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Ancient Technologies of Everyday Life

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Many of the ancient technologies used to create ordinary objects for everyday life required help from all family members, young and old, men and women. The work varied seasonally between the cool rainy winters and hot summers. During the dry summer months, people built new constructions, made repairs on existing structures and walls, and produced pottery, bronze, and iron. Herbs, dried branches, and straw collected by young people in the summer were woven into mats and baskets in the autumn and winter when there was less work to do outdoors. Cleaning practices for buildings and pottery varied to meet daily and seasonal needs.

Traditional technologies and practices that persist in a handful of Near Eastern and Mediterranean societies today mirror what life was like before the availability of mechanized equipment. The technologies described here rely in part on ethnoarchaeological research—that is, the study of living people by an archaeologist who searches for answers to specific questions about ancient lifestyles. Recent rural communities, where people made what they needed from local raw materials, can provide evidence of how ancient people lived and worked in similar preindustrial settings. This is especially true for how ancient clay pots were made, used, and cleaned. Because all pottery cracks easily, broken sherds are a prominent find at most archaeological sites. Broken pots that could not be mended were replaced. Because household pottery typically broke after a few months (although some pieces might last three to five years), gradual changes in their shape and surface treatment result in useful indicators of chronological and social changes. A pottery tradition might be stable for decades until subtle or more obvious alterations occur.

Ceramics

Clay pots were the primary containers for cooking, processing, and storing foods. Potters working in the courtyards of their homes, in workshops, and in factory settings (fig. 58.1) made cookware, bowls, plates, jugs, jars, incense burners, stands, decorative pieces, and

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Fig. 58.1. A traditional potter in her courtyard works on a series of ovens in different stages of manufacture. The lower body is wrapped with strips of cloth to support the wet clay (left rear). After adding a flue, and the initially flat base is scraped into a rounded form, finished ovens stand upside down to dry. The oven is set on its side and encased in bricks and mud for use. (Agios Demetrios [Morathassa], Cyprus, May 2000)

more. The porous pottery had surfaces that were plain, incised, or painted in various patterns. Glazed ceramics were not used until early medieval times.

Clay Procurement and Preparation

The methods that traditional potters use to make pottery and prepare clay manually are comparable to the techniques of ancient potters. For example, traditional potters in Cyprus, an island in the eastern Mediterranean, produce jugs, jars, cooking pots, goat-milking pots, and so forth that resemble ancient forms in their manufacture, shape, and unglazed finish (London 2000; 2016, 53, figs. 4.4, 4.41, 17.1.1–3, 17.2.1–2, 19.3.4–7; London, Egoumenidou, and Karageorghis 1989). Cypriot potters work for six months, from April or May, after the rainy time of year. The work begins with digging locally available clay with a pick or axe.

Clay transported in baskets was spread on the ground in order to dry in the sun and to loosen the largest rocks that had been dug up with it. People pulled out the big rocks before the rest was pounded or trampled into powder. Children could trample it by foot, or men and women pounded it with the aid of a bent tree branch (figs. 58.2a, 58.2b). Until the 1960s, the clay was piled in the street to allow people and carts to crush it as they passed by.

With a basket or a piece of leather punctured with many small holes, potters sifted the powder before mixing it with water. Sometimes they altered the clay by combining it with another clay in order to benefit from the properties of each. An alternative was to add pulverized rocks, fired pottery (grog), or organic materials, such as fine chaff, straw, or dung. The additives ("grits" or tempering material) enhanced the quality of the clay. Organic material created a plastic, pliable clay body. Crushed calcite added

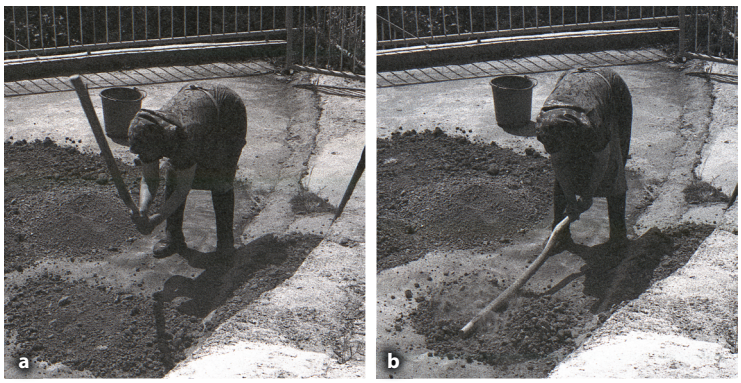


Photo by Gloria London.

Fig. 58.2. People took turns pounding clay with a bent tree branch. They would swing it over their head before crashing it down on the clay. (Agios Demetrios [Marathassa], Cyprus, May 2000)

to cookware made pots that could withstand repeated heating. Grog was the preferred additive for painted wares. Unlike the rock additives, grog absorbed the paint, which enhanced its adhesion to the pot wall.

Manufacturing Techniques

Ancient handmade pots were made in the coiling, pinching, molds, slab, or turning techniques. Later, especially after the seventh century BCE, pots were thrown on a wheel. Handmade ceramics continued to be produced despite the availability of wheel-thrown pots, even until the twentieth century. The coarse handmade jugs, cookware, large jars and basins, served different purposes than wheel-thrown pottery.

Based on observations of traditional potters, we see that the process of making each pot involved an interrupted technique of manufacture that spanned several days or longer. First a potter placed a cylinder of clay on a turntable or work surface, known as a "bat," which was made of stone, bark, wood, or an old basket or mat. With a thumb, knuckle, and fist she opened a hole in the cylinder and enlarged it to create a bowl-like form. To heighten the wall she added coils (fig. 58.3). After applying each coil, the potter thinned and smoothed it so that no trace of the join remained. Afterward the pot dried slightly, for minutes, hours, or overnight, before it could support the weight of more coils, handles, and any additional work, such as thinning the lower body.

Once the handle(s) dried minimally, attention shifted to the flat base. The potter "turned" or scraped it into a rounded bottom. Pots with sharp wall-base angles are harder to shape. They crack more easily than rounded bases. Large stationary containers with rounded bases were embedded into the beaten earth floors and stood without problem. A large stationary jar can remain serviceable for decades or more than a century.

Large open platters and many round-bottomed pots initially were often shaped with the help of a mold. A coil or slab of clay was arranged in or on an old bowl that served as a mold. Small bowls, no larger than the palm, were made from a ball of clay as a pinch pot. A hole made in the clay was enlarged by pinching the clay between the fingers to create the bowl. Large jars, vats, and storage closets were built with rectangular slabs of clay, about the size of a hand, stacked edge to edge, on top of one another. The ancient oven, or *tabun* (plural *tawabin*), was made with slabs (Ebeling 2014).

Pots made of coils could be built with the aid of a slow-moving wooden or stone turntable that lacked momentum. It stopped rotating unless pressure was applied constantly, usually by hand and less often by foot. In contrast, pottery thrown on a fast, heavy wheel, capable of momentum, freed both hands to shape the clay as the feet kicked the wheel. To throw small bowls, lamps, cups, and juglets, potters centered a tall cone of clay on the wheel and shaped one piece after another from it. The potter used a pointed tool or piece of string to cut off each pot from the cone. Potters working

Kornos Pottery Cooperative. Photo by Gloria London.

Fig. 58.3. Eleni, a traditional potter in Cyprus, rolls a coil in the air to attach to the pot under construction. Anthoulla scrapes away excess clay to make a round-bottomed pot. (September 1999)

with coils, molds, or a fast wheel can shape hundreds of pots per week.

Firing

To fire the fragile raw pots—either in pits lined and covered with dung or stacked in kilns with separate fuel boxes—was always risky, especially if the pots, kiln, and fuel were not fully dry. Clay pots harden if fired minimally to 600 degrees centigrade.

In Cyprus, the handmade pots were stacked in a kiln with a separate firebox for the fuel (fig. 58.4). Kilns had open or closed rooftops. Pots stacked in an open rooftop kiln were covered with broken pots or large sherds, roof tiles, metal sheeting, and wooden poles that burn away.

The fuel on the roof was in addition to wood placed in the firebox at a lower level, under the pots. Dark spots, or "fire clouds," resulted if pots had contact with the kiln wall or floor, which were the hottest parts of the kiln. For kilns with a closed roof, pots entered via a side door (figs. 58.5, 58.6), which was closed with a temporary door made of bricks and broken pots (fig. 58.7).

Kilns with an open roof are suitable for wheel-thrown pottery as at Zizia, an industrial production center south of Amman. The Zizia kilns are fired with plastic bottles, bags, and all types of plastic trash.

Kiln firing in Cyprus begins with a small flame before 7:00 a.m. Potters would bless the kiln with an incense burner in which dried olive leaves burned. For the huge wine jars (pithoi or sing. pithos), it was customary to bless each one before it went into the kiln and again after firing. Each huge jar took two months to construct and three days to fire. It was normal to start with a very small fire on the ground. It was outside, in front of the kiln. The purpose was to thoroughly dry the pots and kiln.

For household pottery, the kiln burned for ten to eleven hours. A small flame fueled by

Kornos Pottery Cooperative. Photo by Gloria London.

Fig. 58.4. Outside the firebox of the communal Kornos Pottery Cooperative kiln, branches burn following a smaller initial fire begun early in the morning. (1986)

Kornos Pottery Cooperative. Photo by Gloria London.

Fig. 58.5. A traditional kiln, with a permanent roof, stands empty before pots are stacked in the firing chamber. Heat generated from a firebox located on another side at a lower level will rise through the grid-like floor of the firing chamber. (September 1999)

Kornos Pottery Cooperative. Photo by Gloria London.

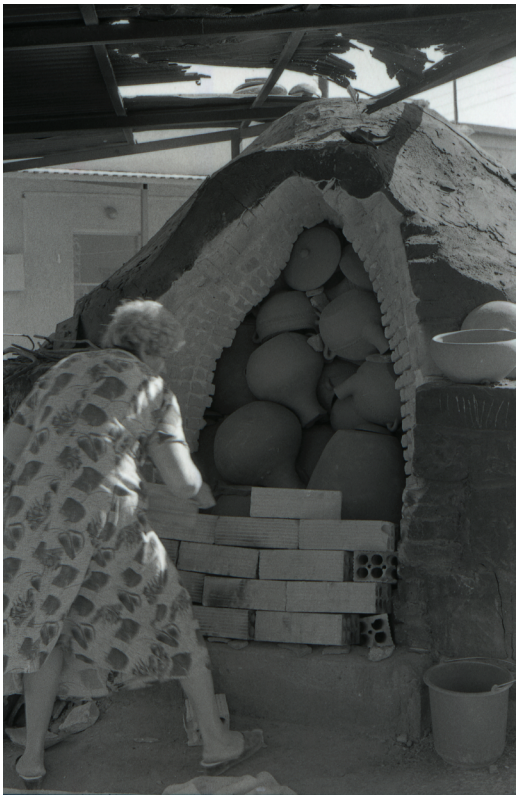
Fig. 58.6. Ovens, jars, cooking pots, and flowerpots stacked in the Cooperative kiln. Small pots fill the large pieces in order to maximize kiln space and fuel. Pots touched each other without damage. (1986)

twigs starts outside the firebox. It is moved closer to the kiln by early afternoon. Finally, wood branches and logs placed inside the fuel box resulted in huge flames by 6:00 p.m. Traditional potters burn bark, pinecones, old mats or baskets, and animal dung as fuel. Once the pots achieve the proper firing color, the remaining burning logs are pulled from the kiln and doused with water, later to be sold as charcoal. Pots, unloaded early the next morning while still hot, went directly into a cart pulled by a donkey or a truck to be sold to customers outside the village. Traditional potters in the eastern Mediterranean sold or bartered their wares at local markets or regional holiday fairs, especially in the autumn. They traded pottery for grains, beans, and other staples needed for the winter months.

Porous Unglazed Pottery

Clay jugs for carrying water were the original water coolers and purifiers. The unglazed walls kept the water cool through evaporation, in a process called "sweating," very similar to what our bodies do to keep cool. At normal room temperature and atmospheric pressure, water is out of equilibrium. It wants to evaporate. Water slowly sweats through the porous walls and evaporates from the outside surface of the pot. This process takes five times as much energy as is needed to make water boil. The sweating or leaking is highly effective in slowing down any heating of the water. Water in a plastic or metal container warms up quickly because the absorbed heat from the environment cannot escape by evaporating. It remains trapped inside the plastic or metal receptacle and then heats the water. Water stays cooler much longer in a clay jug because of this efficient evaporation mechanism for carrying away most of the absorbed heat.

As water evaporated through the pot wall, the water channeled the bitter tasting minerals to the inside pot walls. They gradually coated the interior and created a dense white deposit that clogged the pot walls. After a few months of use, jugs were no longer able to sweat and cool the water. Instead the jugs were



Kornos Pottery Cooperative. Photo by Gloria London.

Fig. 58.7. After stacking the pots, Anthoulla, a traditional potter in Cyprus, creates a temporary door from factory-made bricks. Broken bricks and large sherds minimize any shifting during the fire. (1986)

repurposed to store vinegar, oil, or cheeses held in oil or brine.

There are several methods to make traditional cooking pots watertight without the application of a glaze. Pots first were filled with water, to assure that they had no cracks, and then were filled with lard until the porous walls became fully saturated with it and impermeable. Another method involved coating vessel interiors with a mix of egg white and sugar. A combination of egg and ash was smeared on the exterior. People likely cooked meat, grains, and vegetables in very little water to minimize leakage. Boiling water could also be added at a later stage to make a soup or porridge.

Jars for fermenting and storing wine had linings made of resin and pitch collected from Aleppo pine, terebinth pistachio trees, or the Dead Sea. The resin imparted a distinct flavor to the wine. Ancient jars rarely preserve evidence of a lining. Acids in the wine normally destroyed the resin. Jars were relined regularly to keep them from leaking (London 2016, 105–8).

Architecture

Domestic and Public Structures

Ancient houses were small. The limited interior space accommodated sleeping, food storage, clothes, bedding, and at times a household shrine. The few small windows kept out the heat or the cold. The rooftop and adjacent courtyard, which were larger than the interior sleeping and storage quarters, functioned much of the year for cooking, cleaning, eating, playing, and summertime sleeping. The courtyard was repurposed seasonally for making pottery and processing food in summer, or for daily cooking and sheltering animals in fall and winter.

Temples, palaces, and official residences included open public areas where people could gather. They were also used as storage facilities. The building materials, floor, and wall surfaces were more elaborate and better finished than in regular houses.

Construction Materials

Excavated buildings were made of handmade or molded sun-dried bricks, timber, field and quarried stones, bitumen, and plaster mortar, the same raw materials known from the biblical text (Gen. 11:3). The construction material selected depended on the location and building type. The soft limestone of the coastal area and lowlands was unsatisfactory for construction. As a result, handmade bricks were shaped from the plentiful clay deposits. In contrast, the harder limestone in the central hills of ancient Israel and basalt rock in the north were used for public and private houses.

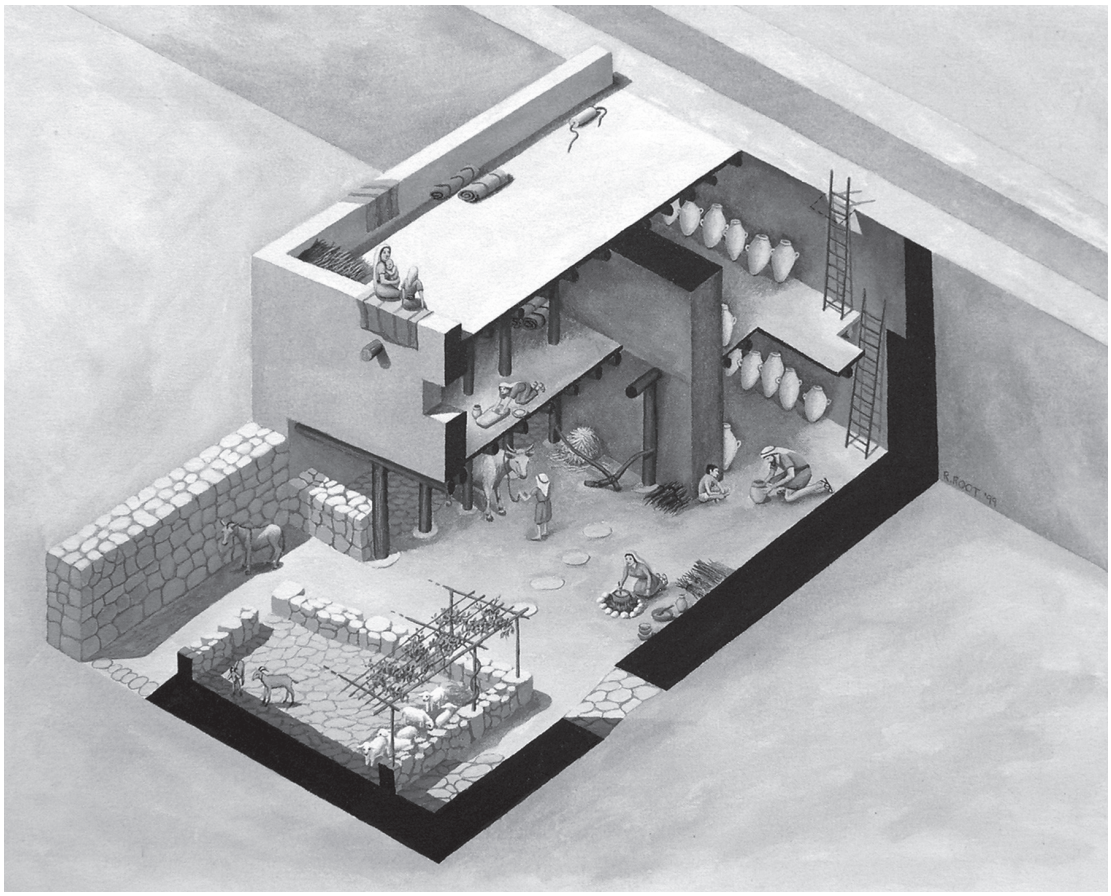


Fig. 58.8. Reconstruction of a two-story late-thirteenth-century house based on excavations at Tall al-ʿUmayri in Jordan. The structure had five rooms and measured 12 × 16 meters and was made of small stone boulders and mud bricks.

Clay bricks were incorporated into the upper walls of houses that had foundations made of stone. The stone foundation limited potential damages caused by water dripping from the roof or flowing down the hillsides in winter.

Raw, uncut fieldstones for houses contrasted to dressed, finely carved, and jointed ashlar masonry in the walls of temples or palaces. The fine masonry of ashlar stone was often limited to the exterior surface of walls that had rubble interior filler. Building and city walls were remarkably wide. The exterior walls of a two-story Late Bronze / Iron Age building at Tall al-ʿUmayri (fig. 58.8) measure 1.5 meters (Herr and Clark 2009, 77). Earthquake activity in the region might have induced people to overbuild walls, making them thicker than necessary in order to withstand powerful tremors and aftershocks.

Houses with floors of beaten earth or cobblestones contrast to the stone paving or plaster in public buildings, including temples. Limestone quarries and kilns provided the raw material for plaster. Soft limestone was crumbled in the hand and mixed with water to make ready-to-use plaster. Harder limestone was fired in a kiln. Seasonal whitewashing of walls and floors with plaster provided clean surfaces and eradicated insect infestations, according to rural residents of contemporary Cyprus. The thatch and wood rooftops, connected by mud plaster or clay, provided a constant source of dirt inside the house.

Textiles

Wool and Flax

Most clothing was made of sheep's wool (Lev. 13:47–48, 52, 59; 19:19; Isa. 51:8; Ezek. 34:3). Sheep and goat hairs were woven into wool to create bedding, sacks, and tents. The heaviest fabric for tents, made from black goat hair, was impervious to rain. Linen was a luxury woven fabric made from flax (Deut. 22:11; Prov. 31:13; Hosea 2:9). Sheepskins served as floor coverings (Judg. 6:37) or as outer clothing. Large pieces of plain or dyed fabrics that wrapped around the body provided warmth as well as a means to carry almost anything, including young children.

Wool preparation required multiple stages of work. After men sheared the animals following the winter rains, women and children washed the hair and rewashed it to remove dirt and grease. Then women and girls teased (spread out to dry) and carded (disentangled) it before it was spun. The spindle, or flywheel, was a small conical stone that fit over the end of a rod made of a long bone or a piece of wood. The yarn wrapped around the rod as it was spun.

Coloring Agents

Excavated grinding stones, of the type for crushing wheat and barley, preserve traces of crushed organic materials used to dye fabrics. It is assumed that they were coloring agents, rather than edible food, because the plants are lethal when ingested. The poisonous mullein (*Verbascum*) plant provided a light yellow-green dye. A purple or blue color came from a member of the spurge family known as turnsole (*Chrozophora tinctoria*) and from murex seashells. Red and brown colors derived from soaked pomegranate rinds. Dyes made of noxious material were also used for working leather (Crabtree 1986, 89).

Wood, bone, or stone spinning and weaving tools for yarn and thread created fabrics with the help of wooden vertical standing looms or parallel horizontal looms spread across the ground. The latter are depicted in Egyptian wall paintings and miniature models (Barber 1994, 80–81).

Basketry

Organic materials such as cloth and baskets are rarely preserved archaeologically due to the unfavorable humidity and soil conditions in the Levant. Indirect evidence of baskets and mats comes from the impressions on the bottom of clay pots worked on bats made from mats or baskets.

Materials

Dried date palm branches, rushes, reeds, grasses, twigs, bark, and pigments were collected in late spring and summer. To shape into baskets, they often required soaking prior to use. They also needed peeling, splitting, shredding, twisting, or dyeing before they were woven into open and closed forms, either colored or monochrome.

Uses of Baskets

Baskets were used to collect, harvest, serve, cook, or store food. Biblical texts refer to baskets of bread (Gen. 40:16; Exod. 29:3, 23; Lev. 8:2, 26, 31; Num. 6:15, 17, 19), grapes (Jer. 6:9), or figs (Jer. 24:1). A basket lined with tar and pitch hid the baby Moses in the Nile River (Exod. 2:3). Coatings of asphalt or bitumen from the Dead Sea created airtight baskets suitable for holding liquids. Baskets lined with pitch and filled with water were suitable for cooking food. Hot rocks dropped into a basket heated the water and cooked the food. Baskets were useful for making cheese. Until recently in rural Cyprus, milk curds, with extra salt added, were packed into an unlined, tightly woven basket and allowed to dry. It was hung outside as excess water drained from it. Then

it was boiled in the basket and again dried for several days before it was ready to eat.

Basketry was made into homes for small animals, clothing and shoes, household furniture, pot stands, brooms, or decorations. Babies, fuel, and raw clay likely were transported in baskets attached to people or animals as in traditional Mediterranean societies until the twentieth century. With woven flat baskets women could separate chaff from grains and seeds or rocks from raw clay.

Cleaning and Fumigation Practices

In a region of limited water resources, people relied on natural cleaning abrasives and antiseptics for houses, pots, textiles, and more. The Bible refers to *neter*—possibly a mix of natron (salt) with lye (*borit*)—as a general cleaning agent (Jer. 2:22).

Buildings

One method to keep house interiors clean in traditional Mediterranean societies was to sprinkle salt on rooftops. This practice prevented weeds from sprouting in the earth and mud-plaster mortar that held the roof beams and thatch together. The annual plaster whitewashing of floors and walls served a similar purpose. Texts refer to cleaning houses, contaminated with illness, by scraping and entirely removing the stones, mortar, and plaster (Lev. 14:40–44).

Fumigation and Insecticide

Organic materials widely used in traditional Mediterranean societies until recently were likely available in antiquity. Burned sage (*Salvia* sp.) leaves are useful for fumigating buildings and other structures. Natural insecticides were made from the poisonous juices of the oleander tree (*Nerium*) and larkspur (*Delphinium*) in central Jordan until the late twentieth century. To deodorize beaten earthen floors, people in the Madaba Plains area of Jordan collected and crushed edible savory (*Thymus*) and sweet clover (*Melilotus*) (Crabtree 1986, 80, 91–93).

Pottery

The scarcity of water made cleaning the unglazed pottery problematic. The porous walls absorbed the foods held or cooked in the pots. Roman era recipes specifically mention the need to clean clay pots (Bober 1999, 158). A medieval physician, Marwan Abd al-Malik ibn Zuhr (d. 1162), who believed that illness could result from food trapped in cookware, wrote that unglazed pots should be discarded after a single use! He concluded that glazed cookware could be used safely five times only (Zaouali 2007, 49).

Sand and water, with or without herbs, were suitable to scrub out any visible food stuck on pot interiors. The problem was that meat or dairy protein embedded in the pot walls could not be removed in this way. If allowed to accumulate, the residue would sour or spoil fresh foods. Unglazed pottery required daily and seasonal deep cleanings. Vinegar diluted with water and left standing in an unglazed cooking pot overnight could eliminate food residue. After the liquid was discarded the next morning and rinsed with water, the clean pot was ready for use.

Porous, unglazed clay pots also required periodic deep cleansing, especially those pots for processing dairy foods such as yogurt, milk, butter, and cheese. At the end of the goat-milking season, before the jugs, jars, and pots were stored away they were refired in a kiln to remove the residue embedded in the porous walls. If no kiln was available, the dirty pots were placed in a hot oven overnight in order to burn out whatever fats and protein remained.

Several plants in the mint family, known as effective for cleansing unhealthy skin (Lev. 14:4), provided convenient materials to clean handmade pottery. The antibacterial properties of thyme, a member of the mint

family, provide old-fashioned disinfectants, antiseptics, and fungicides. Thyme contains a carbolic acid comparable to alcohol, but more acidic. Until the mid-twentieth century, Cypriot goat herders would swish a branch of dried or fresh thyme in a little water to clean clay milking pots daily. At the end of the summer, they refired the pots in a kiln for a deep cleansing.

The biblical kosher dietary laws hint at the problems in cleaning absorbent ceramic cookware. It is stated, "You shall not boil a kid in its mother's milk" (Exod. 23:19; 34:26; Deut. 14:21). If this implies that meat cannot be cooked in a pot used for milk, it acknowledges that dairy protein embedded in pot walls causes meat to sour. Before glazed cookware became common, it was dangerous to cook meat in a pot that once held milk. Instead, specific pots for milking, heating, fermenting, and storing dairy products differed from those reserved to cook meat (London 2016, 138–41).