

Chapter 2

Theoretical approaches to the origins of pottery

Over the last 20 years, the issue of the origins of pottery has been analysed by a number of researchers, both from the perspective of archaeology and that of cultural anthropology. As a result, many theories explaining the above-mentioned issue have been proposed, alongside general theoretical approaches used in studies on pottery. The emergence of pottery has been considered both in the context of ecology/environment, and economic or social organisation/life, or even symbolic/ritual behaviours. In ecological approaches, pottery is seen as a tool that helped people adapt to the environment. Such an approach is most visible in the ceramic theory proposed by D.E. Arnold (1989). Importantly, Arnold did not focus on the emergence of pottery per se, but rather on the processes/factors which favoured or hindered pottery production and its further evolution (Arnold, 1989: 19). An economic approach to the origin of pottery was proposed by J.A. Brown (1989), who treated both its invention and its further innovation as a product of new demand. P. Jordan and M. Zvelebil, who studied pottery adaptation by prehistoric Eurasian hunter-gatherers, proposed to consider early pottery production as a social practice or part of the social life of past societies (Jordan & Zvelebil, 2010: 34). In their deliberations, they concentrated both on the issue of the invention of pottery and on the later spread of this new technology. The placement of early pottery production among the symbolic/ritual behaviours of past societies is prominently featured in the works of B. Hayden (1995). Early pottery is considered by Hayden as a prestige technology, while its emergence is linked to the need for demonstrating health, power or control over labour and resources by aggrandising individuals.

General theories on the origins of pottery are accompanied by models aimed at explaining a specific case of the emergence of pottery, defined in time and space. While they have been created and tested on the basis of specific data, they may be helpful in understanding the origins of pottery in other contexts as well. Particularly worthy of attention are studies by J. Eerkens, addressing the issue of relations between pottery production and a mobile way of life, covering prehistoric groups that occupied the Mojave Desert and the North American Great Basin in the United States (Eerkens, 2001; 2008). Another valuable contribution are general remarks by K. Gibbs (2012) on the disposable character of pottery among mobile groups.

2.1. Ceramic theory

The ceramic theory proposed by Arnold (1989) is based on two theoretical approaches - the systems paradigm and the culture ecological approach. In the view of Arnold, although pottery is part of the material culture, it is also closely related to the environment. It belongs in the techno-economic subsystem and, as a highly specialised part of this subsystem, it is involved in the process of adaptation to (or even modification of) the environment. For Arnold, the relationships between pottery, environment and culture should be viewed as processes that contributed to the emergence of pottery and its subsequent development. On this basis, he proposed general models based on ethnographic observations that may be used in archaeological studies on the pottery of past societies. The factors/processes that influenced the emergence and development of pottery production identified by Arnold are related to the environment and to culture understood as a system. They include raw material resources, weather and climate, possible scheduling conflicts, the degree of sedentariness, demand, human-land relationships and technological innovations.

According to Arnold, raw material resources are one of the more important factors in this regard. Their analyses should include the quality and availability of materials used in pottery making, such as clay, tempers, slips, as well as the firing fuel and water necessary for the production process. An attempt at determining the distance to raw material sources should also be made, as this particular factor has an effect on material choices and, thus, on the entire pottery making process.

Other important environmental factors are weather and climate. Temperature, humidity, wind, and rain had a tangible effect on pottery production, including, in particular, drying and firing processes. Excessively low temperatures, high humidity and frequent precipitation could make it difficult or impossible to properly dry vessels before firing. The same factors could also have had an adverse effect on firing itself, particularly in open fireplaces, but also in ovens.

A factor related to both the environment and culture – as seen by Arnold – is the scheduling conflict between pottery production and other activities, especial-

ly those linked to food procurement or production. Such a situation could have taken place when the weather allowed for subsistence activities and pottery production to take place simultaneously. Under such circumstances, the involvement of some people in making pots may have adversely affected the amount of food procured or produced, and thus on food reserves available for the entire group.

The emergence and production of pottery may have been related to the lifestyle of a given community. In the traditional culture-historical approach, pottery is generally linked, first of all, to farming communities and to sedentism. A mobile way of life was a factor that rendered pottery making impossible. However, as part of ceramic theory, Arnold considers mobility merely as an impeding factor that was in conflict with technological requirements, such as access to raw materials or the time necessary for the process, including, in particular, adequate vessel drying before firing.

The demand for ceramic containers was an important cultural factor that had an effect on pottery production and its development as such production is closely related to the need for containers of this kind in a given community. Such needs may have been determined by the utilitarian functions of pottery, by the way pottery was used (which, in turn, determined the breakage rate), by population growth, or even by symbolic behaviours. The common use of pottery for food processing purposes by past societies contributed to the prevalence of culinary hypotheses in explaining the origins of pottery in farming communities. The new type of containers is generally believed to have been used for processing a new type of food.

The last two factors indicated by Arnold are linked to the development of pottery production and growing specialisation. Human-land relationships are best visible when a population exceeds the land's ability to sustain it and moves on to other occupations, for instance to pottery making. Population pressure produced in such a situation may have led to specialisations in many activities, including pottery production. The last distinguished factor that largely affected the overall pottery making strategy are technological innovations that increased the speed and efficiency of production and were thus conducive to population growth. Improvements introduced at the stage of forming, drying or firing could limit negative impacts and improve production efficiency, thus positively affecting the quality and quantity of the pottery produced. As a result, all of these changes fostered the formation of pottery specialists in the community.

2.2. An economic approach to the origins of pottery

In the opinion of Brown, "the adoption of pottery as a container form has been a response to conditions in which the rising demand for watertight, fire-resistant containers is coupled with constraints in meeting this demand" (Brown,

1989: 213). In his approach, this demand was a response to social, economic and environmental changes. The emerging demand for a new type of containers may have been caused by population growth, changes in subsistence strategies, food processing, storage or even serving. Brown (1989: 216) is of the view that clay vessels had a number of advantages over other containers (such as baskets) and could thus better respond to the newly created demand. Although pottery production is considered to be one of the more challenging technologies, owing to its flexible character and possible ‘stop-and-start’ operation, it could be adapted to existing work patterns. As a result, scheduling conflicts with other activities could be avoided. Brown additionally drew attention to the low cost of pottery making, in terms of both raw materials and human involvement. In Brown’s opinion, multi-stage pottery production made it possible to reduce the overall production time and increase output by introducing technological innovations in the process of forming, drying and firing. Employing the term ‘the economy of scale’, in Brown’s approach, pottery is the only industry that could respond to the growing need for all-purpose containers without increasing the necessary time or workload (Brown, 1989: 219). While in the case of basketry the production time grows in line with the number of baskets produced, an increase in the number of ceramic vessels does not necessarily require a correspondingly greater amount of time.

According to Brown, the emergence of pottery production should be linked to trends towards sedentism that existed in past societies, which eventually increased the range of food sources available. New processing needs for new food, including, in particular, small-sized plant foods and grains, created a greater demand for new containers, or pottery. In Brown’s view, only pottery production was capable of meeting such demands owing to its low cost and flexible production process compared with other container-making technologies.

2.3. Pottery technology as a social tradition

Jordan and Zvelebil (2010) see pottery as a cultural tradition whose role extends beyond that of an “adaptive tool”. In this approach, a pottery tradition is part of social life and consists of a set of technological practices forming the entire production sequence, from collecting raw materials over to firing them into a durable vessel. The dispersal of pottery and its adaptation into the life of past societies may have been linked to processes of transmission, learning, invention, creation or inheritance. The incorporation of a pottery tradition into the life of past societies was gradual and occurred at various intervals and in a variety of ways. In this approach, the character of a pottery tradition is dynamic, since once introduced it may have been passed between generations and communities, which resulted in innovations and transformations. Furthermore, its introduction also modified traditions and practices that existed previously.

The emerging hunter-gatherer ceramic dispersal model proposed by Jordan and Zvelebil was originally developed with Eurasian groups in mind (Jordan & Zvelebil, 2010: fig. 1.4). However, it may also be useful in the case of research on the origin and adaptation of pottery in other parts of the world. This refers both to situations in which pottery was first introduced and adapted, and to those in which it was further dispersed. The model proposed by Jordan and Zvelebil focuses on the causes and consequences of pottery's emergence (Jordan & Zvelebil, 2010: 72-74). In their opinion, the introduction and adaptation of pottery may be attributable to the practical benefits offered by the new technology of making food containers. However, the earliest pottery may have also had a social or symbolic value. As an element of social practice, it may have denoted the status or prestige of its producer, user or owner. It could also express the social identity of an entire society. Another element of the model in question are the consequences caused by the introduction of pottery into the social structure. The use of clay containers may have involved an improvement in the quality and quantity of one's diet and the greater security of food reserves. As a matter of consequence, it may have had a significant impact on the entire community, in terms of its health, size and survival rates.

In addition, Jordan and Zvelebil identified four key stages in their pottery introduction and dispersal model (Jordan & Zvelebil, 2010: 72-74). At the first stage (*experimentation*), pottery was a new tradition, gradually introduced into everyday practice, alongside other container-making technologies. At this stage, pottery is likely to have been a minor practice, additionally used for ritual or symbolic purposes. The second stage (*intensification*) involved the development of pottery production. The main characteristics of this stage include technological improvements and greater practical use of pottery. Pottery production was a cheap and efficient method of making vessels used for food storage and processing. At the third stage (*integration*), the role of pottery vessels extended beyond having a utilitarian function, as they became permanently present in the social practices of past societies, often related to their social identity and status. This is how ceramic containers gained a social and symbolic function. At the fourth stage (*dispersal and differentiation*), pottery spread outside its core area. It may have become a prestige technology and may have been even used as gifts. Furthermore, this stage could see further improvements and changes in this technology.

2.4. Early pottery as a prestige technology

In the view of Hayden (1995), early pottery needs to be considered as a prestige technology that was used to denote one's wealth, and power or control over labour and resources. Its advent was linked to the emergence of economically based competition caused by socioeconomic inequalities among hunter-gatherers. Social changes were connected with the intensification of food resources and modi-

fications in securing access to them. Ceramic vessels would have been used for containing special foods in competitive prestige display events. As a novelty, clay vessels were perfectly suitable for this purpose owing to their physical properties. The very process of fire-induced transition from a soft raw material to a hard vessel coupled with the use of surface treatments or decoration patterns may have largely contributed to building the image of pottery as a prestige technology. Hayden additionally draws attention to the particular character of the entire production process that was labour-intensive and required specialist skills and knowledge (Hayden, 1995: 261).

As seen by Hayden, a prestige technology may have evolved towards a practical technology owing to improvements that saved workload and processing time (Hayden, 1995: 262). As a result of technological innovations, pottery may have lost its symbolic function, becoming a practical utensil used for cooking or storage of food. Furthermore, as a result of the spread of pottery technology, clay vessels may have been readily adapted as practical items in those socioeconomic systems where the need for rivalry or demonstrating one's position was non-existent. In 1999, P. Rice presented a very detailed overview of the studies on the origins of pottery. She also compared a number of cultures where early pottery had appeared. The analysis of contexts in which pottery had emerged and the character of early pottery, including its technology and function, inspired her to follow the theory first proposed by Hayden, which – in Rice's view – explains the emergence of pottery among other forms of containers (Rice, 1999: 44-45). Indeed, Rice identified two stages of early ceramic production: "subceramic" (figurines) or "softceramic" (containers made without firing) that preceded the production of high-fired vessels. In her opinion, both stages suggest that pottery production should be seen as a prestige technology. The early non-container forms may have served ritual functions. Furthermore, according to Rice, early ceramic containers seem to have been more useful as serving vessels rather than as cooking or storage vessels (Rice, 1999: 45). Since early pottery containers appeared in archaeological contexts of rich, diverse, tropical/subtropical and riverine/coastal locations inhabited by complex hunter-gatherer communities, their use as prestigious objects is consistent with Hayden's theory. In this theory, the emergence of pottery is combined with the intensification of food resources and asserts a transition from generalised to complex hunter-gatherers with unequal access to food resources and differences between various social roles.

2.5. Pottery and mobility

The relationship between pottery and mobility has been analysed by Eerkens (2001; 2008). While his interests focused on prehistoric groups occupying the Mojave Desert and the North American Great Basin in the United States, the

theoretical model developed as part of his research can be also useful in analysing materials from other regions, such as north-eastern Africa (see Riemer, 2011 regarding the Sheikh Muftah cultural unit). Eerkens identified five main problems entailed by pottery making that had to be faced and solved by mobile or pastoral communities before pottery production could be successfully commenced.

The first of these problems is the weight of clay vessels – an aspect of particular importance for groups that were constantly on the move. In this case, even the use of pack animals did not solve the problem due to the increase in energy required for transport compared with containers made of organic materials, such as baskets or skin pouches. Moreover, the fragility of pottery and the ensuing high breakage rates during movement did not favour – according to Eerkens – the production and use of clay vessels by mobile societies (Eerkens, 2008: 309).

In the view of Eerkens, one of the more important factors in the context of the ‘mismatch’ between mobility and pottery making could be a group’s inability to stay in one location for a time sufficient to complete the entire pottery-making process, from clay collection through to firing (Eerkens, 2001: 7-8; 2008: 309-310). However, Eerkens additionally consulted the results of certain ethnographic studies that indicate a rather broad pottery-making timeframe, namely that the time from raw material collection to the first use of a vessel would vary from 2 or 3 days, on the one hand, to a few months, on the other. If the production process was simple and well organised, and if environmental conditions were favourable (dry and warm climate), then probably the entire process could be relatively short and would not affect the group’s mobility.

Another obstacle to pottery making by mobile groups may have been scheduling conflicts with other activities, including, in particular, gathering. The dry and warm seasons that made vessel forming and firing easier also offered an abundance of nuts and berries, gathered and stored as an important part of people’s food supply (Eerkens, 2008: 310). Thus, making pottery and gathering food at the same time may have had an adverse effect on the quantity of stocked supplies.

Pottery production may have also been limited in, or rejected by mobile groups due to little or no demand for it. Here, Eerkens follows Brown (1989) and his economy of scale approach (Eerkens, 2001: 8; 2008: 310). In his view pottery production could be ‘profitable’ only if the number of manufactured vessels was adequately high, given the necessary ‘fixed costs’ (raw material, energy and time). If only a small number of containers were required, they could be made using another technology (such as basketry) that was both simpler and ‘cheaper’.

Despite problems with, and conflicts existing between a mobile way of life and pottery making, both archaeological and ethnographic data indicate the presence of clay vessels among certain mobile groups. According to Eerkens, pottery could have been successfully made if the problems discussed above had been solved

and if pottery production had been modified so as to fit a group's mobile lifestyle (Eerkens, 2008: 313). One possible solution was caching pots, which helped avoid the problem of the weight and fragility of ceramic containers during transport. Caching pots could be left in locations used as fixed stopover places on regular routes travelled by mobile groups, ensuring relatively stable and predictable water and food resources. The problem of time necessary to make and fire vessels may have been solved by modifying the travelling routine – the group would either stay a little longer on the production site or return to it more often. However, Eerkens drew attention to the fact that both caching pots and changes in travelling routines eventually tethered people to certain locations and permanently modified their way of life (Eerkens, 2008: 316-317). He also remarks that once pottery had begun to be used by mobile groups (after the aforementioned problems had been solved), pottery production would have been continued and would no longer have been affected by the mobile way of life (Eerkens, 2008: 319).

The mismatch between pottery production and mobility has also been analysed by K. Gibbs (2012). In his opinion, in some contexts the existing conflict could have been solved by making pottery with a short use-life, or simply disposable pottery. Such an approach to pottery production supposedly had an effect on the entire production process, as it was not aimed at ensuring durability or longevity of ceramic vessels. Hence, vessels could be made even during cold and humid periods while the production process itself could be short, with little preparation of raw materials and no special tools. Likewise, the drying and firing processes could be reduced to the bare minimum. The outcome would be 'ugly' low-fired pots, discarded after use rather than transported to the next stopover. While the proposal formulated by Gibbs may be seen as yet another attempt at finding common ground for pottery production and a mobile lifestyle, Gibbs himself drew attention to the problem of the identifiability of disposable pottery in the archaeological evidence (Gibbs, 2012: 88). Although its function and short-use life may have been obvious to their makers and users, our ability to determine such functions merely on the basis of technological features and archaeological contexts seems rather limited.

2.6. The theoretical approach and method of the study

As pottery first appeared in, and was adapted to a variety of cultural contexts, there is no general theory or single method to explain this phenomenon. Moreover, the multitude of reasons why clay vessels began to be used does not make the researcher's task any easier. Each of the approaches presented above has its advantages and disadvantages. Although they address the same problem and take into account the same or similar elements (i.e. environment, subsistence pattern, a way of life), in each of them the origin of pottery is explained from the per-

spective of only one key element. For Arnold (1989), pottery is a way of human adaptation to, and a modification of the environment. For Brown (1989), however, the main reason for the emergence of pottery is demand, caused by new food resources, new subsistence strategies and new ways of life. Jordan and Zvelebil (2010), on the other hand, treat pottery as a social practice introduced for its practical benefits or symbolic values. Finally, as Hayden (1995) sees it, early pottery should be treated only as a prestige technology, although its introduction could also be connected with changes taking place in the environment (and thus in subsistence strategies).

The choice of the research method for this study depends on the character of the available archaeological evidence. The scientific value of existing data on Lower Egyptian Neolithic pottery varies considerably. The pottery from the excavations of G. Caton-Thompson and E. Gardner in the Fayum Depression underwent a typical early-20th-century selection process. Although the latest analyses of Fayumian pottery by J. Emmitt are very valuable, it should be remembered that they are based on assemblages selected during excavations from the first half of the 20th century (Emmitt, 2011; 2017; Emmitt *et al.*, 2018). The pottery collection from the excavations by H. Junker at Merimde Beni Salame is similarly fractional. It was only after the research of J. Eiwanger in the 1980s that our knowledge of the pottery tradition of the Merimde site was thoroughly enriched. Moreover, explorations currently being held at Sais make it possible to analyse ceramic assemblages of the Merimde culture in compliance with contemporary standards of archaeological research. Although the el-Omari pottery was excavated during the Second World War and soon thereafter, the results of these excavations were only published in the 1990s. The excavation methods available in the 1940s and 1950s, sometimes in harsh wartime conditions, as well as the rather long delay between actual explorations, on the one hand, and the publication of results, on the other, must have impacted the nature of these pottery assemblages.

The nature of the desert assemblages, including, in particular, their small size and a limited amount of detailed publications, has also been taken into account in selecting the most appropriate method. Southern Levantine pottery seems to be the best understood variety, which is due to state-of-the-art research and numerous publications. However, different views on the chronology and cultural connections between the Pottery Neolithic cultures cause some difficulties. In addition, comparisons and parallels are made difficult by considerable site-to-site diversification of pottery assemblages.

The main goal set by the author is to determine the direction from which pottery was introduced to Lower Egypt. Comparative analyses of ceramics of Lower Egyptian pottery, on the one hand, and that from the southern Levant or the Western Desert, on the other, were selected as the main method of investigation.

The results of these analyses will be used to verify the hypothesis indicating the southern Levant or the eastern Sahara as a possible place of origin of Egyptian pottery or, alternatively, to present a new hypothesis on the origin of Lower Egyptian Neolithic pottery.

Given the nature of the available data, a comparative analysis was carried out taking into account the principal stages in pottery production, as proposed by C. Orton *et al.*, (2010; see also Rice, 2005). It addressed the basic characteristics of pottery, i.e. technology (fabric, shaping method, surface treatment, firing) and typology (shapes, decoration).

Additionally, the analysis took into account the influencing factors defined by Arnold (1989) as part of ceramic theory. Five of the seven factors have been analysed in detail, namely: raw material resources; weather and climate; possible scheduling conflicts; the degree of sedentariness; and demand. Their analysis will make it possible to determine how pottery production was organised in the regions in question. The other two other factors in the Arnold's model, i.e. human-land relationships and technological innovations, will not be taken into account. As they primarily relate to the further development of pottery-making (i.e. from household industry mode to a full-time craft), they are irrelevant from the perspective of the early stage of production.

Moreover, in the view of this author, pottery production should be treated as a cultural tradition.¹ Once introduced into the life of the past societies, pottery production became its constituent part, while the adaptation process of these new traditions also involved some cultural modification. In this approach, pottery ceases to be merely an adaptive tool as proposed by Arnold. Once it has been incorporated into a cultural tradition, it becomes dynamic and subject to change as it can be passed between generations and communities, resulting in innovations and transformations. Such an approach is followed in the model that describes the introduction of pottery production to Lower Egypt.

In addition, reflecting a mobile way of life of desert groups and probably a partly mobile way of life of Neolithic societies from Lower Egypt, this monograph also refers to theoretical considerations concerning the relationship between pottery production and mobility as proposed by Eerkens (Eerkens, 2001; 2008). Particular attention is paid to solutions applied by mobile societies in order to eliminate obstacles preventing or hindering pottery production.

¹ A similar approach has already been used by the author in studies on the development of pottery production in Lower Egypt during the Neolithic (Mączyńska, 2017).