A decoration on the inside of bases of open shaped vessels was visible in 25% of the sherds, but apart from some exceptions (Figure 9.2-4), these were too worn to give indications about a more specific pattern. They mainly occur in phases associated with sugar production.

Closed shapes (AGC)

Shapes and technology

The closed shaped vessels consist of jars and jugs in various sizes as well as pitchers. Only a few larger fragments were found and therefore the general shape of the jar or jug could not serve as a basis for a description of the available repertoire. For that reason,

Figure 5.18-24. Various exceptional decorations.

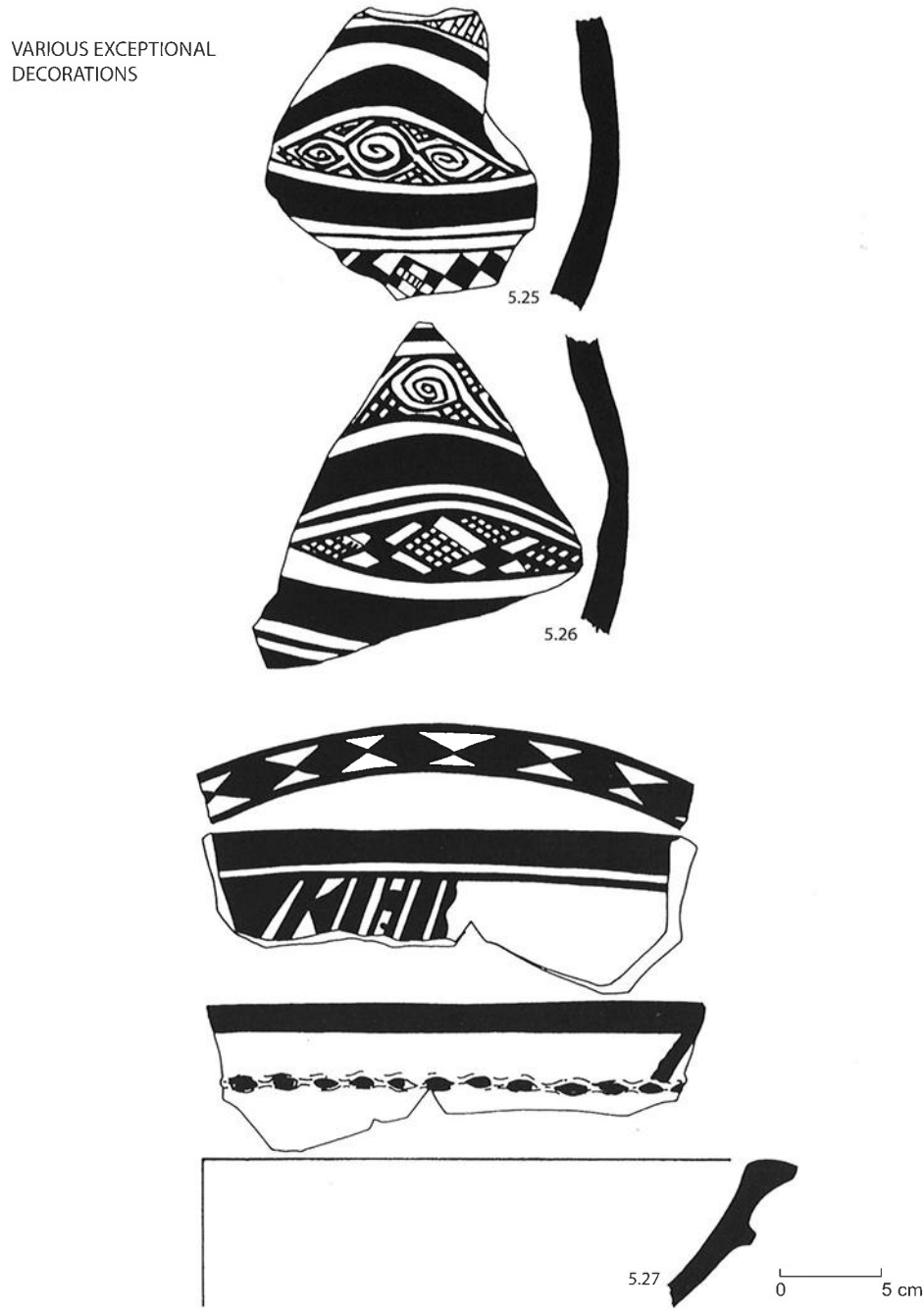

Figure 5.25-27. Various exceptional decorations.

Figure 5.28-30. Various exceptional decorations.

the rims belonging to jars, jugs and pitchers have been arranged to their general shape without regard to the diameter, although this implies that rims of a small and a large vessel can end up in the same group. Nor was it feasible to diffentiate between jars with or without handles.

In contrast to the shaped vessels, whose interiors could easily be finished, the closed shapes provided the potter with some difficulty in this respect. This is illustrated by the profile of a small jug, which was made in various, subsequently joined segments: lower half of the vessel, the upper part of the vessel and thirdly the neck (Figure 10.1). The ring base was a later, separate addition.

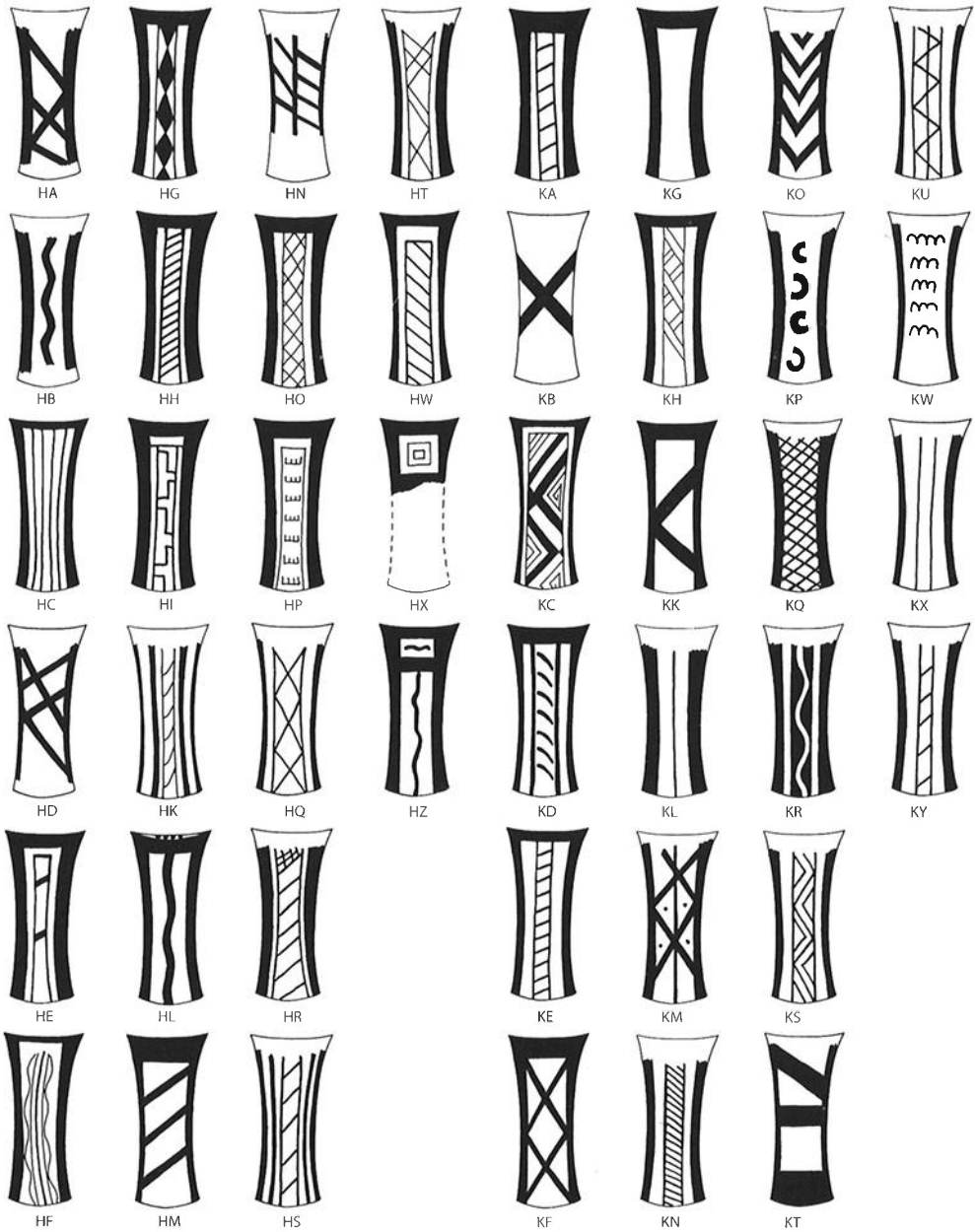

Figure 6. Decoration on handles.

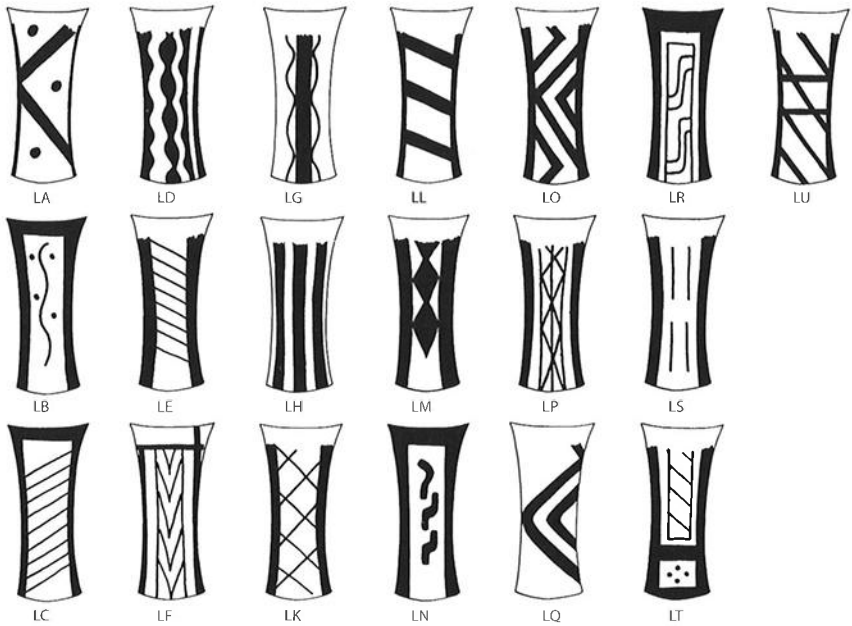

Figure 6 (cont.). Decoration on handles.

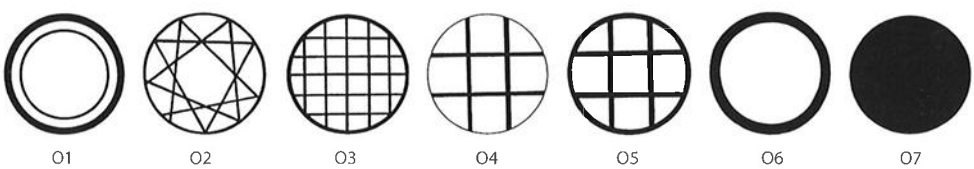

Figure 7. Decoration underneath bases.

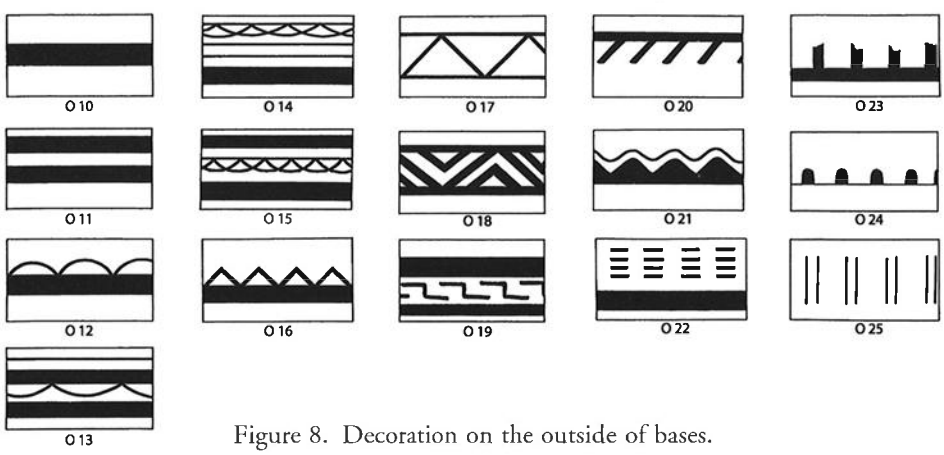

Figure 8. Decoration on the outside of bases.

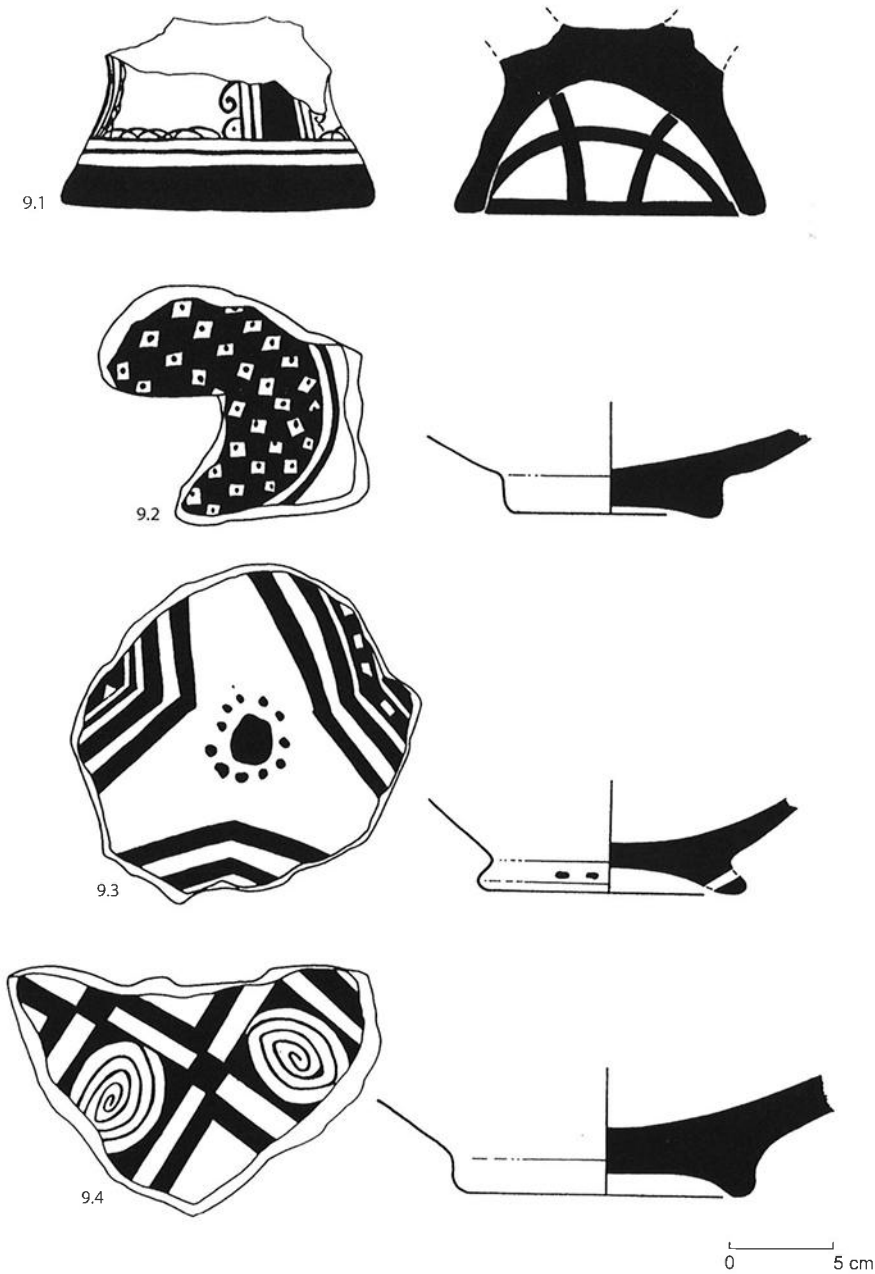

Figure 9. Decoration of bases.

The first segment, the lower part, clearly shows signs of wiping on the inside, which is therefore rather smooth. The second segment, however, could not be wiped inside any more, because the opening of the neck was too small to enable the potter to reach there and shows traces of a moisty cloth, which had been pulled away after supporting attachment of that part. The neck itself is again accessible and is neatly finished. The neck is, however, rather high and narrow, making it impossible to insert part of a hand far enough to strengthen the joint of the neck with the body on the inside of the vessel. Therefore, the neck broke off exactly at the joint and this was often the case with rims AGCR1-2 (see below). Other rim shapes have a wide, more splayed neck, as rim AGCR3, or a wider mouth and a lower neck, like rims AGCR5-7, which enabled the potter to insert a hand and reach the joint with some fingers to strengthen it from the interior. Traces of fingers can often be seen below the join of the neck with the shoulder. In these cases the joint was stronger and did not break. Also that part of the inside that could be reached and wiped was larger and this was usually done.

The jars were probably used for the storage of water or other liquids so the wiping would close off at least the larger pores in the clay and prevent unwanted evaporation or leakage.[30]

Rims (AGCR)

These rims do not have a specific diameter that can be linked to one rim variety, but in general those of jars have a smaller diameter, around 12 cm, than pitchers (Table 6). Stratigraphically, jar rims AGCR1 and AGCR2 and pitcher rim AGCR5 are common until phase 60, after which jar rim AGCR3 and pitcher rims AGCR6 and AGCR7 also come in usage, while other rims continue to be part of the repertoire.

	rim 1	rim 2	rim 3	rim 5	rim 6	rim 7	group total
	n sum	n sum	n sum	n sum	n sum	n sum	sum
diameter							
6	0	1	0	0	0	0	1
8	3	5	0	0	0	0	8
10	5	9	1	0	0	0	15
12	16	11	5	1	0	0	33
14	10	4	4	5	0	0	23
16	2	1	4	2	2	3	14
18	0	1	1	4	5	0	11
20	0	0	0	2	0	0	2
group total	36	32	15	14	7	3	107

Table 6. Closed shapes: diameters of rims.

Rim AGCR1
Rim of a jar with a high neck that becomes thinner towards the top of the rim which is usually slightly everted (Figure 10.2-4).

Rim AGCR2
Rim of an even thickness, which belonged to a jug with a somewhat splayed neck (Figure 10.5-7).

Rim AGCR3
Rim of a jar with a distinctly splayed neck, which can be provided with two handles (Figure 10.8).

Rim AGCR5
Rim belonging to a pitcher with a low splayed neck with a transition from rim to shoulder, having a distinct edge on the inside. The handle passes from the top of the rim to the shoulder (Figure 10.9).

Rim AGCR6
Rim of a pitcher with a splayed neck and a transition from rim to shoulder that is clear and smooth on the inside of the vessel (Figure 10.10).

Rim AGCR7
Rim of a pitcher with a low rim and a transition to the shoulder that is direct, with only a slight curve (Figure 10.11).

Handles (AGH)

The handles are made of the same fabric as the vessel and were sometimes constructed by folding both sides of an oblong slab of clay inwards. This could result in a small groove on the inside of the handle, if the edges did not join, or in a small ridge if the edges had an overlap (Figure 11.1). The outside of the handle is usually smooth. Mostly, however, it is difficult to establish which method was used to form handles, since traces indicating how they had been made were obliterated. At both hanle attachment points and on the ends of each handle, scratches were made for strengthening the join. For the same purpose, clay would be added to the inside of the handle where it joins the wall. Traces on the wall interior of a number of sherds show that the potter gave counter pressure, when pushing the end of the handle against the outside of the wall, implying that in case of the jars this was probably done before the neck was placed. This support was at times not adequate or could not be given anymore and as a result, the wall would bulge inwards somewhat and at times clay of the handle was even pressed through the wall, while adding the handle on the outside.

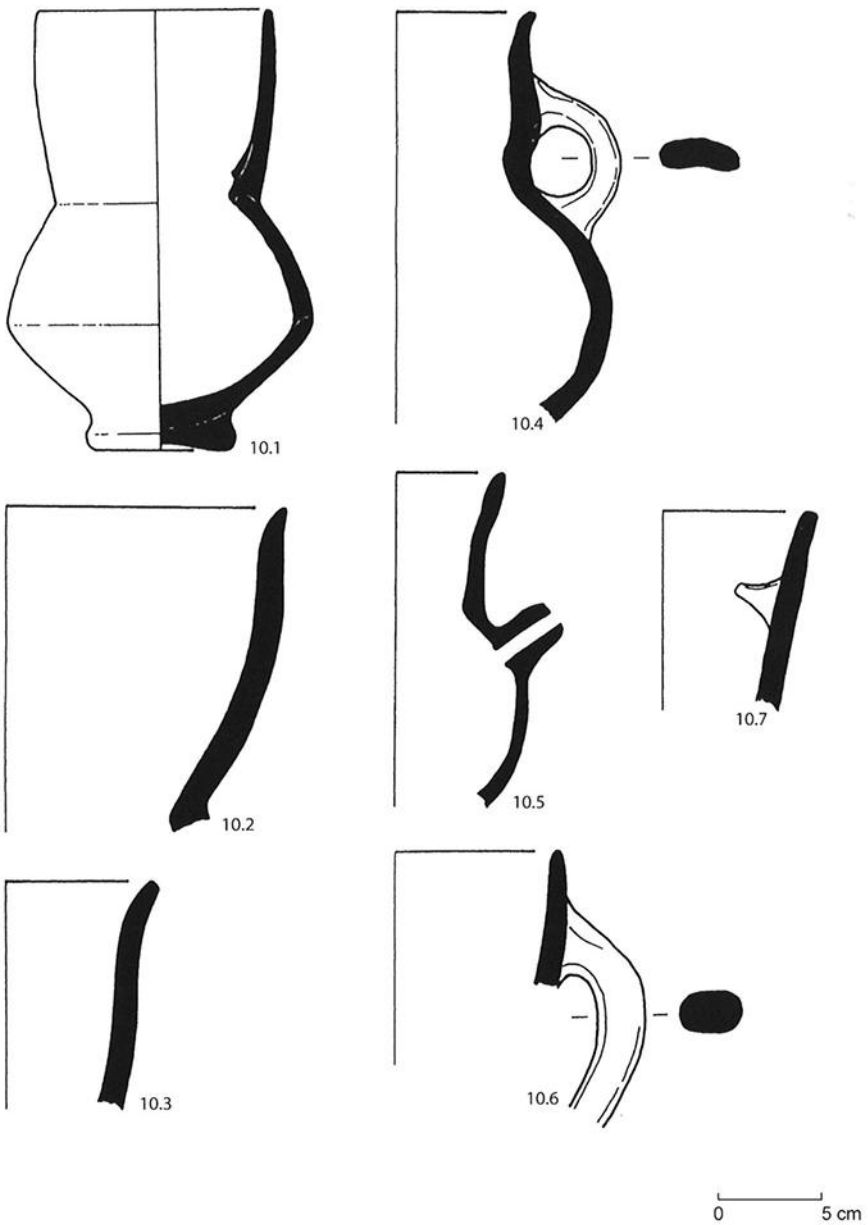

Figure 10.1-7. Closed shapes: rims.

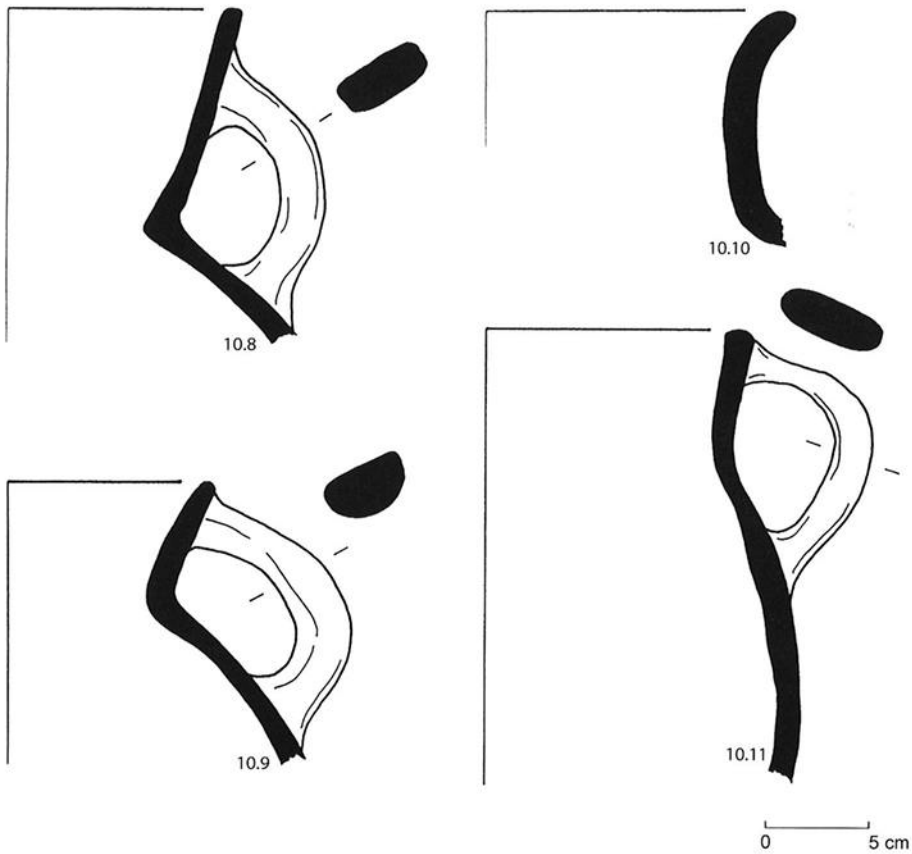

Figure 10.8-11. Closed shapes: rims (cont.).

The handles have been divided into those, which have two points of attachment on the shoulder (handle AGHA) and those, which have one on the neck and one on the shoulder (handle AGHE). Most fragments of handles have only one point of attachment left or none at all, which makes it difficult to ascribe them to either of them, but based on the general shape of a fragment, most seem to have had two points of attachment on the shoulder. The handles vary not only in shape, but also in size (Table 7, where the dimension is given based on the thickness of the handle multiplied by its width, in millimeters, and then divided by 100). The variations in dimension probably reflect the various sizes of the jars, and shows that the handle, which connects the neck and the shoulder is relatively smaller than the handle with the cup (AGHL, see below), which is smaller than the handle on the shoulder.

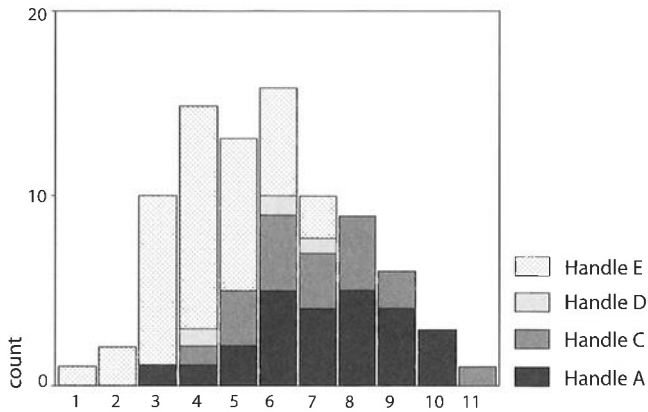

Table 7. Closed shapes: general dimensions of handles.

Stratigraphically, handles placed on the shoulder dominate in all phases, while the handle connecting neck and shoulder is found only after phase 40. The handles with the cup and the vertical protrusion (AGHD, see below) appear only in phase 100, but were always few in number. The colors of handle decorations parallels colors used on closed pots. The absence of a red color on handles with the cup and the vertical protrusion reflects their later introduction on the site, when black or brown were the dominant colors. An example of handle AGHA is given in Figure 11.2).

Handle with cup (AGHC)

A number of handles on the shoulder have a small 'cup-shaped' addition on the top of the handle, which itself has a decoration that usually consists of broad crossing lines and sometimes horizontal stripes reminicent of style D (Figure 11.3-4). The larger handles can have a hole in the middle of the 'cup', which runs down right through the handle and has a diameter between 0.5 cm and 2 cm (Figure 11.5.[31] On one fragment a 'cup' was not attached to a handle but was placed on top of a rim with a large diameter, it might therefore have belonged to an open shaped vessel (Figure 11.6). The purpose of these 'cups' is not directly obvious, since they are rather large to have served as a thumb knob. They could have been intended for another, practical purpose. The larger ones could have served as a holder for a real cup that was used to take water from the jar. This would, however, not explain the presence of the smaller sized 'cups', which could have been merely meant as decoration as well.

Handle with protrusion (AGHD)

Some handles had a small vertical protrusion on the handle top. The purpose again is not clear, although it could more easily have served as thumb knob (Figure 11.7).[32]

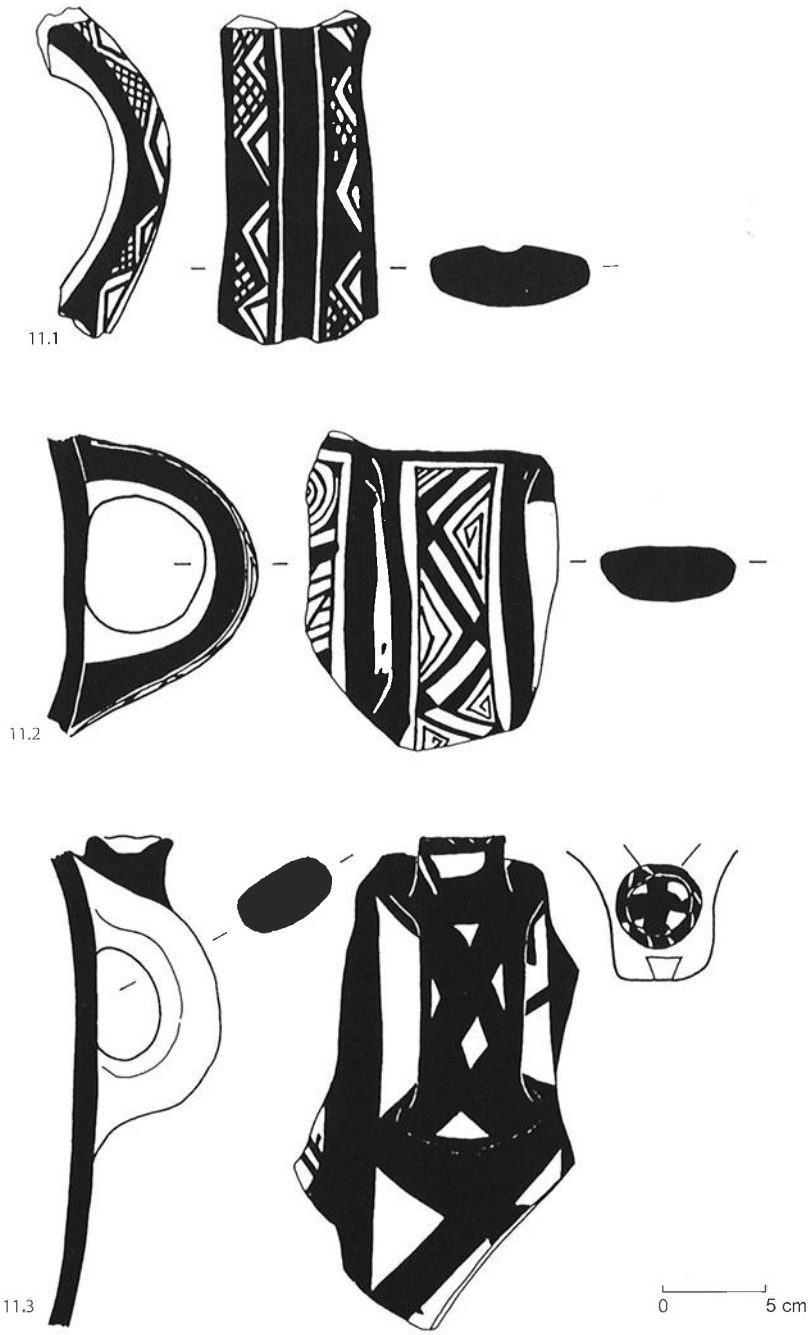

Figure 11.1-3. Closed shapes: handles.

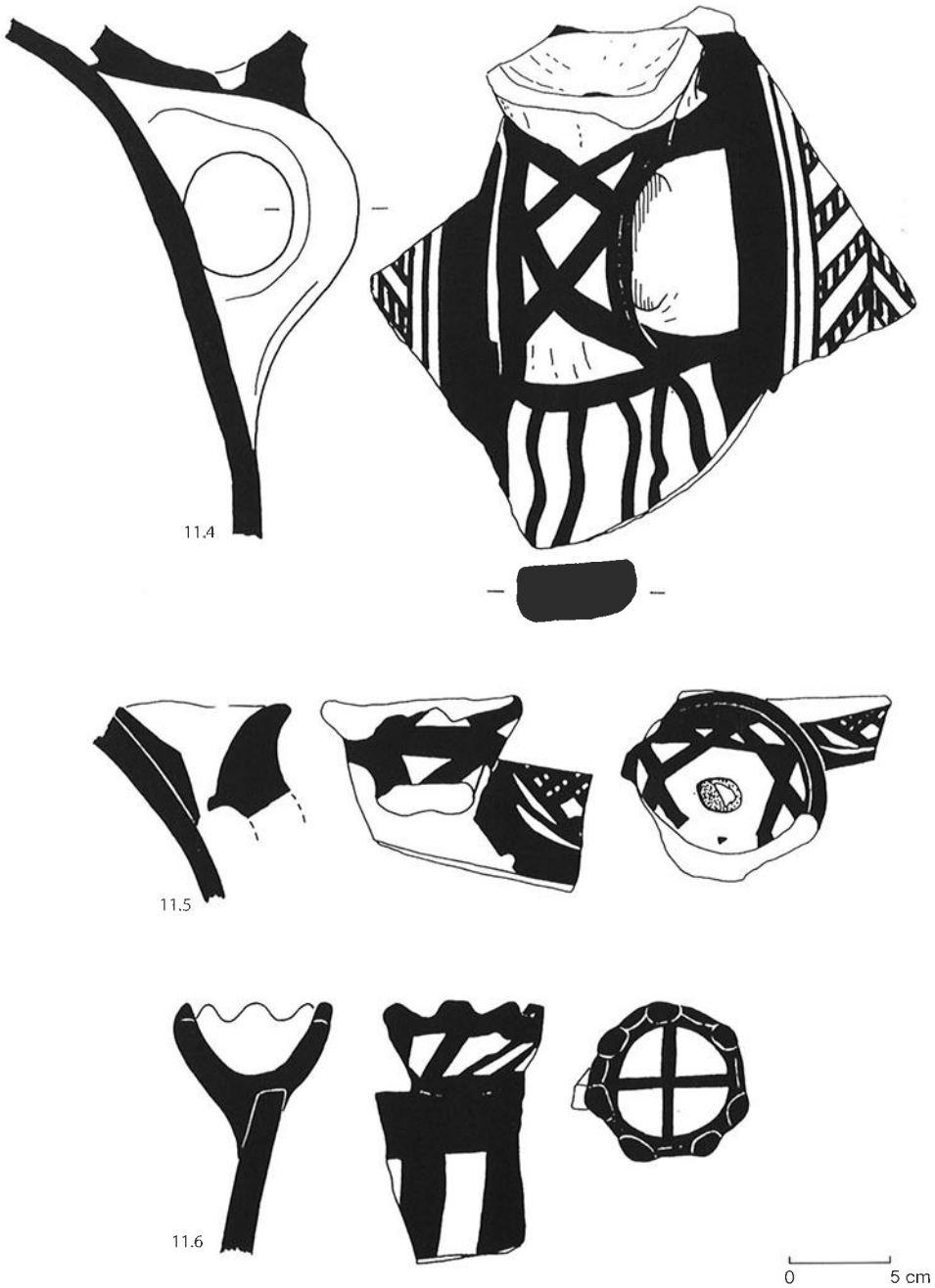

Figure 11.4-6. Closed shapes: handles.

Various handles

Some handles are different from those described above. One handle has a second smaller handle on top. On the inside of the neck a small, horizontal and triangular shaped protrusion has a little hole pierced vertically through it (Figure 11.8). A small roll of clay with incisions was added on top of another handle along the attachment to the body of the jar (Figure 11.9). Some jar fragments have a small strip of clay attached to the outside in what looks like a horseshoe shape, although the original form might have been different. The fragments are too small to establish the complete shape. The purpose of this strip could have served as a grip, but considering the size it is more probable that they were merely meant as decoration, as they were integrated in the overall decorational pattern of the vessel (Figure 11.10).

Filters

Jars and especially jugs can be provided with a filter to prevent unnecessary evaporation of their contents and contamination with insects, dust and dirt. Remarkably enough only five filter fragments of AG ware have been found and no further neck fragments show signs of a previously attached filter.[33] A reason for this might not only be the unstable nature of the material itself, since a broken filter would easily be crushed to miniature fragments, but also the way the vessels were made. The necessary efforts of the potter to join the neck and the shoulder, as described above, would prevent one from adding the filter before the neck was placed. The presence of the neck could make it impossible to insert a filter, unless the neck had a clear splaying shape, like rim AGCR3. The filters look like small concave discs, which were 'lowered', with the open side of the disc downwards, into the neck of the vessel and attached to the sides of it with some clay smeared along the upper edge.

Filters from other sites like Ti'innik have a different shape in the sense that the disc is placed in the neck with the open end upwards as opposed to the illustrated examples. Also the location of the filter is different, sometimes being half way up the neck like the ones published by De Vaux and Steve, a feature, which is probably related to the aforementioned trouble the potter had to reach inside the neck (de Vaux and Steve 1950: pl. B, no. 1-3; Gibson et al. 1991: 43. no. 8; Porëe 1993: 20. A and B; Pringle 1984: 96. no. 11; Tushingham 1985: 394, no. 12; Ziadeh 1995: 227 no's 8 and 9). Only two filter fragments from Tell Abu Sarbut were preserved sufficient material to determine construction technique. They both belong to splaying rims. (Figure 12). Both fragments were decorated with paint.

Spouts

A relatively small number of spouts belonging to AG jugs and jars were found. They were made in two different ways.

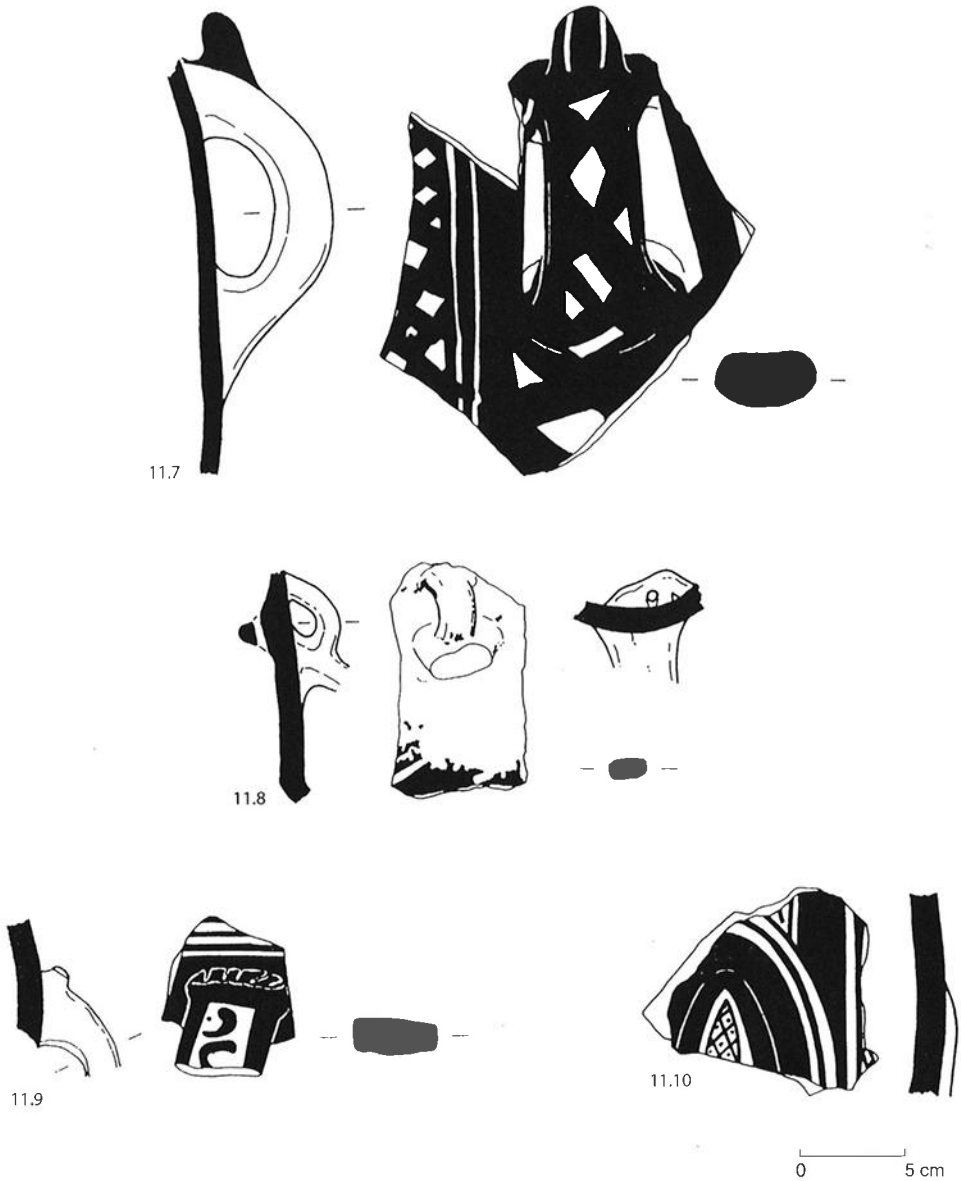

Figure 11.7-10. Closed shapes: handles.

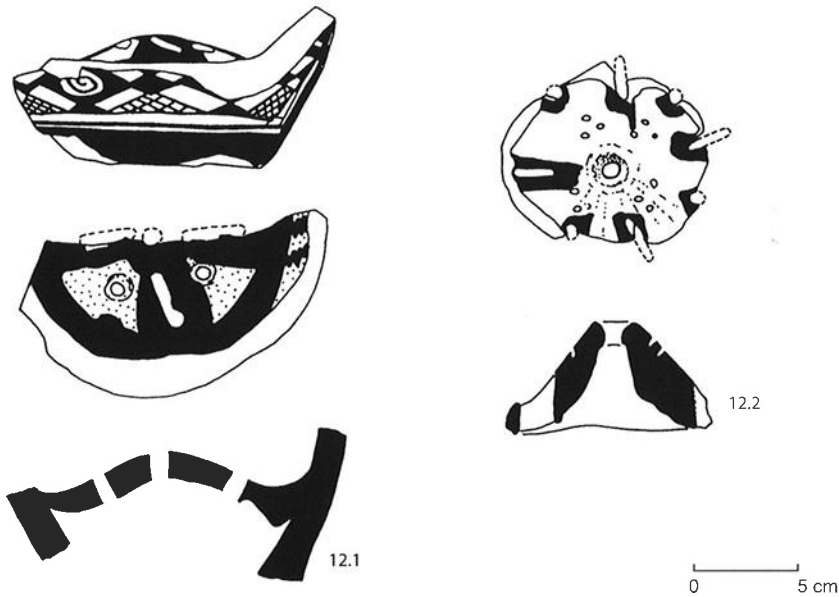

Figure 12. Closed shapes: filters.

Spout 1
A slab of clay was folded in the shape of a hollow conical tube and, if needed, the top was cut off and the spout was attached to the wall of the vessel where previously a hole was made from the outside to the inside (Figure 13.1).

Spout 2
A roll of clay was formed in a solid, straight or conical shape and was attached to the wall of the vessel. Then, a hole was pierced into the roll of clay directly through the wall of the vessel (Figure 13.2).

The spouts normally have a straight top except for one, which was cut obliquely as a finishing touch (Figure 13.3).

Bases (AGCO)

The bases ascribed to the closed shapes of AG were made in two different ways:

Base A
A number of vessels were probably made using a shaping dish and later, after some drying, the vessel was turned upside-down and clay was added to form a proper base, usually a ring base, on the initially concave lower part of the vessel (bases AGCO01-05).

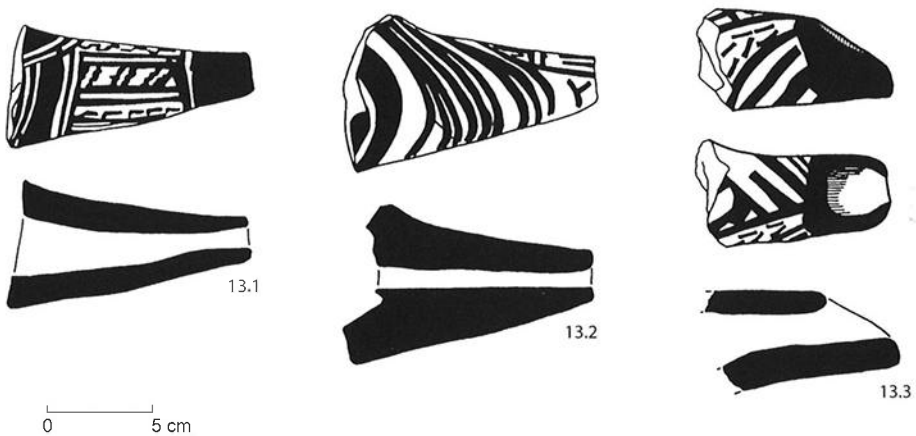

Figure 13. Closed shapes: spouts.

Base B
Other bases were formed on a flat or slightly concave surface and then the wall of the vessel was built up (bases AGCO10-17).

Often it was difficult to establish whether the vessel was formed in a shaping dish, after which clay was added to form the ring base, or if the vessel was built up from a base which was formed first with the aid of rolls and slabs (base AGCO20).

The diameters of bases, whether they were made in a shaping dish or built up from a slab, are mainly between 8-12 cm, with a limited number having a smaller or larger size. This is also the case with the separate varieties within these ways of making the vessels described below.

Bases made in a shaping dish
Base AGCO01
This base has a high, somewhat flaring ring base, which is often decorated on the outside and on the inside of the ring. Probably, a broad band of clay was added to the base and inside this resulting hollow space a lump of clay was placed and carefully smoothed with the interior of the ring base. Often the ring with the inside lump broke away from the vessel (Figure 14.1).

Base AGCO02
A roll of clay was added to the base and smeared inwards on the inward side of the roll and smoothed with the concave base of the vessel. The outward side of the roll was pressed between the fingers and protrudes outwards (Figure 14.2).

Base AGCO03
A roll of clay was added to the concave base. Then the inward edge of the roll was pushed downwards and inwards and then smoothed with the vessel, while the outside of it was merely pushed inwards, forming a straight profile on the outside (Figure 14.3).

Base AGCO04
A thin roll of clay was added and smoothed inwards with the base of the vessel. This method resembles that of base AGCO03, but these pots are smaller and their walls thinner (Figure 14.4).

Base AGCO05
A round coil of clay was added to the concave base of the vessel. The edges of this coil were pushed outwards from the inside, forming a shallow ring base, which protrudes outwards (Figure 14.5).

Bases formed on a surface
Base AGCO10
The base was formed on a slightly concave surface, which could have been a stone or a mat, because one fragment still had the impression of matting made of coils in a circular pattern. Then, the wall was built up in coils. The inside of the base is irregular and can have a small bump in the middle, which might be a remnant of the lump of clay from which the base was formed (Figure 14.6).

Base AGCO11
The base was formed on a concave surface and has a regular thickness. The transition from base to wall is smooth, as if the base and the lower part of the vessel were made of a single slab of clay (Figure 14.7).

Base AGCO12
The base was formed on a flat surface after which the wall was built up, probably in coils, leaving an angular transition from base to wall (Figure 14.8).

Base AGCO13
The base was formed on a slightly concave surface. The wall of the vessel was built up somewhat inside the outer edge of this base, leaving a distinct outward protrusion at the base (Figure 14.9).

Base AGCO14
On a slightly concave surface first a circular thin layer of clay was laid with a roll of clay on top of it, along the edge, which would later form a ring base. Then the base proper was formed by adding a thicker layer of clay on top of the thin layer, including the roll of clay, and the rest of the vessel was built up (Figure 14.10).

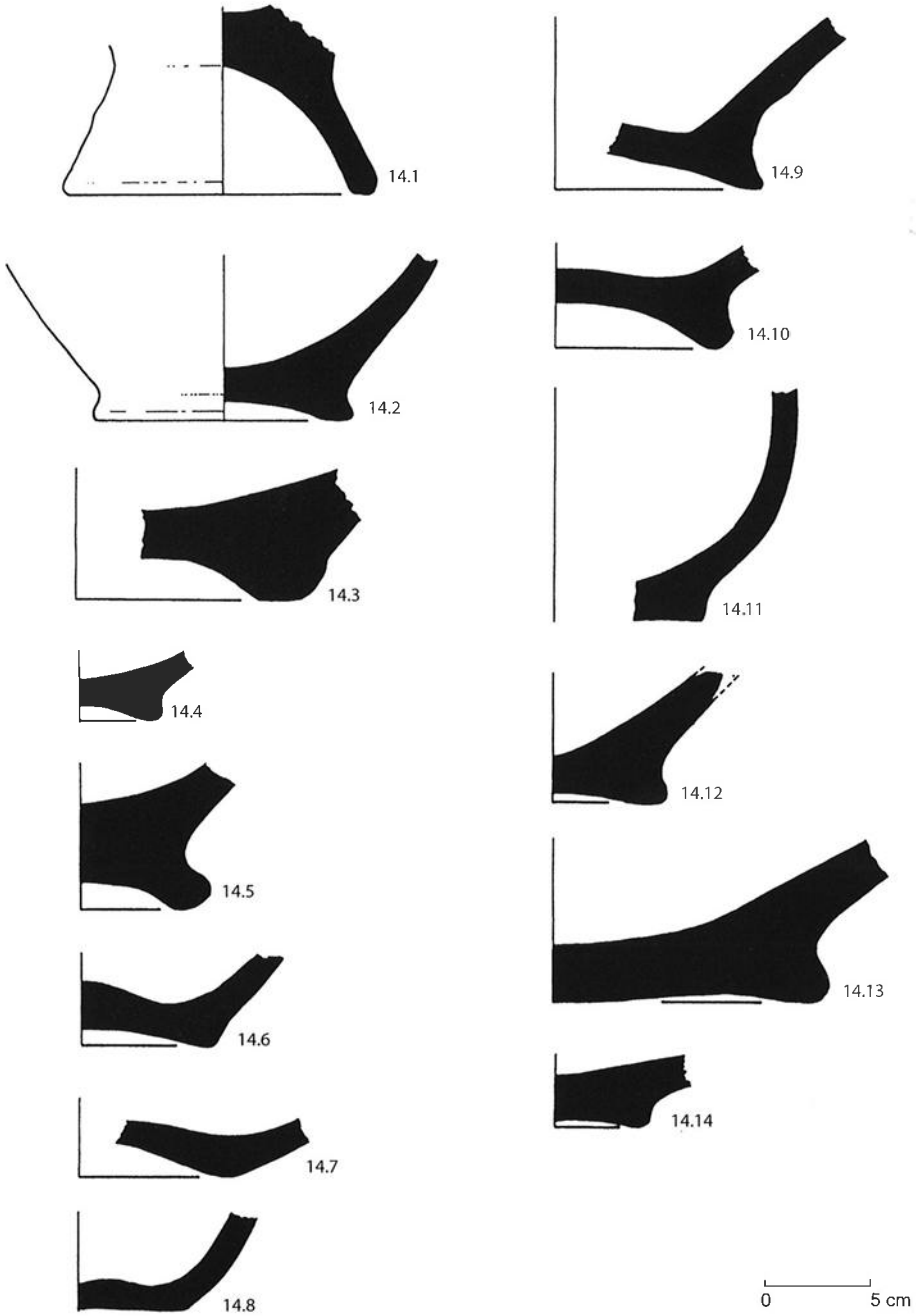

Figure 14. Bases.

Base AGCO15
Bases of small pots were built from a nearly flat slab of clay. The transition of the base into the wall is thicker because extra clay was smeared on the inside to strengthen the joint (Figure 14.11).

Base AGCO16
The rather irregular thickness of base and wall suggest the following possible method of construction: a lump of clay was put on a slightly concave surface and opened from the middle. Like this, the base part and the lower part of the vessel were formed at the same time, after which the rest of the vessel was built up (Figure 14.12).

Base AGCO17
Nearly flat bases belonging to large vessels were formed with several pieces of clay with coils around the edge of the flat base. Then, the rest of the vessel was built up. The base is often irregular underneath, because the surface on which it was made was not straight (Figure 14.13).

Bases made either in a shaping dish or formed on a surface
Base AGCO20
Vessels with a flat base that was either added after the vessel was built up with the use of a shaping dish, or from which the rest of the vessel was built up (Figure 14.14).

Open shapes (AGO)

Construction

The open shaped vessels within the Arab Geometrical pottery repertoire display a wide variety of shapes, from large basins with flat bases to small bowls with a ring base. Analysis of base and wall fragments suggests that these vessels were built up with coils of clay or had been formed in a shaping dish, although the distinction is not always clear. To what extent textile was used in the process, as has been described above, is unclear because no sherds of open shapes with imprints of textile have been found. After the vessel was formed, the outside and inside of it were wet-smoothed and could be burnished. These finishing touches, which could be applied to the complete exterior and interior of the vessel, would have obliterated the traces of textile. The sherds of some of the deeper shapes indicate a buildup with coils of clay, because the fracture is horizontal and clearly shows the wedge-shaped joining point of slabs of clay. However, whether or not this way of constructing was also used for other deep bowls and basins is not certain but, considering the rather straight walls of these vessels for which a shaping dish would not provide much support. The more shallow shaped vessels were probably formed in a shaping dish and clay was added later to form the outside of the base. One body fragment had not been wiped or burnished completely and on the outside the imprint of plaited matting could still be seen of approximately two centimetres

wide, which could point to the use of a basket as a shaping dish.[34] A basket is, in fact, very suitable to use because it does not have a completely closed structure, which allows the clay to dry rather evenly on the inside and the outside, reducing the tensions during the drying, and at the same time shortens the drying time.

Rims (AGOR)

Rims of open shaped vessels of the Arab Geometrical pottery display a large variety in profile, but not in the way the rim had been finished. Therefore, in the following description a main 'group' is illustrated by its variants and rims have been attributed to these, although there can be slight differences in shape or finishing touch with the illustrated examples.

The rim diameter varies between 16 and 50 cm and there is no clear concentration around certain diameters for the totality of the rims (Table 8). Rim groups 0-3 are

	0	1	2	3	4	6	7	group total
	n count	n count	n count	n count	n count	n count	n count	count
rim diameter								
16	0	0	0	0	2	0	5	7
18	0	0	0	0	1	1	3	5
20	0	0	0	0	0	4	8	12
22	0	0	0	0	2	7	3	12
24	0	0	0	0	1	7	8	16
26	1	3	0	0	0	0	0	4
28	0	0	0	0	1	8	10	19
30	0	3	0	0	1	10	0	14
32	1	7	1	2	3	9	0	23
34	5	2	2	0	0	10	2	21
36	4	4	2	2	3	9	1	25
38	7	4	4	0	2	3	0	20
40	8	4	1	2	5	3	1	24
42	4	8	0	10	3	3	0	28
44	3	12	4	2	4	3	0	28
46	2	4	0	0	0	2	1	9
48	0	2	0	0	0	0	1	3
50	0	1	1	0	0	0	0	2
group total	35	54	15	18	28	79	43	272

Table 8. Open shapes: diameters of rims.

mainly found in the larger sizes, while the others are more spread over a range of diameters, but with some concentration in the smaller sizes. This is also the case with the variants within each group, meaning that one variant does not have a specific diameter within the group but that in each variant a number of diameters and therefore sizes were available.

Through the phases some general developments can be discerned, although sometimes the number of fragments available is small and some might have belonged to the same vessel, making the data insufficient to draw detailed conclusions about the development of each variant through the phases. Group 6 is important from phases 20 to 50 after which group 1 becomes important and eventually dominant, i.e. slightly smaller and shallow vessels are becoming less frequent in the course of time, and the proportion of larger sized vessels increases. Group 0 with a somewhat larger size was attested from phase 40 onwards, while groups 4 and 7 are present in all phases with nearly the same ratios.

Not all rims have traces of a painted decoration, which is either because it has worn off or it had never been applied. The undecorated vessels also lacked slip on the inside and outside, an indication that its application was linked to the eventual painted decoration, but occasionally some interior and exterior burnishing had been done. In most cases if variant undecorated vessels are present, there are also decorated vessels available, which might reflect personal predilections or more simply, differences in price.

Group 0

Rim AGOR00

Deep and rather large vessels usually have loop handles. The upper part of the handle was attached directly under the top of the rim. The inside of the top of the rim slopes distinctly inwards and along the outside a small and irregular edge can be present due to the pushing downwards and inwards of the clay at the top of the rim (Figure 15.1).

Rim AGOR01

The rim and the wall are like that of AGOR00, but in this case a horizontal roll of clay was added as a decorative element on the outside, just below the top of the rim. The top part of the loop handle is attached to this roll (Figure 15.2).

Rim AGOR02

Like rim AGOR00, but instead of a loop handle a curbed roll of clay was added just under the rim as a lug handle, which could have different sizes (Figure 15.3).

Group 1

Rim AGOR10

Deep and usually large vessels probably have two loop handles, the top end of which is either attached directly to the top of the rim or somewhat underneath it. The top of the rim is flattened (Figure 15.4).

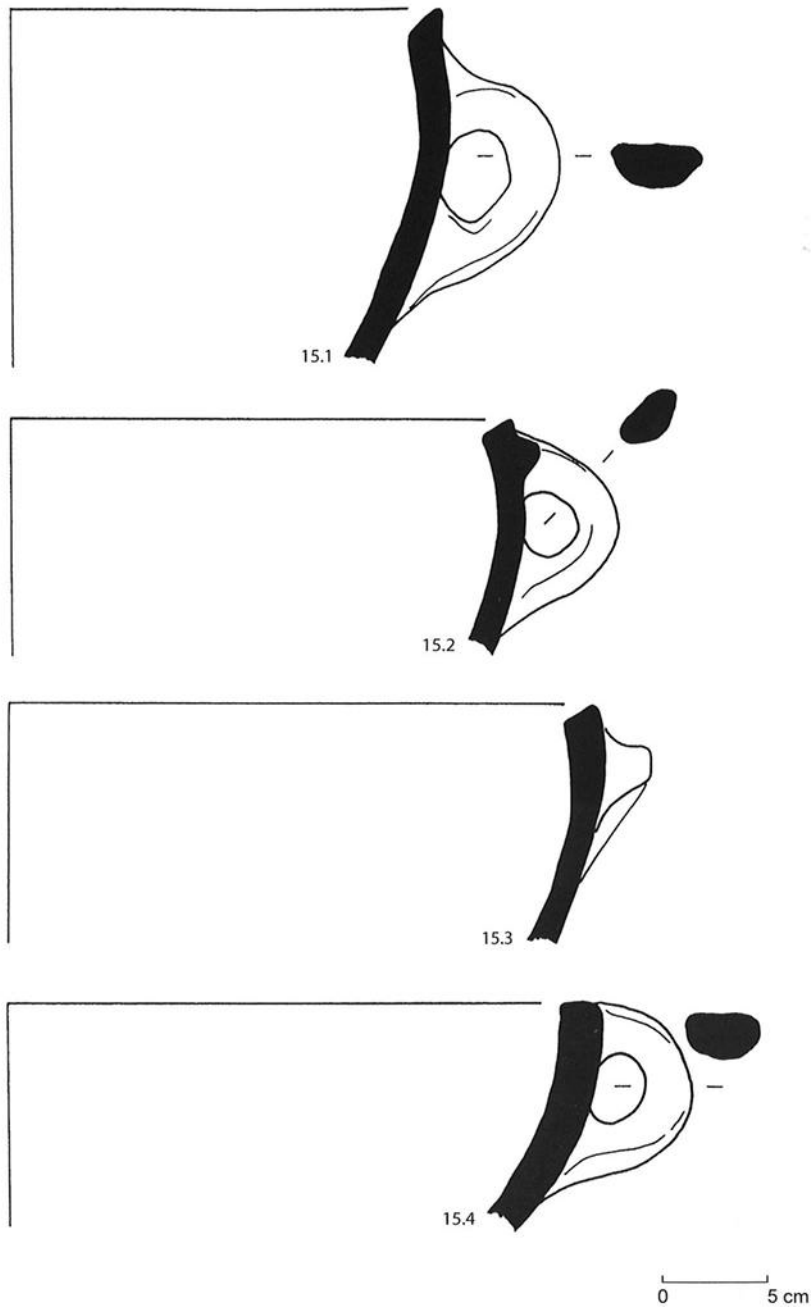

Figure 15.1-4. Open shapes: rims.

Rim AGOR11
Like AGOR10, but in this case a strip of clay has been added as a decorative element along the outside of the rim, just below the top of it (Figure 15.5).

Rim AGOR13
Deep vessels with the rim pressed down, causing a small and irregular edge along the outside of it. The top of the rim is flat. The thickness of the wall is often irregular and the decorations are made with bold strokes in style D. One fragment has a knob serving as a grip and another fragment has a loop handle attached nearly to the top of the rim (Figure 15.6-7).

Group 2
Rim AGOR20
Deep vessels with rather straight walls. Loop handles are attached under the top of the rim, which is flat and thickened as a result of a no longer visible coil of clay, which was added along the outside top part of the rim and smoothed completely with it (Figure 15.8).

Group 3
Rim AGOR30
Large bowls or basins with two or four loop handles. On the inside of the rim a roll of clay was added, which was smoothed with the interior, but still left a distinct edge (Figure 15.9).

Rim AGOR31
Deep, large vessels with loop handles. The rim becomes thinner towards the top and slopes inwards. On the outside, a horizontal and decorative strip of clay was added just below the top of the rim (Figure 15.10).

Group 4
Rim AGOR40
Shallow vessels with a concave shape and loop handles, the top end of which is attached under the top of the rim. The top is flat and can be sloping slightly inwards and sometimes a small edge was formed on the inside along the rim, probably caused by the downward pressure while flattening the top of the rim (Figure 15.11).

Rim AGOR41
Shallow bowls, probably concave with loop handles the top part of which is attached somewhat under the top of the rim. The top of the rim is flat, slightly thickened, and points outwards (Figure 15.12).

Rim AGOR42
Shallow bowls, which are concave and possibly provided with small loop handles, although none have been found. The top of the rim is flattened and protrudes outwards.

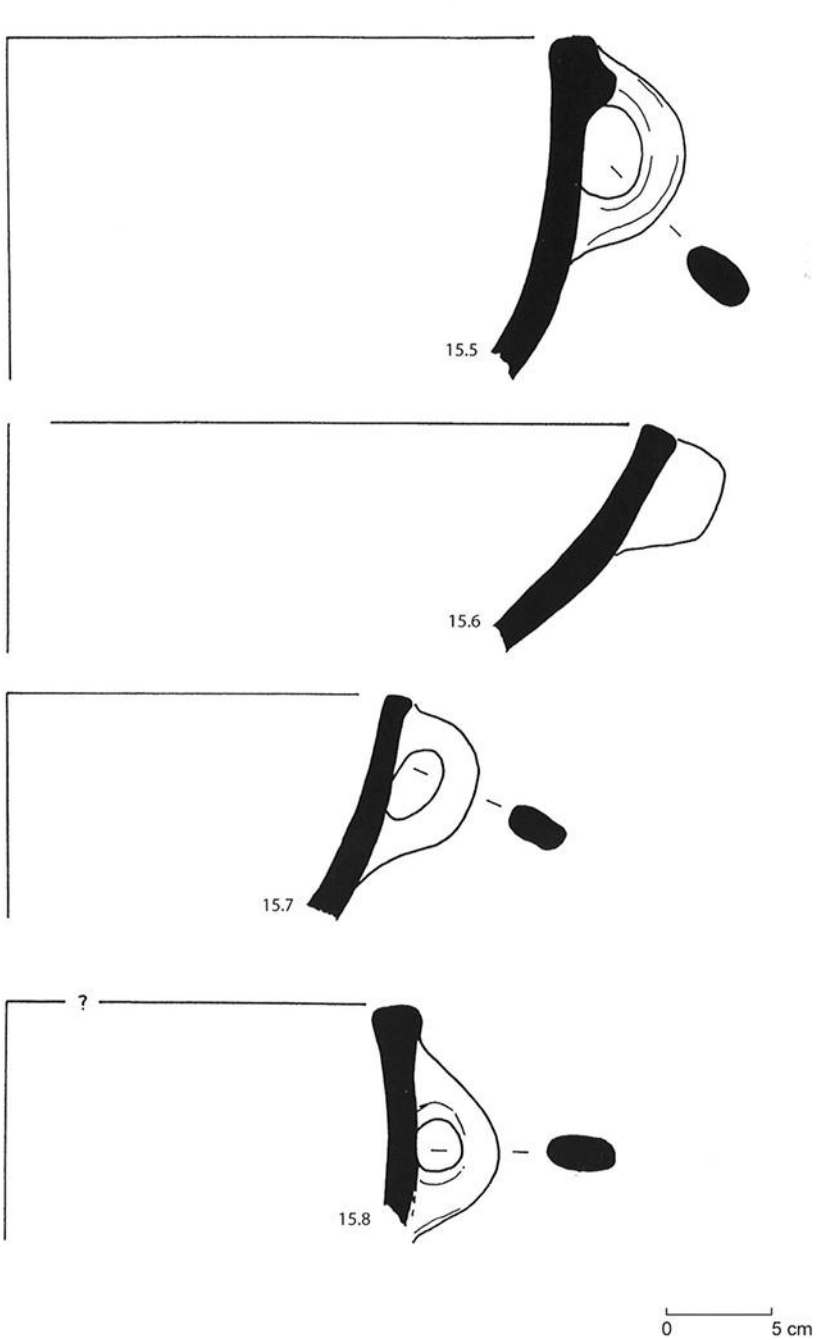

Figure 15.5-8. Open shapes: rims.

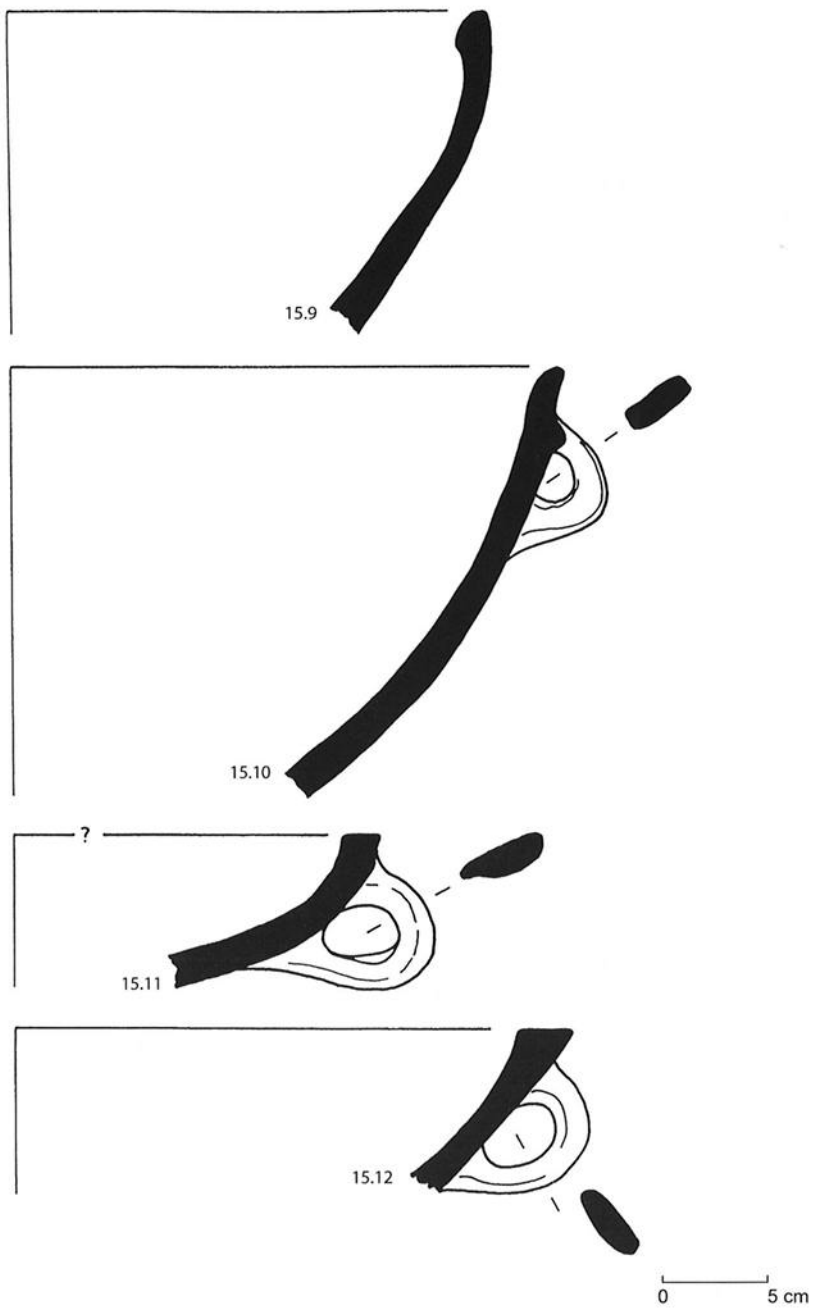

Figure 15.9-12. Open shapes: rims.

Along the outside a horizontal strip of clay was added as a decorative element below the top of the rim (Figure 15.13).

Group 6
Rim AGOR60
Shallow bowls with a distinct carination, probably where the shaping dish ended, with an extra coil of clay to form an upstanding rim. They can be provided with loop handles the top part of which was attached at the level of the carination. The top of the rim can be flat or sloping inside somewhat (Figure 15.14).

Rim AGOR61
Shallow bowls without a distinct carination, but with a slight horizontal irregularity on the outside (Figure 15.15).

Rim AGOR62
Shallow, nearly flat vessels with a lower upstanding rim like rim AGOR60. They can be provided with loop handles the top part of which was attached at the level of the carination under the rim (Figure 15.16).

Group 7
Rim AGOR70
Shallow bowls with a rim, which becomes somewhat thinner towards the top. They were probably made in a shaping dish and no additional coil of clay was added to form an upstanding rim. Although the profile in general resembles that of the lids or spindle bowls described below, the difference in decoration and the lack of an internal loop handle point to another function (Figure 15.17).

Rim AGOR71
Small concave bowls without a carination. The top of the rim is usually rounded but can at times be flat as well (Figure 15.18).

Rim AGOR72
Shallow vessels with have flattish rims. They were built up to the edge of the shaping dish and then the top of the rim was made flat. This could sometimes result in a sharpish edge on the inside of the rim. The diameter could be approximately 40 cm, but no fragment was large enough to establish this. They only occur in a non-decorated variant (Figure 15.19).

Rim AGOR73
Shallow concave bowls of which the top of the rim flares slightly outwards. No fragments with handles were found. Probably the complete inside of these vessels was decorated (Figure 15.20).

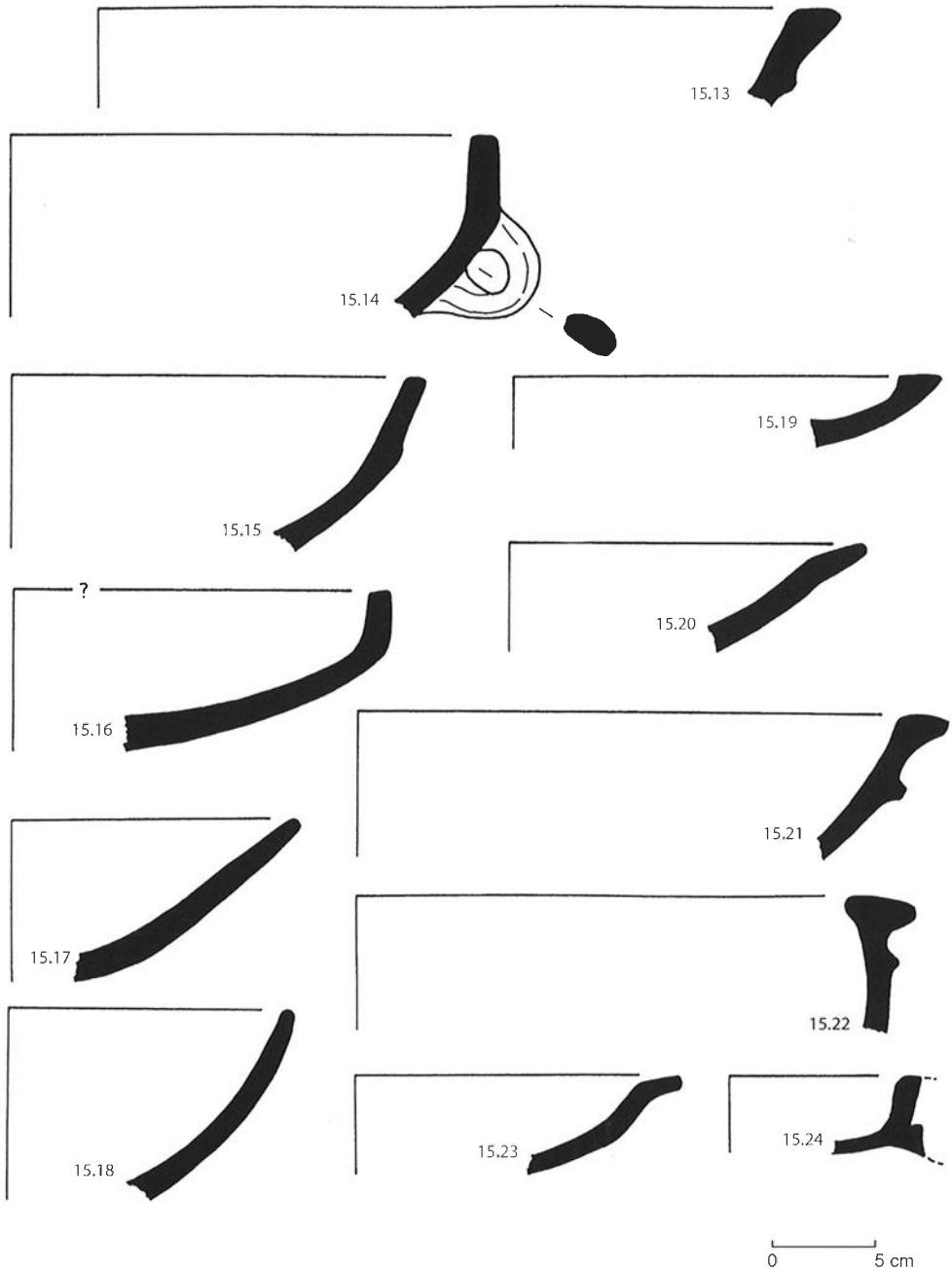

Figure 15.13-24. Open shapes: rims.

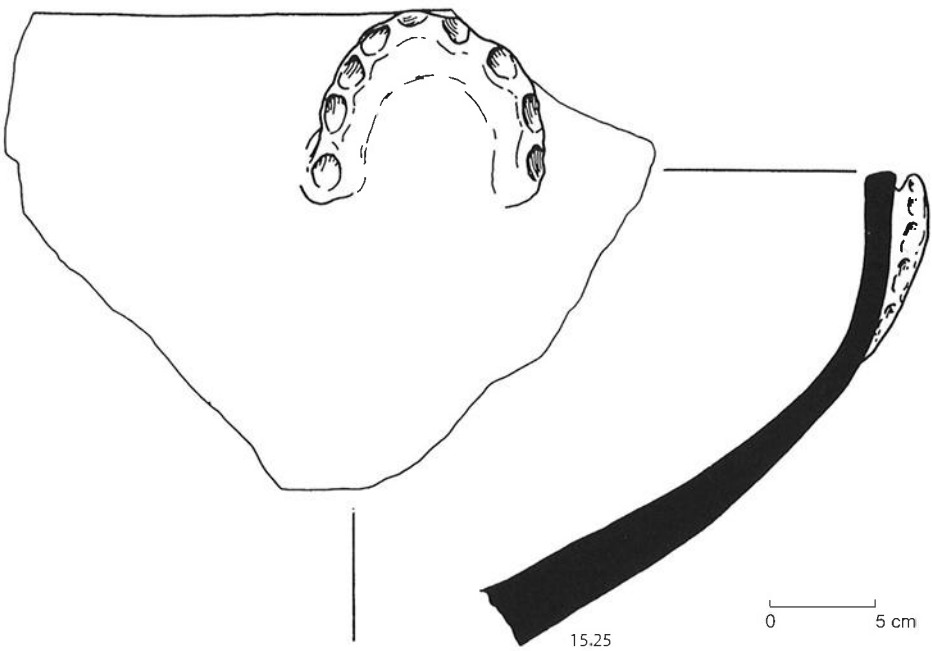

Figure 15.25. Open shapes: rims.

Various rims

A number of rim fragments could not be ascribed to any of the above mentioned groups, but some of them are large and distinct enough to be illustrated for eventual comparison with material from other sites (Figure 15.21-25).

Bases (AGOO)

The bases of the open shaped vessels were constructed either on a flat surface or formed in a shaping dish, a distinction which could not always be made.

Base AGOO1, which was made with a slab or slabs of clay, is mainly found with the larger diameters, while bases AGOO2, AGOO3 and AGOO4, which were made in a shaping dish, are mainly found with the smaller diameters. The bases described below are found in all phases and so are, for that matter, the two basic ways of constructing the base. Base AGOO2 and base AGOO4, however, are more important in the phases associated with the sugar production, while base AGOO3 becomes more important later and eventually dominant in phase 100.

Base AGOO1
Flat bases belonging to larger vessels. On a number of them traces of a mat with a spiral-like pattern could still be seen, on which they had been formed. The mat enabled the potter not only to turn the vessel while working on it, but would also have facilitated removal and subsequent drying of the vessel.[35] The base does not always consist of a single round slab of clay, but was at times formed by smearing several thin layers on top of each other. After the base itself had been finished the wall was built up, probably in coils. In the outside corner between the flat base and the wall an extra roll of clay was sometimes added to strengthen the joint between the base and the wall (Figure 16.1).

Base AGOO2
Flat or nearly flat bases, which were first formed in a shaping dish. After removal from the dish the vessel was turned upside-down and a circular roll of clay was laid on the then still concave shape of the base. The roll was smeared out and smoothed with the wall, resulting in a nearly flat base, which in the center has approximately the same thickness as the wall (Figure 16.2).

Base AGOO3
More or less flat bases, which were probably first formed in a shaping dish and had initially a concave shape. Then, a thick round slab of clay was added on the outside and was smoothed with the wall of the vessel, resulting in a base, which is thicker than the wall (Figure 16.3).

Base AGOO4
Bases with a ring base. The bases were first formed in a shaping dish and then on the outside of the resulting concave shape a circular roll of clay was attached the sides of which were smoothed with the wall, resulting in a ring base. Within the ring of the base an extra lump of clay could be applied to strengthen the joint between the base and the body proper. These bases probably belong to shallow bowls with carinated rims and are decorated on the inside. Due to use and wear only some patterns could be reconstructed. Sometimes holes were pierced in the ring of the base, two next to each other. These were not 'reparation holes' because they were made when the clay of the vessel was still soft and occur in unbroken bases as well. Probably a string was pulled through them in order to hang them on the wall for decoration and protection (Figure 16.4).

Base AGOO5
These bases were constructed in a way that could not be accurately established. The thickness of the base and the wall is irregular and on the inside and outside traces of fingers, which smeared or pressed the clay can be seen. Probably a flat piece of clay was made into a round shape after which the wall of the vessel was built up in slabs. A thin broad ring of clay was added, giving the base a slight ring base (Figure 16.5).

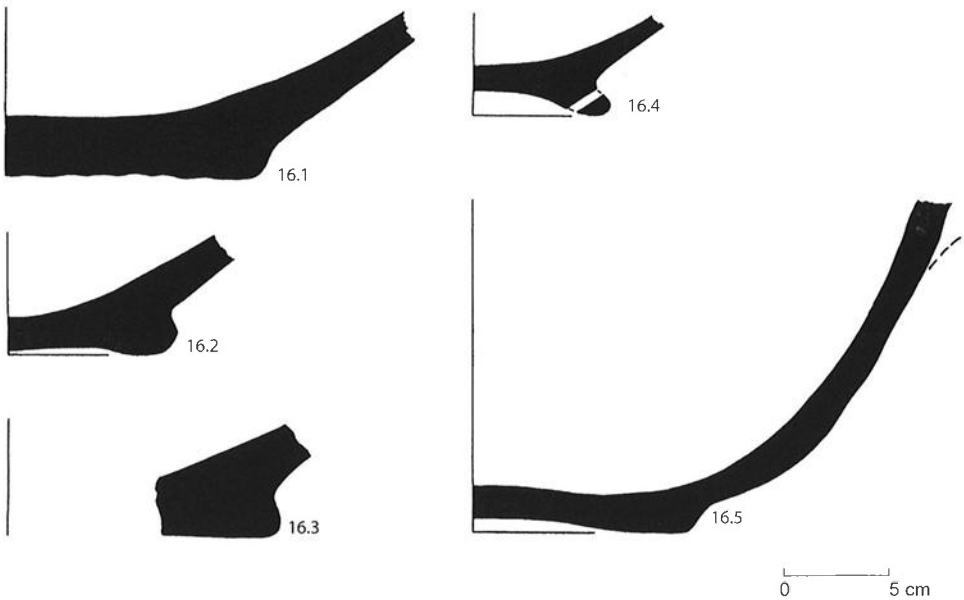

Figure 16. Open shapes: bases

Lids or spinning bowls

Introduction

Within the Arab Geometrical repertoire a small group consists of bowl-like shaped vessels with a small loop handle in the interior. These are usually thought to have served as lids, although some excavators consider them to have functioned as spindle bowls (Franken and Kalsbeek 1975: 198; Smith 1973: 242, 1989: 118). These latter base themselves on a rather similar shaped vessel, which was common in the fourteenth-seventh centuries B.C.E. and widely used in Palestine and Egypt. Such vessels were studied by Dothan, who concluded that these served as spinning bowls, based on contemporaneous wall paintings from Egypt, which illustrate the use of them (Dothan 1963). These vessels, however, have two interior handles with grooves due to wear and are flat based or have a ring base. None of the examples from Tell Abu Sarbut displays any of these characteristics and it, therefore, does not constitute a likely parallel, enabling an explanation as lids as well. From Jerusalem and also from Tel Yoqne'am a bowl with a ring base and interior handle was published, which could hardly have served as a lid and therefore had another function, maybe a spinning bowl, but it is not clear to what extent these latter belong to the AG decorated ware described here (Avissar 1996: 133; Tushingham 1985: 397, no. 15).

From the description above on general construction problems of sieves inside the closed vessels and considering the need to have some protection for the contents of a vessel, some kind of lid could be expected. The bowl-like shape is very well suited to serve as a lid, because the diameter of such a shape only needs to exceed that of the vessel to be covered and it will fit in a stable way. Flat lids tend to slip off and inverted bowl shaped lids need to fit exactly, which is difficult to do with handmade wares. More recent illustrations of handmade painted pottery from Palestine show a concave bowl-like shaped vessel with an interior handle which is described as a lid (see i.a. Dalman 1942: Abb. 117; Einsler 1914: Taf. XLVI, no. C and E). According to Einsler, they were not only used to cover water jars, but were also used as covers for 'butter bowls', which had a diameter of 20.5 cm. Considering the diameter of such vessels found at Tell Abu Sarbut, which varies between 14 cm and 26 cm, the vessels described here could have served as lids for both jars and pitchers, and as well for the smaller sized bowls.

Shape and technology

These vessels have a very shallow shape with a somewhat thicker base than the rest of the vessel, which is of a nearly even thickness. The outside surface of the base is irregular and sometimes rough. The rim has a flat top, as if it had been cut off and directly under it a hardly observable irregularity can be noticed parallel to the rim, which might indicate the top of a shaping dish. The inside and outside surfaces were wiped with a cloth, which could be the reason why no traces of textile were observed, if it was used. Burnishing was only seen on 9.5% of the sherds and the use of slip could only be established in 2% of cases, while the rest had no clear traces of a separately applied layer. The loop handles were well attached to the interior, because they usually did not break off at the joints, but around it.

Decoration

The vessels have a decoration on the inside consisting of lines, sometimes in combination with dots, and a band along the rim. The lines occur single or double and parallel, and cross straight or curbed from one side of the rim to the other. The patterns described below are based on a four or eight point division equally spaced along the rim, where the lines connect. A six-point division was not observed. A variety of patterns is possible like this and from the larger fragments a number of these patterns were deduced, to which smaller sized sherds could be attributed, realizing that they could sometimes as well belong to a non-recognized, different pattern. If doubt existed, they were not ascribed to a pattern. Also the loop handles were decorated, usually with two parallel lines along the edge and oblique stripes in between.

The decorations have been divided in basically four groups:

- group AGL1 single lines
- group AGL2 double lines

- group AGL3 a double line along the rim
- group AGL4 pattern with dots

A separate group, AGL90, is formed by vessels, which have the handle on the side instead of in the middle.

The measured diameters of these vessels vary between 14 and 26 cm, with group AGL2 occurring in the smaller sizes, groups AGL1, AGL3 and AGL4 in the medium sizes and those with the handle on the side, group AGL90 in the larger sizes. The colors are red, brown and black, like the rest of the AG pottery, with group AGL90 occurring only in black and pattern AGL20 being mainly in red.

These vessels are mainly associated with phase 50 and following, but the number of larger fragments is too small to indicate a development as regards the decorations.

Rim fragments of such vessels could easily be taken as belonging to bowls and its loop handles as belonging to jars if little else of the lid proper remained. This might be the reason that although AG decorated ware in general was reportedly found at many sites, from only a few places such vessels were published or mentioned. An exception being Ti'innik, where reportedly 64 (fragments) were found, albeit of non-quantified different shapes (Ziadeh 1995: 230-231). AG-lids or spindle bowls with a loop handle were also published from i.a. Hama (Riis and Poulsen 1957: 276, no. 1042), Jerusalem (Tushingham 1985: 388. fig. 7), Pella (Smith 1973: pl. 58, no. 400), Tell Abu Gourdan (Franken and Kalsbeek 1975: 182 no. 16 and 186 no. 24), and from Emmaus el-Qubeibeh (Bagatti 1947: 134, no. 4).

At other places different kinds of lids were found, but it is impossible to indicate to what extent these played a role in the repertoire. From Jerusalem a flat lid with a decoration, and ascribed to the Ayyubid period, was published, although it is not clear whether this one belongs to the AG tradition (Tushingham 1985: 388, fig. 9). Sometimes a vertical flat slab of clay with a hole was used instead of a loop handle and examples of this kind were published from Abu Gosh (de Vaux and Steve1950: pl. F, no. 4), Bethany (Saller 1957: 283, no. 5693), Gezer (MacAlister 1912: pl. CLXXXIX, no 11), and Pella (Smith and Day 1989: pl. 63, no. 4 and no. 6). From some sites seemingly non-decorated examples with a knob were published, i.a. Abu Gosh (de Vaux and Steve 1950: pl. G, no. 2), Hama (Riis and Poulsen 1957: 265, no. 972), and Khirbet Jenin (Hart 1987: 46, no. 6).

Pattern AGL10

The general pattern is an eight pointed star made up from single lines crossing parallel to the opposite rim with a single band along the inside of it. A comparandum was published from Baisan (Tzori 1973: 245, no. 5) (Figure 17.1-3).

Pattern AGL20

The pattern consists of double parallel lines, crossing in a curbed way in the interior of the vessel with a single band along the inside of the rim (Figure 17.4).

Pattern AGL21
A single band runs along the inside of the rim, while the pattern is made up from curbing double parallel lines in combination with a single line (Figure 17.5).

Pattern AGL22
A single line along the inside of the rim and straight crossing double parallel lines (Figure 17.6).

Pattern AGL30
Based on a four point division, single lines form a square around the handle, while double parallel lines run along the inside of the rim. The space between the rim and the single lines is filled with double crossing parallel lines (Figure 17.7).

Pattern AGL40
The pattern consists of two intertwined squares of double parallel lines with a single band along the rim and dots were applied in the spaces near to the rim (Figure 17.8).

Pattern AGL41
The pattern is probably a square of double parallel lines, while a single line runs along the inside of the rim. The spaces near the rim have a single oblique line with dots on both sides (Figure 17.9).

AGL90
In this case the handle is not placed in the center, but is located next to the rim. Only three small fragments like this were found and it is therefore not clear if on the opposite side a second handle was located. If not, a 'parallel' from modern times is illustrated by Einsler, who described it as a lid of a jar (Einsler 1914: Taf. XLVI, no. E. See also Needler 1949: 76) (Figure 17.10).

Not all decorations fit into the descriptions above. Some decorations seem more at random, as if to fill the inner surface rather than that a specific geometrical pattern is intended (Figure 17.11).

Conclusions

Study of the Arab Geometrical ware was designed to contribute to a better understanding of how it was made. It could be established that in addition to being built with the aid of textile in a shaping dish, also slabs of clay were used. Apart from the use of a shaping dish, vessels were also built up from a flat surface. These ways of constructing and the stability of the clay mixture influenced final shapes and possible varieties. For example, the way the closed shapes were constructed made it difficult to add a filter and explains partially why hardly traces of such components were found. At the same

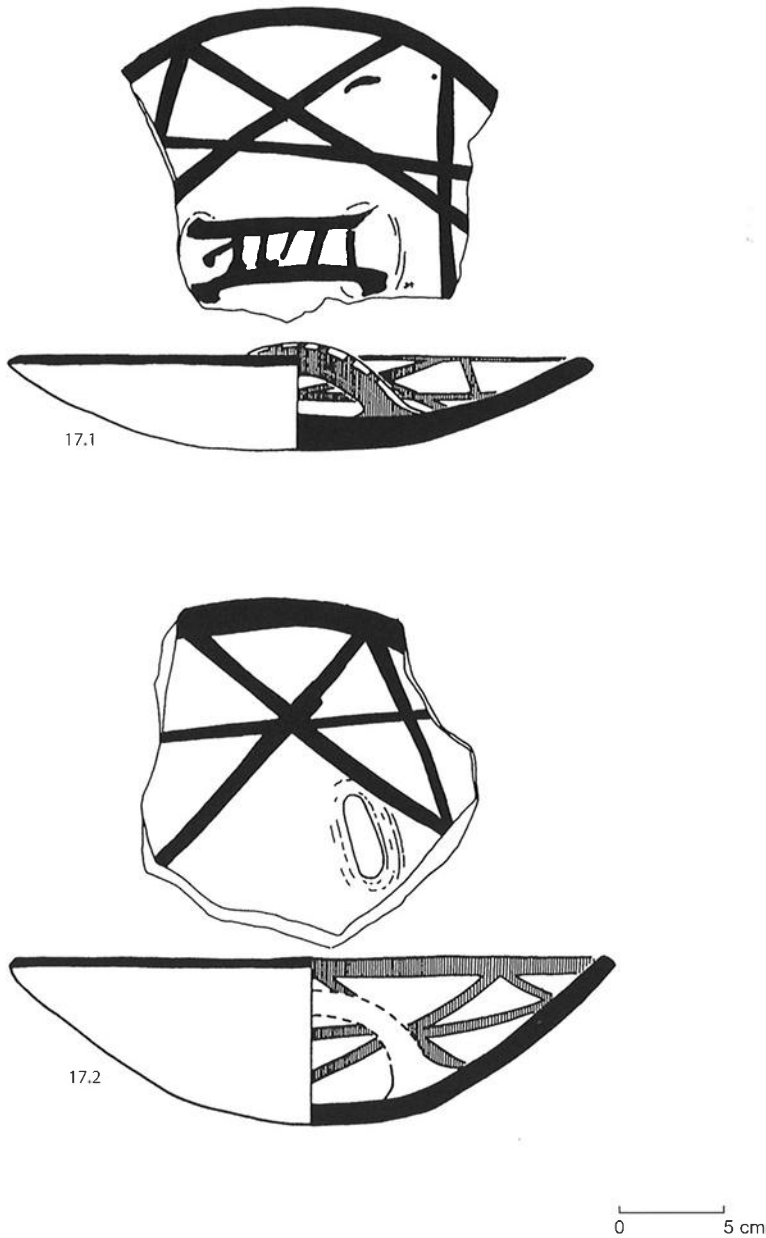

Figure 17.1-2. Lids or spinning bowls.

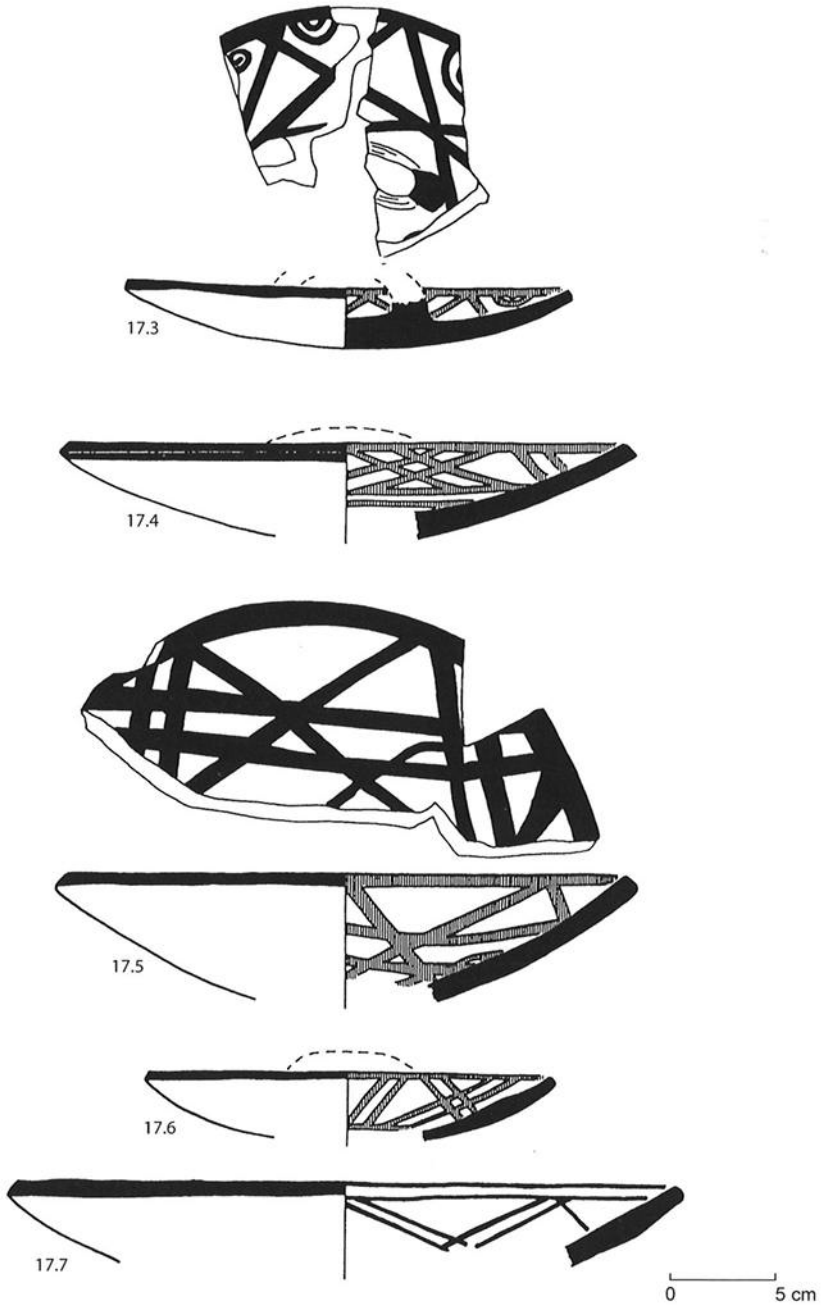

Figure 17.3-7. Lids of spinning bowls.

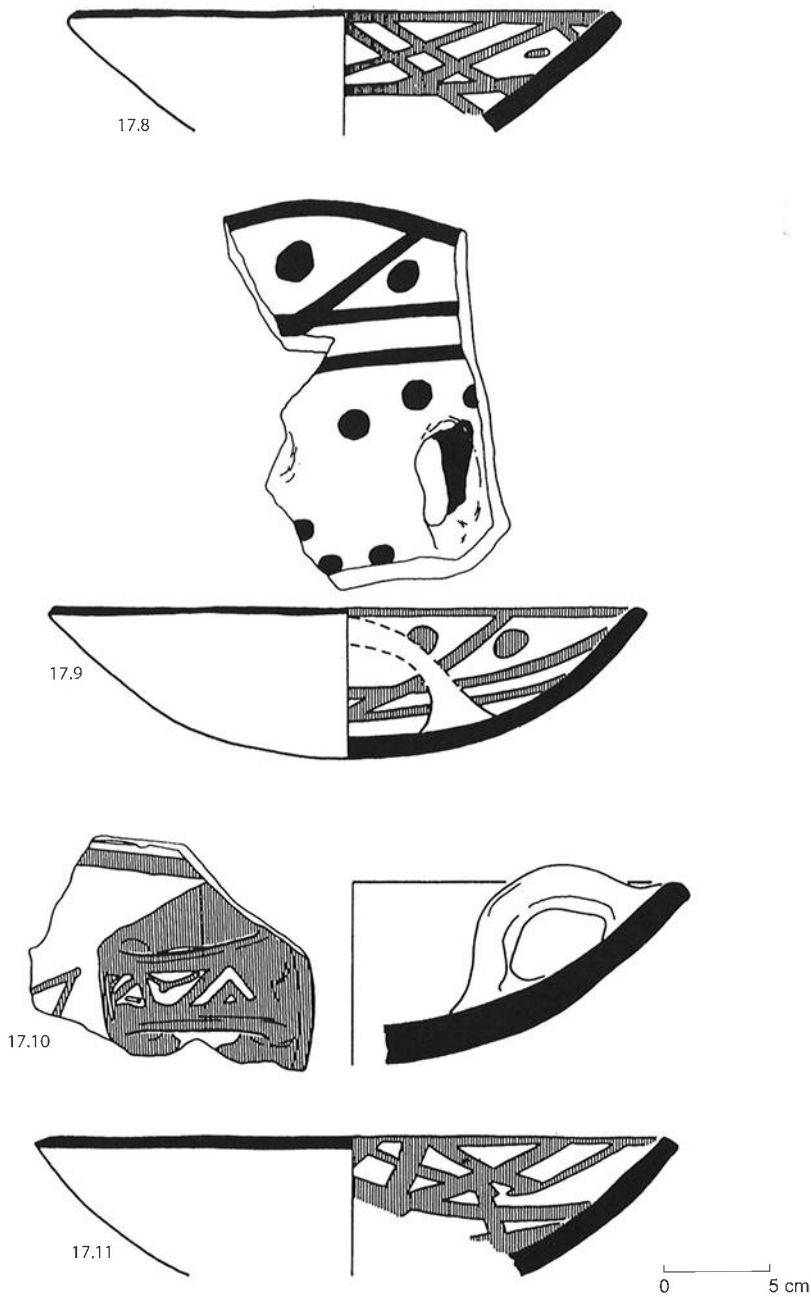

Figure 17.8-11. Lids of spinning bowls.

time it provides an argument for the function of bowl-like shaped vessels as lids instead of as spindle whorls.

The decorations of the Arab Geometrical pottery show a clear development in their colors, i.e. from red to black. Browns can either be intentional, or the result of a thick red or a thin black paint. The distinction established here for the first time between the various styles makes it possible to observe a development in this little studied pottery. The repetitive pattern used to fill in a zone or a triangle (style C) is related to the later occupational phases of the site and the more open and free style begins in phase 100, the last occupational phase that could be taken into account. This latter style could be a predecessor or the beginning of a style, which became more common in the Jordan Valley in later centuries. As regards the specific motifs, little development could be detected. The various styles and extensive catalogue with individual motifs will, however, eventually enable more direct comparisons of the decorative aspect with that found at other sites, when more detailed information becomes available.

As regards the shape of the rim of the closed and open vessels of AG pottery some developments could be established. It became also clear that handles with various cup-shaped protrusions (AGHC) came into use in later phases, but this remained proportionally limited and therefore probably reflects a development somewhere else.

When a more extensive corpus from other parts in Bilad al-Sham are published, it might become clear to what extent the aforementioned styles and motifs are local aspects or that these can be linked to a more general development in the area. The same applies for the variation in rims, bases, filters, and perhaps differences in the way this pottery was made. More detailed distribution maps of AG ware might contribute to understanding who produced this pottery: itinerant potters, potters in specialized centers, villagers or maybe a combination of them, whereby those who made the most attractive ware would be able to sell or present it as a gift outside their direct vicinity.

Appendix 1: color descriptions accompanying the pottery drawings

Fig. 5.1. O= 7.5 YR 7/8 Reddish yellow C= 5 YR 6/4 Light reddish brown I= 5 YR 6/4 Light reddish brown/ Dec. 10 R 3/3 Dusky red

Fig. 5.2. O= White (slip) C= 5 Y 7/3 Pale yellow I= 5 Y 7/3 Pale yellow / Dec. 10 YR 2/2 Very dark brown

Fig. 5.3. O= 10 R 6/6 Light red C= 2.5 YR 6/4 Light reddish brown I= 7.5 YR 8/4 Pink / Dec. Black

Fig. 5.4. O= 5 YR 8/2 Pinkish white C= 2.5 YR 6/4 Light reddish brown I= 2.5 YR 6/4 Light reddish brown / Dec. 5 YR 3/2 Dark reddish brown

Fig. 5.5. O= 10 YR 8/3 Very pale brown C= 2.5 Y 8/2 White I= 10 YR 7/3 Very pale brown / Dec. 5 YR 2/2 Dark reddish brown.

Fig. 5.6. O= White (slip) C= 2.5 YR 6/6 Light red I= 5 YR 8/2 Pinkish white / Dec. 2.5 YR 3/0 Very dark gray

Fig. 5.7. O= White (slip) C= 2.5 YR 6/2 Pale red I= 10 R 5/4 Weak red / Dec. 10 R 3/1 Dark reddish gray

Fig. 5.8. O= White (slip) C= 5 YR 8/3 Pink I= 5 YR 8/3 Pink / Dec. Lines are black, hatching indicates 10 R 4/8 Red

Fig. 5.9. O= White (slip) C= 7.5 YR 8/4 Pink I= 7.5 YR 8/4 Pink / Dec. Lines are black, hatching indicates 10 R 4/6 Red. Fragment with an additional red line between the black lines.

Fig. 5.10. O= White (slip) C= 5 YR 7/4 Pink I=5 YR 7/4 Pink / Dec. black lines, hatching indicates 10 R 6/3 Red

Fig. 5.11. O= 7.5 YR 7/4 Pink C= 7.5 YR 7/2 Pinkish gray I= 7.5 YR 7/2 Pinkish gray / Dec. lines in black, hatching indicates 2.5 YR 4/6 Red

Fig. 5.12. O= 7.5 YR 7/4 Pink C= 7.5 YR 7/2 Pinkish gray I= 7.5 YR 7/2 Pinkish gray / Dec. lines in black, hatching indicates 2.5 YR 4/6 Red

Fig. 5.13. O= White (slip) C= 10 R 6/8 Light red I= 10 R 6/8 Light red / Dec. 5 YR 3/2 Dark reddish brown

Fig. 5.14. O= White (slip) C= 10 R 6/8 Light red I= 10 R 6/8 Light red / Dec. 5 YR 3/2 Dark reddish brown

Fig. 5.15. O= White (slip) C= 10 R 6/8 Light red I= 10 R 6/8 Light red / Dec. 5 YR 3/2 Dark reddish brown

Fig. 5.16. O= White (slip) C= 2.5 YR 5/0 Gray I= 5 YR 8/4 Pink / Dec. 5 YR 3/3 Dark reddish brown

Fig. 5.17. O= 5 YR 7/4 Pink C= 5 YR 8/2 Pinkish white I=10 R 6/6 Light red / Dec. 2.5 YR 3/6 Dark reddish brown

Fig. 5.18. O= 5 YR 8/4 Pink C= 2.5 YR 6/4 Light reddish brown I= 7.5 YR 8/4 Pink / Dec. 10 R 3/3 Dusky red.

Fig. 5.19. O= White (slip) C= 7.5 YR 7/2 Pinkish gray I= 7.5 YR 7/2 Pinkish gray / Dec. 5 YR 3/4 Dark reddish brown

Fig. 5.20. O= White (slip) C= 5 YR 8/2 Pinkish white I= 5 YR 6/2 Pinkish gray / Dec. 2.5 YR 2/4 Dark reddish brown

Fig. 5.21. O= White (slip) C= 2.5 Y 8/2 White I= 2.5 Y 8/2 White / Dec. 7.5 YR 3/2 Dark brown

Fig. 5.22. O= 5 YR 8/2 Pinkish white C= 5 YR 8/2 Pinkish white I= 5 YR 8/2 Pinkish white / Dec. 7.5 YR 3/2 Dark brown

Fig. 5.23. O= 5 YR 8/4 Pink C= 5 YR 8/3 Pink I= 5 YR 8/3 Pink / Dec. 10 R 3/2 Dusky red

Fig. 5.24. O= 5 YR 8/2 Pinkish white C= 5 YR 8/3 Pink I= 5 YR 8/3 Pink / Dec. 5 YR 4/3 Reddish brown

Fig. 5.25. O= 7.5 YR 8/4 Pink C= 10 YR 8/3 Very pale brown I= 10 YR 8/3 Very pale brown / Dec. 10 YR 4/1 Dark gray

Fig. 5.26. O= White (slip) C= 5 YR 6/4 Light reddish brown I= 5 YR 7/1 Light gray / Dec. 5 YR 3/3 Dark reddish brown

Fig. 5.27. O= 5 YR 7/8 Reddish yellow C= 5 YR 6/6 Reddish yellow and I= 5 YR 7/8 Reddish yellow / Dec. 10 R 4/3 Weak red

Fig. 5.28. O = White (slip) C= 5 YR 6/4 Light reddish brown I= White slip / Dec. 10 R 3/2 Dusky red

Fig. 5.29. O= 5 YR 7/4 Pink C= 2.5 YR 6/4 Light reddish brown I= 5 YR 7/4 Pink / Dec. 10 R 3/4 Dusky red

Fig. 5.30. O= 5 YR 7/4 Pink C= 7.5 YR 6/2 Pinkish gray I= 5 YR 7/4 Pink / Dec. 10 R 5/4 Weak red

Fig. 9.1. O= White slip C= 5YR 7/2 Pinkish gray I = White slip / Dec. 5YR 4/3 Reddish brown
Base of a closed shaped vessel with a more intricate motif on the outside and motif O5 underneath.
Fig. 9.2. O= 10 YR 8/3 Very pale brown C= 10 YR 5/2 Grayish brown I= 10 YR 7/1 Light gray /Dec. 10 R 4/2 Weak red
Fig. 9.3. O= 10 R 6/6 Light red C= 7.5 YR 7/4 Pink I= 2.5 YR Light red / Dec. 10 R 3/4 Dusky red.
Fig. 9.4. O= R 3/4 Dusky red C= 5 YR 5/3 Reddish brown I= 5 YR 6/4 Light reddish brown / Dec. 5 YR 3/3 Dark reddish brown.

Fig. 10.1. O= 10 YR 8/1 White (slip) C= 7.5 YR 6/4 Light brown I= 7.5 YR 8/2 Pinkish white / Dec. 10 R 3/2 Dusky red.
Fig. 10.2. O= 5 YR 8/3 Pink C= 2.5 YR 6/4 Light reddish brown I= 10 R 6/6 Light red
Fig. 10.3. O= White (slip) C= 5 Y 7/4 Pale yellow I= White (slip)
Fig. 10.4. O= White (slip) C= 10 R 5/6 Red I= 10 R 5/6 Red
Fig. 10.5. O= 10 YR 8/1 White (slip) C= 10 YR 8/2 White I= 10 YR 8/1 White (slip)
Fig. 10.6. O= White (slip) C= 10 R 6/3 Pale red I= White (slip)
Fig. 10.7. O= White (slip) C= 10 R 6/4 Pale red I= White (slip)
The function of the little protrusion on the inside is not clear and it occurred only once. It might have served as a support for a small lid.
Fig. 10.8. O= White (slip) C= 2.5 Y 7/2 Light gray I= 2.5 Y 7/2 Light gray
Fig. 10.9. O= 10 R 6/6 Light red C= 10 R 6/6 Light red I= 5 YR 8/2 Pinkish white
Fig. 10.10. O= White (slip) C= 7.5 YR 8/2 Pinkish white I= 7.5 YR 8/2 Pinkish white
Fig. 10.11. O= White (slip) C= 7.5 5/0 Gray I= 7.5 YR 7/4 Pink

Fig. 11.1. O= White slip C= 10 YR 6/1 Reddish gray / Dec. 10 R 3/4 Dusky red
Fig. 11.2. O= White (slip) C= 2.5 YR 6/2 Pale red / Dec. 10 R 3/3 Dusky red
Fig. 11.3. O= 7.5 YR 8/4 Pink C= 2.5 YR 6/4 Light reddish brown / Dec. 2.5 YR 3/0 Black
Fig. 11.4. O= White (slip) C= 2.5 YR 6/6 Light red / Dec. 10 YR 4/1 Dark gray
Fig. 11.5. O= White (slip) C= 5 YR 7/4 Pink / Dec. 7.5 YR 3/2 Dark brown
Fig. 11.6. O= White (slip) C= 2.5 YR 6/6 Light red / Dec. 10 R 3/1 Dark reddish gray
Fig. 11.7. O= 10 YR 8/4 Very pale brown C= 7.5 YR 8/4 Pink / Dec. 10 R 3/1 Dark reddish gray.
Fig. 11.8. O= White (slip) C= 5 YR 6/4 Light reddish brown / Dec. 10 YR 3/1 Very dark gray
Fig. 11.9. O= White (slip) C= 2.5 YR 6/6 Light red / Dec. 5 YR 4/2 Dark reddish gray
Fig. 11.10. O= White slip C= 7.5 YR 7/2 Pinkish gray I= 7.5 YR 7/2 Pinkish gray / Dec. 7.5 YR 3/2 Dark brown

Fig. 12.1. O= 5 YR 7/4 Pink C= 2.5 YR 6/6 Light red I= 7.5 YR 8/4 Pink / Dec. 10 R 2/1 Reddish black
Filter with four round holes, alternating with four oblong holes pierced in it.
Fig. 12.2. O= 5 YR 7/4 Pink (slip) C= 7.5 YR 7/2 Pinkish gray I= 7.5 YR 7/2 Pinkish gray / Dec. 10 YR 3/2
Very dark grayish brown This filter had eight oblong holes pierced in it around a central round hole. In addition four groups of three evenly spaced non-continuous holes were added as an embellishment.

Fig. 13.1. O= White (slip) C= 2.5 YR 6/6 Light red / Dec. 10 R 3/3 Dusky red
Fig. 13.2. O= White (slip) C= 2.5 YR 6/6 Light red / Dec. 10 R 2/1 Reddish black
Fig. 13.3. O= White (slip) C= 2.5 YR 6/6 Light red / Dec 10 R 2/2 Very dusky red

Fig. 14.1. O= White slip C= 5 YR 7/4 Pink
Fig. 14.2. O= White slip C= 5 YR 6/1 Gray I= 5 YR 7/4 Pink
Fig. 14.3. O= 2.5 YR 5/2 Weak red C= 2.5 YR 6/2 Pale red I= 5 YR 7/4 Pink
Fig. 14.4. O= White (slip) C= 5 YR 7/6 Reddish yellow I= 10 YR 7/3 Very pale brown
Fig. 14.5. O= 7.5 YR 8/4 Pink C= 10 YR 8/4 Very pale brown I= 5 YR 6/4 Light reddish brown
Fig. 14.6. O= White (slip) C= 10 YR 6/2 Light brownish gray I= 7.5 YR 8/4 Pink
Fig. 14.7. O 2.5 YR 6/6 Light red C= 2.5 YR 6/8 Light red I= 5 YR 7/6 Reddish yellow
Fig. 14.8. O= 2.5 YR 5/0 Gray C= 7.5 YR 5/0 Gray I= 10 YR 8/3 Very pale brown
Fig. 14.9. O= 5 YR 7/4 Pink C= 5 YR 7/8 Reddish yellow I= 5 YR 7/4 Pink
Fig. 14.10. O= 2.5 Y 8/2 White C= 5 Y 6/3 Pale olive I= 5 Y 8/3 Pale yellow
Fig. 14.11. O= White (slip) C= 7.5 YR 6/0 Gray I= 10 YR 8/4 Very pale brown
Fig. 14.12. O= White (slip) C= 10 YR 7/4 Very pale brown I= 10 YR 8/4 Very pale brown
Fig. 14.13. O= 7.5 YR 8/4 Pink C= 7.5 YR 8/4 Pink I= 5 YR 7/2 Light gray
Fig. 14.14. O= 5 YR 7/6 Reddish yellow C= 10 YR 5/1 Gray I= 2.5 YR 6/4 Light reddish brown

Fig. 15.1. O= 2.5 YR 6/6 Light red C= 7.5 YR 7/4 Pink I= 2.5 YR 6/4 Light reddish brown
Fig. 15.2. O= 7.5 YR 8/4 Pink C= 7.5 YR 7/6 Reddish yellow I= 7.5 YR 7/6 Reddish yellow
Fig. 15.3. O= 5 YR /3 Pink C= 5 YR 7/3 Pink I= White slip
Fig. 15.4. O= White slip C= 7.5 YR 6/4 Light brown I= 7.5 YR 8/6 Reddish yellow
Fig. 15.5. O= 2.5 YR 6/4 Light reddish brown C= 7.5 YR 6/4 Light brown I= 5 YR 8/4 Pink
Fig. 15.6. O= 10 YR 8/3 Very pale brown C= 2.5 Y 8/2 White I= 10 YR 7/3 Very pale brown
Fig. 15.7. O= White slip C= 5 Y 8/3 Pale yellow I= White slip
Fig. 15.8. O= White slip C= 7.5 YR 5/2 Brown I= White slip
Fig. 15.9. O= White slip C= 5 Y 6/3 Pale olive I= 5 Y 7/4 Pale yellow
Fig. 15.10. O= 5 YR 7/4 Pink C= 5 YR 6/3 Light reddish brown I= 5 YR 7/4 Pink
Fig. 15.11. O= 5 YR 8/4 Pink C= 5 YR 7/8 Reddish yellow I= 2.5 YR 6/6 Light red
Fig. 15.12. O= White slip C= 2.5 YR 6/8 Light red I= White slip
Fig. 15.13. O= 7.5 YR 7/4 Pink C= 7.5 YR 7/4 Pink I= 7.5 YR 7/4 Pink
Fig. 15.14. O= 7.5 YR 7/4 Pink C= 5 YR 6/4 Light reddish brown I= 7.5 YR 7/4 Pink
Fig. 15.15. O= White slip C= 2.5 YR 6/4 Light reddish brown I= White slip
Fig. 15.16. O= 5 YR 7/4 Pink C= 5 YR 7/4 Pink I= 5 YR 7/4 Pink
Fig. 15.17. O= 10 YR 8/3 Very pale brown C= 5 Y 7/4 Pale yellow I= 10 YR 8/3 Very pale brown
Fig. 15.18. O= 5 YR 7/4 Pink C= 2.5 YR 6/4 Light reddish brown I= 5 YR 7/4 Pink
Fig. 15.19. O= White slip C= 5 YR 6/3 Light reddish brown I= White slip
Fig. 15.20. O= White slip C= 2.5 YR 5/6 Red I= White slip
Fig. 15.21. O= 5 YR 7/4 Pink C= 5 YR 6/4 Light reddish brown I= 5 YR 6/6 Reddish yellow
A small roll of clay was added under the rim and then indentions were made in it which were painted later. The inside and outside of the vessel were burnished.
Fig. 15.22. O= White slip C= 10 YR 6/1 Gray I= White slip
The outside was wiped, while the inside was burnished. Just under the rim a small roll of clay had been attached in which finger impressions were made.

Fig. 15.23. O= 5 YR 6/4 Light reddish brown C= 5 YR 7/6 Reddish yellow I= 5 YR 8/4 Pink
Rim of a shallow bowl with a flaring rim, which was burnished on inside and outside.
Fig. 15.24. O= 10 R 6/6 Light red C= 10 R 5/1 Reddish gray I= White slip
Fragment of a small bowl with traces that something had been attached to it, either a handle or a second bowl (Suggestion made by B. Claasz Coockson seems plausible).
Fig. 15.25. O= 10 YR 8/3 Very pale brown C= 5 YR 6/4 Light reddish brown I= 10 YR 8/3 Very pale brown

Fig. 16.1. O= 2.5 YR 6/4 Light reddish brown C= 5 YR 7/6 Reddish yellow I= 2.5 YR 6/6 Light red
The interior has a worn decoration the pattern of which is no longer recognizable.
Fig. 16.2. O= 7.5 YR 7/4 Pink C= 5 YR 7/6 Reddish yellow I= 2.5 Y 8/4 Pale yellow
Fig. 16.3. O= 5 YR 7/4 Pink C= 7.5 YR 7/4 Pink I= 5 YR 7/4 Pink
Fig. 16.4. O= 10 R 6/6 Light red C= 7.5 YR 7/4 Pink I= 2.5 YR 6/8 Light red
Dec. 10 R 3/4 Dusky red
Fig. 16.5. O= 5 YR 6/4 Light reddish brown C= 10 YR 7/4 Very pale brown I= 5 YR 6/6 Reddish yellow

Fig. 17.1. O= 10 R 6/6 Light red C= 2.5 YR 6/2 Pale red I= 10 R 6/6 Light red / Dec. 10 R 4/4 Weak red
Fig. 17.2. O= 7.5 YR 6/2 Pinkish gray C= 10 YR 6/2 Light brownish gray I= 7.5 YR 6/2 Pinkish gray / Dec. 2.5 YR 3/2 Dusky red
Fig. 17.3. O= 10 R 6/6 Light red C= 10 YR 7/1 Light gray I= 10 R 6/6 Light red / Dec. 10 R 4/6 Red
One fragment has this pattern with additional spirals along the rim.
Fig. 17.4. O= 7.5 YR 8/4 Pink C= 7.5 YR 5/0 Gray I= 7.5 YR 8/4 Pink / Dec. 10 R 3/2 dusky red
Fig. 17.5. O= 10 R 6/6 Light red C= 10 R 6/2 Pale red I= 10 R 6/6 Light red / Dec. 10 R 4/6 Red
Fig. 17.6. O= 5 YR 7/4 Pink C= 5 YR 6/3 Light reddish brown I= 5 YR 7/4 Pink / Dec. 10 R 5/4 Weak red
Fig. 17.7. O= 7.5 YR 7/4 Pink C= 7.5 YR 6/4 Light brown I= 7.5 YR 7/4 Pink / Dec. 7.5 YR 3/2 Dark brown
Fig. 17.8. O= 10 YR 8/4 Very pale brown C= 10 YR 4/1 Dark gray I= 10 YR 8/4 Very pale brown / Dec. 10 R 3/3 Dusky red
Fig. 17.9. O= 7.5 YR 7/2 Pinkish gray C= 7.5 YR 2/0 Black I= 7.5 YR 7/2 Pinkish gray / Dec. 10 R 7/2 Dusky red
Fig. 17.10. O= 5 YR 7/4 Pink C= 5 YR 6/2 Pinkish gray I= 5 YR 7/4 Pink / Dec. 5 YR 3/3 dark reddish brown
Fig. 17.11. O= 2.5 YR 6/8 Light red C= 2.5 YR 6/8 Light red I= 2.5 YR 6/8 Light red / Dec 10 R 3/1 Dark reddish gray

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Notes

1. The chapter about the Ayyubid-Mamluk pottery used for the sugar industry pottery from Tell Abu Sarbut (Lagro 2002: 37-54) has been published in the *Leiden Journal of Pottery Studies* 25 (LaGro 2009: 63-102).

2. The excavations were supported by the Netherlands Organization for Scientific Research (NWO).

3. The location of Tell Abu Sarbut is 35° / 37' E.L. and 32° / 12' N.L. (Map of Jordan, 1:250000 Sheet 1 Amman. Department of Lands and Surveys of Jordan, 1948).

4. At Hama not only geometrical decoration was used, but occasionally also people and animals were depicted, a feature not (yet) reported from other sites (Riis and Poulsen 1957: 270).

5. If the spread could be considered a reaction to 'political' developments, it might as well have been against the Fatimid rule, during which the peace was frequently disrupted in Bilad al-Sham. Their pottery has many as such recognizable elements of flora and fauna, which were not accepted by Sunnite Muslims. The strict geometrical patterns could therefore be a reaction to that. But at the same time it does not explain the continuation of these patterns long after the Fatimids ceased to exert influence, nor does it explain the depicting of animals on this ware in Hama, although this seems an exceptional occurrence.

6. The diminishing supply of trees will also have influenced the availability of wood which was suited to make wooden small bowls and other utensils. Since this aspect of the household repertoire is virtually unknown, it is possible that wooden bowls became less frequent and were replaced by Arab Geometrical bowls. See for the diminishing supply of wood Lombard (1959: 248).

7. The pottery described by Marçais from that place is only made on a wheel (Marçais 1913: 15).

8. Also painted pottery was found at Qsar es-Seghir, constituting 5 % of the total, but this probably refers to thrown ware (Redman 1980: 293 and 297; Redman 1983: 358).

9. The geometrical patterns published from North Africa are difficult to compare with those published here and often denote a strong symbolism with flora and fauna motifs, which are hard to derive from the motifs found at Tell Abu Sarbut.

10. In a more general way, however, it should be noticed that between the eleventh and sixteenth century painted pottery was used at a time in an area comprising the Mediterranean and stretching along the Arabian Gulf to East Africa. The patterns used, either strictly geometrical or symbolizing elements of flora and fauna, the way the pottery was made and its eventual shape vary considerably from one region to another and the state of study at present precludes the establishment of any direct link between them as

yet, but needs further attention. See for a variety of patterns used in East Africa e.g. Adams 1986, Part I and Welsby and Daniels 1991. For Iran i.a. Whitcomb 1991: 97 and Whitehouse 1969: pl. VI, (f) +++.

11. A similar influence was suggested for North Africa by Poinssot and Revault, quoted by Camps but not exactly accepted by him and he suggested that the influence could have been the other way around as well (Camps 1961: 334 ff.).

12. The same technique for closed forms is described by Ziadeh, who studied pottery from Ti'innik (Ziadeh 1995: 218), and by Avissar, who published pottery from Yoqne'am (Avissar 1996: 168). A nearly similar technique was still recently used by a potter in Busra and has been described by Bresenham. Instead of a bag with wet sand, a basket covered with canvas was used whose traces were obliterated when clay was smeared on the inside to smoothen the interior of the vessel. This technique was used to form the lower part, while the upper part of the vessel was built up with slabs (Bresenham 1985: 92-94).

13. Occasionally coils were used in combination with textile for the upper part (Franken and Kalsbeek 1975: 168). Textile could also have been used to cover part of the vessel and prevent the clay from drying too fast or at an uneven rate, but this would also have left more fragments with textile impressions.

14. The textiles used at Tell Abu Sarbut are of a simple plain weave and are well woven, with 25 threads on 1.5 cm. Interwoven are heavier, thicker yarns at regular intervals forming a checkerboard pattern. The quality is not that of bags etc., but more that of cloth used for clothing (Personal communication Diane Mott).

15. According to Einsler the potters called the grog *homra*, meaning red, referring to the dominant color of Byzantine pottery. See also Dalman 1942: Abb. 8 and Mershen 1985: 79.

16. If the container should be waterproof, fine chaff could have been used, as was done in Ramallah in the beginning of the twentieth century (Einsler 1914: 253).

17. At Pella "segmented boxes" were found, but are not published as yet.

18. Rims with a splaying top have been published by i.a Pringle 1986: 140, fig. 42 ; Olavarri 1965: fig 54, no. 12; Hart 1987: 46, fig 17, no. 1. Inward sloping rims have been published by i.a. Olavarri 1965: 89, fig 3, no. 13; McQuitty and Faulkner 1993: 56, fig. 19, no. 15 and p. 57, fig. 20, no. 31. Other rim shapes might be found as well or variations of those mentioned. The relatively small number of published complete vessels or even rim fragments result in a poor overall perspective of the repertoire as a whole and limit any discussion of organization of the industry, whether by local or centralized potters, itinerants, or some combination.

19. The paints were probably based on ocher and umber as at Tell Abu Gourdan, but no chemical analyses have been done on the material from Tell Abu Sarbut (Franken and Kalsbeek 1975: 51). Other materials might have been used as well, as in North Africa, where e.g. the peel of the pomegranate was used to produce red and leaves of the pistachio for the black color (Fayolle 1992: 35 ff.).

20. Motif C019 is illustrated in ill. 3.19. Motif B71 and B72 were counted together in the table, because the initial difference, which was based on the original position of the sherd in the vessel, could not be established unequivocally in many cases.

21. For comparison: Tell Abu Gourdan A 1-10 / B 1-25 / C 1-12 / D 1-10 and Tell Abu Sarbut A/B. At Ti'innik reportedly only 25 motifs/patterns were found. As a result, a comparison was difficult to make (Ziadeh 1995: 219).

22. A nearly similar development is given by Grey, who suggested "a move from high quality design and execution of geometric motifs to a freer, less geometric style in later centuries' (Grey 1994: 60).

23. SP = (B53-B56, B150-B163)), LL = (B1, B2, B5), EE = (B70-B79), TR = (B10-B31), LO = (B32-B52).

24. The color indication white slip corresponds with 10 YR 8/1 White.

25. Grouped as filled in squares are C10-C11, C20-C24, C40-C52. Grouped as filled in parallel lines are C60-C75.

26. Reference in general to a more 'loose' way of painting is made for material from Pella (Walmsley and Smith 1992: 195) and Tel Yezreel (Grey 1994: 60).

27. This phenomenon was also mentioned by MacAlister in his publication of material from Mount Ophel (MacAlister 1926: 198, no. 6) and it can be found illustrated in other publications, however, without specific mention of it as an observable feature (e.g. Sauer 1973: fig. 4, no. 157 ; Tushingham 1972: fig. 8, no. 16).

28. E.g.: Hama (Poulsen 1957: 270), Qasr al-Hayr East (Grabar et al. 1978: 113), Pella (Walmsley and Smith 1992: 194) and Heshbon (Sauer 1973: 55). The extent of these sites indicates that it was not a local occurrence, but occurred in roughly the same area where the AG ware is found.

29. A comparable fragment as in ill. 3.18 was published from Jerusalem (Tushingham 1985: 391, fig. 39, no. 26).

30. The reason that only jugs and smaller jars have been found and no large containers for water might be explained by the presence of the perennial stream, which runs along the site.

31. Handles like these were also published from Tell Abu Gourdan. See Franken 1975: 189, no. 31, 190, no. 26, 192, no's 27 and 28, 196, no. 13, 197, no. 30. They come from phases ascribed to the 'third period', which would mean late Mamluk.

32. See also Franken 1975: 196, no. 12. Rogers states that all handles at Apamaea had a lug at their apex (Rogers 1972: 264 and pl. XCV). A number of handles from Hama have a lug, but these are either wedge shaped or small and flat and as such do not have a parallel shape with those found at Tell Abu Sarbut (Poulsen 1957: 273-274). One published from Aleppo is round in profile (Porter 1981, p. 4). See in this case also Corbo 1965: 154, no. 3.

33. This seems to be a common phenomenon because reports on this material only occasionally contain a description or illustration of filters. Crowfoot mentions that jugs sometimes had strainers in the neck, but did not illustrate any (Crowfoot 1957: 363). See for some illustrated examples the following note.

34. Although the fragment is too small to identify the material used, it could have been straw, which was still recently in use for model-coil technique in Northern Jordan (Mershen 1985: 76).

35. Ziadeh (1995: 218) and Gibson et al. (1991: 43) refer to0 mat imprints. Also Einsler mentions the use of mats by potters, while building vessels in twentieth century Palestine (Einsler 1914: 254).

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THE PHILISTINE BIRDS AND DEIR 'ALLA'S *RARA AVIS* A PLEA FOR A 'PALEOGRAPHIC' APPROACH IN ORDER TO ADDRESS THE TECHNIQUE OF PHILISTINE DECORATION

Michel de Vreeze

Abstract

Philistine decorated ceramics play a crucial role in discussions on the nature of Philistine migration, ethnicity and the construction of social boundaries. As such, we need to address the nuances that are present in this corpus of material culture. Although the painted decoration is used as a primary aspect to identify a ceramic vessel as Philistine, it has been predominantly studied from an iconographic stance. This is in contrast to the ceramic vessels themselves, which have been studied from a perspective focusing on fabrication techniques. In this paper, it is suggested that a more detailed study of the techniques and actions involved in decorating these vessels can bring valuable new insights. We will focus on one of the prime hallmarks of Philistine decorative ceramics: the bird. Through selective studies, with reference to a paleographic approach, we will hope to show that there is much to gain from a more in depth study of the chaîne opératoire of this tradition of painting vessels. Such an approach can be well integrated with the archaeological approaches already taken. As such they can lead to more detailed understanding of the development of this style of pottery decoration, and the differences in its transmission and adoption. These insights will hopefully aid in the discussion on the relation between ceramics and Philistine identity.

Introduction

The Philistines – or *Peleshet* – are part of a larger group of Sea Peoples, which are thought to have roamed the seas after the collapse of Late Bronze Age social and economic life in the Mediterranean. It is generally assumed these groups came to settle in the Southern Levant, at the end of the Late Bronze Age and beginning of the Iron Age around 1200 BC. The exact nature of these Sea Peoples and their migration is still heavily debated, and the homeland of the Philistines is usually situated in the Aegean, but might range anywhere from the Mycenaean world to Cyprus and Anatolia (see Barako 2003; Killebrew 2005). The Philistines are known from several literal sources; Egyptian accounts of struggles with these Sea Peoples attest to the *Peleshet* being allegedly settled in strongholds within the Southern Levant (Dothan 1982: 1–12; Dothan and Dothan 1992). The Bible attests to the Philistines as archenemies of the Israelites,

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with a settlement organization of 5 main towns, known as the Pentapolis, in the Southern part of the coastal region (modern Israel and part of the Gaza strip). These cities have been recognized archaeologically with more-or-less certainty. Gaza, identified with the modern town of Gaza, is hardly excavated because of the present political situation and the large modern settlement on top. Ashdod and Ashkelon have been excavated, as well as Tell Miqne, which is securely identified with Ekron, and Tell es-Safi, identified with ancient Gath. Within these settlements, archaeologists have found evidence for the existence of the Philistines: destruction layers of the Late Bronze towns, new settlements with fixed planning and numerous artefacts, often showing Aegean affinities and associated with these 'newcomers'. Although skepticism rightfully remains, the separate ethnic identity of the Philistines is taken more and more for granted and archaeological evidence is evaluated in this light, yet nuances in this equation between artefacts and certain groups are coming to light (for instance: Killebrew 2005).

Of these artefacts, the pottery is crucial. Philistine ceramics are seen as showing a strong Aegean influence in their shapes and decoration. The first ceramics associated with the Philistines are known as Mycenean IIIC:1b (or the more recent coined term: Philistine 1 in Dothan, Gitin and Zukerman 2006: 71), characterized by a predominance of open shapes, its monochrome decoration of black paint on a white surface, the use of the fast wheel, a highly calcareous clay and low firing in professional updraft kilns (Dothan, Gitin and Zukerman 2006: 71; Killebrew 1996; Killebrew 2005: 227). From the start, this ceramic corpus showed a blend of local 'Canaanite' ceramic traditions and Aegean inspired ones (Mountjoy 2010). The second stage in the ceramic sequence is marked by Philistine bichrome ware, with red and black (or brown) painted motifs, often on a white slip. This bichrome ware saw an increase in vessel types and decorative motifs incorporating Aegean as well as local Canaanite and 'Egyptianizing' motifs (Dothan 1982; Dothan, Gitin and Zukerman 2006). At a later stage this elaborate painted style disappeared, and vessels were more often decorated by a red slip covered with vertical lines and spiral motifs in black, known as 'Ashdod ware' or 'Late Philistine Decorated Ware' (LPDW). The appearance of red slip is in line with the more general popularity of such decoration in the Iron Age II, and might be attributed to a shift in production location and organization (Ben-Shlomo 2006: 208–209).

Philistine ceramics and social boundaries

Philistine ceramics play a substantial role in discussions concerning ethnicity, boundaries and chronology in the Iron Age Southern Levant. The presence or absence of this 'Aegean style pottery', either monochrome (Myc IIIC:1b) or bichrome, was often directly equated with the presence of Philistines (Killebrew 2005: 219). Hence, it plays an essential part in the discussions on the presence of Philistines and their relation with the neighbouring groups. In recent discussions, the absence of Philistine ceramics at sites nearby the area where Philistines had their main settlements is both interpreted in chronological and social terms (Stager 1995, Bunimovitz and Faust 2001). The absence

of Philistine ceramics was either taken as evidence for chronological differences between the strata of these sites, or as evidence for strong social boundaries (Stager 1995). Recently, these theories of strict 'cultural segregation' have been criticized. Some scholars have suggested that the Philistine ceramics and their presence or absence at sites has more to do with deliberate choices, where this material culture is used to demarcate social boundaries (Bunimovitz and Faust 2001; Mazov 2005). The nature of the ceramics is important in this sense as well. Many of the ceramic shapes, especially in the bichrome phase, such as kraters, stirrup jars, strainer jugs and bowls might be seen as consumption ware. Some of the vessels are specifically associated with an Aegean style 'wine set' (Stager 1998: 155). This role of such ceramics in conspicuous consumption has been thoroughly studied for the site of Miqne-Ekron by Laura Beth Mazov, where the Philistine decorated ware shifted from a domestic assemblage to an assemblage of 'elaborate dining vessels' used in feasting contexts (Mazov 2005: 460; see also Yasur-Landau 2005 for the role of food preparation and consumption). Moreover, she states that the latter Philistine bichrome ware became "less a symbol for 'Philistine' ethnic identity and more an expression of 'elite' identity" (Mazov 2005: 461).

Conventional approaches to the Philistine decorated ware

For a long time, Trude Dothan's work on the Philistine material remained the hallmark study of this material (Dothan 1982); it is still one of the most detailed studies on this ceramic corpus and its different styles of decoration. Since this study, others have added important information on the Philistine decorated ware, stressing fabrication techniques of the vessels, and iconographic studies of the decoration (for instance Killebrew 1996 and 2005; Ben-Shlomo 2006; Ben-Shlomo 2010, 132-135). New publications on sites such as Tell Miqne-Ekron and Ashdod have added considerable information (Ben-Shlomo 2005; Dothan and Ben-Shlomo 2005; Dothan, Gitin and Zukerman 2006). Recently a detailed study of Philistine decorated ware, mostly focused on bichrome and LPDW was published by David Ben-Shlomo, and incorporated an up to date treatment of the evidence on production of these ceramics together with extensive archaeometric studies on the ceramics. Another article by Dothan and Zuckerman gives a detailed treatment of the Myc IIIC:1b decorated ware from Miqne-Ekron and Ashdod, specifically focusing on the decoration (Dothan and Zuckerman 2004).

In her work on the Philistine ceramics, Dothan already worked towards a detailed study of the decoration, stressing the influences of local traditions on the decoration, and treating the different motifs with a great eye for detail (Dothan 1982, especially chapter 3). Yet, although many of these studies specifically focus on the Philistine decorated ware, and address aspects of technical developments and modes of production for this ceramic corpus, there seems a lack of focus on the techniques used for the decoration itself.[1] This neglect seems to come forth from the perceived dichotomy between decoration and its iconographic aspects, and ceramic production of the clay body itself. Although decoration is often referred to as an important stage in the production

sequence, too little effort seems to address the techniques of the decoration itself. If the decoration on these vessels is one of the most crucial aspects of identifying a vessel as Philistine, and the identification of such vessels as Philistine plays such an important role in all kinds of discussions considering identity, transmission of material culture and ethnicity, we could benefit from a more detailed study of the decoration itself. It is this aspect of decoration we want to focus on in this paper. We will not treat the whole set of decorative motifs, but focus on what has been called one of the 'hallmarks' of the Philistine decorative ware; the bird (Dothan 1982: 198).

This study must be seen as a far from perfect preliminary attempt to address the decoration in a different way, which is not as much based on quantitative information, but focuses on an important void in the ceramic study of Philistine ware. The central question throughout is: do we benefit from a technical study of the painting itself? Related questions are: can we speak of a Philistine technical tradition of painting? And from this technical stance, what insights do we gain on the process of painting? What can the outcomes show on the relation to the social processes related to the current debate? We will focus on some key birds, amongst which a jug from Deir 'Alla yielding debated 'Philistine birds'.

Philistine decoration and the birds

Some details are provided on the decoration of Philistine ware. Recently, Dothan and Zukerman provided more information on the Myc IIIC:1b ware from Miqne-Ekron and Ashdod. They remark that "the paint is usually (but not always) applied with a fine brush, and its color varies from brownish-red to dark brown or, less frequently, black, and it always has a matte finish." (Dothan and Zukerman 2004: 35). Moreover, they remark that "different decorative elements on the same vessel were executed in various shades of the same color, creating an almost bichrome effect." This painting with fine brush seems to be in contrast to the later bichrome style, which, according to the authors, is "usually (but by no means always) less carefully executed, the line is thicker, and the hand of the artist is less steady." (Dothan and Zukerman 2004: 41). The same is suggested by Mazov (citing the unpublished work of Gloria London). It is suggested that the variability observed in this Philistine bichrome ware was due to the mass production stimulated by the increased demand for this ceramic ware, also observed in the 'wide-spread distribution of Philistine bichrome wares beyond the borders of Philistine heartland' (London 1986; Mazov 2005: 116). As Mazov states, this 'deterioration' in the painted design, and increased variability in execution of 'relative standardized motifs' could perhaps be attributed to a change in the workplace situation (Mazov 2005: 116). It is suggested that the painting itself might have been executed by apprentice potters, including members of the potters' families. These developments in painting techniques have important consequences for questions on the transmission of these techniques, the designs and the Philistine decorated ware as such. It is important to distinguish different levels of transmission, as the distribution of decorative

motifs can work on a different level than the technique of decoration itself, for instance depending on the visibility of the results of applied techniques (see for instance Gosselain 2000).

Another way of looking at the decoration: a 'palaeographic' approach

> "The more obviously distinctive, among the features that appear to identify personal hands, are not absolutely reliable marks of personal identity, since the more obviously distinctive the more readily taught, acquired, and imitated." (Bishop 1961: 1)

In the light of the general status of studying the Philistine decoration itself, it might be worthwhile to approach the decoration of Philistine ceramics from a paleographical approach – using archaeological methods – especially one that takes into account the sequence in which lines are drawn (for instance van der Kooij 1986). Although written forms and painted decoration might have different cognitive processes involved (the first incorporating a sense of language), there are common principles in studying both technical procedures. The importance of studying the tools, clay body and decorative surface in order to understand decoration itself was already advocated by for instance Henk Franken (Franken 1969: 172–174). In order to best address this issue, we should ideally have knowledge of the kind of paint and brush that was used and the role of the rounded surface of many vessels on the ultimate result. The kind of paint, type of brush and surface would directly affect the type of movements possible and choices made in sequence of decoration. Unfortunately, there is still little information on these aspects of Philistine decoration as yet. Nevertheless, a most important advantage of taking such an approach would be the possibility of addressing the sequence in which the painting was applied; the *chaîne opératoire* (van der Kooij 1986: 4–5, the sequence of lines in written text is called a *script pattern*). In such a framework, we might be better able to explain certain changes in decoration, and evaluate the transmission of decoration; shortly stated: 1) was the technique of decoration itself transmitted, or 2) was the decoration transmitted, without direct knowledge of the underlying technique.

Another issue that can be ideally addressed from such a stance is the issue of *formality* and *informality* (both internally and externally, see van der Kooij 1986: 5). Briefly stated, the formality of a script would suggest a degree of regularity, and less deviation in standardized shapes, the same might apply to painted designs. Informality would hence indicate that there is considerable variation in the results of certain shapes; more liberties are taken and irregularities are allowed. Formality or informality in a painted tradition can be on different levels. Internal informality would suggest the lack of standardization on an individual level, where in our case, the painter shows large variety in the pattern of painting, just as a scribe shows variety in the shape of letters. External informality would be a case where a certain number of individuals, for instance in a pottery workshop setting, show considerable variations and irregularities in executing a certain tradition. This informality necessarily reflects on the organization of the

painting traditions itself and ties into the questions already posed on the organization of the workplace. Importantly, it reflects on the space for innovation in a tradition (van der Kooij 1986: 5).

For traditions in script, van der Kooij argues that such innovations are to an important extent caused by desire to increase the speed of writing, "so that parts of letters may disappear or be contracted to one movement and curved movements are straightened out" (van der Kooij 1986: 5–6). The same principles might very well apply to the developments of painting techniques in general, and the painting of Philistine decoration specifically.[2] The advantage of the term formality is that it introduces a concept that ties into technical ability and choices, related to traditions and change, and might in this regard replace more subjective notes as 'careless' designs (for instance used in Dothan's 1982 treatise).

Finally, we might address the issue of certain workshops, or even individual hands, which was already attempted by Benson (Benson 1961). Referring to the citation of Bishop, it is important to keep in mind the visibility of certain designs. As he uses the principle in paleographic study: the more obviously distinctive a feature is, the less likely it is to represent an individual, but rather a school or tradition, as it is more readily transmitted. To recognize an individual painter, we should focus on elements that are painted almost automatically, most dependent on motor skills and deeply personal in this regard. Recognizing individual painters can be highly valuable, as seen for instance in the stylistic study of Greek ceramics (as developed by J.D. Beazley: for example Beazley 1974 and more recently: Oakley 1997). However, the detailed study of Philistine decoration would most benefit the discourse on a more general level, with the distinction and contacts between different workshops. This focus on workshops of potters and painters would tell us more on the rise of the Philistine ceramic tradition, and its subsequent spread and acceptance at other sites.

Elements, design motifs and units of design

Prudence Rice gives a useful schematic approach to the analysis of a style in design (Rice 2005: 248–249). Rice gives a very systematic account of a potter's possible mental template of a design. This starts with the basic unit: which is the 'element'. An element is the smallest self contained component of a design (like an atom). These elements can subsequently be grouped in order to make 'design motifs', which are seen as fixed groups of elements. These design motifs can subsequently be combined to form a 'basic unit of design'. This basic unit of design is the conceptual unit the artists uses to fill in the 'design space' and is seen as the primary constituent. As Rice remarks: "Basic units are in essence the most immediately recognizable components of a design, and so may be easily borrowed or imitated from artists to artist...Basic units are categories in the mind of the artisan and thus may be difficult to work with in prehistoric context without too much subjective inference" (Rice 2005: 249). In other words, what we should try to find out is whether the potters who produced this ware had such

concepts, in which the design of a bird might be seen as composed of basic unit of design, consisting of design motifs, which are composed of elements.

The birds

As stated before, the birds are seen as one of the hallmark designs of painted Philistine pottery. Although it is by no means the only design used, nor the most frequent, it does yield important prospects of studying the painting techniques and sequences (for the full corpus of designs used, see Dothan 1982). The Philistine birds have long been recognized to show particular traits. These have been summarized best in two publications (Dothan 1982; Dothan and Zukerman 2004). The birds seem to be painted mostly on kraters, stirrup jars, strainer-spout jugs, jugs and bowls (Dothan 1982: 198). As Dothan summarizes, the outline of the birds is mostly painted in black, with filling painted in red (in the bichrome tradition). The birds are generally painted within a metope and framed by vertical lines. Other motifs are used to further fill these metopes, such as concentric semicircles or rhombuses (Dothan 1982: 198). The design of the bird might be summarized as follows (following Dothan 1982: 198–199). The bird is depicted in two positions:

- Head turned back 'while the beak seems to preen the wing feathers'. While the neck joins the body at a point low on the breast, "a position most suitable for fitting within the confines of a metope" (Dothan 1982: 198, and illustrations and see the Miqne Ekron bird (Figure 1).
- Head facing forward. The neck is arched back and the neck joined to the body high up on the breast, again 'so the bird remains inside the metope' (see Figure 3).

The head seems oval in shape, the eye rendered by a dot, and the neck is rendered by two lines, with no filling in between these lines. The body is leaf-shaped (or tear-shaped), with a tapering tail, which might curve upwards. The body might be divided into particles by vertical lines, almost halfway the body, which can be filled with different patterns such as straight and wavy lines, semicircles and net patterns. Often, the breast is filled with a smaller semicircle, or less often, other motifs such as semicircles. The wings are painted by lines often with a sharp curvature, which run parallel or join at a more or less central point. The legs are usually three-toed, but birds can be rendered with four legs or without legs as well (Dothan 1982: 199). Different individual characters might be traced to Aegean traditions or local painting styles (Dothan 1982, most recently reviewed by Yasur-Landau 2009). In all, Dothan suggests the bird motif is a "sensitive indicator of the background of the Philistines. It shows clear affinities with the mainland home of the Mycenaean style, together with elements absorbed during the Philistines' meandering through the Aegean isles" (Dothan 1982: 203). Interestingly, Dothan remarks that the way the neck is attached to the body is related to the possibility of painting the motif within the confines of the metopes, a technical limiting factor. In a later work with Zukerman, Dothan returns to the characteristics of the Philistine bird (Dothan and Zukerman 2004). They state that "the pictorial

convention according to which this motif is rendered is relatively uniform and includes a rounded breast, curved body divided by triglyph, tapering tale, chevron-shaped wing, and drop-shaped head with a closed beak depicted as a single, slightly curved line" (Dothan and Zukerman 2004: 39). They also observe the great similarity of these MycIII:1b birds with later birds painted in the bichrome tradition. Again, it is noted that although the birds incorporate various elements known from other painted traditions in the Aegean and Cyprus, "the bird motif as it appears on the Mycenaean IIIC:1b pottery from Ekron and Ashdod is an original creation of the Philistine artist on the basis of the Aegean-style iconographic tradition" (Dothan and Zukerman 2004: 40).

A proper Philistine tradition?

The Philistine birds thus seem to have general characteristics. Within these general characteristics, there is room for deviation, as has been shown in great detail in past studies. Yet for our present purpose, it is crucial to understand if there is indeed a general Philistine tradition of painting birds. Reviewing the evidence from publications such as those of Ashdod, Miqne-Ekron, and the work of Trude Dothan, we might suggest there is (Amiran 1969; Ben-Shlomo 2005; Dothan 1971, 1982; Dothan and Zukerman 2004). Looking at the illustrated examples, there might be evidence for such general similarities, we might perhaps call *templates* or basic units of design. More importantly, and not given enough attention in previous studies, there might be a rather fixed sequence of painting shapes and lines attached to this general template. It is in looking at the probability of such sequences that the 'paleographic' approach shows its greatest advantage. If such a general sequence would exist, it brings us closer to the way of transmitting a tradition of painting. Moreover, it allows us to better study such transmission of designs.

A Philistine 'early bird'

The excavations at Tell Miqne-Ekron – thought to be one of the five main Philistine settlements – yielded important information on the earliest stage of Philistine ceramics. It provided several examples of the Philistine birds, amongst which a bird painted on a krater (see Fig. 1) This example was found in Stratum VI (Phase 8C-B), and belongs to the first stratum where ceramics derived from the Myc. III:1b tradition was fabricated (Dothan and Zukerman 2004: 3; 20, Fig. 20.2). Dothan and Zukerman show additional birds that yield some characteristics, but still deviate from the general template, by painting the wings differently and filling the neck with lines or painting the neck in a single line (Dothan and Zukerman 2004: 13, Fig. 8.14; 16, Fig. 14; 20, Fig. 19.3).[3]

The bird seems to be painted with a fine brush with slightly alternating thicknesses – seen in the end of the beak opposed to the lines of the feathers – which implies its tip was possibly rectangular shaped – because a pointed tip would have yielded a different

Figure 1. Bird motif on a sherd from a Myc IIIC:1b krater found at Tel Miqne-Ekron. It is seen as a transitional style, yielding horizontal bands in red, but with the bird painted in black (courtesy of the Tel Miqne-Ekron excavation directed by Profs. S Gitin and T. Dothan).

ending of the beak.[4] This bird is very important for our present discussion. If we can take it as one of the early representation of the tradition of painting the Philistine birds (it can never be shown to be *the* specific ancestor of all subsequent birds), it yields important insights in the development of what we might call the general design template with the basic units of design.

A possible design template and its basic units of design

The overall drawing of the bird might be divided into several basic units of design, consisting of various motifs.[5] A central basic unit of design is the outline of the body, consisting of a tear shaped form. This basic outline of the body serves as the centerpiece to which the additional design units are attached. The body is divided by placing vertical lines, almost midway (in this case five). The middle line is decorated with concentric lines; such concentric lines (or half circles) might be seen as specific element used to compose the motifs. The back of the bird's body is filled by tracing lines between the outer lines of the body and filling them with paint. As is perhaps visible in the different shading of this filling, this part was first filled with vertical lines running from left up

to right down, and subsequently completely filled. The breast of the bird is filled by adding two concentric lines and filling the most internal one with small concentric lines (a design motif consisting of elements). To make a complete bird, three basic units of design need to be added: (1) the head and neck of the bird; (2) the wings; and (3) the legs. In this case, the head is facing backwards (preening the feathers). The neck consists of two parallel lines (almost never filled, especially in the later bichrome phase), the beak is a single line, and the head is a semicircle with a dot inside it. The wings consist of parallel lines, which are painted from the body upwards to the left, and then come downward with a sharp curvature (in this case ending fairly concentrated).

The legs of this particular bird are unfortunately not completely preserved. The legs are rendered by a single line, which go down diagonally to the left and subsequently turning to the right. The part between the legs and the body is filled with black paint in a triangular fashion. Probably, based on other parallels, the toes would consists of three lines, the first being made by the line of the legs, and adding two lines to the left (see below).[7]

General sequence

The bird is characteristically painted between horizontal lines (metopes) divided by vertical lines (trighlyphs: the traditional nomenclature being inspired by classical architectural principles). As we can see on the picture, the black paint of the motif is painted over the red horizontal bands. This phenomenon, straightforward as it may be, seems consistent in the Philistine decoration as illustrated (Dothan 1982, Amiran 1965: 267, Photo's 272 and 274). Moreover, what becomes clear is that at least the vertical lines to the left are painted first, as the wings and body of the bird are placed against these lines. The vertical lines to the right do not touch the bird's body, and this might indicate that the bird's outlines were painted just within the confines, or these lines were actually painted later, and could be accurately controlled as such. The bird itself is painted *from the left to the right*, and it is very plausible that the whole sequence of painting run this way, implying the vessel was turned clockwise when painting: vertical lines → the bird motif → vertical lines. An exception is the filling motifs placed against the vertical lines and within the metope, as they could have been painted after the lines and bird were in place.[7]

The sequence is not completely retraceable, but some tentative initial steps can be taken. The horizontal lines were already in place, in this case in red, and likely applied already on the potter's wheel for ease, by turning the vessel and holding the brush against the surface. Subsequently the vertical lines to the left were painted, and the middle one decorated with a wavy pattern (concentric circles with a slightly different angle of brush). The first part of the bird that is painted is the central body part, it is probably painted by starting at the lower edge of the last vertical line and the horizontal line, painting the body in a single line going upwards, making a turn and ending back at the start of the line.[8] The difficult thing is to see what happens next, which part

of the body is painted afterwards. It might be the painting of the neck and head, but it could also be the wings or the legs. As soon as lines of these basic design units are touching, such as the beak and feathers, this issue might be resolved.

The neck and head are painted by a single line from right to left, starting at the front of the basic unit of the body. The line turns slightly upwards at the end. The beak is painted as a separate line, starting near the end of the first line, and painted in a concentric fashion, ending up again. The head is rendered by a concentric line starting at the line of the neck and painted slightly over the beak. A dot is added as an eye. A line painted from the head back to the body, under the initial line of the neck and ending between this line and the body line, finishes the neck.

The wings are created by painting more or less parallel lines that start at the body of the bird, go upward, make a turn, and follow downwards to end on the last vertical line to the left. In this case, it seems the upper line was painted first, followed by the lower lines in ever decreasing length. The ends of the wing are joined, which in later bichrome examples does not generally appear to be the case.

The legs of the bird are painted by a line, starting from the body, going down in an angle from right to left, making a turn (turn of the brush) and continuing down to the right. It seems plausible the toes were added by painting two more short lines from the line of the leg. To finish the legs, a painted line extends upward from slightly above the curve to the body and the space between filled with paint. Which one of the legs was painted first is hard to tell.

A development in painting sequence?

As discussed above, the sequence of painting might be adjusted to increase the speed of painting of the vessel, which would be well in line with the general evidence on the 'degeneration' of the painting style due to hastily work as suggested above. Using this Miqne-Ekron early bird, and comparing it with other birds from the bichrome tradition, there might be evidence for such developments. It is however admitted that to know if a chronological development might be seen, or more personal changes depending on the painter, we should examine more evidence and in more detail. Neither should we assume that such changes occurred in a linear progress.

We will presently use two design motifs described above to suggest such a development, the legs, and the neck and head. The hypothesized developments are summarized in Figure 2.

The legs

There might be a sequential development in the way of painting the legs of the birds, as summarized in Figure 2. The most elaborate way was likely used for the Miqne-Ekron 'early bird' and other birds amongst which is a very similar bird from Bet Shemesh (Amiran 1969: 267, Photo 272). This elaborate way includes five steps: the

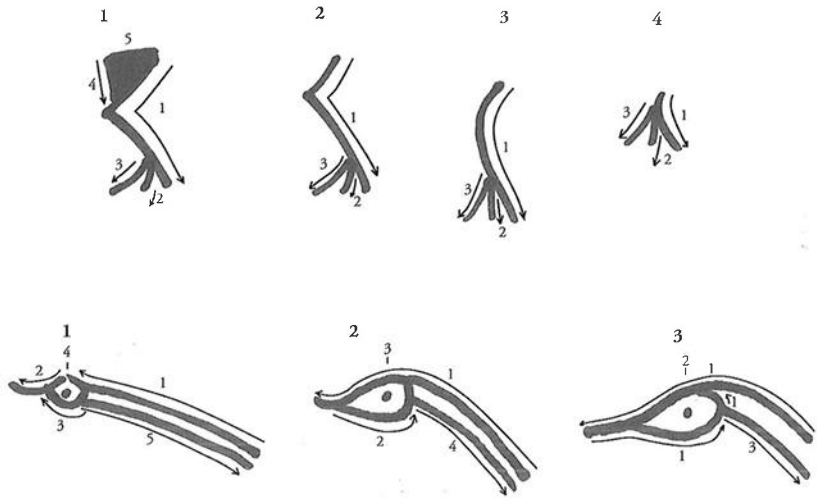

Figure 2. Possible sequential development of painting the legs and neck and head of Philistine birds. The arrows note the direction of the lines, the small numbers indicate the sequence. The dot of the eye is indicated as second last step, but might have been the last step in the sequence. Note that this sequence may be chronological, or dependent on potters individual styles. We would benefit of more research to find out more on this issue.

general outlay of the leg in a single line with a curvature (1). The feet added (2 and 3). A line from the body to the first line painted for the foot (4). The filling between these lines (5). This way of rendering the foot may have progressed toward a form in which the last two steps (4 and 5) aren't included anymore. The third phase might have incorporated a more fluidly painted line, without the sharp curvature (1), after which two lines were added to complete the feet (see for instance the bichrome birds from Ashdod (Stager 1998: Plate 11). The final stage would be the shortening of the initial line (1), after which the two toes are added (2 and 3), as seen on a bichrome bird from Ashdod (Amiran 1969:267, Fig. 274 and see Figure 3).

The neck and head

As the bird in Figure 1 from Miqne-Ekron might be seen as an early variant, it is relevant to look at the neck and head. In this case, there are five steps involved – with a step indicating the withdrawal of the brush from the surface (see the 1st neck and head of Figure 2). The first line is the upper line of the neck (1). Afterwards the beak is rendered by a curving line (2). The head is completed by a separate line from the neck to the beak (3). A dot is added to render the eye (4) and a last line from the head back to the body completes the neck (5).[9] A way of painting the neck and head incorporating less steps is

rendered under number 2. Here the neck and beak are rendered in a single line that starts at the body, flows upwards, descends and then curves upwards slightly (1). The head is completed by a second line, starting at the beak and ending on the line of the neck (2). An eye is added (3) and the neck is completed by painting a line from the head down to the body (4). This order of painting the head can be seen on numerous occasions (see generally Dothan 1982). A last measurement to speed up the way of drawing the neck and head is by painting the neck and head in a single line (number 3, line 1). A dot is added for the eye (2) and a line from head towards the body completes the neck (3). This way of painting the head and neck is seen at birds from Ashdod (Amiran 1969: Photo 274; Stager 1998: Plate 11 and see Figure 3 where the dot rendering the eye is left away as well).

Figure 3. Bichrome jug from Ashdod, showing a bird with features which might be seen as late in the sequential development, such as the neck and head, legs, and absence of the eye. This bird is a fine example of good mastery of the brush and paint, resulting in well controlled fluid lines (photograph after Dothan 1982: Plate 47)(courtesy of the IAA).

Whether such developments are statistically real, chronologically significant, and/or dependent of separate pottery traditions might be examined looking at the technical features in a different light. It would for instance be worthwhile examining if such steps occur in close symbiosis, or else, if measures to speed up the painting are first taken in the rendering of the neck and head, while still using a way of painting the legs that is still more time consuming. In any case, when categorizing these motifs in the design unit of the Philistine bird, we need to take account of the technique of painting, as this leads us to adjustments in the motifs which are likely based on changes in sequences and related to economizing and shortening of movements.

Formality and informality

As has been remarked, especially the bichrome Philistine ceramics show remarkable variability in workmanship. Such instances of informality become strikingly visible on a sherd from Ashdod (Figure 4). Here, two birds are painted, but the method of painting the neck and head are completely different.

We might pause for a while on the reasons for this informality. A possibility might be that the birds are painted by two different painters. As is visible, the lower bird has the upper line of the neck and head rendered in a single line, after which a second line back to the body completes it (as in Figure 2, the last stage). Yet the upper head and neck are painted completely differently. The neck is painted by a line starting at the

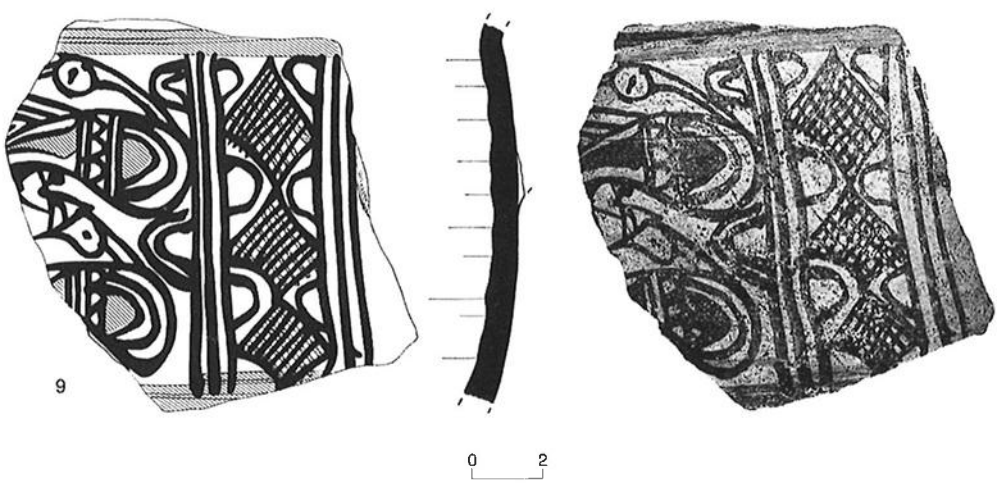

Figure 4. Two birds on a single sherd, but showing difference in painting and indicating the high amount of informality in this Philistine bichorme phase (after Ben-Shlomo 2005: 140) (courtesy of the IAA).

body. It stops, at which point a second line is drawn in a concentric way, and a third rounded line completes the shape of the head. Two lines, barely visible, render the beak, and a line starting at the head and going to the body completes the neck. If it was the same painter who rendered both birds, then what might explain this difference? There might be a technical explanation for this diversion. The lower bird shows the painter 'more or less' masters a tradition of painting by rendering the upper part of the neck and the head in a single line, as was part of the learned *chaîne opératoire* of the painter. Yet this way of painting is dependent upon skill, and quality of brush and paint. If not enough paint is applied, or the brush dries out before completing the movement, the painter must resort to other means. It is at this stage that he might divert from the general way of painting a certain basic unit of design. Moreover, by being versed in 'the quick way' of painting the bird, a painter might get 'confused' in what actions to follow up with. The painter has a mental picture of the completed bird, and likely makes a cognitive difference between the neck, head and beak based on biological – everyday knowledge. Thus, it might be the painter feels the need to finish the head first, than paint the beak separately, and after rendering the eye, completing the neck. It is very tricky to use such 'personalized' explanations, but it might explain the diversion from the general painting tradition by a technical failure. This would lead to a discrepancy between painting in fixed sequences of stroke on the one hand, or based on separate classification of the neck, head and beak on the other hand. Such informality might thus be due to a certain strict way of having learned to paint a bird (the quick way), without knowledge of the preceding steps in the development of painting the birds. Once this sequence in painting the lines is interrupted, the painter does not have enough technical experience to resolve the question with considerable skill.

The Deir 'Alla jug and its 'strange birds'

A strainer jug from the earliest Iron Age phase (A1) attested at Deir 'Alla yields painted motifs that have been considered Philistine (Franken 1969: 180, Fig. 47.4: see Figures 5 and 6).[10] Franken called for an analysis of 'paints, paste and temper material' to understand if this jug, amongst other sherds with Philistine motifs, indeed represents a 'foreign element' in the local repertoire (Franken 1969: 172). Others have pointed to this jug as standing out within the Philistine decorated ware. Trude Dothan states the birds as a "crude variant of the well-known Philistine motif" (Dothan 1982: 154). She calls the decoration on the jug "a variation on the Philistine theme, linking Deir 'Alla, however tenuously, with the Philistine material culture" (Dothan 1982, 154). Ben-Shlomo remarks that the "decoration shows a mixture of typical Philistine Bichrome Motifs and local variants (as the birds)" (Ben-Shlomo 2006: 42, note 52). In all accounts, these birds might thus be seen as 'strange birds'. The question is: do they really represent a mixture of local birds with Philistine ones? Moreover, can we see a hand of a painter versed in the Philistine tradition?

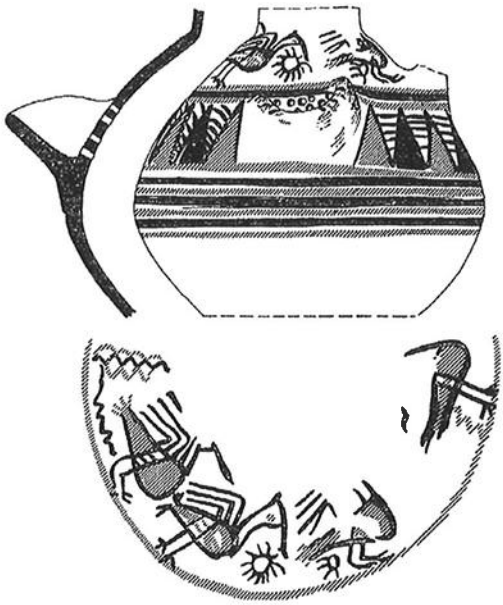

Figure 5a.

Figure 5b.

Figure 5. (a) The drawing of the jug as published in Franken (1969: 180). Red paint is rendered in grey, black paint is rendered in black. (b) The strainer jug with approximate scale as photographed by Gerrit van der Kooij.

In order to answer these questions we have to take a closer look at the birds painted on the jug. As can be seen on Figures 5, the vessel is painted in bichrome with four birds on the upper register. In Figure 5a, grey represents red paint, black represents black paint. Both red and black paint were used to paint the horizontal bands in alternating fashion. Triangles were painted by rendering the outline in black paint and alternatively filling them with red and black.[11] The outline of the birds is painted in black, whereas the filling of the body was done in red, sometimes partly covering the body. Interestingly, one tail is painted in red while another one is painted in black. But to what degree do these painted birds reflect a Philistine tradition? It seems the painter recognized some general design template with basic units of design for the Philistine bird, most significantly, the way the wings are painted by parallel lines. Yet when we look at the technique, it seems the painter was not familiar with the tradition of painting such birds. Some similarity exists in the *chaîne opératoire*: the horizontal lines were painted first, and the birds were painted over these lines. The body of the bird was painted first, but the lines did not touch again at the tail, but were left open, and finished by rendering several lines as a tail. On Figure 6b more details are visible. The body of the left bird is not painted all round at the breast. This might be because the

Figure 6a.

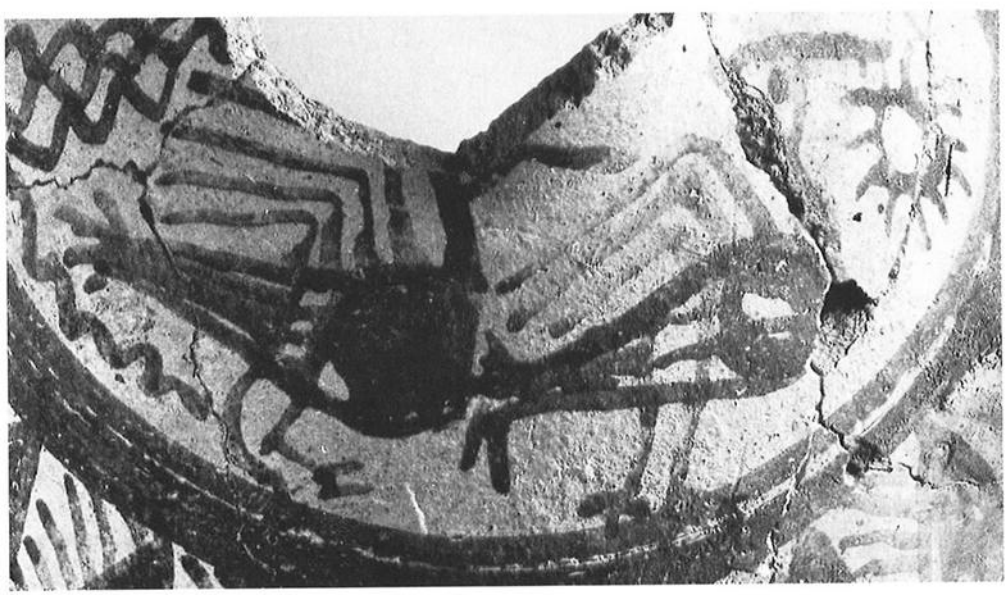

Figure 6b.

Figure 6. (a) The Deir 'Alla jug as photographed from above. Note four birds with additional motifs and elements such as a sun and wavy lines. (b) Detail of two birds, unfortunately both neck and heads of the birds are damaged (photographs: Gerrit van der Kooij).

right bird was already in place. When we look at Figure 5a we see that the layout is not symmetrical. It is very likely that the bird as shown to the left of Figure 6a was painted last, and had to be up close to the bird 'in front' because the motifs of wavy lines were painted between the previous bird and this last one. The tail of this left bird was painted red, when the internal part of the bird was also painted. At the second bird to the right, the tail is rendered in black paint.

The difference in rendering the birds shows internal informality, where the painter did not have a very standard technical approach. Significantly, the body was divided in three, by painting two vertical lines, and these lines were painted downwards extending the body, as to render the legs simultaneously. In one bird (Figure 6b right) these legs were straight, and three toes were added. With the left bird, an angle was created and one foot yields only two toes. To fill the bird's bodies, a circle was painted at the breast. Horizontal lines are in the rear area. This deviates from the practice as attested in the perceived Philistine tradition as described earlier. The head and neck were rendered by painting a single line upwards, followed by a second line down, which forms the head and beak, and finishing with a third line in a triangular fashion. Afterwards a dot was added for the eye. This way of rendering the neck and head is not in line with the 'Philistine tradition'. The wings are painted by lines that start at the top of the body, make a turn and then continue to the back, as visible particularly with the left bird in Figure 6b.

From this brief analysis it appears that the painter recognized a general design template and units of design for a Philistine bird, but was not versed in the technical school that gave rise to this standard template. Some features might have been due to technical limitations, as the paint could not always be applied in equal thickness. It is suggested though that these birds do not reflect a local style, but reflect an attempt to imitate the Philistine birds from a mental template of a Philistine bird, yet by someone not familiar with the more specific sequence of painting the birds that has been attested in the Philistine tradition proper.

Discussion

It must be admitted that this attempt of recognizing a Philistine painting tradition is not based on enough empirical evidence. In order to attain sounder knowledge of such a tradition we need to include a larger sample of Philistine painted birds. Yet it is hoped that the possibility and fruitfulness of such an attempt might have been shown. When proceeding in such a way, we might start to recognize regional schools or site specific workshops. In this regard we would have better grounds to tackle the uncertainties on the identity this ceramic ware displays, and the potters and painters responsible for this ware. In combination with archaeometric analysis we might gain much deeper understanding of the transmission of this painting style in the Philistine heartland and over a wider area. For now we have focused on the birds, but the whole corpus of designs, and their combination on vessels painted in the Philistine style can be addressed in a similar way.

This brief treatment is intended as a reminder that the technique of painting, previously largely neglected, should be well integrated in a study of this Philistine ceramic tradition. In order to further develop such studies, we would benefit from more documentation. For one, we need better understanding of the type of brush and paint that were used, as they would heavily influence the technical possibilities. For instance, a thin brush and fluid paint would result in more fluid lines that make possible the swift movements of painting a neck and head in one stroke. It would be best to examine the ceramics itself, as details traces of paint, brush and sequence of painting might appear.

Yet this is hard to accomplish and a database of good photographs of Philistine ceramics would improve the progress and accessibility of such a study. The number of photographed painted designs, especially with high resolution, is rather low at the moment. Most birds are rendered by drawings. These drawings are sufficient to recognize if the painting shows certain key elements, motifs and basic units of design, but when proceeding to look at the technique of painting, such drawings are no longer sufficient, as we would analyze the technique of the archaeological draftsperson, not of the original painter.

In looking at the techniques behind the painting, we might see certain communalities that go beyond the Philistine tradition. For one, painting the horizontal lines which frame the pictorial scene first occurs in other traditions as well, as it is tied into the general organization of fabrication. It is well possible that the pot was still on the wheel when these initial lines were painted. It is also very likely that in a more professional setting, where tasks have been divided, the painting of the design is left to other persons than the potter making the vessel, as described by Mazov (citing London). The procedure of painting from left to right is not awkward if we take into account the dexterity of most people. If one is right handed, it is more logical to proceed from left to right as this yields a better angle for holding the brush and limits the possibility of smearing earlier painted designs. If we would examine specific features such as the way the legs are painted in more detail, we might get closer to certain schools, or even individuals. The suggested sequential development of painting the legs and neck and head of a bird might show general value. Yet it is in the identification of the presence of certain workshops, regional styles, and the transmission of whole techniques or just designs, that this approach can add to the discussion on the link between Philistine pottery and identity.

Conclusion

It is difficult to yield a conclusion based on such a limited number of examples. Yet the most important issue is that we address the general neglect of treating the painting of designs in the Philistine tradition from a technical stance. This neglect is not intentional but comes forth from an internalized dichotomy between the technical aspects, and the iconographic properties of the painted designs. We have hoped to show the additional worth of a more detailed treatment of the technical side of painting, which

might give important additional or even new evidence on the Philistine decorated tradition. We do not need expensive new methods (save from detailed analyses of the paint) or even necessarily new material evidence. We could start by looking at material at hand. It is suspected that this might yield many new insights. For instance, it is suggested that the bird from Miqne-Ekron is indeed an early example of the Philistine bird that shows a specific design template. Moreover, there seem to be developments in the separate design units, which might relate to chronology or specific painting traditions. This is illustrated for the legs and the neck and head of the birds.

Taking such an approach on with a larger sample of Philistine ceramics, we might better address the way the technique of painting was transmitted, between individuals in workshops and between sites. We can gain better insight into the formality and informality of the tradition, which changes are likely due to technical developments and choices. As the analysis of the Deir 'Alla *rara avis* shows, we might understand some 'Philistine decoration' to be imitations of recognized style, in which the painter did not have firsthand knowledge of the technical tradition. In the end, such studies should yield important new information on the Philistine decorated tradition. In combination with the general progress of ceramic studies within this subject, we could get a more balanced account of what the Philistine ceramic tradition actually represents.

Acknowledgements

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Notes

1. An important exception may be the unpublished work of Gloria London (1984), entitled: *The Economic and Social Implications of Pottery Decoration*, Jerusalem. Numerous citations of this work in Mazov (2005) give the impression that this work is a detailed study of the technical aspect of decoration. Recently, Louise C. Maguire has strongly and very eloquently advocated a similar approach in the study design structure and sequence of brush strokes on Cypriot ceramics: Maguire 2009, and especially Maguire 2010.

2. Following a Darwinian approach to evolution. Variation and selective pressure are the key concepts for evolution. We might apply this approach to material culture – in this case the painting of birds – where the variety in execution of birds, in an informal painting tradition, combined with the selective pressure of speeding up the painting of decoration on the pottery, led to a fairly rapid evolution and diversification of the Philistine bird.

3. The first bird derived from Ekron, Stratum VII and belongs to the Myc IIIC:1(b)/Philistine 1 ceramic group. It yields a neck filled with vertical lines, a tail which ends in two diverting lines and wings rendered by short connected lines: Dothan and Zukerman 2004,13. Fig. 8.14; 16, Fig. 14. The second bird derived from Ashdod Stratum XIII and shows a single line for the neck: Dothan and Zukerman 2004, 20, Fig. 19.3. Both birds are from earlier phases than the bird shown in our Fig. 1, see Dothan and Zukerman 2004, 6, Table 2 for the chronological overview.

4. Also seen in the first internal line of the breasts. The line starts thick at the top, where it probably started being painted, and ends thin on the downside, this is probably due to the angle of holding the brush and the change of direction: first painting from left to right, and ending the line painting back to the left.

5. Note that the sequence in which the design units are mentioned are not necessarily in sequence as painted, we will come back on this issue further below.

6. See for instance Amiran 1965: 267, Photograph 272 on a painted bird from Beth Shemesh (near Miqne-Ekron), which shows such legs with three toes in similar fashion. On the similarity of these birds, see below.

7. There is evidence for this sequence, see for instance the wings of a bird painted against the head and beak of the bird to the left at Ashdod: Ben-Shlomo 2005: 148, Fig. 3.52.2. Another jug from Ashdod shows the lines to the right painted *over* the breast of the bird: see Figure 3, main text.

8. The opposite would be possible as well, starting with the lower line, making a turn and ending with the upper line – in one draw. Even more high resolution photographs, studying the vessel itself, or visual manipulation of the image to enhance layers of paint might better address this question, see below in discussion.

9. An intermediate phase might be seen at the bird from Beth-Shemesh, which still shows a similar curvature at the end of the neck and beginning of the head, Amiran 1969: 267, Photo 272. The bird is very similar to the Miqne-Ekron 'transitional bird' and might show a similarity in tradition, especially since the geographical proximity of the two sites.

10. Phase A1 represents a 'depression' between the ruins of the Late Bronze Age temple cella. It belongs to the earliest Iron I.A. deposits, consisting of occupation levels with thick deposits and streaks of burnt material washed from the ruined L.B. buildings (Franken 1969: 33).

11. His motif is also attested at vessels from Azor (as an Egyptianizing 'lotus motif'): Dothan 1982: Fig. 48; and Ashdod: Ben-Shlomo 2005: 97, Fig. 3.18.8.

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IS THERE A CASE TO BE MADE FOR ASSUMING AN UPCOMING SPECIALIZATION WITHIN POTTERY WORKSHOPS AS REFLECTED IN THE SEQUENCE OF HANDLES ON DUTCH CHAMBER POTS FROM LATE MEDIEVAL TO EARLY MODERN TIMES?

Rosa M.R. van Oosten

Abstract

This article focuses on the application of handle-type to red, grey and white ware chamber pots produced in the Netherlands. The question is when someone other than the thrower himself started attaching the handles during the production process, known in old Dutch as a 'handhaver' (from later dated historical sources). Changes in the ways of attaching handles may represent an indication for an upcoming specialization in the pottery workshop. Following van der Leeuws' assumptions on how handles were attached to the pot, a hypothesis about specialization is coined. Would it be possible to explain the shift from attaching the handle on the inside of the pot wall with a depression to an attachment without depression, as the work of this second man? Unfortunately, after carrying out an experiment of throwing chamber pots and attaching handles, it turned out that the assumptions made by van der Leeuw needed correcting. As a result, the hypothesis also needed adjusting.

Firstly, the main sources and methods in constructing the sequence for chamber pot and handles through time are explained. Secondly, the focus is on historical sources and follows the specialization hypothesis. Thirdly, on the basis of an elaborate description and illustrations of the throwing experiment, the way of attaching handles is investigated and the hypothesis critically reviewed.

The evolution of handles on chamber pots

When studying 14th or 15th century chamber pots in the Netherlands, it is striking that they all have either one or two deep depressions on the inside of the pot wall. Sander van der Leeuw illustrated this aspect with a picture that has been the logo of this journal since 1983 (van der Leeuw 1976: 140–142 and 168–169; translated in Dutch 1979). The depression is caused by the potter providing counter pressure with the index finger when placing the handle. Van der Leeuw came to this conclusion after studying firing wasters pottery from the site Frankesteeg in Haarlem (Schimmer 1979). The site dates to the second half of the 13th century (Numans 1987), roughly a hundred years before the introduction of chamber pots (14B). Van der Leeuw distinguishes

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three kinds of handles, which he designates handle type A, B and C. Type A and B are both round vertical handles. Type C is a hollow handle that is only found on skillets and as such will be left out of consideration. On chamber pots several types of round and flat vertical handles can occur, albeit with slight differences from type A and B. I have designated them type D through F and their features are summarized in Figure 1.

ad type D
Unfortunately, the occurrence of depressions is not systematically recorded in archaeological reports. Nor is it possible to deduce the presence of such depressions from the drawings. Technical drawings of pots generally show the inside on one half of the pot and the outside on the other half. In urban archaeology, it is common to draw the side of the ear as the outside half. For this reason, depressions are not represented. To work around this problem, I studied samples from Haarlem, Den Bosch and Amersfoort. I selected pots, which are stored in the internal archaeological depot of the municipalities. The focus was on chamber pots, but cooking pots and large jugs were also included. The following four observations are worth noting. First: these depressions are not a local characteristic, but a general trend in the Northern Netherlands. Second: the depressions on the rim are generally more shallow than the ones on the inside. This can be considered to be a logical consequence of the fact that the rim dries quicker than the body. Third, these depressions are not exclusively seen on chamber pots. Cooking pots certainly showed similar depressions, but these seem to have disappeared before 1400. This contradicts the findings in the most frequently used book for Dutch pottery studies, *Cities in Sherds.* Here, we read that such depressions were only used on chamber pots and as such are recommended for making the distinction between fragments of cooking pots and chamber pots (Bartels 1999: 125). As a consequence archaeologists could claim to have found one of the oldest chamber pots dating to the fourteenth century when in reality they were dealing with a cooking pot. And last, in Den Bosch the chamber pots with depressions contain an incised groove on the shoulder. Van der Leeuw interpreted these grooves as markers where the potter is to place the handles, but the possibility that they may represent a kind of decoration or a characteristic, a sign, of a particular pottery tradition cannot be excluded.

Specialization in the pottery workshop: the profession of attaching handles in historical sources

From historical sources and ethnographic observations in the province of North Brabant it is known that besides the thrower a second person was employed in the production whose task it was to attach the handles and legs to the pots after a short drying period. In old Dutch this man (there is no mention of women having been employed in such a manner) is called a 'handhaver'. He did not work at a wheel, but stood or sat at a table/workbench. On Monday when the pots were not ready yet, the *handhaver* cut clay and on other days when supply stagnated, he would join the carriers. He was second in

Type	Drawing	Description	Handle is attached from	Date occuring at chamber pots
A		Round handle, with two depressions. Maybe the same as type D.	rim to shoulder	13B-13B?
B		Round handle, with one depression. The upper end of the handle goes over the rim.	shoulder to rim	13B- 14A? Handle occurs on morphological predecessor of chamber pots
C	Hollow handle of skillets, leave out of consideration.			
D	depressions are similar with type A	Round handle, with two depressions.	shoulder to rim	14B-till 16A r-pis-1, r-pis-20
E		Round handle	shoulder to rim	15b-19AB r-pis-2, r-pis-4, r-pis-5 (type Alkmaar)
E1		Round handle, squeezed	shoulder to rim	17a-17d? r-pis-5 (type Deventer)
F		Flat handle	shoulder to rim	16d-17a/17d? w-pis-2
F1		Flat handle, squeezed	shoulder to rim	16d-17a/17d? r-pis-5 (type Deventer)
G		Flat handle, with a tail end.	rim to shoulder	17A-19AB f-pis-1 and on (German) stoneware chamber pots (s2-pis-2, s2-pis-3). It seems that in Redware this method arrived just in 19th century (r-pis-25, r-pis-43).

Figure 1. Different kind of round and flat handles from 1350 to 1900. Type A and B from van der Leeuw 1976, vol. 2, fig. 18 and 19. Figure Type D–G from Bitter and Clevis 2003.

pay only to the potter, although he was not generally able to throw. Although the potter himself mastered attaching handles, he normally left it to the *handhaver* (Vos and van Lieshout 1990: 1613–1614). The profession of *handhaver* is known to have existed in the province of Friesland. A systematic analysis of all the 'personal wanted'-ads in newspapers concerning the pottery craftsmanship from 1753 till 1900 turned up the oldest advertisement mentioning a *handhaver* dated to 1780 (van der Meulen and

Smeele 2005: 22–26, in particular Table 1). Older historical documents about the pottery craftmanship are limited and even the wealth of documentary evidence in the famous pottery town of Bergen op Zoom does little to reveal the exact division of labour (Slootmans et al. 1970). It remains unclear when this kind of specialization entered the production process, so we have to turn to archaeological sources.

Upcoming specialization based on the van der Leeuw type handles?

As shown, the *handhaver* entered the workshop by least the 18th century. Archaeological evidence pertaining to the evolution of handles may however provide us with indications for an earlier introduction in the pottery workshop. The shift from handle type D (with one or two depressions) to type E (no depressions) could be interesting in this respect. Type D shows a strong similarity with van der Leeuw's handle type B. The difference is the attachment on the rim. Type B is laid over the rim and lacks a depression. Type D is attached on the rim and frequently has a shallow depression. Both handle types are attached first to the shoulder and then to the rim. Van der Leeuw assumes that for handle type B "had to be fastened to the vessel as soon as its body had been completed." (van der Leeuw 1976: 142). When we combine this statement with the historical observations, we take the next step and formulate a new hypothesis, namely: the sequence of actions, i.e. throwing and immediately attaching the handle of type B/D can only be guaranteed when the potter attaches the handle himself. The switch to handle type D may be interpreted as the result of a division of labour in the workshop. An assembly line could have been introduced. The potter continued throwing, while the *handhaver* added the handles and legs to the leather-hard pots. It could be a clue for an upcoming specialization, on the condition that the way of attaching handles represented by van der Leeuw is correct. As will be shown below, this is to prove the weak link within the analysis presented here.

Discussion: the hypotheses of van der Leeuw revisited?

I asked two potters for their opinion on the model of van der Leeuw. The fist potter is Andres Bauer. He is a replica-potter from Nederweert in the province of Limburg and his ceramic repertoire focuses on the serial production of medieval pots. The second is an artist potter, Addy Meewisse in Nootdorp, near The Hague. Her ceramic repertoire focuses on single pieces (unica), with different kinds of glaze and different kinds of firing. On the basis of their remarks, I will comment successively on the theoretical starting points and the sequence of actions of van der Leeuw. In the next paragraph an alternative interpretation of attaching handles will be illustrated, as performed by Bauer and Meeuwisse.

Theoretical starting-points

Van der Leeuw mentions three theoretical problems the potter could be faced with when attaching handles (van der Leeuw 1976: 140–141).

(a) He assumes handles come apart from the body during the drying process, because of the different drying rates and consequently different shrinkage rates of the pot and the handle. Van der Leeuw is correct on the fact that the risk of developing cracks is an aspect every potter takes into account (Rye 1981: 21). This does not however necessarily delimit the way handles are attached. It dictates foremost that the drying process should be monitored carefully. Bauers replica chamber pots do not show cracks on the handles, in spite of the fact that the pots were already leather-hard. Bauer works around this by drying the pots with handles under a piece of plastic. There creates a climate akin to a greenhouse: pot and handle can then slowly acclimatize to each other. Meewisse says that her naturally won clay (instead of fabric-made), does not show such problems at all.

(b) Van der Leeuw assumes affixing a handle will deform the body, in particular at the location where the handle is first connected. However, the experiment shows no deformation at all when the pot is leather-hard.

(c) Although he does not do so directly, van der Leeuw mentions another issue. When the potter attaches the lower end to the shoulder, he risks having estimated the handle length incorrectly. As a result, the upper end will not reach the required location. According to van der Leeuw the potter works around this by placing a rib on the shoulder. The observed incision on the chamber pots of Den Bosch could have served in a similar manner. Van der Leeuw is correct on this point to a certain degree. The first time Bauer attaches the handle to the shoulder, elongating it by pulling he notices immediately that the handle is too short and will form an angle instead of a loop. In order to correct this he simply repeats the action on the same pot with another piece of clay. The problem van der Leeuw mentions, only exists when a potter make the handles on a particular pot for the first time. Besides, as archaeologists we will not find traces of the very first new types. Test pots would be destroyed before being fired. So the potter could use the clay again. On the other hand, the problem could not have been avoided by placing an incision on the shoulder when the handle is placed and elongated by pulling. It would only have functioned if the handle is rolled beforehand, has a fixed length and an even width. The handles on chamber pots however are not an even width along their length; the lower end always being considerably thicker.

The findings of the current experiment do not support the assumptions of van der Leeuw that the three theoretical problems would have represented serious problems in practice.

The central focus of van der Leeuw in the case of the handles, but in the rest of his approach as well, is rather negative; the potters were constrained by the raw material and the equipment used when manufacturing the pottery. On contrary, I propose that potters were primarily constrained by time and money. Time saving would have been a regulating factor and unnecessary actions in the production process would be skipped. Above all, the potter was a professional, who had to earn a living by providing a basic product. Furthermore, I assume that historic potters were highly skilled workers, who were able to cope with a variety of circumstances, like different clay sources, weather conditions, temperatures in the kiln, and still deliver a product of

equal size and quality. Finally, I deduce that the pottery craft is highly traditional, focusing primarily on conservation rather than innovation, the same pots being produced for over decades or even centuries.

To round off this theoretical part, some important must be said about the actions in the workshop, more specifically on the leather-hard stage. The leather-hard stage is a gradual process and which can be subdivided into the soft leather-hard, medium leather-hard and stiff leather-hard sub-stages. The pliability in each stage is being reduced in each stage. The pot enters the soft leather-hard stage, when fingerprints are no longer visible in the clay and leather-hard stage ends when bending the clay creates crack formation. Actually, time is not a correct unit of measure to express how long it takes before the pots reach a particular stage. It depends on the temperature, the movements of the air and humidity.

The sequence of actions of type A and B

Moment of attaching handles

As a result of theoretical assumption A (see above) van der Leeuw concludes that handle type A must be leather-hard and attached to a leather-hard pot whereas handle type B must be freshly formed and attached to a freshly formed pot. Attaching leather-hard handles is possible, but in the case of chamber pots the action is unnecessary and therefore I assume, that the historical professional potter skipped it. Attaching a handle immediately after the pot is thrown (handle type B) carries the risk of completely deforming the body. Both potters refused to sacrifice one of their freshly thrown pots to demonstrate. Throwing a body on the potter's wheel requires a lot of water; as a consequence, a freshly thrown pot is soft, weak and vulnerable. The assumed precautionary measure by van der Leeuw of first affixing the handle to the shoulder instead of the rim, would not have avoided serious damage. A couple of hours would need to pass first. When the last pot in the row had been thrown, he could have started attaching handles on soft leather-hard pots.

Preparing the handle (Figure 2: 1)

Van der Leeuw supposes type A was made by rolling a flat slab of clay as if it were a carpet. He deduces this operating procedure from a "typical spiral" seen in cross-section of one or more handles in his sample in Haarlem and from the fact one or more handles are broken longitudinally. A picture is lacking however and he neither does mention whether the longitudinal broken handles show a typical spiral as well. Both Bauer and Meeuwisse had serious doubts about the proposed method, as first flattening and then rolling the clay takes a great deal of time. Bauer tried and found out that rolling in this way will allow a big air bubble in the middle of the handle. Potters consider air bubbles as a primary cause for pottery cracking during firing. It is highly unlikely that the potters in the 13th century chose this method of preparing handles. The typical spiral in cross-section could probably be explained by another way of rolling, as both potters proposed independently, i.e. by rolling a paste of clay on a

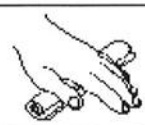
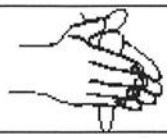
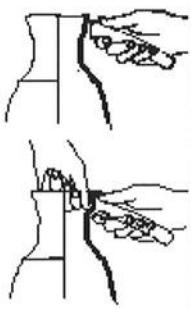
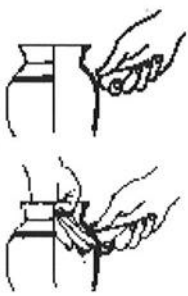
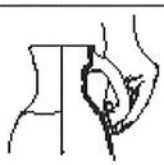
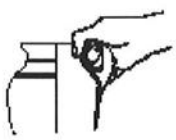
Sequence of actions	Attaching a handle method A according to Van der Leeuw	Attaching a handle method B according to Van der Leeuw
1. Preparing the handle	- to flatten an amount of paste into a slab - to roll the slab together 	- to roll a ball of paste between the fingers into a slightly conical roll 
2. Attaching lower or upper end and 3. Bending into a curve* (*a picture lacks)	- to fasten the handle just below the rim, supporting the latter from the inside with a finger or a thumb - to bend the handle in two places 	- to fasten the thick end to the shoulder of the vessel, supporting the latter from the inside with the tip of the first finger of the other hand - to bend the other end of the roll towards the rim of the vessel 
4. Attaching the lower or upper end	- to affix the other end on the shoulder, supporting the latter from the inside with the tip of the middle finger of the other hand 	- to fasten it there by wiping some of the paste from the handle over the rim 

Figure 2. The sequence of actions of attaching handle type A and B according to van der Leeuw. Text from van der Leeuw 1976: 168–169 and figures from ibidem. vol. 2, fig. 18 and 19.

bench and using your hands as a rolling pin or by rolling between the hands. Van der Leeuw assumes handle type B is rolled between the hands to create a conical shape. He deduces this from the fact that the cross-section of the handle is homogenous, no spiral was seen. In my opinion, this observation suggests pulled rather than rolled handles.

Attaching the lower end (Figure 2: 2)

Bauer and Meewisse do agree with van der Leeuw that the potter would have first attached the lower end. This is quite remarkable as modern pottery tutorials are always advocating the opposite. It seems to be connected with the fact that the handle is attached on the upper edge of the rim and not, like handles of modern cups, one finger below the rim. One may wonder whether attaching on the rim has any particular advantages. Bauer experienced that attaching on the rim is the most difficult type of connection, in particular when the chamber pot (r-pis-1) has a small mouth. When the potter saves the hardest connection (the first connection) for the easiest location (the shoulder) it facilitates the application of the handle.

Bending into a curve (Figure 2: 3)
No essential comment beyond the demonstration

Attaching the upper end (Figure 2: 4)
Van der Leeuw supposes handle type B was attached "without support from the interior" to avoid deformation of the rim. Giving some counter pressure is however necessary.

The experiment: attaching handles on replica pots

I asked Andres Bauer, to make four different types of chamber pots, r-pis-1, r-pis-4, r-pis-5 and r-pis-38 including handles and glaze. The experiment took place in Haarlem at the civil service for archaeological investigation on the 11th of October 2010. He brought with him a couple of chamber pots in the leather-hard stage. He had thrown them beforehand, as it would not have been possible to carry out throwing and attaching handles of chamber pots both in one day. I took pictures and filmed. I also visited the potter two times at his domestic workshop in Nederweert to observe the way of glazing, discuss the results and finally to pick up the replicas. Afterwards, I discussed my observations of the experiment with Addy Meewisse. She also threw two chamber pots of the r-pis-1 type.

Demonstration by Bauer

Imitating the historic potters in all respects (clay, wheel, kiln) would have required too much time. For this reason Bauer used fabric-adapted terracotta clay, an electric wheel, an electric kiln and instead of a lead-glaze, a modern transparence glaze (see Table 1). As the latter is prohibited, due to its toxic nature.

Clay	K142 red; firing temperature 1000–1150 degrees Celsius without any grog, fired on 1080 degrees Celsius
Wheel	Electric wheel Shimpo RK-10
Glaze	Transparent glaze, 40 271 TM
Kiln and temperature	Electric kiln, OBY Uden, top-loader

Table 1. Variables of Bauer

Sequence of actions

Moment of attaching the handle
Bauer had thrown some pots on Saturday before and had let them dry slowly under a piece of plastic. The handles were attached on Monday in Haarlem, roughly 48 hours later. The other pots were thrown on Monday in Haarlem with handles being attached

on Tuesday, roughly 24 hours later. The latter pots were not kept under a piece of plastic and had actually become too dry. Therefore they were dipped several times into a bucket of water beforehand. Despite these bad conditions, no handles fell of after firing.

Handle type D applies to r-pis-1 according to Bauer

Preparing the handle (Figure 3: 1)
The potter stands and holds the upper end of a ball of clay in one hand, which he forms by pulling it into a carrot-shape piece. He pulls frequently and gently with his other hand to elongate. A bucket of water stands next to him in which he frequently dips his working hand, in order to keep the clay and his working hand wet. When the clay is long enough and has reached the desired thickness, he cuts the lower end by using his finger as if it were a pair of scissors.

Attaching the lower end (Figure 3: 2)
In order to create a comfortable working height, the pot stands on an elevation on the table. The thicker end is placed head on directly on the shoulder of the pot (forming the lower part of the handle). He inserts one hand in the pot and gives counter pressure with his index finger once, short and firm, while the other hand presses the handle into place. Next, the contact area around the handle is smoothed out with wet fingers.

Bending into a curve (Figure 3: 3)
The handle does not form a loop, but is still horizontal. The potter inserts one hand in the pot, turns the pot upside down, and keeps it above shoulder height. The handle now curves naturally in the right direction towards the rim. His other hand massages the handle gently into a curve, while frequently dipping his hand into the bucket of water.

Attaching the upper end (Figure 3: 4)
He puts the pot back on the elevation and inserts one hand in the pot to give counter pressure, while the other hand presses the handle in place. He presses the handle by pushing and massaging the handle from behind to the rim. This way of pushing caused a small but distinctive angle to the handle, near the rim (compare at this point type A of van der Leeuw). He carries this action out twice. The first time he gives counter pressure without leaving a depression, as a matter of fact, this is construction method E. His fingers inside the pot are stretched or he just holds the rim. The choice for this method is automatic as the rim is already stiff leather-hard. The problem is that the rim always dries quicker than the rest of the pot. The second time he gives counter pressure by using his index finger, as a result a depression is left. At this stiff leather-hard stage this is hardly possible any more. As a result, the upper depression is

shallower than the lower depression. Next, he smoothes out the joint and finally he removes clay spots and cleans up the area with a wet sponge.

Handle type E applies to r-pis-5
Step 1, 2 and 3 are identical.

Attaching the upper end (Figure 3: 4).
He inserts one hand in the pot to give counter pressure with straight fingers, while the other hand presses the handle in place. Next, he smoothes out the joint. To turn the appearance of the handle from an ordinary round type handle E into type handle E1, he takes the upper part of the handle and squeezes the two sides towards the middle.

Handle type F applies to a test pot
Bauer demonstrates the method on the basis on a test chamber pot (r-pis-5). In reality no type r-pis-5 is known with this type of handle.

Preparing the handle (Figure 3: 1)
He pulls a flat instead of a round tail.

Attaching the upper part (Figure 3: 2)
The pot stands on an elevation on the table, the thicker end is placed a little below the rim. He inserts one hand into the pot in order to give counter pressure with straight fingers, while the other hand presses the handle in place.

Bending into a curve (Figure 3: 3)
He holds the pot in one hand and the handle bends naturally in the right direction. His other hand massages the handle into a curve, while frequently dipping his hand into the bucket of water.

Attaching the lower part (Figure 3: 4)
He sticks the lower part to the pot and adds three finger marks to the tail as a kind of decoration. This also creates an enlargement of the contact area, which enhances connection.

Demonstration by Meewisse

Meewisse objected to the method of Bauer, as she felt that successively putting down, lifting up and putting down the pot represented rather unnecessarily actions. She was determined to find an easier and quicker method. For the first pot she used (sifted) clay from an excavation of Borgharen in the province of Limburg. For the second pot she used self dug clay from an excavation in Den Hoorn in the province of South-Holland,

which was only roughly cleansed (Table 2). Neither clays were left to rot, as is known from historic sources to have been done by potters in the past (Roodenburg 1993: 73).

Clay	Self dug in Borgharen in the province of Limburg and Den Hoorn in hte province of South-Holland
Wheel	Electric wheel
Glaze	
Kiln and temperature	Electric kiln

Table 2. Variables of Meewisse

Handle type D and E applies to r-pis-1

Moment of attaching the handle
More than sixteen hours after the first pot has been thrown, the handle is attached. By this stage it is in such a leather-hard stage that no depressions could easily be formed. For this reason, she attaches the handle to the second pot after four and a half hours, in the soft leather-hard stage. As already said, only the time is not a good unit of measure for how long it takes the pot reach the leather-hard stage. The temperature in the workshop during the entire time was a steady 18 degrees Celsius.

Preparing the handle (Figure 3: 1)
Meewisse rolles the handle between the hands, in the same way van der Leeuw describes for handle type B. However, in this case it cannot be called a rolled handle, as it is only rolled rudimentarily. In pottery terms, a rolled handle indicates it is finished before being attached to the pot. In contrast, this handle is pulled and elongated while being attached to the pot.

Attaching the lower end (Figure 3: 2)
In order to make a handle type D she puts one hand into the pot and gives counter pressure with the index finger while using the other hand to press the handle into place in the same way Bauer did. This was only possibly when the pot was rather soft and the first time she tried it the pot was already too hard, as a consequence it was more akin to a handle type E (without depressions). In this case she used several straight fingers instead of just the index finger. Before she placed the thicker end directly on the shoulder of the pot, she made a small ridge on the head of the handle to avoid including air bubbles and this provides a more solid connection as well.

Next, she incises the pot where the handle will be located. Possibly, this action could have been skipped, but like potters are common to do, she continued working according to the conventions she was taught by her instructor.

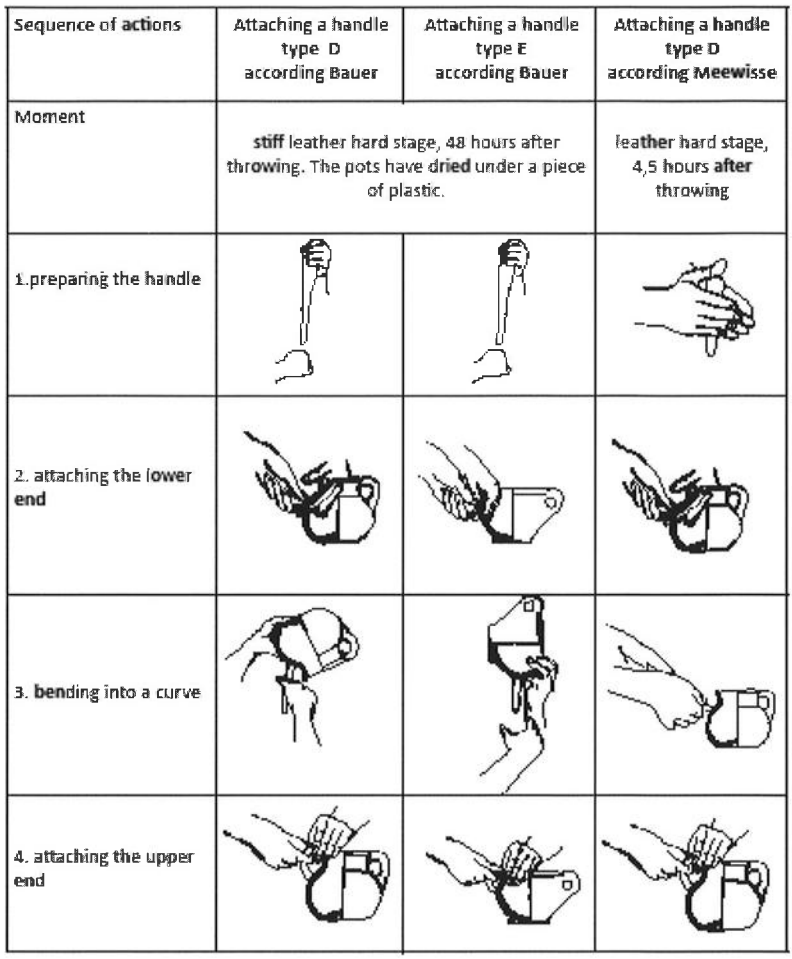


Figure 3. The sequence of actions of attaching handle type D and E according to Bauer and Meewisse. Drawings by E. Eimermann.

Bending into a curve (Figure 3: 3)
Contrary to what Bauer did, she left the pot standing on the table and started pulling upwards. This is more difficult for her, because she has little experience with this method and the gravity exacts an opposite force. The result is however the same.

Attaching the upper end (Figure 3: 4)
She attached the upper end by providing a small amount of counter pressure from inside, the first time with straight fingers (handle type E) and the second time with the index finger (handle type D).

Which of the three options?

The demonstration of throwing replica pots however shows that carrying out such experiments is of the utmost importance when trying to understand the potter's point of view. Both modern potters agree that it is highly unlikely even impossible for historic potters to have attached handle type B "as soon as the body had been completed", as assumed by van der Leeuw. Therefore this option is discarded and we are left with the methods of Bauer and Meewisse. When we combine the observation that the handles types causing depressions are best placed when the pot is in the soft leather-hard stage, it can be concluded that the pot is not lifted in any way. Otherwise, the pot would likely have been deformed or damaged. As soon as handle type E enters the repertoire, it is probable that the handles are attached in the leather-hard stage and both methods are possible. The difference between the actions of both potters perfectly illustrates just as there is a different hypothesis for every archaeologist, there is a different way of attaching a handle in every pottery tradition. A potter should have worked according its unwritten rules.

An interesting question is why the depressions have disappeared. There seems to be a strong connection with the type of pot and the wide of the mouth. The depressions on cooking pots disappeared around 1400. On chamber pots they start fading in the second half of the 15th century and have completely disappeared by the second half of the 16th century. On (large) pitchers they survived till the 17th century or 18th century. As soon as a pot shape becomes wide-mouthed, the depressions disappear. There are two possible explanations. As soon as the mouth of the pot widens, the inside of the pot became more visible to the potter and his customers. Depressions may have been avoided for aesthetic reasons. There is however also a technical necessity. Handles with depressions are attached after only a few hours. Closed forms resists attaching handles in the soft leather-hard stage better than open forms do. The latter carries the risk of deformation. So, when the potters start producing wide mouth pots, this brings about adding handles in the (medium) leather-hard stage. Taking into account that closed pots dries slower than open forms one can also wonder whether this altered the time-schedule for the potter. Imagine, the potter (or his assistant) continued attaching the handles after, lets say, five hours, the old-fashioned closed chamber pots would have just arrived at the soft leather-hard stage, whereas the open chamber pots might at this time already have reached the medium leather-hard stage. Another experiment would be needed to draw any definite conclusion on this matter.

Final remarks

My previously formulated specialization hypotheses should be adjusted, because the handles with depressions would have been attached in the soft leather-hard stage and not immediately after the pot is thrown. It is still possible that the potter himself attached the handles, but the arguments in favour are greatly weakened.

For a more comprehensive analysis of an upcoming specialization in pottery workshops, it would be better to not concentrate on a single aspect of the pot, but on several characteristics, like the type of bottom, the pot shape and shifting production centres. It would be necessary to combine this with investigations on firing wasters. Furthermore, the identification of finger prints could be a promising tool. It could give an indication on the number of persons who held the leather-hard pots and even age determination could prove a possibility as well (Moran 2007).

Acknowledgements

This article could not have been possible without Andres Bauer, replica-potter in Nederweert, who performed as expert, and Addy Meewisse, artist potter in Nootdorp, who performed as contra-expert. I would also like to thank Bram van As and Loe Jacobs for the productive discussion on Haarlem chamber pots in November 2009, the archaeological municipal service of Haarlem, 's-Hertogenbosch, Deventer and Amersfoort for their hospitality when studying their collections and Pjotter Sannen for checking my English.

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Pottery tutorials on internet for instance, www.pottery.about.com; www.jhpottery.com; www.theclayconnection.org, and many more interesting films on youtube, in particular of Simon Leach, a grandson of the famous British potter, Bernhard Leach.

THE LAND OF MILK? APPROACHING DIETARY PREFERENCES OF LATE NEOLITHIC COMMUNITIES IN NW ANATOLIA

Laurens Thissen, Hadi Özbal, Ayla Türkekul Bıyık,
Fokke Gerritsen and Rana Özbal

Abstract

Recent work by Richard Evershed and colleagues published in Nature in 2008 concerning residue analysis on ancient potsherds has provided clear evidence for milk processing and dairying in Anatolia and SE Europe in the Neolithic. Good results were acquired from ceramic samples taken from late 7th millennium cal BC sites in NW Anatolia. The investigation also suggestively linked the dominance of cattle in the bone assemblages of these sites to dairying. Building on this pioneering work, a new research project takes these primary results to the level of the pottery assemblages themselves. Integrating the residue analysis with ceramic studies, we regard residue analysis sampling specific vessel categories as an important step into assessing pottery function and meaning in prehistoric assemblages. This paper presents background and first results of the research, and will focus on the NW Anatolian key area seen by Evershed as favourable to Neolithic milk processing.

Introduction[1]

Over three decades ago, Andrew Sherratt coined the term "Secondary Products Revolution" to signify the exploitation of domestic ruminants for their secondary products, like milk, wool, etc., and dating this major shift in animal use to about 4,000 cal BC (Sherratt 1981). His claim has always been critically approached and he was perhaps the first to acknowledge its infirm basis, but only during the past decade the suspicions are being buttressed by facts due to the emergence of organic residue analysis in archaeology (cf. Evershed 2008). In 2003, Copley conclusively demonstrated dairying in England as starting during the 5th millennium cal BC as an important form of food production (Copley et al. 2003), and slightly later Craig published milk-processing evidence from pottery coming from two Early Neolithic sites in the Balkans, dating back to the first half of the 6th millennium cal BC (Craig et al. 2005). An extensive organic-residue project carried out by Evershed et al. (2008), targeting the Neolithic revolution and its potential pathways from the Near East to Europe was a major step forward. Evershed and collaborators sampled over 2,200 potsherds, and found good

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proof of milk processing across Turkey and SE Europe during the late 7th and 6th millennia cal BC. Particularly good results came from sites in Northwest Anatolia, more specifically from sites along the eastern Marmara Sea board (Figure 1). Two of the sampled Marmara sites, Fikirtepe and Pendik, can be securely dated to the 2nd half of the 7th millennium cal BC. They count among the first Neolithic settlements of NW Anatolia. Corroborating Evershed's pioneering work, a 2007 residue analysis by Özbal and Türkekul Bıyık found traces of milk lipids on some base sherds from the contemporary site of Barcın Höyük, which is located in the same general region (Türkekul Bıyık and Özbal 2008; Türkekul Bıyık 2009). The occurrence of dairying in NW Anatolia will shed new light on the neolithisation of this region, an area that is commonly seen as of key importance for understanding the neolithisation of Europe (e.g., Özdoğan 2008). The analyses done so far are path breaking, because proving that milk was being processed as early as the 7th millennium cal BC, over 2,000 years earlier than Sherratt's suggestion.

What these early studies did not do, however, was to integrate the ceramic data with the chemical ones. Following up on – still rare – work trying to link form with trace use (e.g., Craig et al. 2003, Gregg et al. 2009), our project is explicitly focusing on samples that have the potential to integrating issues of vessel form and vessel function. Within the known ceramic assemblage, it is our aim to select basic-level categories and

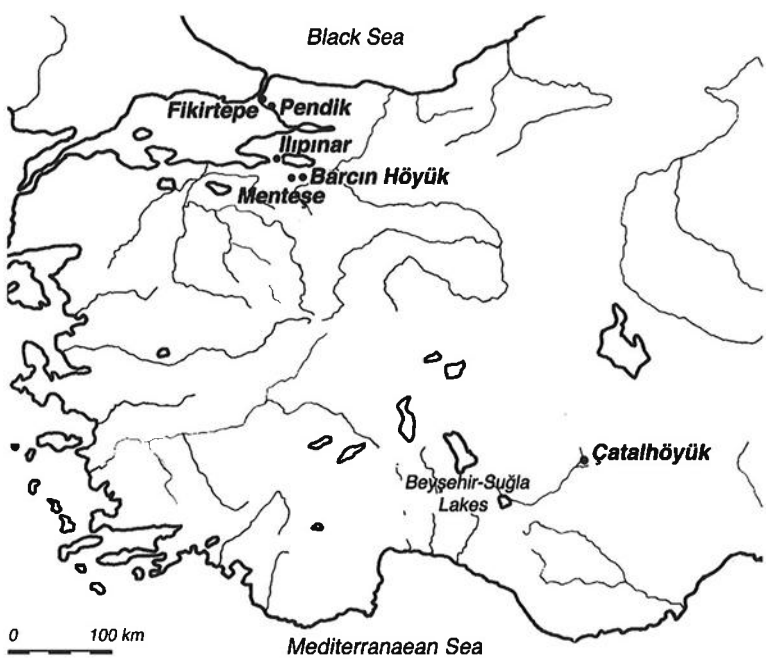

Figure 1. Sketch map of Anatolia with sites mentioned in the text.

subordinate categories in order to resolve hypotheses combining dissimilarity in manipulation with similarity in form, as is, for instance, the case with two-handled pots carried between two hands, and pots with four suspension lugs. The sample will also take into account vessel types not traditionally linked with cooking, including cups, oval bowls and boxes. The immediate goals of the sampling procedure are to acquire circumscribed sets of vessel types related to dairying and other food processes, and, furthermore, to see if technological correlates to such vessel types exist in terms of fabric, surface treatment, firing, and form. Samples are taken from the shoulder areas or from handle zones, provided these parts enable reconstruction of the vessel shapes and category attribution.[2] Ultimately, our aim is to move forward in interpreting vessel function in early Neolithic society, particularly focusing on vessel use in relation to fire.

Pots and fire

We have argued elsewhere for the connections between the Central Anatolian Konya area and NW Anatolia during the Neolithic (Thissen 1999), and we will merely use this association to highlight the development of cooking using ceramic containers, which started earlier in the south.

Çatalhöyük, the key site of Central Anatolia for the Neolithic period, was settled somewhere during the 2nd half of the 8th millennium cal BC. At about the 67th/66th centuries cal BC at Çatalhöyük transformations in material culture (Düring 2002: 220f.) co-occur with changes in attitudes towards food preparation and in pottery technology (Last 2005).[3] These developments had been germinating for a longer time, but around the Levels VI/V transition Çatalhöyük society seems particularly dynamic, open to changes, willing to experiment and also willing and able to adopt the changes (cf. Marciniak and Czerniak 2007: 123f.). Imagine a society in flux. Perhaps the need for openness was also felt in a literal sense, since at about this time the settlement plan became more open: there is an increase in open spaces (Düring 2002: 224).

Simultaneously, new ways of cooking are being created. Until then, people seem to have been cooking perhaps not so much in pots, but were using baskets and "cooking stones" (Atalay and Hastorf 2006: 293). Thousands of baked clay balls have been found in Çatalhöyük often in association with fire installations. Debate has been heated over their suspected function, and interpretations range from room heaters to baked clay objects for cooking. The idea of these clay balls representing cooking gear is not so strange. To us it would appear very cumbersome, laborious and impractical, but there are in fact many ethnographic parallels for clay balls, baked clay objects, or real stones being routinely involved in food cooking procedures (Thissen 2005). Stone cooking, or "indirect moist heating" in American terminology, was, for instance, common practice among North American Indian prehistoric societies, where it was associated with thick walled, fibre tempered vessels. Only with the change to thinner walled, mineral tempered pottery, the demise of the method set in (Sassaman 1995). Closer to home, hundreds of baked clay objects have turned up from the Early Neolithic site of Măgura,

in the Lower Danube catchment, Romania, dating to about 6,100 cal BC. Also these may have been used for cooking (Thissen et al. 2007).[4]

One of the conspicuous disadvantages of this method of food preparation is that you would be unable to keep food simmering over the fire for prolonged periods because the control to maintain heat at a constant temperature is low (Arnold 1985: 128).[5] Foodstuffs that would need long simmering times could not be prepared. Other disadvantages are that you will need to pay constant attention and effort to maintain food broiling, you will need to change your stones repeatedly with concomitant drops in temperature, not mentioning the awkward manipulation of the hot cooking objects themselves. Despite these drawbacks, it is now assumed that this method of cooking was in use for over 500 years at Çatalhöyük, and one may actually imagine that this practice is just a continuation of Mesolithic cooking techniques, which may have been the case in the Danube region as well (Thissen 2005).

The pottery in use during this half millennium at Çatalhöyük has simple, bucket-like shapes and thick walls (Figure 2). The clay is tempered with fibres, probably cereal

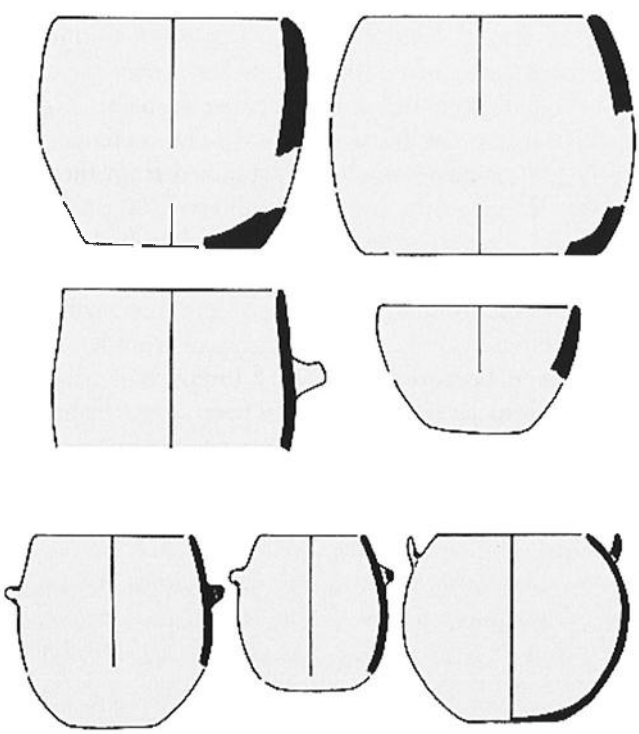

Figure 2. Çatalhöyük, early, thick walled, fibre tempered (top rows) and later, thin walled, mineral tempered pottery (base row).

chaff and/or straw. Handles or lugs are rare, and the larger vessels must have been difficult to hold and manipulate when full. Very few are decorated with "splodges" of brown paint. Mellaart describes the firing as "poor" (1966: 170), the fabric having thick black cores possibly due to a reducing atmosphere followed by rapid cooling in the air (cf. Rye 1981: 116f.). Occurrence was very low. Mellaart found only 300 sherds over seven building levels (Mellaart, *l.c.*). The new, ongoing excavations at Çatalhöyük confirm these low figures for the early levels (Last 2005). Although Mellaart describes this pottery as having fulfilled a purely utilitarian role, it is hard to imagine that it was pottery that was used routinely in cooking, if only because of its rarity. At the same time, the fibre temper used is advantageous for cooking since reducing thermal shock: the cavities created by the burnt-out fibres resisting breakage of the vessel during repeated heating and cooling cycles (Rye 1981: 34). Therefore, even if these pots were used in the kitchen, then probably just in continuation of and in addition to older practices using perishable containers for cooking, involving "cooking stones" as well. Technological innovations, such as pottery containers, thus were embedded in existing procedures.

At about halfway through Çatalhöyük's history, however, the local situation culminated towards the almost exclusive use and production of a different kind of pottery (Figure 2 bottom row). Experiments or attempts to produce thinner walled, mineral tempered vessels resistant to thermal shock and less heavy to manipulate had been going on for perhaps two or three centuries already, before finally being adopted wholeheartedly around 6,500 cal BC (Last 2005). The preferred clays naturally contained sand, mica or quartz, and were mainly obtained from the rich, alluvial soils of the May and Çarsamba Rivers near the site (Doherty 2007, Camizuli 2008). These fine, sedimentary clays apparently had no need for additional tempering. Also quartz tempered pottery is advantageous to cooking since it has, though less so than calcite, thermal expansion coefficients similar to that of the clay matrix (Kilikoglou et al. 1998). According to Philippa Ryan clay balls disappear from level V onwards at Çatalhöyük (cf. also Atalay and Hastorf 2006: 293).[6] Interestingly, the evidence for basket making is also absent from level V onwards. There seems to have been an inversed relationship between basketry, clay balls, fibre tempered pottery on the one hand, and the emergence of mineral tempered ceramics on the other.

Vessels are now carefully burnished both on the inside and outside surfaces, in order to reduce permeability, and to compact the surfaces helping against thermal shock (Schiffer et al. 1994). The combination of thinner vessel walls and mineral tempers is beneficial to a quicker heating up time of the vessel contents, as experimentally confirmed by Skibo et al. (1989: 131). The new pottery is perfectly suitable to be used over direct heat sources to cook food, and Mellaart mentions the presence of thick, sooty deposits on the vessels (Mellaart 1962: 54). The horizontal lug handles and suspension lugs now standardly applied to the new gear help in moving heated vessels from the fire and back again. Parallel developments occur in the neighbouring Beyşehir-Suğla region ceramics, where similar thin walled vessels with lug handles are tempered

with dense, crushed shell particles, another ideal thermal shock resistant material (Rye 1981: 33; Arnold 1985: 23ff.).

The changeover from the older, traditional way of cooking with the aid of "cooking stones" to direct heating has several implications. The new technique makes it easier to process food by boiling and steaming, and requires less effort (no manipulating of heated cooking stones, etc.). In addition, food is boiled more rapidly and less fuel is needed. Tasks can be economised and attention space is won. Heat can be maintained for a long time, where sustained cooking breaks down toxins contained in raw foodstuffs naturally (Arnold 1985: 135). This will have expanded the range of food resources. Arnold supplies a six-page list of toxic constituents of plant foodstuffs that can be reduced by prolonged cooking, including beans, peas, barley, rye, lentils, vetches etc., thus making them more tasty as well (Arnold 1985: 129–134). Cooking in pottery also makes it easier to sustain specific temperatures, and enables a cooking technique such as simmering. At Çatalhöyük, however, Atalay and Hastorf argue that with changing cooking procedures (from stone cooking to direct cooking in pots) "the faunal and botanical evidence does not reflect any dramatic change in what was boiled" (2006: 309), and they conceive the transformation as merely a shift in time management. While this may be the case at Çatalhöyük, it is nonetheless tempting to relate Arnold's summary of advantages of direct cooking and the emergence of strong, light and portable cooking gear to the introduction or adoption of new foodstuffs, or to new ways to make them more tasty and nutritional. An argument that can, of course, be reversed: a desire for tastier food was beneficial to the adoption of innovations made in pottery and cooking.

Generally, and within our new "milky paradigm", the control of temperature, and the quickness to heat up a vessel because of its thin walls while being resistant to thermal shock and the ability to maintain heat at constant temperatures, would also have been advantageous for processing milk. Evershed et al. (2008) assume that – for the Turkish/South Balcanic evidence they gathered – milk was being heated, perhaps as part of its processing into lactose-free food products, where it is assumed that adults were still lactose intolerant. The making of yoghurt, for instance, involves heating the milk up to 80°C, after which the temperature is being reduced to about 40°C and maintained for between 4–6 hours. Also the making of cheese involves heating of milk for a prolonged period in order to coagulate the milk solids into a curd. All these practices need a constant temperature, careful monitoring of the fire and of the vessel contents.

Regulating the heating temperatures for a prolonged time span is more effective with direct cooking on the fire than with cooking stones or baked clay objects. Additional control may be achieved with regulation devices for attuning heat transfer, for instance by stand rings on the pot base, by pot stands, or by means of suspension lugs on the vessel itself. Despite these good preconditions, and despite that the evidence for dairying using pottery at Çatal is there, Evershed thinks it was still "less important" at the site. He states that this accords with the available ageing data for sheep and goat at

Çatalhöyük, who were almost all killed as subadults and young adults, a pattern he says is suggestive of a concentration on meat production. If animals were being milked at Çatalhöyük this would have been restricted to sheep and goats (Evershed et al. 2008). Louise Martin argues that the Çatalhöyük cattle are morphologically wild – having the same size ranges as those from Aşıklı Höyük. She suggests that although knowledge concerning animal husbandry and breeding techniques was readily available (as seen with sheep and goats) this understanding was not applied to cattle for socio-cultural reasons, where cattle were rather used for hunting, feasting and ritual display (Martin 2002: 215).

NW Anatolia

At about the critical timeframe of the 65th century cal BC with all these changes going on the Konya area, the first Neolithic settlements contemporary with Çatalhöyük are founded in NW Turkey. Also the NW Anatolian pottery groups are thin walled and mineral tempered and have well burnished in- and outside surfaces. More important is that in the Northwest attitudes towards manipulation and use of cooking pots are shared with Çatalhöyük. The triangular lug handles occurring in pairs, and smaller, perforated knob handles occurring in fours connect Çatalhöyük with sites such as Demircihüyük, Barcın Höyük, Menteşe, Fikirtepe, Pendik and Ilıpınar (Figure 3).

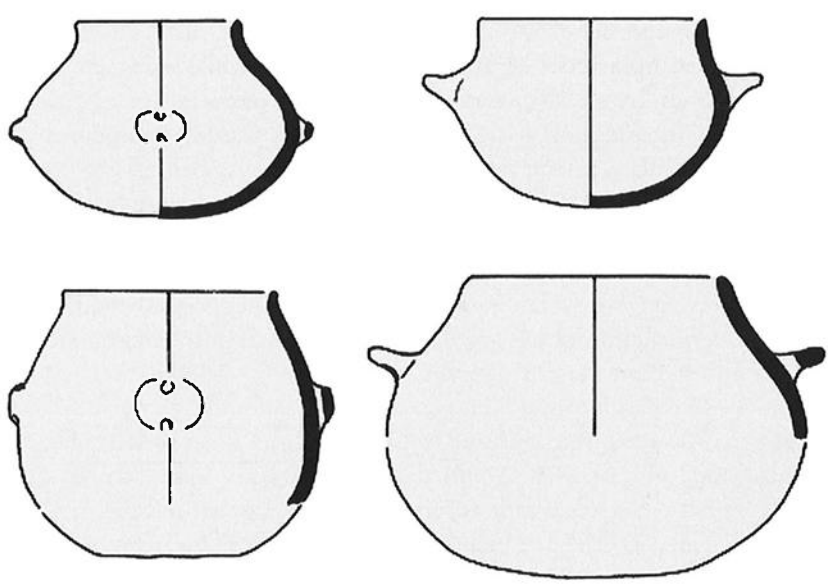

Figure 3. Fikirtepe and Pendik Late Neolithic pottery.

There is no doubt that these morphological and technological concepts were transferred to the Marmara area from an original centre being Çatalhöyük and its hinterlands, where Neolithic life had been going on for a near 1,000 years (Thissen 1999). Within the Marmara region, ceramic knowledge is truly shared, to the extent that the pottery from all these sites is all but interchangeable. Surface treatments and firing of pottery are very similar, and the same operational chains have structured vessel manufacture. Handles, for instance, are attached to vessel walls by means of scoring the contact areas, and the rudimentary handles are modelled and secured to the walls by additional slabs of clay. Manufacturing details suggesting parallel methods or similar *chaînes opératoires* interlink all the known NW Anatolian sites in the later 7th millennium cal BC. In addition, all the Northwestern sites' earlier ceramics were preferably calcite tempered, a feature that is absent from the Çatalhöyük pottery. The calcite was deliberately added: the crushed particles are angular, well sorted and of similar size. We can be sure that potters were aware of the beneficial characteristics of calcium tempers for cooking vessels. Calcium has a similar expansion rate as the clay matrix and so is well suited to be used as a tempering agent in vessels used on the fire (Rye 1976; 1981: 33). Hoard et al. (1995) have argued that the addition of calcium or limestone as a temper allows for thinner walls and more globular shapes, both factors increasing thermal shock resistance as well. All these identical technological variables hint at shared functional purposes and a similar use and manipulation of specific vessel categories over the wider area. The evidence from Ilıpınar, the only site at present where occupation continued into the Early Chalcolithic, shows that this cohesive tradition consists down to Level VI there, dated to about 5,700 cal BC, suggesting unchanged attitudes towards vessel use and vessel manipulation.

Before Evershed's and Türkekul Bıyık and Özbal's discoveries of milk residues in sherds from NW Anatolia, archaeozoologists Lionel Gourichon and Daniel Helmer came to similar outcomes starting out from entirely different research procedures. Analysing the animal bone from the contemporary Menteşe site, which is in walking distance from Barcın Höyük, they point out that in the basal strata cattle herding was predominant, only to shift to sheep herding in the later levels (2008: 439). The same dominance of cattle we find also at Fikirtepe, while the picture for the later Menteşe deposits ("Menteşe middle" and "Menteşe upper") tends towards corresponding more with Ilıpınar phases X–IX, where sheep/goat are prevailing (Buitenhuis 1995; 2008: 208) (Figure 4).

Gourichon and Helmer argue that the observed kill-off patterns in the Menteşe bone suggest milk exploitation, as indicated by the slaughtering of milk lambs (less than 3 months old), and simultaneously the slaughtering of ewes (ages 3–4 years onward), which they see as two complementary strategies in flock management. In cattle they observe a pattern where milk calves were slaughtered exactly at the moment they would be suckled at ages between 6–12 months old. The French scholars interpret all these results as strong arguments in favour of a post-lactation slaughtering, suggesting a husbandry practice geared toward dairy production (Gourichon and Helmer 2008: 439f.).[7]

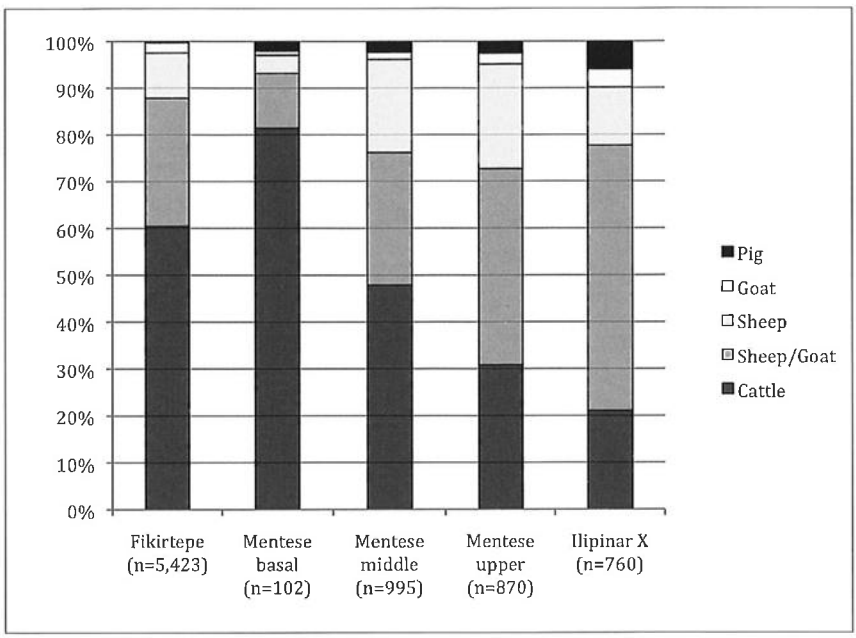

Figure 4. Domestic animal bone distribution in Late Neolithic NW Anatolia (data after Gourichon and Helmer 2008; Buitenhuis 1995: 155f.).

Preliminary results

In order to buttress the recent work done in the field of Neolithic dairying, during the 2009 excavation season at Barcın Höyük we started to sample a good quantity of Late Neolithic pottery to use in an extensive residue programme. In view of the temporal and material culture correspondences with Menteşe, we expect Barcın to yield similar results in animal husbandry and dairy production.

For the current project we have now processed 137 sherds from Barcın, covering the 2nd and 3rd stage of the local Late Neolithic sequence, which can be dated to the 63rd–61st centuries cal BC.[8] The extracted organic residues that were preserved in the porous matrix of potsherds are mainly lipids and their degradation products. The important biomarkers in the extracted organic residues are detected and identified by High Temperature Gas Chromatography (HTGC) and High Temperature Gas Chromatography-Mass Spectrometry (HTGC-MS). The possible origin of the extracted lipids and their degradation product especially from animals can be assigned by determining the stable carbon isotope ratios ($\delta^{13}C$) of palmitic and stearic fatty acids by Gas Chromatography-Combustion-Isotope Ratio Mass Spectrometry (GC-C-IRMA). The probability of finding organic residue in ancient pottery is only about 20–25%. A considerable number of potsherds have to be analyzed in order to obtain statistically meaningful

results. Barcın Höyük sherds were no exception and out of 137 samples 33 (24%) yielded enough organic residue from which stable carbon isotope ratios could be determined (Figure 5). All of the extracted organic residues were of animal origin and similar to previous data reported by Türkekul Bıyık and Özbal (2008) as well as by Evershed et al. (2008). 18 of them (55%) were milk lipids. 11 (33%) samples yielded lipid residues that originate from the adipose fat tissues of ruminant animals. Only 4 (12%) samples were porcine adipose fat. The result complements the faunal analysis where the majority of the bones were cattle and sheep. There is no evidence for domesticated pig in Barcın, although excavations did recover some wild boars.

These results clearly indicate that dairying was an important component of the Barcın diet. The results, however, do not provide insight as to whether the Barcın farmers could consume raw milk. The DNA analysis of Neolithic human bone samples to determine if they contained the necessary mutation for lactose tolerance is still not conclusive. However, we can safely claim that Barcın people were consuming milk as a secondary product in the form of, possibly, yoghurt, cheese and maybe even butter. It is well established that no milk lipid residues survive in pottery used only for storage. A thermal process of heating the milk to about boiling temperature as known from yoghurt or cheese production is necessary for lipids to impregnate into the fine pores of pottery. Such lipid samples were protected from the degradation by microbial activity or environmental factors.

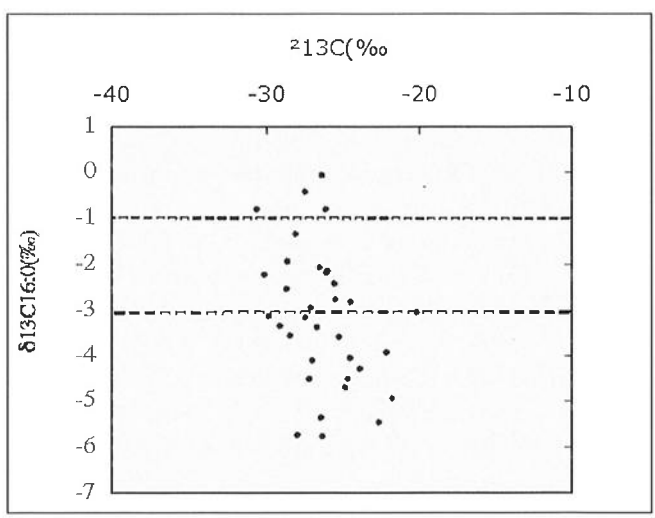

Figure 5. Barcın Höyük 2009 season sherd samples yielding organic residues (n=33). Circled are the samples with milk lipids.

The organic residue samples link up with four out of ten basic-level pottery categories distinguished at Barcın Höyük so far (Table 1; Figure 6).

Basic-level categories	Milk fat residues	Ruminant adipose fats	Porcine adipose fats
Cups	2	1	0
Deep Bowls	3	1	1
Oval Bowls	2	1	0
Pots	11	8	3
Total	18	11	4

Table 1. Barcın Höyük 2009 season organic residue *vs.* Late Neolithic pottery categories.

As expected, given its dominance in the Barcın Höyük ceramic assemblage, the basic-level category of Pots is central among all three groups as well. Within Pots, the various subordinate-level categories (e.g., S-shaped pots and holemouth pots) are equally represented. Both pots with two horizontal lugs and pots with four suspension knobs are present in the milk and ruminant fat groups. Remarkable is the presence of the basic-level category of Cups (diameters between 10–12 cm), occurring both in the milk fat

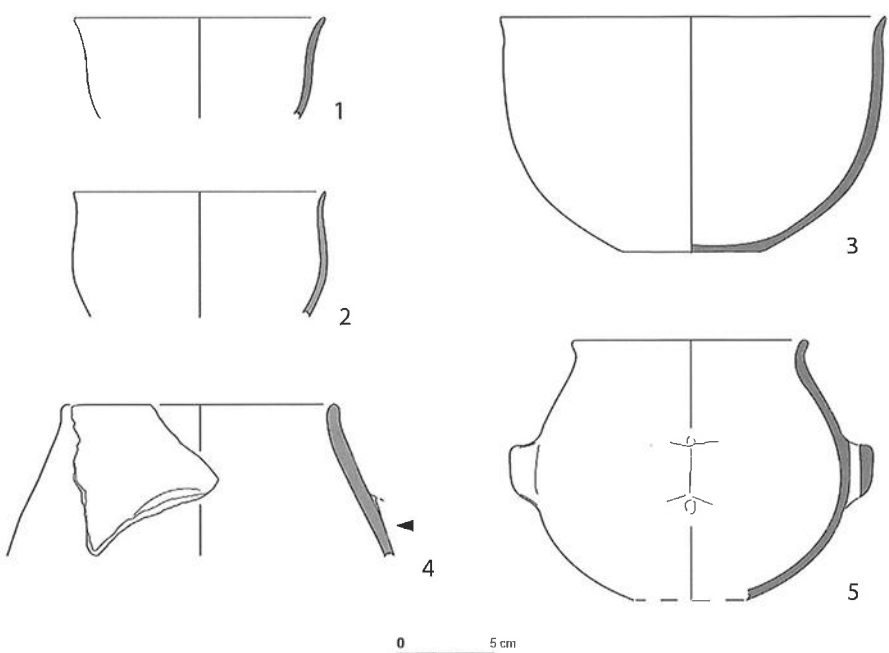

Figure 6. Barcın Höyük selected Late Neolithic pottery categories. 1, 2 Cups; 3 Oval/Deep bowl; 4 Two-lugged pot; 5 Four-lugged pot.

and in the ruminant fat groups. While by their shapes and proportions these "cups" suggest to have been used for drinking, we might want to reconsider their function, now that they are clearly linked up with both milk and ruminant fat residues. Deep bowls occur in all three fat groups, and Oval bowls in two, and they might well have been used for cooking as well, as seems confirmed by bowl bases with sooty deposits on the insides occurring in the Barcın Höyük pottery studied so far. Absent are larger pots with sturdy tubular lugs, but with similar profiles as the normal pots. Also the well-known decorated "Boxes"did not yield any residues.

Outlook

Milk is a reality in the Neolithic of Turkey, and especially in the first farming sites in the Marmara and South Marmara region. It is, however, difficult to rationalize the earliest domestication of cattle and extensive dairying in the settlements of Northwestern Anatolia at this time. Since the regional distribution of residue analysis data is so limited, at present one cannot confidently say whether the extensive dairying of Northwestern Anatolia was part of a broader development or whether this was something initially restricted to this geography. The data do indicate that the Marmara region must have played an instrumental role in dairying, and it might have played such a role in the migration of domesticated cattle to the Balkans exactly because of dairying. Dairying must have had a considerable impact upon society and should probably make us rethink how we conceptualize the Neolithic in the Near East. Since it is also related to the neolithisation of NW Turkey, and since dairying evidence is found in the early levels of early pottery-bearing sites in the Balkans, dairying and human–animal relationships may have been a major force in transmitting ideas and concepts from the Near East to Europe.

The discussion above also aimed to demonstrate that milk processing and dairying are almost by necessity linked with high-level, technologically sophisticated pottery. It is only once new tools had been developed that serious headway could be made in exploiting animals for their milk, and in processing it in palatable foodstuffs that were simultaneously preservable and digestible. The picture gained from these preliminary results is perhaps that at Late Neolithic Barcın Höyük pottery with milk fat residue covers a whole range of vessel types, suggesting that either users were not very particular about specific vessels for milk processing, or rather that milk processing involved a sophisticated technology linked to specific vessel categories and dependent on the dairy produce required. Put otherwise: vessel diversification was partly due to a high-level dairy practice in the late 7th millennium cal BC Marmara region.

Notes

1. The chemical part of the project is carried out by the Archaeometry section of Boğaziçi University, and is being supervised by HÖ and ATB; LT is responsible for the archaeological part, including the sample selection. This project is being sponsored by TüBITAK, the Turkish Science Foundation and

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2. Handle zones are good markers of specific vessel categories in the NW Anatolian Neolithic, and are equal in diagnostic potential to rim profiles (cf. for the idea of diagnostic handle zones, Thissen 2001: 3f.).

3. Boundaries are blurred, but a marking point could be set at about Çatalhöyük Levels VII/VI, *c.* 6,600 cal BC. Timing the VI–V shift is only recently resolved quite well (Bayliss and Farid *apud* Bronk Ramsey et al. 2009: 337–340). Commenting upon a series of ^{14}C dates they reach an approximate date for Çatal building 1 being occupied between the latter part of the 66th and the 65th centuries cal BC. The associated ceramics, including those from Building 5 are characteristic for Levels VI–V. Since we assume a knowledge transference concerning pottery making towards the NW, the new Çatal data also provide a good *terminus post quem* for the adoption of the Neolithic life style in NW Anatolia (Thissen 1999). Such a scenario conforms well to the available ^{14}C evidence from the Northwest, where the oldest data from Menteşe suggest settlement during the turn of the 65th/64th C cal BC.

4. Compare the experiment carried out by the Leiden Pottery Department in Romania (van As et al. 2005).

5. Simmering being the technique of cooking food in hot liquids at or just below 100°C.

6. Phillipa Ryan, unpublished paper read at *The 8.2 ka climate event and archaeology in the Ancient Near East* workshop, Leiden, March 19, 2010.

7. Similar patterns have possibly been at work in the contemporary animal bone assemblage of Barcın Höyük (p.c. Alfred Galik, Aug. 2010).

8. Barcın Höyük ^{14}C dates confirm contemporaneity with Menteşe, but largely predate the beginning of settlement at Ilıpınar (Özbal and Gerritsen, *in press*).

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University of Amsterdam

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Working Group on Mesopotamian Pottery:

- A Corpus of Mesopotamian Pottery (Second Millennium B.C.) (H. Gasche and J.A. Armstrong).

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