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The Most Ancient Ceramics

The Course of Technological Innovation

This paper focuses on archeological complexes representing the most ancient ceramics of the final Pleistocene–early Holocene in East Asia, West Asia, and North Africa. Each region shows its own characteristic line of development for the independent origin and growth of ceramic technology. The data correspond well to the model of multilinear culture-historical process.

In recent decades several international conferences (Jordan and Zvelebil 2009b, pp. 27–29; Kajiwara 1995), and a number of monographs, collected volumes, and articles have been dedicated to the appearance of early ceramics in different world regions (e.g., Barnett and Hoopes 1995; Bjork 1995; Freestone and Gaimster 1997; Jordan and Zvelebil 2009b; Kobayashi 2004; Rice 1999). Such attention to this theme is not a chance occurrence, as archeologists and anthropologists often use ceramic types as one of the basic material criteria for archeological periodization. Particularly, the appearance of ceramics in Stone Age archeological assemblages often serves as a weighty argument for assigning them to

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the Neolithic period, as well as for recognizing the first signs of "neolithization" (that is, transition to the Neolithic) in societies of the late Paleolithic or Mesolithic (Budja 2006; Dolukhanov, Mazurkevich, and Shukurov 2009; Jordan and Zvelebil 2009a; Novak 2009).[a]

Investigation of the most ancient ceramics necessarily goes beyond the usual scope of pottery studies in archeology and the humanities. This paper is about the very fundamentals, about the circumstances under which people in three separate world areas independently achieved the invention of pottery through devising special technological procedures that could transform a naturally occurring raw material into an artificial substance with qualitatively new properties.

It is generally recognized that the earliest experiments with clay as a natural raw material belong to the late Paleolithic. About 26,000 years ago hunters and gatherers of Eastern Europe made small clay figurines of animals and people, which had a sacred meaning and were used in rituals. These were still very imperfect works from the point of view of technology and artistic expression (Budja 2006), but they were a beginning. A fundamentally new stage in mastering clay as a raw material emerged substantially later, when further skills were developed in the preparation of items with a different purpose.

This article examines and compares materials from three primary regions where the earliest ceramics in the world made their appearance—East Asia, West Asia, and North Africa (Figure 1). In preceding publications I have devoted primary attention to the ecological and technological aspects of early ceramics in the Russian Far East—Priamur′e and Primor′e (Zhushchikhovskaia 1997; 2004, pp. 7–30; 2009a). Today the data available permit a more complete survey of problems in the establishment of pottery making technology, taking into account new materials and new research trends.

The East Asian region of ceramic origins

The most ancient ceramics of East Asia were discovered on the islands of Kyushu and Honshu in the Japanese archipelago, on the southern part of the Korean Peninsula, in northern and eastern China, and in the Amur River basin and western and eastern Primor′e. The known archeological sites containing archaic ceramics lie within the bounds of approximately 23°–52° north latitude.

Best studied archeologically are the territories of the Japanese archi-

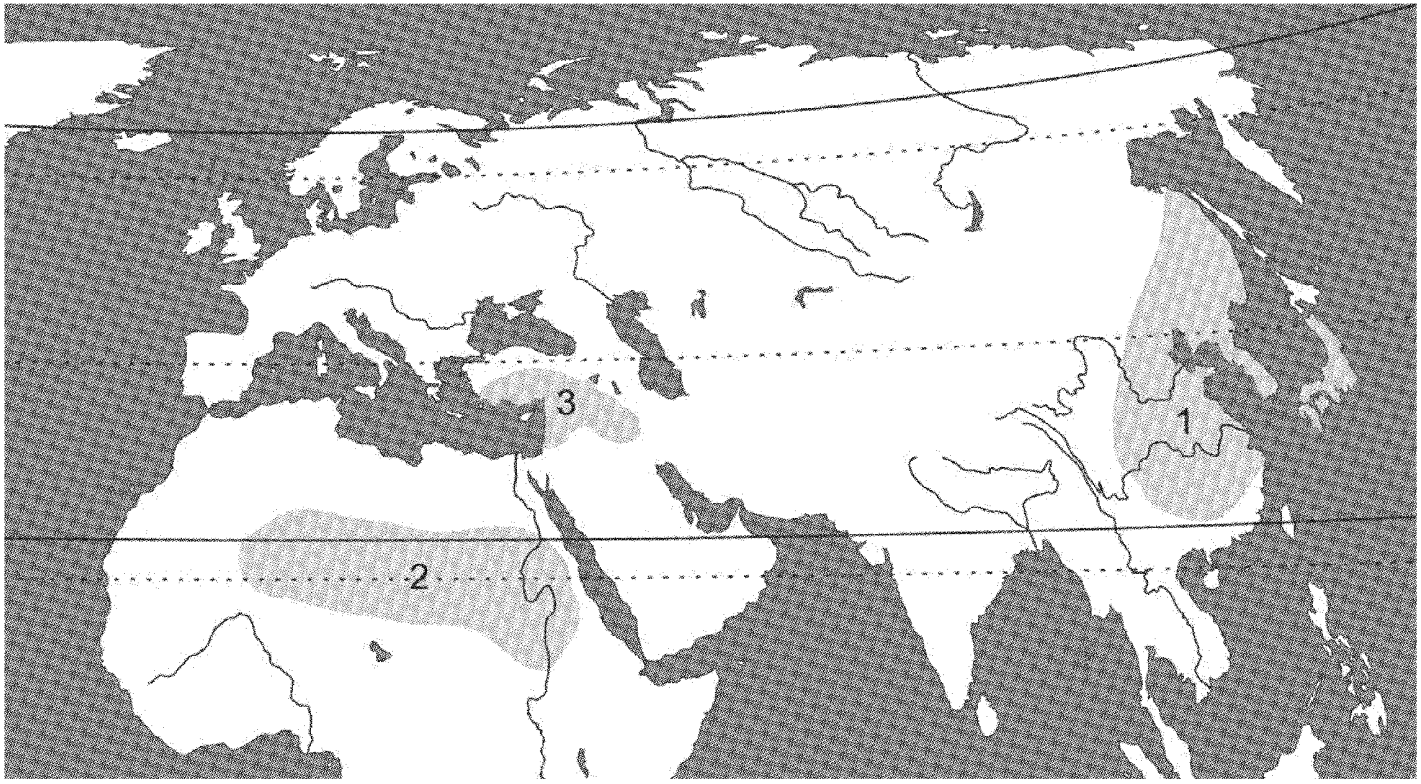

Figure 1. Map Showing the Most Ancient World Regions of Ceramic Development: 1—East Asian, 2—North African, 3—West Asian

pelago, where since the 1960s over 100 sites have yielded ancient ceramics. Radiocarbon dates for the earliest of these finds fall preponderantly between about 16,750 and 15,750 cal. BP, though there are earlier and later dates (Aikens 1995; Aikens, Rhee, and Zhushchikhovskaia 2010; Kaner 2009). Early ceramic specimens were found in sites of the late Paleolithic and the initial and beginning stages of the Neolithic Jomon culture. Characteristic of the earliest archeological complexes are an absence of long-term dwelling traces, a rich stone tool inventory, and much evidence of organic remains in the cultural layers. Researchers interpret the Holocene inhabitants of the Japanese archipelago as semisedentary hunters, fishers, and gatherers. The sea coast with its rich resources and the highly productive temperate woodlands supplied the basis of the Late Paleolithic and Jomon economies in all periods, and semisubterranean pit houses appeared early (Aikens 1995; Kaner 2009; Kobayashi 2004, pp. 7–17).

The climatic-environmental situation during the time when ceramics were beginning to be made in the Japanese islands was extremely unstable, as seen in the following. The first phase of ceramic development dates between about 16,750 and 14,350 cal. BP, at the end of the late Pleistocene cold period.

The second phase dates from about 14,350 to 13,150 cal. BP, a period of climatic warming. The third phase dates from about 13,150 to 11,180 cal. BP, a short-lived interval of climatic cooling. The fourth phase dates from about 11,180 to 10,160 cal. BP, a period of stable warming of the climate.

It is notable that the first pottery phase is marked by an insignificant number of ceramic specimens in archeological sites, while sites of the second and especially the fourth phases show significant numerical increases in pottery specimens (Kaner 2009). Thus, the initial appearance of ceramics in the Japanese islands belongs to the final Pleistocene, when the climate was still rather cold, while a more intensive mastering of the new technology occurs in the subsequent warming period. This evidence supports in a general way earlier expressed opinions that climate change during the transition from the Pleistocene to the Holocene contributed to the establishment of ceramic technology in Japan (Aikens et al. 2010; Zhushchikhovskaya 2005, pp. 26–30).

Characteristic of the most ancient ceramics of the Japanese islands are vessels having a roundish, slightly pointed, or (rarely) flattened base, and walls straight or slightly expanding toward the open mouth. Vessels were

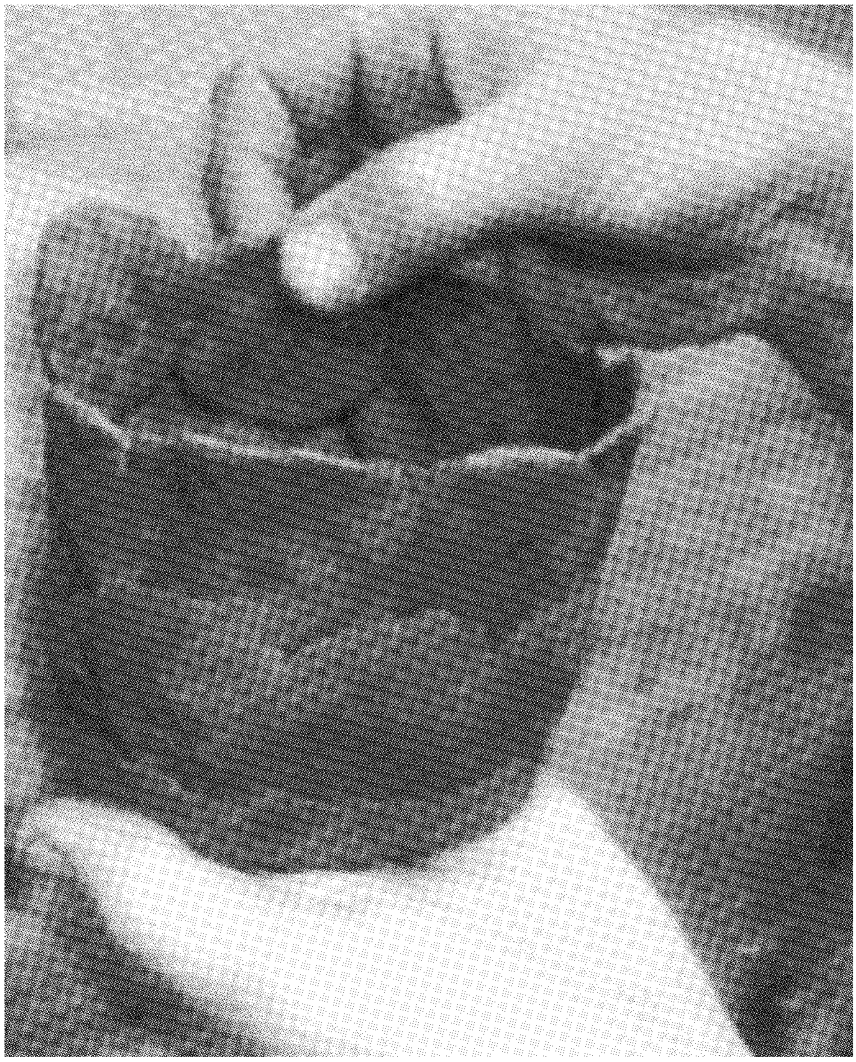

Figure 2. Experimental Forming of a Clay Vessel by "Scrap Modeling"

made from local clays that often contained a natural mixture of sandy particles. The raw material generally underwent no special modification, but in very rare cases, besides inclusions of sand, there were traces of organic admixture (probably plant material) in the composition of the modeling mass. It is difficult to determine whether this admixture was artificial and added to improve the modeling qualities of the clay, or was there by chance (*The Collection of Data on the Incipient Period of the Jomon Culture* 1996; Kaner 2009; Vandiver 1991).

Researchers have determined that the earliest vessels were fashioned from small flat slabs or scraps of clay successively joined together (Kaner 2009; Vandiver 1991). As my experimental research showed (Zhushchi-

khovskaia 2009b), this is a simple and accessible method of modeling that does not require special mastery (see Figure 2). The earliest potters left the surface of the formed artifact unworked or slightly smoothed. Firing was done in an open fire, primarily at low temperatures. In several cases a layer of soot was noted on the surface of ceramic fragments, which formed during the use of finished vessels for cooking food (Kaner 2009).

Researchers note that already in the early stages of mastering the technology of working clay, many ceramic vessels have some decoration. At first we see plain vessels with a thin horizontal bolster "pinched out" from the walls, then fingernail prints, dimple impressions, drawn lines, and finally cord-stamped imprints. It is the cord design (*jômon* in Japanese)——which appears early but not in the very earliest specimens of Japanese pottery–that has become established in the name now applied to the tradition over the whole extent of its history (Aikens 1995; Kaner 2009; Kobayashi 2004, pp. 19–50).

In the mainland regions of East Asia the oldest ceramics have been found in southern China's Yangtze River basin, where the earliest specimens date about 17,200 to 14,700 cal. BP. The most informative sites are Xianrendong Cave, Miaoyan, and Yuchanyan, among others less well studied. In northern China, in the territory north of the Yellow River, the oldest known ceramics are dated to a later interval—about 13,000 to 10,000 cal. BP (Jordan and Zvelebil 2009a). The environmental situation here approaches that observed in the Japanese islands. New technology appears just preceding or at the beginning of post-Pleistocene warming, and develops more actively as temperatures rise. The archeological data show that the sites containing early ceramics were left by hunters and gatherers who were already displaying tendencies toward a settled way of life. River fishing and collection of edible freshwater mollusks played a notable role in their economic activity. The lithic industry of the northern lands at this period is characterized by tools made on microblades, a technology quite different from that in the south, where flaked cobble tools dominated (Jordan and Zvelebil 2009a).

Both similar and different tendencies may be seen in the ways people of southern and northern China developed their skills in pottery making. However, it is possible to address this subject only in the most general terms, since the published data do not provide sufficiently detailed technological information about the ceramics. For example, it appears that the clay used in making vessels often contained an admixture of large-grained minerals, and the opinion has been expressed that these mineral

admixtures were intentionally added to the modeling mass. However, there are no detailed results in available publications that support this interpretation with systematic petrographic analysis of the specimens (Jordan and Zvelebil 2009a; Wang 1995).

Researchers propose that people could have formed the pottery vessels under discussion by either ribbon/rope modeling or "scrap modeling," and suggest that a pounding or paddling technique was used to compact the walls. Pounding is suggested by imprints seen mostly on outside vessel walls that show either rows of cords or some woven fabric (Jordan and Zvelebil 2009a). However, pounding is only one possibility, as similar imprints can be made by various processes: beating out the walls of a hand-modeled vessel using a paddle wrapped with cordage or plant fibers; modeling a vessel inside a hard template or mold such as a basket; or modeling a vessel inside a semisoft cord mold such as a woven bag (Zhushchikhovskaya 2005, pp. 21–23). While compacting vessel walls by pounding could produce the irregular thickness and uneven surfaces often seen in the earliest ceramics from the Chinese sites, experimental data cited above show that such signs are also seen in ceramics made in basketry of soft bag molds. To narrow down the manufacturing processes that produced the earliest Chinese pottery, more systematic and specialized investigation is necessary.

A common characteristic shared by early ceramics in both southern and northern China is its low-temperature, open firing (Jordan and Zvelebil 2009a; Wang 1995). The most notable feature differentiating the pottery of the two regions is the contour of vessel walls and bottoms. Characteristic of sites in southern China are containers with slightly convex walls, broad mouths, and rounded bottoms. In contrast, early ceramic vessels from the northern regions more often have a flat broad bottom and straight walls, though in some sites vessels with rounded bottoms have also been discovered (Jordan and Zvelebil 2009a).

Korea's most ancient ceramics have been identified in cultural layers of the Gosanni, Dongsamdong, Gumyongri, Munamri, and other sites, located on its southern, western, and eastern shores around the tip of the peninsula. In these archeological contexts the archaic ceramics are associated with a Late Pleistocene/Early Holocene stone tool assemblage characterized by blade and microblade technology, and tentative dates may fall between about 12,300 and 11,625 cal. BP (Cho and Ko 2009).

The early Korean ceramic specimens are few and fragmentary; only the most fundamental features are distinguishable. The modeling mass

for making vessels consisted of clay and organic plant admixtures, the organic components burned out through the firing to leave holes visible on the surfaces and in the breaks of ceramic fragments (Myl′nikova and Nesterov 2008; Cho and Ko 2009). The most ancient vessels were round-bottomed and, as a rule, not decorated. Researchers note that sometimes "vessels were decorated with a zigzag motif," but do not clarify the design's details (Cho and Ko 2009, p. 152). The early ceramics were fired at low temperatures.

To complete our review of East Asian archeological complexes containing early ceramics, let us examine sites from the Russian Far East. In Priamur′e and Primor′e, materials from the sites Gasya, Gosyan, Khummi, Gromatukha, Ustinovka-3, Chernigovka-1, and a few others have been described by a number of researchers. Here I refer only to the primary publications of the past ten years (Derevianko and Medvedev 2006; Garkovik 2005; Medvedev 2003; Zhushchikhovskaia 2002, 2005).

Available radiocarbon dates of these complexes place them within a broad interval of about 17,250 to 10,000 cal. BP, corresponding to the period of post-Pleistocene global warming.

Two technological lines in the earliest pottery products of the Russian Far East can be distinguished. The first line of development is seen in the sites of Gasya, Gosyan, Khummi, and Gromatukha on the lower and middle Amur River, and Chernigovka-1 (Chernigovka-Altynovka) in western Primor′e. It is characterized by: (1) traces of plant (grass) admixture in the modeling mass; (2) imprints of a plaited or net type, primarily on the external surface of the pottery sherd; (3) irregular thickness of potsherd walls; (4) low-temperature firing; and (5) the occurrence of vessels with a flat bottom. In some cases, possible food residues can be seen on ceramic surfaces (Derevianko and Medvedev 2006, pp. 130–31; Medvedev 2003; Zhushchikhovskaia 2005, pp. 28–29).

The second line of technological development seen in the Russian Far East is represented by fragmented specimens of a kind known from only one site—Ustinovka-3, dated to 9301±30 years ago. The modeling mass here consists of clay with sand inclusions. The method of modeling is not positively identified, but was probably either scrap modeling or modeling within a mold. The interior sides of the walls were worked with a dentate-pectinate tool that left parallel furrows on their surfaces, and the vessels were fired at low temperature in the open (Garkovik 2005; Zhushchikhovskaia 2005, pp. 20, 23). The researchers assert that the mineral admixture in the modeling mass was artificially added, but

do not support this opinion with a detailed demonstration of their petrographic analysis (Yanshina and Garkovik 2009).

The West Asian region of ceramic origins

Sites of the most ancient ceramics in the territories of modern Turkey, Syria, and Iraq date primarily between 9200 and 8700 cal. BP. While the best-known sites are Çatal Höyük, Mersin, Ras Shamra, Hasilar, and Abu Hurairah, there are others, totaling over three dozen. The sites are located between 38° and 32° north latitude. The first ceramic vessels appear at a time when the population in these areas had already been occupied for almost two thousand years with agriculture and domestic livestock breeding, led a settled form of life, and built houses of unfired bricks (Moore 1995).

It is significant that in West Asia there were technological "predecessors" to ceramic vessels (Moore 1995; Simpson 1997). In the terminology of foreign researchers, these were "plasters" made of soft, plastic natural materials that included plaster of Paris (gypsum plaster) and several varieties of lime. Such plasters were used in the hilly flanks of the Tigris–Euphrates drainage area by about 9500–8000 cal. BP for making capacious containers. When mixed with water these materials become plastic, and once dry they preserve the forms into which they are shaped. To avoid air shrinkage, the vessels were formed inside basket molds or molds made of other materials. It is inferred that such containers were intended for preserving stores of dry products such as grains.

It is important that clay as a natural raw material was mastered in the same region for the purpose of house construction. Walls were laid with adobe bricks reinforced by an organic admixture of straw (Amiran 1965; Simpson 1997). In the characteristically dry and hot climate of the region such sun-dried brick could last quite a long time. Such architecture is not limited to West Asia, existing today in rural areas of several major world regions across both eastern and western hemispheres.

The most ancient ceramic vessels from early agricultural sites in West Asia have long been the object of research (Amiran 1965; Moore 1995; Simpson 1997; Vandiver 1987). Vessels were made from good clays abundant in the region. To improve modeling quality and prevent shrinkage, cut straw was often added to the modeling mass, just as straw was used in making bricks for houses. However, other admixtures such as sand and crushed shell were also found.

The method of forming vessels is identified as scrap modeling, with molds generally used in constructing the lower part of the vessel. The forms of the artifacts were simple but not necessarily uniform, including bowls, cups, pots, and large packing containers. The surface of such vessels was often carefully smoothed and decorated with simple designs, either painted using ocher pigments or made with appliqué elements. Low-temperature firing took place in an open fire. Such vessels served various requirements, generally preparing and serving food and keeping stores. It is significant that differentiation of technological methods dependent on the assignment of the artifacts appeared very early in West Asia, where sites tend to contain both "ordinary" utilitarian wares and more elegant dishes for serving and dining (Moore 1995; Simpson 1997).

The North African region of ceramic origins

The North African region includes primarily the southern territory of the Sahara and the Nile Valley in its middle and partially lower course, within the bounds of 13°–23° north latitude. About three dozen radiocarbon dates from sites containing ancient ceramics vary in age from about 11,700 to 9500 cal. BP, marking the end of the late Pleistocene/early Holocene transition. Tools made on blades dominate the lithic inventory of this time, and the Saharan sites mark primarily short-term occupations by hunters and gatherers. Some sites contain the bones of domestic animals, attesting to the beginnings of a new kind of economy. Sites of the Nile valley represent a distinctive cultural group tentatively defined as the "Khartoum Mesolithic," while archeological data from the coastal zones point to an economic focus on fishing, the collection of mollusks in combination with hunting, and well-developed gathering. The degree of sedentism was notably higher than among mobile populations of the Sahara (Close 1995; Welsby 1997).

Ceramic collections from the Saharan and Nile valley sites are few and fragmentary, but nevertheless quite diagnostic, and local sources of clay raw material have been rather precisely determined for several sites. An important feature of the early North African ceramics is that they appear in a form seemingly not at all primitive. Vessels of simple shapes with rounded bottoms and walls of uniform thickness were made by ribbon modeling, with surface finish varying in degree of thoroughness. Firing, though carried out in the open, achieved comparatively

high temperatures (no less than 800° C) (Close 1995; Welsby 1997). Decorated fragments are predominant, revealing established local styles of ornamentation. Variants of pectinate design were widespread, and vessels display imprints of both cord-stamped and drawn elements over much of their surfaces. Ornamental compositions consist of numerous horizontal rows of repeated decorative elements, either with rows of uniform elements or with alternating rows of different elements (Close 1995, Figs. 3.*3*, 3.*4*). On the whole the technological and esthetic levels of the early ceramics of North Africa are comparable to those of "classic" ceramics of the Neolithic periods of many regions of the world (Jordan and Zvelebil 2009b).

The functional assignment of the vessels is not well understood. It has been suggested that they were not intended for cooking, as the sites lack evidence of the cultivation of cereals and systematic domestication of animals (Welsby 1997). Nevertheless, some traces have been noted that may indicate food preparation. At many sites ceramics were represented by only a few forms, indicating that ceramics still played a limited role in the daily life of society (Close 1995).

Some comparisons and conclusions

Substantial evidence shows ceramic vessel-making technology in East Asia and North Africa during the Pleistocene–Holocene transition, and in West Asia at the beginning of the Holocene. This was a time of dramatic change not only in nature, with global warming of the Earth's climate, but also in human adaptation to various ongoing environmental transformations. The structure of human economic activity became more complex as the sphere of edible plant collection in terrestrial settings was greatly expanded, and people actively developed the exploitation of aquatic resources, especially river fishing and intensive harvesting of mollusks. Emerging new socioeconomic strategies influenced ways of life and social patterning of human habitation in certain parallel ways over a broad front. In place of the highly mobile hunting patterns practiced by earlier Paleolithic groups, people now began forming into communities organized for procuring food through higher degrees of sedentism and a stabilized mastery of more limited territories. Convincing evidence shows that these tendencies are comparably traceable in materials from the sites of East Asia, West Asia, and North Africa that are under consideration here.

Many researchers agree that the factor most important for the appearance of pottery making in different world regions is residential sedentism (Arnold 1989, pp. 109–26; Rice 1999). In discussing cases of early ceramic origin, especially noticeable are regional cultures characterized by the exploitation of aquatic resources, but other kinds of productive activities—notably intensive harvesting, in favorable locales, of seeds, nuts, and fruits—are also associated with ceramic origins (Kaner 2009). Sedentism is key to the origin and continuing technological development of pottery for two major reasons. On the one hand, long presence in one place permits people a good mastery of local resources that may be effectively processed and utilized using pottery; on the other, stable residence greatly facilitates efforts to improve various aspects of the production cycle that creates the ceramic vessels.

East Asia, West Asia, and North Africa all share the key climatic-environmental factors that encourage sedentism and the intensification of food production, which in turn encourage the innovation and utilization of pottery. So far, however, local researchers have not sufficiently addressed a comparative study of how and why pottery was developed independently in various world regions. Instead, they continue to focus more on technical and descriptive details of the artifacts, for example comparing decorative approaches or relative crudity and quality of finish. Analyses of this kind lead to such interesting and counterintuitive conclusions as "the most ancient ceramics do not necessarily have to be the most primitive" (Close 1995, p. 26), but leave one wondering about the reasons this may be so.

These reflections lead to a further thought that there may be stages in the development of early ceramics that have not yet been discovered. It is conceivable that even more ancient complexes will be found, which may bring the temporal boundary for the appearance of ceramics in West Asia and North Africa closer to the early dates available today for East Asia. Observations suggesting diverse and quite early explorations in pottery technology over a broad front are now being made even within the relatively well-known region of East Asia. There it is possible to distinguish—though rather schematically at this stage of knowledge—two vast zones of primary experimentation: the Japanese archipelago to the east and the mainland territories to the west. Though there is a whole series of similar features, we also see important regional differences, both in principles of preparing the modeling mass and in the modeling of vessels. Differences between the southern and northern regions of China, and between western

and eastern Primor′e in the Russian Far East, suggest that continuous experimentation in different cultural communities produced particular ways of dealing with common technological problems.

In a similar vein, West Asia, with its geographical and climatic differences, shows a distinctive line of experimentation in the ancient technology of ceramics that is not seen farther east. This feature is that hermetic containers made of nonceramic plaster appeared here long before ceramic containers did, becoming the technological predecessor of ceramic containers. It cannot be doubted that long-practiced West Asian skills in working with architectural plasters influenced regional artisans' subsequent development of methods for making containers of clay. The rapid tempo of development in pottery making within the region, once began, is also no accident: by the seventh to sixth millennia B.C.E. the ceramic vessels that flourished here were highly distinctive in form and artistic decoration, and were fired in special ovens [kilns] (Simpson 1997).

The comparative analysis of West Asian and East Asian materials will be of substantial importance for understanding the interesting problem of technological convergence between the two regions. One important approach will be to examine the methods of modeling containers. Examples include the use of a basket mold for making vessels from "plasters" (clay and lime) in West Asia, and the evident use of a basket matrix for modeling clay vessels on the Lower Amur. Data from western Primor′e and possibly some regions of China show that at various times, in regions of the world distant from each other, ancient masters could arrive at the same principles for working plastic materials. Also worth noting is a similarity in methods of modeling early ceramics in the Japanese islands and sites of West Asia. Scrap modeling and modeling with the aid of a mold both belong to the most archaic principles for constructing clay containers. They comprise the simplest solutions to the technological task of modeling.

The functional interpretation of ancient ceramic vessels is another important and actively discussed research problem. Through the 1960s and into the 1980s, early ceramics were seen as connected primarily with everyday economics and living requirements. Today new and interesting versions of this perspective are being proposed. Modern views are based on a variety of archeological data documenting the beginning stages of pottery making, not only in the regions we have examined here, but also in many other territories of Eurasia. Thus, much attention has been devoted in the past twenty years to studying the socioeconomic

contexts of early pottery making in Europe (Barnett and Hoopes 1995; Bjork 1995; Budja 2006; Jordan and Zvelebil 2009b; Vitelly 1995, and others). Here the first ceramic vessels appeared later than in East Asia, North Africa, and West Asia, and in many cases researchers note that their form has quite a developed Neolithic appearance. Especially curious are complexes of the Balkan region, where relatively small quantities of ceramics represent vessels that are well developed and often display unusual forms and elegant decoration. These features, and sometimes data on conditions of discovery and vessel contents, have been taken to indicate a nonutilitarian function. In this view, early ceramic containers are connected with cult and ritual practice, and are seen as material objects having prestige and status significance in ancient society (Bjork 1995, pp. 113–35; Budja 2006; Vitelly 1995).

Some researchers see evidence of prestige in early ceramics, given that a new, not yet readily available technology such as the first pottery could serve as a specific marker distinguishing the social elite in early societies—such people as shamans and chiefs, for whom vessels made of clay were presumably intended. An argument for this view is the circumstance that early ceramic ensembles are often sparsely represented (Hayden 1995). In the hunting-gathering cultures of Central Europe (territory of Poland), new technology, borrowed from more progressive neighboring farmers, may have marked the special status of certain people who now possessed the new technology (Novak 2009).

With regard to functional interpretation of the most ancient ceramic vessels from sites of East Asia, North Africa, and West Asia, it is not possible to propose a single interpretive model for all regions. Materials from East Asian complexes attest to the use of ceramic containers for cooking or for thermal modification some kinds of products. But were these operations purely utilitarian or were they combined with other markers, such as status functions? The sources available today do not provide an answer to this question. Some researchers also allow the possibility that pottery served a prestige function for ancient residents of North Africa, pointing again to a low number of ceramic items collected at studied sites and the relatively well-developed technological and decorative standards exemplified by the specimens (Close 1995). In my view, the point that few ceramic specimens exist at many sites is at best a weak argument for proposing prestige significance for the new pottery technology.

More cogent are conclusions about a functional dynamic for the most ancient vessels of West Asia, which appear in the sites of early farmers

(Amiran 1965; Moore 1995; Welsby 1997). In the first stage, pottery reiterates the function of packing containers previously made from other plastic materials, and indicates the appearance of some new functions specific to ceramics, notably the preparation of food. Later, with increasing complexity in intrasocietal relationships and a growing facility in ceramic production, specially crafted pottery becomes one of the prestige items employed to mark special situations of status or ritual significance.

The appearance and establishment of ceramic technology was a complex process, not having only one meaning. It should be investigated with due consideration for regional differences in cultural, economic, and ecological conditions and factors. As research progresses, it should be possible to work out different regional models for the origin and development of this historically significant technological innovation.

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Editor's note

a. Translator Richard Bland notes that the author uses "geographical terminology found in foreign archeology literature."

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