CHAPTER THREE

CERAMIC-MAKING BEFORE THE CONQUEST

At the time of the Spanish arrival the central Mexican ceramic industry was flourishing, and was the outcome of several cultural and technological changes that occurred during the last pre-colonial centuries. This late period, the so-called Postclassic (AD 900-1521), is today considered a time of high mobility, preceded by an early episode of political and cultural balkanization after the collapse of the powerful city of Teotihuacan (Epiclassic ca. AD 700-900). In the Postclassic we recognize two episodes of economic and cultural integration of large areas of Mesoamerica, the Toltec (Early Postclassic ca. AD 900-1150) and Aztec epochs (Late Postclassic ca. AD 1350-1521), separated by a period of migrations from northern Mexico (Middle Postclassic ca. AD 1150-1350) (Smith 2001a, 2001b; Smith and Berdan 2003). These historical processes had an impact on several aspects of life but also on the ceramic craft, as we will see in this chapter. Throughout this period ceramic objects show a variety of decorative styles suggesting different social and economic spheres of influence at the regional level (see e.g., Cervantes *et al.* 2007; Cobean 1990; García Cook and Merino 1988; Hodge and Minc 1990; Lind 1994; Noguera 1954; Smith 2007; Whalen and Parsons 1982). For example, Aztec decorative styles had variable presence in central Mexico due to the variable political and economic relations of the Aztec empire with other centers (see Smith 1990). Also, during this late period ceramics had a wide variety of uses. Everywhere in domestic environments they were for cooking, storing, transporting and serving, but in particular contexts they also played a major role in ritual activities as offerings, ritual equipment, means of writing, and even as divine objects. For example, in the last two centuries before the conquest in some places potters began to manufacture fine objects with complex pictographic decoration to be used as serving ware in ritual feasts (see Hernández 2005, 2010). In spite of the high variability in decoration and use of ceramics, some parts of their process of manufacturing remained without change, such as the method of forming, as we will see later; evidencing that ceramic-mak-

ing was involved simultaneously in various dynamics of change and continuity.

After the collapse of Teotihuacan (Map 2) around the seventh century began a period of conflict and migrations of people throughout Mesoamerica; new towns were founded and even political systems were modified (see Davies 1980; Smith and Berdan 2003). This process had an important impact on many aspects of culture; also on the ceramic industry. We recognize new decorative styles and vessel shapes and the modification and extension of distribution networks. For example, as George Cowgill (2001:730) explains, the fall of Teotihuacan was accompanied by rejection of many of its distinguishing ceramic shapes and decorations in the valley of Mexico. According to him, not only fine and public objects changed in the region, but also jars and other cooking and storage vessels used at home later assumed quite different shapes. Also *comales*, griddles for making *tortillas* well-known in other regions of Mesoamerica, began to be made for the first time in the valley of Mexico (see Sanders *et al.* 1979:451-474), suggesting new eating habits and possibilities for food preservation. We also identify that routes of distribution of ceramics were modified after the trade relations of that city were broken. For example, the trade corridor in Tlaxcala that according to Ángel García Cook (1981:269) communicated Teotihuacan with eastern Mesoamerica was closed. Such modifications in the ceramic craft were, however, not new in Mesoamerica. Earlier historical processes that we today identify as major political shifts were also associated to modifications in material culture. For example, Teotihuacan's power in the fourth century was accompanied by new vessel shapes and decorations in many regions of Mesoamerica (e.g., in the valley of Mexico see: Sanders *et al.* 1979; in Cholula: Noguera 1954; in the region of Tlaxcala: García Cook and Merino 1988; in the valley of Oaxaca: Caso *et al.* 1967).

Later historical processes also had effects on central Mexican ceramics. The rise of the city of Tula (AD 900-1200 according to Mastache and Cobean 2001:759) that coincides with increasing inter-regional trade throughout Mesoamerica (Smith 2001b:249), was accompanied by wide circulation of ceramics that we today associate with the 'Toltec' world although they were not manufactured in the city. This was the case of the so-called Plumbate wares, fine ceramic vessels with glossy appearance produced in the Xoconochco region of Chiapas (Neff and Bishop 1988), which were abundant at Tula (Mastache and Cobean 2001:761; Smith 2001b:250). Also in different

Map 2. The valley of Mexico showing the places mentioned in the text.

regions of central Mexico were produced similar quotidian wares, suggesting that the communication between regions also had effects on the manufacture of common pottery. For example, the so-called Mazapa ceramic complex, produced in Tula between AD 1000-1200 according to Cobean (1990:274), was similar to the Aztec I complex in the valley of Mexico dated to AD 1150-1300 (Cervantes *et al.* 2007:282-289), and to the Early Postclassic wares in Cholula in the valley of Puebla-Tlaxcala dated to ca. AD 950-1150 (Lind 1994; McCafferty 1994, 2001). The later development of the Aztec culture was related to new decorative styles and vessel shapes in the valley of Mexico (see Cervantes *et al.* 2007; Hodge and Minc 1990; Vega 1975). The Aztec empire had an important impact in neighboring areas; however local ceramic-making was little influenced. For example, the valley of Morelos, south of the valley of Mexico, was dominated by the empire in the first half of the fifteen century; the valley of Toluca, west of the valley, late in the same century (Hassig 1988). Although Aztec ceramics were traded and used in those regions, potters continued producing their own local styles (see Chacón *et al.* 2007:203-209; García Payón 1941; Smith 2001c, 2007). In contrast, the city of Cholula in the valley of Puebla and many settlements of the valley of Tlaxcala, east of the valley of Mexico, maintained their political independence; traders did not exchange Aztec wares, local potters did not imitate them either (see Lind 1994; Müller 1978; Noguera 1954).

Despite regional variation, on the eve of the conquest potters from central Mexico had similar preferences for decorative styles and vessel shapes. For example, most vessels were decorated with painting; in contrast to earlier times such as the Teotihuacan period, when potters usually decorated with incisions (see Rattray 2001). Also bowls often had large conical supports; in Teotihuacan, in contrast, vessels generally did not have supports (see Rattray 2001). Not only were decoration and vessel shapes widely shared in many regions, probably the organization of production and the process of manufacturing were also similar. The problem here is that we know much less about those less visible aspects of ancient ceramic-making, as many of them did not leave recognizable marks on the finished products, also the extant documentary sources rarely provide data. In addition, our present knowledge of ceramic industries at that time in the various regions of central Mexico is quite dissimilar. While the valley of Mexico has been well studied, other regions, such as the valley of Toluca, have been scarcely explored.

Sources to study late pre-colonial ceramics

No other region and pre-colonial period of central Mexico has been so extensively studied as the valley of Mexico during the Late Post-classic. In particular Aztec culture has received a lot of attention. Pre-Hispanic and colonial documents and archeological research have given insights on its history, social organization and material culture, especially at the time of the Spanish arrival. For other regions of central Mexico documentary information is scarce and archeological research has been concentrated only on particular settlements. The same applies for our present knowledge on ceramic-making; the majority of the archeological research and documentary information is concentrated on the valley.

The few extant pre-Hispanic documents from central Mexico offer very little information on ceramic-making as they were made for mantic and ritual purposes. Still, in those painted books several ceramic vessels are represented as offering containers, and this gives insight on the kind of objects that were used in those contexts at the time the books were painted, or at earlier times, if they were copies of former documents. Also colonial documents offer few data on pre-colonial ceramic-making, as most of the scarce information on this topic refers to the situation after the conquest. For example, the only known document dealing in particular with ceramics, the *Código de los Alfareros de Cuauhtitlan*, a piece of account and claiming of potters from that town made around 1564, alludes to events at that time. Although this manuscript was written only four decades after the conquest, several of the vessels depicted show clear Spanish influence. In addition, Fray Bernardino de Sahagún in his description of pre-Hispanic professions provides only a few brief general observations about potters.

Thus, our present understanding of the ceramic craft in the valley of Mexico and neighboring valleys has mainly been derived from archeological research. Material evidences of workshops in the region are to date scarce, however. In Tula, north-east of the valley of Mexico, have been excavated remains of a city's neighborhood dedicated to ceramic manufacture, used at least during the period of florescence of that metropolis (AD 950-1150) (Hernández *et al.* 1999). In other regions of central Mexico, however, finds are reduced to a few scattered molds, manufacturing errors and raw clay, which do not permit

the reconstruction in detail of the process of production or the spatial distribution of workshops (e.g., in Otumba in the valley of Mexico: Charlton *et al.* 1992:106; in Ocotelulco, Tlaxcala: Contreras 1994:23; in Yautepec, Morelos: Smith 2006b, Ch.E1:6). For those reasons archaeological investigation has concentrated on ceramic remains. Major sources of information have been several projects of surface survey that covered most of the valley of Mexico. This region is particularly suitable for ceramic studies as it is well circumscribed and not too large. Projects of extensive surface survey conducted during the 1960s and 1970s were able to recover quite systematically large collections of ceramics, which are by now extensively and intensively studied (Blanton and Parsons 1971; Parsons *et al.* 2008; Parsons *et al.* 1982; Sanders *et al.* 1970, 1979). Thanks to that research, we have at present a good knowledge of clay composition, manufacturing techniques, shapes and decoration of late pre-conquest ceramics of the valley of Mexico (e.g., Charlton *et al.* 2008; Minc *et al.* 1994; Whalen and Parsons 1982). Also chemical studies for identifying clay composition, such as neutron activation analysis, have been able to recognize the provenance of some ceramics, and therefore to trace their exchange within the valley. This kind of study has proliferated in the last years, and for this reason, at present our knowledge of the ceramics of that region has a strong emphasis on aspects such as distribution, trade and market systems (e.g., Charlton *et al.* 2008; Garraty 2006a, 2006b; Hodge and Minc 1990; Hodge *et al.* 1992; Minc *et al.* 1994; Nichols *et al.* 2002). In addition, rescue excavations in Mexico City and its surroundings have recovered large collections of ceramic fragments from a variety of contexts (e.g., Cervantes and Fournier 1995; Cervantes *et al.* 2007; González 1988; Matos Moctezuma 1982; Noguera 1934, 1969; Parsons 1966; Sejourne 1970, 1983; Vega 1975). Although these samples are often highly mixed due to continuous building activity in the city, they provide useful information on shapes, decorative styles and methods of manufacture.

In other regions of central Mexico ceramics have not been so intensively studied as in the valley of Mexico. Also scarce technological analysis of ceramics has been conducted, and for this reason, their distribution is less known. In the Puebla-Tlaxcala valley investigation of late pre-Hispanic ceramics has concentrated on the city of Cholula, in particular on its decorated ceramics (Hernández 2005; Lind 1994; McCafferty 2001; Müller 1978; Noguera 1954). In that place were pro-

duced, among a variety of plain and decorated ceramics, fine painted vessels with pictographic writing, which according to previous studies were made to be used in ritual contexts (Hernández 2005; Lind 1994; Nicholson 1982:243; Noguera 1954:141). Late pre-Hispanic ceramics from other parts of the Puebla-Tlaxcala valley are less known (e.g., in the region of Tlaxcala: Castillo 2007; García Cook and Merino 1988; in the region of Huejotzingo: Schmidt 1975).

In the valley of Morelos archeological late pre-Hispanic ceramics from several settlements such as Teopanzolco, Xochicalco and Guapulita have been studied in some detail (Angulo and Arana 1989; Hirth and Cyphers 1988; Vaillant and Vaillant 1934). More attention has been given to remains excavated in domestic contexts of a rural settlement, Yautepec, in which local ceramics as well as importations from the valley of Mexico appear (Smith 2006b, 2007; Smith and Doershuk 1991). In the valley of Toluca little systematic research has been done so far (e.g., García Payón 1941; Smith 2001c; Vargas 1975), therefore ceramics from the last centuries before the conquest remain poorly understood. Thus considering the extant ceramic collections, documentary information and previous research from the several regions of central Mexico, this view of the late pre-Hispanic ceramic industry gives more attention to the valley of Mexico. Data from the valleys of Puebla-Tlaxcala, Morelos and Toluca help to complement, or contrast, the situation in the valley.

Organization of ceramic production

The archeological excavations at Tula (Hernández *et al.* 1999) have revealed a city's neighborhood which was specialized in the manufacture of pottery during its period of florescence (AD 950-1150). Several houses of that area were also pottery workshops, as there have been found kilns, open firing places, tools, molds and production waste. This shows that pottery-making was a domestic and family-based industry, and that it was concentrated in one sector of the city; both patterns still common today in Mesoamerica. Sahagún's (1992, IX, Ch. 18-19:517-519) accounts on craftspeople suggest that in pre-colonial times some industries were highly organized; that is, members of a profession had a particular patron god, festivities and rituals, and even lived in the same neighborhood. This was for example the case

for feather workers. Although he did not mention if this was also the rule for more common occupations, the concentration of pottery workshops in particular sectors of Tula might be an indication of that.

In the valley of Mexico the lake environment is ideal for ceramic-making. Clay deposits suitable for manufacturing are widespread and distributed more or less regularly (Nichols *et al.* 2002:31). Thus during late pre-conquest times several towns were specialized in this activity. According to Charles Gibson (1964:350), colonial documents¹ indicate that this industry was important in Huitzilopochco, Azcapotzalco, Xochimilco and Cuauhtitlan, the latter being the major production center in the valley. There were also other settlements specialized in ceramics, although at present they are not identified. That is, studies of the composition of late pre-colonial vessels' clay, such as neutron activation and petrographic analysis, have recognized several major clay composition groups proceeding from different areas around the lakes (Chalco, Texcoco, Teotihuacan Valley, Cuauhtitlan Tenochtitlan, Xochimilco and Tepetlaoztoc), indicating that ceramics were manufactured at least in those regions (Garraty 2006a:111; Hodge *et al.* 1992, 1993; Minc *et al.* 1994; Neff *et al.* 2000; Nichols *et al.* 2002). Fine variations in vessels' clay suggest in addition the existence of several places of production within those regions, although they have not been located yet. Studies of the composition of vessel clay (Garraty 2006a:175,193-194) also show that in the last years before the conquest settlements in the lakeshore near Tenochtitlan became the strongest producers of decorated and plain ceramics in the valley. Probable reasons were the need to supply a large urban population, the proximity to the market of Tlatelolco that was the biggest in the region, and the interest to make profit in the regional exchange controlled by the Aztec empire.

For the neighboring regions of the valley of Mexico there is little information on places of ceramic manufacture. It can be supposed that in every region during late pre-Hispanic times there were several locations of production as quotidian vessels were normally not transported long distances in pre-Hispanic Mesoamerica. In the valley of Puebla-Tlaxcala there were potters in Cholula as Díaz del Castillo (1980:149) wrote that "hacen en ella muy buena loza de barro, colorado y blanco, de diversas pinturas, y se abastece de ella México y

¹ Gibson (1964:350, 568) obtained this information from documents in AGN Tributos and BNM Ms. No. 455.

todas las provincias comarcanas”.² This city was not only an important regional pilgrimage focus at that time but also a large commercial center, as is clearly stated in the chronicles of the first Spaniards who were there, such as Bernal Díaz del Castillo (1980:149, 150) and Gabriel de Rojas (1985:132), *corregidor* of the city in 1581. Other lines of evidence also confirm that Cholula was specialized in ceramic-making. Compositional analysis of fine polychrome vessels from several places in the valley of Puebla-Tlaxcala show that they were made in that city, though there were also other centers of production in the vicinity of Huejotzingo and in Ocotelulco (Neff *et al.* 1994). In addition, the high variability in decorative styles and shapes of common ceramics from other places in the valley also suggests the existence of many places of production (see Castillo 2007). In the valley of Morelos compositional analysis of ceramics from Yautepec shows that most of these materials were made in the surrounding region although there were also ceramics produced in other areas in Morelos and in the valley of Mexico (Smith *et al.* 2006).

Several stages of the pre-colonial process of ceramic-making in central Mexico can be reconstructed from visible manufacturing traces on the vessels and from extant documents. Those sources of information, however, do not shed light on other parts of the process of manufacturing, such as the methods for clay procuring, drying and storing vessels. In view of this, six stages of the process of ceramic-making will be broached here: (a) clay preparation; (b) vessel forming; (c) vessel surface finishing; (d) firing; (e) decoration, and (f) assembling vessel shapes.

(a) *Clay preparation*

Essential for potters is that the clay for making ceramics is workable. This means that the blend of clay minerals and non-plastic particles, naturally present or added by the potter, must be suitable for forming vessels; to be precise, the clay should be plastic enough to acquire the form given by the potter but not too plastic as it has to retain the new shape (Rye 1981:31). For this purpose the clay can be prepared in different ways; potters may add non-plastic inclusions such as sand, organic materials, crushed sherds, or they may mix clays of different

² They make there very good pottery wares, red and white ones, with a variety of paintings, and they are supplied to Mexico and all neighbourhoud provinces (Díaz del Castillo 1980:149, my translation).

properties. In addition, the actions involved in the preparation of clay can be different; potters may crush clay clods with their feet, or may grind them with a stone or in a mill, also the clay mixed with water may be used immediately or may be stored for a long period (see Rice 1987:115-124; Rye 1981:29-39). Clay recipes depend, in part, on the characteristics of the available clay in a particular geological region, but they also result from cultural preferences of the potters in the manners to deal with their natural environment. Clay recipes are learned, and as a rule they are transmitted for generations, however, they may be replaced or modified after being learned. As Gosselain (2000:192) explains, relatives, neighbors or users are normally not involved in this technical, and not visible, aspect of ceramic-making, but fellow potters may give advice and new ideas for clay processing. However, it is difficult to identify in detail clay recipes and preparation from ancient ceramic remains alone as different activities may leave similar marks on sherds and some activities do not even leave perceptible marks (see Rye 1981).

At present we have little information on clay preparation during late pre-colonial times in central Mexico. Observation of diverse kinds of ceramics from different places in the valley of Mexico shows that the clay used is similar, as clay deposits in this lake region have the same origin and composition. At that time this resource was not scarce, since we can see at present that clay deposits are widespread in the area and close to the surface. This may suggest that access and control of clay sources was not a main issue in ceramic-making towns. The clay of vessels made in the valley regularly contains sand inclusions. Big and thick vessels, such as those for cooking, had a higher percentage of sand, around 20-40%; while smaller and thinner objects had around 5-15% (Blanton and Parsons 1971:294-309). Small and decorated vessels contain additionally small amounts of volcanic particles (pumice) (Blanton and Parsons 1971:304). This suggests that utilitarian ware (for cooking, storing and transporting) and serving ware (for eating) were made in general terms from the same clay, although for the first kind of vessels it was coarser, with larger and slightly more sand particles (Parsons *et al.* 2008:389). It seems that this was the most common clay recipe in the valley, even though it is not clear if sand and pumice were natural components of the clay, or if they were added by potters as temper. Such a recipe did not vary in significant terms during the last five centuries before the conquest as sherds corresponding to the Early Aztec period look similar to sherds

of the Late Aztec period. As an exception, there was a ware made using another clay recipe. Vessels for salt-making, which were rough, thick and low-fired, were made out of clay with abundant fibrous material added as temper (Blanton and Parsons 1971: 312-313; Charlton 1969). These objects were hastily made and very poorly fired as they were only molds for salt production. Under these labor-saving conditions, potters gave stability to the vessels by using extremely coarse clay and fibers.

Sahagún (1992, X, Chap. 22:571) in his account of a potter who sells *comales*, mentions that he "... moja muy bien la tierra y la soba y mézclala con el flojel de las espadañas, y así de ella, así beneficiada, hace comales ...".³ Later he says that also bowls, plates and all kinds of vessels were made using this prepared clay (Sahagún 1992, XI, Chap.12:702-703). At present potters of Metepec in the valley of Toluca also include reed spikes in the clay. Charlton and colleagues (2007:436, 440) briefly mention that in late pre-colonial rural contexts of the valley a small percentage of cooking and serving vessels include vegetal fibers in the clay. This tempering may be similar to the one described by Sahagún, however, other studies of pre-Hispanic ceramics from the valley have not recognized it (Cervantes *et al.* 2007; Whalen and Parsons 1982).

In the valley of Puebla-Tlaxcala we can recognize a little variation in clay recipes. In Cholula ceramics were made from yellowish clay blended with sand and, on occasion, also volcanic particles such as basalt. Petrographic studies suggest that all ceramics in the city were made using in general terms the same methods of processing as clay, inclusions and porosity are similar (Suárez 1994:50). Vessels for cooking and transporting, such as *ollas* and big bowls, and vessels for serving, such as simple decorated small bowls and fine painted bowls, were apparently made from similar clay, although small vessels often had fewer inclusions. As in the valley of Mexico, it seems that during the last five centuries before the conquest potters did not make significant changes in clay recipes. In other parts of the valley of Puebla-Tlaxcala potters used other kinds of clay. In the region of Tlaxcala, García Cook and Merino (1988) have identified that the clay of some late pre-colonial ceramics have inclusions of sand and other volcanic

³ "He moistens well the earth and kneads it and mixes it with reed spikes, and from it, so treated, he makes *comales*" (Sahagún 1992, X, Chap. 22:571, my translation).

ash. Also some vessels have a higher quantity of inclusions than others, and some have a compact structure while others are porous, although more study needs to be done in order to find if this variation is related to the shape of the vessel or to its provenance. The reason of this variability may be that Tlaxcala is a relatively large area with several types of clay deposits, though it may also be that potters of different towns had different preferences.

In the valley of Morelos late pre-colonial potters used similar clays but their recipes showed a large range of minor variations. This was evident in Yautepec, Cuexcomate and Copilco, where Michael Smith (2006a, Ch. B10; 2006b, Ch. C2,) conducted petrographic analysis of ceramics that showed that potters used similar clays but blended them with different minerals in different proportions. According to Smith, it seems that potters were relatively flexible in the manner of preparing their clay, as it was not possible to associate particular vessel clays with particular towns, or with particular kinds of objects. Also it seems that this pattern occurred at least during the last three centuries before the conquest. This variability reflects in part the geological unevenness of the region, which has several types of sedimentary and volcanic deposits, but it also shows that potters did not follow strict recipes but selected the materials they had available or considered more convenient, that is, potters adapted the knowledge transmitted for generations to their present situation.

(b) *Vessel forming*

There are different techniques for applying pressure to plastic clay to form vessels. Potters may use only one method, such as casting a vessel in a mold or throwing it on a potter's wheel, or they may combine various methods, for example, make part of the vessel by molding and the rest by applying coils of plastic clay. In some forming techniques potters perform several operations at different stages of the plastic range of the clay (Rye 1981:21). That is, a section of a vessel may be dried before the rest is made in order to avoid deformation, or the lower walls of vessels made by coiling require the use of softer clay. Also usually when the water content of the clay drops below the minimum for the plastic range (the stage known to potters as leather hard), handles or other additions are applied. Thus, this part of the process of ceramic manufacture involves not only motor habits mastered by frequent repetition, but also knowledge of the sequence of execution.

Both types of expertise are learnt by potters and transmitted across generations, and as Gosselain explains (2000), they are very resistant to change because they are internalized, not visible, and similar vessels can be shaped using other forming methods. The techniques used to form ancient ceramics can be identified from vessel remains alone, as they often leave clear marks on the finished products. For example, objects made by several molds have ridges left by the junctions between parts of molds, or vessels made using the potter's wheel have a series of throwing grooves left by the potter's fingers (Rye 1981:59). However, these marks are often covered by later processes of surface finishing such as painting or glazing. In addition, archeologists studying ceramics often do not describe those aspects, as they concentrate on the documentation of more visible aspects such as clay composition, vessel shape and decoration.

In central Mexico late pre-Hispanic vessels were made using a combination of molding and coiling techniques. Molding implies to press the clay into or over a mold, and coiling to use rolls or 'coils' to build up a vessel around a circumference in order to increase the height (Rye 1981:67, 81). In the valley of Mexico molds to form the body and neck of vessels were horizontal, that is, they served to create horizontal sections of the vessel. Such kinds of molds have been found in archeological contexts. For example, Charlton and colleagues (1992:106-107) excavated in pre-Hispanic contexts in Otumba external horizontal molds to make censers and spindle whorls. They have the shape of simple and complete bowls, with designs incised on the interior. When the clay was pressed in the interior, a raised decoration on the exterior surface of the new formed censer was created. Also in Tula were found horizontal molds for bowls and plates with low-relief incisions on the interior for producing vessels decorated with curvilinear motifs on their exterior walls (Hernández *et al.* 1999:77). In addition, archeological remains of pottery show that *ollas*, with or without high neck, were made using various horizontal molds. In fragments of *ollas* from the valley it can be recognized that their body was made from two separate hemispherical sections, which were attached leaving visible marks of the juncture around the middle inner part of the body.

According to visible marks on the vessels some aspects of the sequence of forming followed by potters of the valley can be reconstructed. In the case of *ollas*, it seems that a first step was to create the body out of two horizontal molds. Then (or in parallel) the neck was

created using another horizontal mold. Later these three vessel sections were attached, and afterwards the potter smoothed the vessel surface placing the pot on its base. The evidence is that as a rule the upper sections of the vessels are better burnished (Blanton and Parsons 1971:298), while the lower (and less accessible to the potter's hands) are less smoothed. Also the base is often rough and uneven. *Ollas* with high necks were made following a process a bit different. That is, necks were molded and smoothed separately in the hands of the artisan and were then attached to the vessel body. This can be seen in the fact that *olla* necks often have vertical burnishing marks (Blanton and Parsons 1971:304). Handles were modeled separately and after the vessel was dried for some time and burnished they were attached to the body.

Bowls with simple walls had an easier forming process. They were made with one horizontal mold, since no marks of junctures of separate mold sections have been detected on their bodies. After the vessel was formed, the potter commonly smoothed its surface placing it on its base. The evidence is again that upper sections of bowls are better burnished (Blanton and Parsons 1971:298). Supports for tripod vessels were made separately and then joined to the vessel's base. In Early Aztec times some supports of serving bowls were made with molds in order to have a stepped form, while in Late Aztec times most supports were just modeled in conical shape (Whalen and Parsons 1982:441, 450). These conical supports were burnished before they were attached to the vessels. This can be recognized in their vertical burnishing marks (it is difficult to burnish supports in vertical direction when they are already attached to the vessel). Censers were also made out of horizontal molds into which the clay was pressed, as the molds found by Charlton and colleagues (1992:106-107) in Otumba suggest. Their handles were modeled separately as well and then joined to the censer's body. The evidence from Otumba also suggests that some censers were hastily made. The handle was often placed over the molded design decoration (Charlton *et al.* 2008:247). Salt-making vessels were again exceptional in their manufacture. Their exterior has a rough texture that apparently resulted from fabric or basketry impressions on the wet clay surface (Blanton and Parsons 1971:312-313). As potters did not want to invest much time in these objects, they just formed them hastily without smoothing their surface, as was usual for other kinds of vessels.

It seems that in the valley of Mexico potters used similar techniques for vessel forming. Differences in this process were related to vessel shape (*ollas* were made out of more sections than bowls), rather than to vessel use (cooking pots were made in a similar way to serving pots). These techniques, in particular the use of molds, promoted standardization in shape and size. Nevertheless, archeologists have observed variation in this stage of manufacturing during the last five hundred years before the conquest. Garraty (2006a:199-203) and Whalen and Parsons (1982:450) have identified that ceramics for cooking and serving made before the rise of the Aztec empire presented some regional variation in shape and size, while ceramics made in the times of the empire were more uniform in their dimensions. They take this increase in standardization as a consequence of imperial control over ceramic production and distribution in the region.

In Cholula, in the valley of Puebla-Tlaxcala, vessels were also made using horizontal molds and coiling as forming marks on their surface suggest. *Ollas* were made using various horizontal molds. Goblets, vases and censers with pedestal base were made with two molds, one for the body and the other for the pedestal; both sections were joined after they acquired a leather hard consistence as marks on the vessels suggest. Bowls often have supports in the shape of eagles, jaguars or other animals; they were made by mold and applied to the leather hard vessel body. Censers also had handles and effigies of eagles, jaguars or *xolotl* faces made by mold and later applied to the vessel. It seems that during the five centuries before the conquest potters of that city used in general terms the same methods for forming vessels. In Ocotelulco bowls, plates, vases and goblets were made using horizontal molds as well; also supports and handles, in the same shapes as in Cholula, were made by mold and applied to some vessels, as ancient molds found in the town show (Contreras 1994:23). Thus, in late pre-colonial times in the areas of central Mexico where information is available the methods for forming vessels were in general terms similar and stable. This suggests that this kind of knowledge was transmitted without disruption across generations.

(c) *Vessel surface finishing*

Once a vessel is formed, but also during the process of forming, a potter generally finishes its surface by rubbing a tool against the leather hard clay or by applying a slip (fluid suspension of clay in water of dif-

ferent color than the vessel clay) to modify its texture and light reflecting qualities (Rye 1981:89). Some of these techniques are more successful when the vessel is leather hard while others require that the vessel is completely dry. Surface finishing requires particular motor habits, but also experience with clay properties. Both kinds of knowledge are learned and transmitted across generations. However, as this part of the process of ceramic-making is visible on the vessels it may be influenced by other potters and by users. The methods used to finish ancient ceramics can be identified by observing vessel remains, although normally earlier stages of this process are covered by later stages, leaving only the latter visible. Archeologists frequently create an artificial and sequential division between forming, surface finishing and decoration of vessels. However, for potters these processes can be part of a continuum, as they may be performed in parallel and on occasion cannot be distinguished, that is, surface finishing may be decoration, or forming may be decoration. In addition, often the perception that certain aspects of a vessel are decorative, but others are not, is not only culturally determined but also subjective. In this work this artificial division is maintained because it is believed that every one of these processes may be associated to particular ideas, preferences and influences of potters. Surface finishing refers here only to the modification of the surface's texture or the application of a slip, while decoration refers to the use of painting, cutting and joining techniques. In the section for surface finishing I give attention to the techniques used while in the section for decoration I concentrate on the motifs and meanings of the decoration. Potters may give variable attention to the finishing of the surface of a vessel. They may only smooth the surface, that is, rub the vessel until it acquires a regular texture but a matte appearance. They may burnish the surface, that is, rub the surface regularly but the tool is used directionally so that a pattern may be produced and the appearance is a combination of matte and luster. Or they may polish the vessel, that is, obtain a regular surface with uniform luster (Rye 1981:89-90).

The remains of pottery workshops in Tula show that potters used for polishing different kinds, shapes and sizes of stone and pieces of fired clay with a half moon shape (Hernández *et al.* 1999:76). We do not know, however, which kind of tools were used. Late pre-Hispanic potters of the valley of Mexico gave to common vessels, such as those for cooking, storage and transportation, a similar surface finishing that was simple and without extra decoration. The surface of this kind

of object shows the natural color of the fired clay, which is generally orange, light orange or orange-brown (Blanton and Parsons 1971:304). The surface is usually relatively well smoothed but hastily burnished, that is, strikes left by the burnishing tool can be seen (Blanton and Parsons 1971:304). As these marks show, vessels were frequently burnished in horizontal direction, somewhat irregularly. The incidence of a few vertical strikes shows, however, that on occasion potters burnished the vessels in vertical or irregular directions. Small vessels were better burnished than bigger ones (Blanton and Parsons 1971:304). In addition, *comales* were made with an extremely rough base in order to resist thermal shock. Their interior surface is, in contrast, like other cooking vessels, well smoothed and relatively well burnished. Potters also made simple vessels for serving, which had the same surface finishing as cooking implements and were as well not decorated. These vessels were often burnished in horizontal direction, although vertical and irregular burnishing also occurs (Blanton and Parsons 1971:304).

Potters also made serving vessels with painted decoration. These objects show more variety in surface finishing. The most frequent were orange bowls and plates with black painted decoration (archeologists name them today Black-on-Orange vessels) (Figure 1). These objects maintained the natural orange-brown color of the fired clay. They were on the interior and exterior well smoothed and hastily burnished so that strikes are clearly seen, and the final appearance was matte. Vessels were often burnished in horizontal direction, but some vertical and irregular marks suggest that they were also sporadically burnished in other directions. Conical supports of tripod vessels were burnished, but other kinds of supports, such as those molded in stepped shape, did not receive any kind of finishing (Whalen and Parsons 1982:441). Afterwards they were decorated with black designs. Potters also made serving vessels with red decoration; archeologists name them today Red Ware (Whalen and Parsons 1982:446) or Texcoco ware (Cervantes *et al.* 2007:279; Tolstoy 1958) (Figure 2). They were as a rule better finished than the vessels with black decoration. Their orange-brown surface was well smoothed and relatively well burnished, usually in horizontal direction as rubbing marks show. In sections of the surface potters applied a thick red paint, which was polished to reach a glossy finishing, often leaving horizontal rubbing marks (Whalen and Parsons 1982:446). Some of these vessels were additionally decorated with black or white paint, or with incisions. Potters also made other serving vessels with more complex decoration

Figure 1. Fragments of Late Aztec Black-on-Orange vessels from the valley of Mexico.

Figure 2. Fragments of late pre-Hispanic Red Wares from the valley of Mexico.

and higher quality. These objects were painted with red, orange and black designs in the same style as the famous late pre-Hispanic polychrome ceramics from Cholula (archeologists name the vessels of the valley of Mexico Chalco Polychromes). The orange-brown surface of the vessels was well smoothed, although most of it was covered with a thin white matte slip, which was used as background for the painted decoration. Subsequent to the painted decoration, potters polished the vessel surface to reach a glossy finishing, usually in horizontal direction (Whalen and Parsons 1982:441, 446). As most of these objects were open bowls and plates, they received more complex decoration and better polishing in the interior than on the exterior.

Potters also made censers, which had an orange-brown surface relatively well smoothed, sometimes with a fugitive white or cream matte slip (Parsons *et al.* 2008:406). These objects were decorated with several techniques, such as triangular perforations, raised decoration produced by mold, and occasionally red paint (Charlton *et al.* 2008:247). Potters produced as well vessels for salt-making. Their exterior surface had the natural orange-brown color of fired clay and was quite rough due to impressions of baskets and fabrics made when the clay was still wet (Blanton and Parsons 1971:312-313). The interior surface was better finished; the bottom was carefully smoothed while the upper part of the walls was only slightly planed by hand. During the five last centuries before the conquest potters from the valley did not notably modify the surface finishing of their ceramics. Although the decoration of vessels for serving had clear alterations, the methods for modifying the structure of their surface remained stable.

In Cholula pre-Hispanic potters also finished the surface of common vessels, such as those for cooking, storage and transportation, in a simple manner and without extra decoration. These objects show the natural orange-red color of the fired clay and are usually relatively well smoothed but hastily burnished as the strikes left by the rubbing tools suggest. Also as in the valley of Mexico, potters finished the surface of *comales* exposed to heat with a very coarse texture, although the inner surface was well burnished with strikes in several directions. They made as well common serving vessels with simple surface finishing and without decoration; however, in the last centuries before the conquest most of these kinds of objects were decorated with painting. They received a more complex treatment; first potters smoothed the vessel surface. The surface was then covered with thin matte white

slip, and it was covered with orange or white paint. On this background, potters painted black, red or orange decorative motifs. Afterwards, they polished the surface, and submitted it to firing, and the result was a polychrome vessel with a burnished although rather matte surface. In the last two centuries before the conquest potters continued producing this kind of vessel, although they modified to some extent the decoration. Also they created an assortment of vessels that were notably more elaborate than previously and contemporary ceramics. They were made following the same process as other painted vessels in Cholula but received a very lustrous surface finishing, so that they acquired a glossy appearance. In addition, their decoration was more complex and carefully made and included elements of the pictographic corpus of the pre-colonial books from central and southern Mexico (see Hernández 2005, 2010; Lind 1994). For this reason, archeologists call them today codex-style vessels (Figure 3). These kinds of objects were also made in other places of the valley of Puebla-Tlaxcala such as Ocotelulco (Contreras 1994) and Huejotzingo (Schmidt 1975), and were similar to the fine polychrome vessels made in the valley of Mexico.

Potters of the valley of Morelos finished the surface of quotidian vessels for cooking, storage and transportation in a simple manner as well. As the study of Smith (2006b, Ch.C2) shows, their orange surface was only smoothed and burnished. *Comales* were finished in the same way as in the valley of Mexico and Cholula. Some *ollas*, however, received a thin and fugitive white slip, and there were other examples with more complex decoration made with red, black and/or white painting. Bowls and other vessel shapes for serving were often decorated following the same trends as in other regions of central Mexico, that is, by using painting of several colors such as red, black, orange and white. The surface of these serving vessels was sometimes only burnished and sometimes polished. Vessels with red surface, and decorative motifs in black, white or orange, were quite abundant in Morelos. These techniques for finishing the surface were used during at least the last two centuries before the conquest.

In sum, potters in central Mexico finished their vessels in similar manner. They shared not only the methods of rubbing the surface but also the high attention given to the surface of some serving objects. That is, in every region there were repertoires of fine polished vessels with polychrome painted decoration. Surfaces were not decorated with vitreous glaze in pre-Hispanic Mesoamerica. Plumbate ware, a

Figure 3. Fine polychrome vessel with pictographic decoration from a burial in Cholula (Suárez 1989) deposited at INAH Puebla (photo by Sergio Suárez).

widespread trade pottery made in the Soconusco region on the coast of Guatemala during the tenth and eleventh centuries, has some similarity to glazed ceramics. These ceramics have a fine ferruginous slip, which after firing have an iridescent gray/orange color (Shepard 1948). Although this slip is vitrified in some places due to the particular mineralogical composition and firing, it is not a high-fired vitreous glaze (Rice 1987:20). This technology, however, did not continue in Mesoamerica after Toltec times.

(d) *Firing*

The main aim of firing is to subject vessels to sufficient heat for a long enough time to assure the permanent change of physical properties of clay. As the ceramist Owen Rye (1981:25) explains, depending on the composition of the clay, the minimum temperature varies between

500°C and 700°C. Potters should control during firing the rate of temperature, the maximum temperature and the atmosphere surrounding the objects. These aspects not only permit, or not, a successful firing, but also determine the hardness, porosity, stability and appearance of ceramics. For example, the atmosphere surrounding the objects during firing clearly influences the final products. An oxidizing atmosphere, that is, with excess of oxygen due to excess of air, produces vessels of orange and brown color. A reducing atmosphere, that is, with abundant carbon monoxide resulting from insufficient air, produces vessels of gray and black color. Potters can fire their vessels in open firing or in kilns. Although the first involves little or no building, it requires a high degree of skill and observation. As Rye shows (1981:25), the kiln does not always represent an advance over open firing, as some kilns do not permit a good control of temperature or may require more fuel as the structure must also be heated. Nevertheless, he adds, kilns with one chamber for fuel and another for vessels are more efficient than open firing, as they permit a better control of temperature and air circulation.

Thus, firing requires knowledge and experience, which can be learned and transmitted across generations, but also facilities (if a kiln is used) and fuel. The firing atmosphere is visible in the final products; however, other aspects of the method used for firing, such as the temperature and the kind of kiln or fuel used, are not visible. For this reason, users, relatives or neighbors are normally not involved in this part of the process of ceramic-making. However, as present-day potters explain, the method used may be modified or replaced as changes in control of heat, type of kiln or fuel may make the production more efficient, and here fellow potters may give advice and new ideas. Ceramic remains alone do not permit us to identify all conditions of ancient methods of firing. Areas or structures for firing and damaged vessels may provide information on the control of temperature but they are not always found in archeological contexts.

The firing technology in central Mexico during late pre-Hispanic times is poorly known given the scarcity of published information on ceramic workshops. Nevertheless, the partial excavation of several pottery workshops in Tula has given important information on this topic. In Tula potters used two-chamber updraft kilns (Hernández *et al.* 1999:73). That is, they constructed circular kilns (one excavated kiln had 116 cm diameter) with one lower chamber for fuel, separated from the upper chamber for the pots by a floor. The chamber was

more or less above the firebox, creating the effect of a chimney. Kiln walls were constructed with adobe and stones; both the firing and fuel chambers had a pottery pipe, probably for controlling the air flux during firing. This facility at Tula was similar in technology to the two-chamber kilns used at that time in Spain (Lister and Lister 1987:147), indicating that the firing technology on both sides of the Atlantic developed in a parallel way. The excavations in that area also revealed the existence of firing floors, which are evidence of open firing, and of pit kilns, which are shallow firing places (Hernández *et al.* 1999:73). The use of various firing technologies in that city suggests that pottery workshops had different levels of specialization and intensities of production, a common pattern in present-day pottery towns.

In the valley of Mexico ceramic remains suggest that potters fired their vessels in an oxidizing atmosphere, as usually their color ranges from orange to brown. Occasionally, remains of common vessels for cooking, transportation and storage show dark firing cores, that is, when the cross-section of a freshly broken sherd has a center distinct in color from the surface. This shows that this kind of vessel did not always receive sufficient heat for a long enough time, a condition typical of most unglazed ceramics everywhere (Rye 1981:115). Also potters did not always have good control of the firing process as these vessels often show firing clouds in the surface, which implies that they were in contact with fuel during firing and were not fired for enough time to permit the complete combustion of carbon. Wares for serving, both orange vessels without decoration and orange vessels with black decoration, sometimes have dark cores, but only occasionally firing clouds. The same is the case for orange vessels with polychrome decoration. These patterns could be the result of firing small serving vessels together with larger cooking vessels. That is, serving vessels might be grouped in the place of firing and then covered by the larger cooking vessels, as present-day potters often do. In this way serving objects received less heat but were not in contact with fuel while cooking objects received more heat but were exposed to fuel. In that case potters used the same firing method for all orange vessels.

Red wares, in contrast, were fired in fairly different conditions. These vessels have almost always a very distinctive dark firing core (Blanton and Parsons 1971:309). Often inner surfaces are blackened, which suggests they were fired upside-down. Also they have well-documented variations in the tone of the red painting; some are brightly red while others are quite dark or quite light (Cervantes and

Fournier 1995:101), which suggests temperature fluctuations. In addition, they are less hard than orange vessels. It seems that this ware was fired at lower temperatures and with less heat control than other wares. This might suggest that these wares were made in different workshops than orange wares, or at least fired separate from orange wares. Pots for salt-making also show a different firing process. They again evidence that they were hastily and cheaply made. They were low fired as they usually have a dark core, and even in a few cases all the cross-section of sherds is dark; also their texture is usually quite crumbly (Blanton and Parsons 1971:312-313). Ceramic remains suggest that during the five centuries before the conquest potters did not make significant changes in their firing technology. Orange and red wares as well as salt-making vessels do not evidence modifications in firing conditions.

In the Puebla-Tlaxcala valley potters also used kilns. Rafael Abascal (1975) reports that in an extensive surface survey in Tlaxcala were found several pits used as one-chamber kilns to fire pottery and shallow pit-kilns, which he assigned to different periods and settlements of the pre-Hispanic history of the region. In Cholula, late pre-conquest ceramic remains suggest a method of firing similar to that of the orange wares in the valley of Mexico. Also it seems that all potters of the city used in broad terms the same process to fire their vessels, as all sherds have similar color range, hardness and porosity. There were some variations between the wares for cooking, transportation and storage and the wares for serving. The first often have firing clouds, while the serving vessels do not have these clouds but present on occasion dark cores. As in the valley of Mexico, it shows that during firing it was important to protect serving vessels from fuel, while cooking vessels could be exposed to it. The fine polychrome wares evidence the same firing conditions as the other decorated serving vessels of the city. Thus ceramic remains indicate that potters used the same firing methods for all their vessels. Also we cannot recognize changes during the last five hundred years before the conquest.

In the region of Tlaxcala ceramic remains suggest that in broad terms potters used similar methods of firing as in the valley of Mexico and Cholula (Castillo 2007:118-123). In contrast, east of the valley of Puebla-Tlaxcala, in the Tehuacan valley, potters clearly used other firing methods. Many vessels are gray (Castillo 2007:142-146; MacNeish 1970), which indicates that they were fired in a reducing atmosphere. This could be a result of covering the vessels during firing so that air

could not circulate. In that region, however, not all vessels were gray; potters also produced orange vessels, the result of firing in an oxidizing atmosphere. In the valley of Oaxaca the technology of reducing firing was used since very early times (see Caso *et al.* 1967). Thus the Tehuacan valley was the area where the ceramic firing technologies of central Mexico and Oaxaca were in contact. In the valley of Morelos, ceramic remains also suggest firing methods similar to the valley of Mexico and the valley of Puebla-Tlaxcala. Fired vessels are also orange-brown, and sometimes have dark cores (Smith 2006b, Ch.C2). In this area potters also produced a red ware similar to that of the valley of Mexico, although it does not seem to be fired in different conditions from the orange ware, as it does not show a high incidence of dark cores and color variation in the surface as is the case of this kind of vessel in the valley of Mexico. In sum, potters of central Mexico fired their vessels using two-chamber kilns, pits, shallow pit kilns and open firing. The analogous visual appearance of finished vessels throughout central Mexico suggests that potters had similar technologies and preferences for firing during the last centuries before the conquest.

(e) *Decoration*

Decorative techniques for ceramics take into account the possibilities offered by the various properties of clay during the process of drying and the effects of firing. Knowledge related to these aspects can be learned and transmitted across generations. However, as this part of the process of ceramic-making is highly visible, potters may easily make changes influenced by users, relatives, neighbors or colleagues (see Gosselain 2000:191). Designs and patterns executed in a particular decoration technique may even be more easily modified as this does not require extra technical knowledge but only new ideas resulting from inspiration, imitation or reinterpretation. The techniques used for decorating ancient ceramics can be identified from vessel remains alone, but the meanings that ancient producers and users of vessels attributed to decorative motifs are difficult to recognize. On the one hand, decoration on ceramics is an index of preferences, influences and social context of potters and users. Archeologists may be able to have insights into these aspects by means of, for example, comparing large collections of ancient ceramics from different contexts and places. On the other hand, ancient decoration might also have a

particular intended meaning and a particular function, and this is more difficult to identify. The function of decoration on this media is culturally determined; for example, in some places decoration animates a vessel. This is the case of the present-day Maya Lacandon *läkil k'uh*, gods' dishes, small censers which are animated by means of its decoration (face and attributes of gods), prayers and offerings (McGee 1998:42-43). Also decoration might have an important role in ritual practice, as apparently was the case of the late pre-Hispanic fine polychrome serving wares from Cholula, which were decorated with well-known symbols of the Mesoamerican rituality (see Hernández 2005, 2010). Nevertheless, decoration might also be only a way to increase the object's aesthetic value. In addition, in a particular society not all decoration on ceramics has the same importance. Some vessels may be decorated with motifs that do not intend to convey deep meanings, while others may have motifs with complex and multilevel connotations. The latter may be the representation of something (a thing, an idea, an action) but this is not all. The object's makers and users might assign to the thing, idea or action represented particular meanings, which might vary or be enlarged according to their knowledge and experience. Thus the interpretation of decoration on ancient ceramics is a complex task, and requires more sources of information than vessel remains alone.

In late pre-Hispanic central Mexico most of the decoration on ceramics was made with painting (see e.g., Cervantes *et al.* 2007; Noguera 1954; Whalen and Parsons 1982). During the florescence of Teotihuacan several centuries earlier, in contrast, ornamentation was often made with incisions, carving and applications (see Rattray 2001). In the valley of Mexico common serving vessels, as well as elegant versions, were often painted following two widespread styles, the orange with black decoration and the red decoration. Orange ware with black designs on the natural fired color of the surface (Black-on-Orange ware) was the most frequent. The patterns of the black decoration had chronological and spatial variation (see Blanton and Parsons 1971:298; Cervantes and Fournier 1995:100; Cervantes *et al.* 2007; Minc *et al.* 1994; Whalen and Parsons 1982:441). Early vessels, that is, made in the Early Aztec period, from about the tenth century till the rise of the Aztec empire in the fourteenth century (ca. AD 900-1350, Brumfiel 2005; Sanders *et al.* 1979), were decorated with patterns of thick black lines and curvilinear motifs. Late vessels, that is, made in the Late Aztec period, from the rise of the empire till the conquest (ca. AD

1350-1521, Cervantes *et al.* 2007:280; Charlton 2000; Hare and Smith 1996), were decorated with similar patterns but lines and motifs were markedly thinner and more homogeneous (Figure 4). Early vessels also show variation in composition of decoration according to their spatial distribution. Leah Minc *et al.* (1994) have identified three different decorative patterns associated to three regions of the valley. Furthermore, both early and late vessels included in the decoration several signs that were part of the corpus of pictographic writing used at that time in central Mexico, such as the step-fret called in Nahuatl *xicalcolihqui*,⁴ conventionalized representations of feathers and precious stones, which were often used to symbolize qualities such as nobility and preciousness in pre-colonial books, architecture and objects. Less common motifs were stylized serpent heads and the 'Maltese' cross, symbol of *tlillan*,⁵ 'blackness' in Nahuatl (Anders *et al.* 1991:222-223), which could have more complex meanings. In the vessels these signs might occur isolated, like at the bottom of plates and bowls, or combined with groups of lines and curvilinear motifs painted on bands on the walls.

Red Ware, in contrast, had different decoration. These vessels were ornamented with large sections of thick and well polished red paint, and often black designs (Figure 5); less frequently they also included white painting or incisions (see Blanton and Parsons 1971: 309; Cervantes and Fournier 1995:100; Cervantes *et al.* 2007:300; Whalen and Parsons 1982:446, 450). Although their spatial and chronological variation is less known, we can recognize that the decoration of Early Aztec and Late Aztec vessels was fairly different. Early examples usually had in the walls several thick vertical black lines separated various centimeters from each other while later examples had thinner lines, often grouped in various sets. Less frequently, potters made red vessels with black and white lines and motifs. The small fragments found in archeological contexts show more complex decoration than other Red Wares, such as bands of different colors, geometrical motifs and

⁴ *Xicalcolihqui* was the Nahuatl name at that time for a standard and frequent step-fret motif composed of three steps linked to a hook. In the so-called *Magliabechi Codex* (1983:6) is represented a blanket with this motif with the gloss 'manta de jicara tuerta', which is the literal translation of the word *xicalcolihqui*. This sign possibly had different meanings in Mesoamerica since it occurs since the third century in different pictographic themes, contexts and places. In the Maya and Mixtec areas it was associated to nobility contexts and important lineages.

⁵ In various place-names and titles in the *Codex Mendoza* (1992:18r, 46r, 65r) this word is represented with such a motif.

Figure 4. Patterns of decoration on Early and Late Aztec Black-on-Orange vessels from the valley of Mexico: (a) Early Aztec tripod bowl (based on Minc *et al.* 1994: Fig. 6.2a) (b) Early Aztec bowl (based on Minc *et al.* 1994: Fig. 6.3b) (c) Early Aztec bowl (based on Minc *et al.* 1994: Fig. 6.3d) (d) Early Aztec tripod plate (based on Minc *et al.* 1994: Fig. 6.4f) (e) Early Aztec bowl (based on Cervantes *et al.* 2007: Fig. 9) (f) Early Aztec plate (based on Cervantes *et al.* 2007: Fig. 14) (g) Early Aztec plate (based on Minc *et al.* 1994: Fig. 6.4k) (h) Early Aztec plate (based on Cervantes *et al.* 2007: Fig. 23) (i) Early Aztec bowl (based on Minc *et al.* 1994: Fig. 6.6h) (j) Early Aztec bowl (based on Minc *et al.* 1994: Fig. 6.5i) (k) Early Aztec tripod bowl (based on Minc *et al.* 1994: Fig. 6.5k) (l) Late Aztec tripod bowl (based on Cervantes and Fournier 1995: Fig. 2) (m) decoration pattern on Late Aztec plate (based on Cervantes and Fournier 1995: Fig. 8) (n) Late Aztec plate (based on Cervantes and Fournier 1995: Fig. 5) and (o) decoration pattern on Late Aztec bowl (based on Cervantes and Fournier 1995: Fig. 9).

Figure 5. Patterns of decoration on late pre-Hispanic Red Wares from the valley of Mexico: (a) Early Aztec Black-on-Red bowl (based on Cervantes *et al.* 2007: Fig. 15) (b, c) Late Aztec Black-on-Red bowls (based on Charlton *et al.* 1995: Fig. 1) (d, e, f) Late Aztec Black-on-Red bowls (based on Cervantes *et al.* 2007: Fig. 61) (g, h, i) Late Aztec Black-on-Red vessels (based on Charlton *et al.* 2007: Fig. 19) (j, k, l) Late Aztec White-and-Black-on-Red bowls (based on Cervantes *et al.* 2007: Fig. 62) (m) Late Aztec White-on-Red bowl (based on Cervantes *et al.* 2007: Fig. 39) (n, o) Late Aztec White-and-Black-on-Red bowls (based on Cervantes *et al.* 2007: Fig. 43).

curvilinear designs, and occasionally shells in cross-section. In addition, potters produced red vessels with black lines and curvilinear motifs surrounded by incisions forming patterns different to those on other Red Wares. It seems that these vessels were only made during the Early Aztec period (ca. AD 900-1350) (Whalen and Parsons 1982:446). All these Red Wares and the Black-on-Orange wares were common serving vessels made in several places in the valley, as compositional analysis of the clay suggests (Minc *et al.* 1994). The painted

designs were in general simple, schematic and hastily done, which suggests that they did not play a special role in the communication of meanings relevant to the contexts where these objects were to be used. Black-on-Orange wares and Red Wares, however, did not share decorative patterns at all and their firing process was to some extent different, which may indicate that they were made in separate workshops.

In addition, potters of the valley of Mexico made less frequently a better polished and more colorful serving ware that consisted of orange vessels with red, black, orange and white motifs (called Chalco Polychrome by Whalen and Parsons 1982:441, 446). Although the majority of the extant examples are small fragments that do not permit us to identify the polychrome decoration in detail, we can recognize lines, bands, geometric elements and more complex motifs such as representations of feathers and precious stones. It seems that these vessels were more frequent in the Early Aztec period (Whalen and Parsons 1982:441-450). Potters also manufactured some objects of superior quality with complex pictographic decoration (Aztec Polychromes, Vega 1975:25) such as those found in the excavations of the Templo Mayor and its surroundings (Batres 1979; López Luján 1993). These vessels were painted with a number of signs and thematic groups of signs of the pictographic writing of that time in central Mexico. The context of these signs in other media and colonial documents suggests that they were associated to important meanings in the context of Mesoamerican ceremonialism, such as piety, preciousness, nobility, but also to deeper religious concepts, as will be discussed later in this chapter (see also Hernández 2005). Besides all these painted wares, potters also made censers and braziers decorated with other techniques, such as incisions, perforations and applications. Since early times in central Mexico these methods of decoration were distinctive of this kind of artifact frequently exposed to fire.

In Cholula late pre-Hispanic potters also decorated their vessels with painting, but they developed local styles different to those of the valley of Mexico. Since around the tenth century there were made polychrome serving wares (see Lind 1994; McCafferty 2001), that is, vessels with a white thin slip covered by a well-polished orange slip, and red, white, orange and black decoration. It consisted of bands of motifs, such as lines, curvilinear elements and schematic representations of feathers, precious stones and *xicalcolihqui*, disposed around the vessel's walls and bottom. Motifs and their style had modifications through the last centuries before the conquest (see Hernández 2005;

Lind 1994; Noguera 1954; Rojas 2008). Some early examples (ca. AD 950-1150, Lind 1994:81) had similarity to the painted wares of the valley of Mexico. Although the colorful vessels were better done than contemporary plain wares for serving, they were still common and frequent utensils accessible to a large part of the population, as their archeological contexts suggest. In the last two centuries before the conquest potters produced, besides the common polychrome wares, also finer and more exclusive serving vessels with complex and colorful decoration and high quality finishing. These polychrome vessels had signs and arrangements of signs from the pictographic corpus of central Mexico depicted in the same style as in the valley of Mexico (Figure 6), though it seems that they were more renowned than the vessels made in the valley, as Díaz del Castillo (1980:167) mentions that they were also used at Moctezuma's palace. In the region of Tlaxcala, and in Cuauhtinchan, Tepeaca and Tepeji, east of the valley of Puebla-Tlaxcala, there were also made colorful serving wares decorated like the common polychromes of Cholula (Castillo 2007:120-125). In addition, in towns not far from this city, like Huejotzingo, Ocotelulco and Tizatlan, there were also manufactured fine polychrome vessels with pictographic decoration (Castillo 2007; Contreras 1994).

In the valley of Morelos potters also decorated their vessels with painting. Red wares similar to those of the valley of Mexico were the most common (see Smith 2006b, 2007). These vessels had a red slip, and on it black lines, geometric motifs and curvilinear elements with a lot of variation in composition. Sometimes decoration patterns were similar to those of the valley, but there were also various local styles. Potters also made a polychrome ware, that is, vessels with white slip and red, black and orange designs. The painted motifs were simple, like lines and curvilinear and geometric elements, although there was a lot of variation in composition. Both red and polychrome wares were common serving vessels.

To sum up, in late pre-Hispanic central Mexico ceramics for serving were often decorated with painting, although there were many local styles. Painted motifs were in general vivid, but simple and hastily done, thus we believe that they did not have important intended meanings in the contexts where the vessels were to be used. Not all serving vessels were decorated, however. In every region here considered, potters also produced simple and undecorated serving wares. In addition, in the last centuries before the conquest potters made a

Figure 6. Pictographic decoration on late pre-Hispanic fine polychrome vessels from Cholula: (a) goblet deposited at INAH-Puebla (b) censer deposited at Universidad de las Américas-Puebla (c) plate of frying-pan censer deposited at INAH-Puebla (d) goblet deposited at Universidad de las Américas-Puebla.

higher quality ware with more complex decoration. The majority of these fine polychrome vessels were for serving, although there were also censers. We believe they were used in feasting, in particular at prominent places such as palaces and temples, although, as their archeological context shows, they were also present in domestic spheres and served as offerings in burials (see Hernández 2010).

(f) *Assembling vessel shapes*

The shape of ceramic objects is the result of several interconnected variables: function, physical properties of materials, forming method and aesthetic preferences of potters. Therefore the form of a vessel may change even if its function remains the same. Likewise, shifts in function may not be evident in its shape. The technique to make particular vessel shapes can be learned and transmitted through generations. Nevertheless, potters can easily modify their size, proportions and silhouette by the influence of users, relatives, neighbors or fellow potters. Even if vessels are completely made by mold, potters can simply alter their shape by using a new mold. In addition, potters nor-

mally produce particular assemblages of vessels. That is, they made a specific variety of vessels for cooking, such as several kinds and sizes of *ollas*, bowls and *comales*, as well as a variety of vessels for serving food and drink, like bowls, dishes, plates, goblets and vases, and usually also several objects for ritual purposes, such as different kinds of censers. The variation in the repertoire of vessel shapes across time and space is meaningful. In particular the variation between different functional classes of objects is interesting for archaeologists, as it may reflect consume and stylistic preferences, variation in cooking and eating habits, and the role of ceramics in ritual practices.

Although late pre-Hispanic central Mexican potters made a wide variety of vessel forms, in the regions here considered the shape repertoire was in broad term similar. In the valley of Mexico the most common vessels designed for cooking, storage and transportation were orange high-necked and short-necked *ollas* of various sizes, some of them with globular bodies and three handles on the shoulders, as well as basins with upright walls or flaring walls (Figure 7) (see Blanton and Parsons 1971:299; Cervantes *et al.* 2007:283-284; Whalen and Parsons 1982:438-441, 450). There were also simple hemispherical bowls (smaller, better finished and with thinner walls than basins) and *comales*. These common vessels, little visible as they were used in domestic contexts, did not present notorious changes from the Early to the Late Aztec periods. Exceptions are the *comales* that became thinner and more curved in later times (Whalen and Parsons 1982:450).

Elizabeth Brumfiel (1991:240-241) found that in several places of the valley of Mexico the ratio of cooking pots to griddles decreases from the Early to the Late Aztec periods. According to her, this shows that in Late Aztec times people preferred more dry griddle foods (instead of maize porridges or soups cooked in bowls and *ollas*), and this might be related to a more mobile labor force at that time as *tortillas*, *totopos* and other dry griddle foods are easier to carry and consume away from home. In addition, Garraty (2006a:163-164) studied the variability of vessels' attributes in the valley of Mexico during the Early and Late Aztec periods. He found that Early Aztec cooking vessels had more variation in attributes (like shape of the rim, thickness of the walls) than serving vessels, which suggests that cooking vessels were produced in more places for local consumers, while serving vessels were apparently produced in fewer large-scale production places. In contrast, in the Late Aztec period the attribute variability is lower

Figure 7. Late pre-Hispanic vessel shapes in the valley of Mexico: (a, b, c) *ollas* (d) basin with upright walls (e) basin with flaring walls (f) *comal* (g, h, i) censers (j) pitcher (k) basin with upright walls (l, m) hemispherical bowls (n) bowl with upright walls (o) hemispherical bowl (p) bowl with upright walls (q) bowl with flaring walls (r) dish (s) tripod bowl with flaring walls (t) *molcajete* (u) bowl with upright walls (v, w) miniatures (x, y) goblets (z, aa, bb, cc) bowls with upright bowls (dd) bowl with composite silhouette (ee) goblet (ff, gg) bowls with upright walls (hh) plate. Not scaled.

both for cooking and serving vessels, and this may imply the existence of fewer pottery centers in the valley which were involved in large-scale production and distribution (Garraty 2006a:199-201).

Common vessels designed for serving food and drink were the Black-on-Orange bowls with upright or flared walls, dishes (lower than bowls) with large tripod supports that could be solid conical, hollow cylindrical or wide thin slabs, *molcajetes* (bowls with striated interior bottom for grinding chilli sauces) with the same kind of supports, and plates (lower than dishes and without supports) (Blanton and Parsons 1971:294; Whalen and Parsons 1982:441, 450). The size of all these vessels could be appropriate for individual servings or for small portions of food, but there were also basins and pitchers decorated in the same style that were larger, as if they were for several portions of food and drink. The shapes of Red Wares were slightly different and less varied than Black-on-Orange vessel shapes. Most of them were bowls with upright walls and no appendages of any kind; though occasionally there were also goblets with high pedestal base and hemispherical bowls with tripod conical supports (Blanton and Parsons 1971:309; Brumfiel 2004:247; Cervantes *et al.* 2007:298-99; Charlton *et al.* 1995:139; Whalen and Parsons 1982:450). All these common, and more visible, serving vessels did not evidence notorious changes from the early to the late period; only their walls became thinner in later times. The common polychrome ware had less formal variety; most vessels were shallow bowls with flared walls and tripod hollow cylindrical supports (Whalen and Parsons 1982:441, 446). In contrast, the fine polychrome vessels with pictographic decoration had a large formal inventory, similar to that of analogous vessels from Cholula. In addition, potters made censers, well-known ritual paraphernalia in ancient Mesoamerica. Usually they were basins with a long handle, often finishing in a serpent-head (Charlton *et al.* 2007:453-454), but there were also larger basins with high upright walls and complex applied decoration (Cervantes *et al.* 2007:303). Containers for salt-making had upright and thick walls; some of conical silhouette, others of straight silhouette with flat base (Blanton and Parsons 1971:312-313; Charlton *et al.* 2007:453).

In Cholula, as in other places of the valley of Puebla-Tlaxcala (see Castillo 2007), vessels designed for cooking, storage and transportation were in general terms similar to those of the valley of Mexico. The same was the case for the regular decorated vessels for serving. In Cholula the most common shapes of this kind of object were bowls

with upright or flared walls and tripod supports, dishes with tripod supports and plates without supports. Earlier vessels had large hollow cylindrical supports while later examples usually had solid conical supports. The fine polychrome ware with pictographic decoration had, in contrast, a wide variety of shapes, which suggests that it was made for different uses. A number of them were censers, though most were designed as serving vessels (Figure 8). Some were appropriate for drinking, like goblets, jars, vases and hemispherical bowls. Other vessels would have been appropriate for individual consumption, such as plates, tripod bowls and hemispherical bowls, and some would have been used for the collective serving of food and drink such as pitchers, craters, bottles and big bowls. From their shape and high quality, these vessels were probably serving wares for feasting, but some of them were also containers for offerings of food, beverages or other substances, given the fact that they have been found in burials and are represented in codices as receptacles for offerings during diverse ritual activities. For example, in the *Codex Borgia* (e.g., 1993:8, 24, 45) and the Mixtec codices (e.g., Nuttall 1992:12), vessels of similar shape appear as containers for food, burning resins, *pulque*, cacao or blood in diverse ceremonies. The vessels' repertoire of the fine polychromes in the valley of Puebla-Tlaxcala was similar to that of the valley of Mexico. Collections of complete and semicomplete vessels from the valley of Mexico: El Volador (Batres 1979) and Templo Mayor (López Luján 1993) and from several contexts in the valley of Puebla-Tlaxcala suggest that the most frequent shapes were goblets, bowls and vases (Hernández 2005:Table 8,2; Smith *et al.* 2003:Table 9,3). In contrast, in other regions where these wares appeared the assemblage of shapes was somewhat different. For example, in Oaxaca the most frequent form was the tripod jar, a shape not represented at all neither in Puebla-Tlaxcala nor in the valley of Mexico (Hernández 2005:223-236).

In the valley of Morelos vessels for cooking, storage and transportation were also similar to those of the valley of Mexico (see Smith 2007:158-160). In contrast, vessels for serving food and drink were to some extent different. The most common shape was the simple bowl with flared walls, while tripod vessels were quite rare; less frequent were the goblets with flared or globular walls and pedestal supports, and the jars. Censers with long handles and serpent heads were also present. In brief, the central Mexican vessel shapes reflects shared and widespread late Pre-Hispanic habits, such as using ceramic containers

Figure 8. Shapes of late pre-Hispanic polychrome vessels with pictographic decoration from Cholula: (a, b, c) bi-conical vases (d) vase (e) goblet (f) tripod bowl with flaring walls (g) bowl with flaring walls (h) hemispherical bowl (i) plate (j, k) censers (l) composite silhouette basin (m) crater (n) bottle.

for cooking, eating, storage and transportation, making their own *tortillas*, eating and drinking from individual vessels, using censers to smoke both in public and domestic contexts, and having a special ware for more special uses like feasting, offering and other ceremonial activities. In addition, from the Early to the Late Aztec periods we observe a trend toward more standardization in vessel shapes, which seems to be a consequence of the existence of larger workshops involved in interregional exchange.

In sum, the variety of ceramic vessels made in central Mexico during the last centuries before the conquest was the result of the ways in which potters accomplished every stage of the process of manufacturing. In every one of these tasks there were diverse circumstances which

guided their work, in particular the manner in which they learnt this craft, their social network, their available natural resources but also the economic and political panorama. For this reason, they had in every step of the process different attitudes regarding continuity, change or innovation. An historical event that had considerable impact on parts of the process of manufacturing of some regional ceramic industries was the rise of the Aztec empire in the fourteen century.

The impact of the Aztec empire on ceramic-making

The indigenous historical manuscript known as *Tira de la Peregrinación* indicates that in 1163 the Aztecs began their migration to the valley of Mexico. The manuscript known as *Codex Mendoza* mentions that they founded Tenochtitlan in 1325. At present we call the span of time between both events the Early Aztec period, and the time after the foundation of that city till the Spanish conquest the Late Aztec period. According to Alva Ixtlixochitl (1975-1977), in 1428 the Aztecs together with the Acolhua of Texcoco and the Tepanec of Tlacopan created the Triple Alliance. They dominated the approximately fifty *altepetl* estimated for that moment in the valley (Hodge 1984:139-140), expanded to other regions and became an empire based on military control. In conquered places they did not remove ruling families, and they often became related by marriage to Aztec nobles, and established different terms of tribute according to local conditions and their own priorities. When the Spaniards arrived less than a hundred years later, large regions of Mesoamerica were tributaries of the Aztecs (see Barlow 1949; Berdan *et al.* 1996; Hassig 1988).

The empire brought various economic changes in central Mexico, which resounded also in the ceramic industry. Specialists using large collections of ceramics from extensive regional surveys and analytical methods for identifying vessels' provenance, agree that ceramics were widely traded within the valley of Mexico during the Early Aztec period but the rise of the empire brought important changes in their production and exchange (Garraty 2006b; Hodge and Minc 1990; Minc *et al.* 1994; Nichols *et al.* 2002). They identify that before the rise of the empire potters (or their intermediaries) traded their products in the several markets of their *altepetl* or associated centers, but only seldom in the markets of other places. According to Garraty (2006a:163,

190), at that time most workshops produced the whole range of non-decorated cooking vessels, which were only distributed in local or nearby markets, while decorated ceramics were often made in few more specialized workshops and had a wider circulation. After the rise of the empire ceramics were exchanged in a more centralized system. It seems that tribute collection and imperial control of trade and markets resulted in ceramics from a smaller number of places being widely distributed in the valley, and Tenochtitlan and its hinterland becoming the principal producer. However how this exchange functioned and how much control was exercised by the Triple Alliance is still unclear (see Charlton *et al.* 2008; Garraty 2006b; Hodge and Minc 1990; Minc *et al.* 1994; Nichols *et al.* 2002). In addition, the tributary plan of the empire probably altered the manufacturing specialization of some towns. For example, Cuauhtitlan was an important producer of ceramic vessels in the valley, however in the *Codex Mendoza* these products were not listed as part of its tribute obligations, which suggests that its inhabitants had to give more emphasis to other productive activities. Maybe this is true, but as an anonym reviewer of this work indicated, it is also possible that they simply kept on producing pottery and exchanged it in the market for products that they had to render in tribute.

Ceramics made in the valley of Mexico and associated with the Aztec culture were also distributed to several other regions, a difficult enterprise considering the transportation techniques at that time (i.e. lack of pack animals and the wheel) and the mountainous landscape of central Mexico. A detailed study of long-distance trade in imperial times (Smith 1990) shows that Black-on-Orange wares were the most common ceramic products of the valley exchanged in other regions. Most of the places in which those objects have been found were controlled by the empire, such as Calixtlahuaca, Malinalco, Cuernavaca and other localities in Morelos, and even remote settlements such as Coixtlahuaca and Quauhtochco. However some vessels were also present in regions not controlled by the empire, like the Tehuacan valley. According to Smith (1990:162), this shows that these ceramics were traded through common commercial networks and markets rather than through empire direction, although the political relations established by the Aztecs clearly facilitated such commercial exchange. Even if the shape and decoration of these common vessels followed the stylistic trends at that time, they had a distinctive Aztec flavor as in no other region were similar objects made. For Smith (1990:161), the

high frequency of common Aztec serving wares in many places is only one example of the recurrent and extensive interregional trade in central Mexico and neighboring regions during the last two centuries before the conquest, a time of high population increase and mobility. However Aztec ceramics were very rare in *altepetl* independent of the empire, like Tlaxcala or Cholula (see McCafferty 2001; Müller 1978; Noguera 1954). Even in those places potters did not decorate their vessels in styles alike to the Aztec orange and black vessels. This was rather unusual considering that during Teotihuacan times, and even earlier, ceramics from the valley of Puebla-Tlaxcala and the valley of Mexico were quite similar. The development of different local ceramic styles was possibly a result of reduced contact between those regions, but it could also be that certain animadversion to the Aztec empire played a role. In addition, the large and far distribution of Aztec common vessels contrasts with the very few ceramics from other regions found in the valley of Mexico. This suggests that interregional trade of ordinary goods not only responded to commercial needs of markets and contacts of traders, but also to the political situation at that time.

The interregional exchange of luxury ceramics probably had different channels of distribution, which were guided by other economic and political motivations. For example, fine polychrome objects with pictographic decoration were made in several regions of Mesoamerica, such as the Puebla-Tlaxcala valley, the valley of Mexico, the Mixtec region and the valley of Oaxaca as analytical studies of vessels' provenance show (Neff *et al.* 1994). They were even made in Western Mexico (Ekholm 1942; Meighan 1971:761) and the Greater Nicoya in Nicaragua and Costa Rica (Day 1994; McCafferty and Steinbrenner 2005). However, the vessels manufactured in Cholula were renowned and were present in important contexts of the Aztec capital. Moctezuma used this objects according... Also in two large deposits of fine serving vessels near the Templo Mayor, one in the ex-plaza del Volador (López Luján 1993:26) and the other in the street of Escalerillas (Batres 1979), several examples have been found that according to their shape and pictographic composition were from Cholula, or at least from nearby localities.⁶ These objects came from a place that was not integrated into the empire, but was an important religious

⁶ The shape and pictographic decoration of fine polychrome vessels varied according to the region of production. For example, vessels from Cholula have shapes and thematic complexes of signs that do not appear in the Mixtec area or the valley of Oaxaca and vice versa (see Hernández 2005; Lind 1994).

and pilgrimage center. Thus their exchange was probably not regulated by imperial economic strategies but by other cultural considerations. The two caches of fine vessels near the *Templo Mayor* might be ritual deposits after feasting, as the high quantity and concentration of fine vessels of similar function suggest (Smith *et al.* 2003). The vessels from Cholula could be acquired for those events, but they could also be fine gifts given during meetings and ceremonial events of the nobility and other prominent people. In addition, objects with complex decoration could be charged with important cultural meanings, a further motivation for their exchange to far regions. That is, ceramic vessels could also have other functions beyond their task as containers. A number of them were made to be ritual objects and even media of literacy.

Ceramics as ritual objects and media of literacy

In ancient Mesoamerica various traditions of ceramics with ritual decoration were developed in Classic times and later. Well-known today are the Maya vessels made from the fourth to tenth centuries painted with complex images that depicted gods and both public and private rituals of the nobility and a few glyphic texts (see Reents-Budet 1994). These texts were mainly phonetic, with some signs representing the sounds of syllables and others representing whole words in a particular language (logograms), but they were also pictographic (word signs picturing the object recorded) (Coe and van Stone 2005:18; Schele and Grube 1994:4). Often these glyphic texts were dedicatory statements referring in a formulaic way to the act of painting the vessel, its shape and original contents and the name of the patron or owner and the artist (Grube 1990:322-325; Houston *et al.* 1989:720). The archeological contexts of these vessels show that they were offerings in funerary ceremonies of privileged people, but their decoration and shape (many of them were vessels for drinking) suggest that they also had a role during important ritual events.

In Teotihuacan were also made polychrome vessels decorated with pictorial images and conventionalized signs although the meaning of those scenes and signs and their system of representation is today poorly understood as they seem to be highly emblematic (see Kubler 1967; Langley 1986, 1991). Many signs are iconic but others are abstract, and we still do not know if their meaning, or meanings, was

directly related to the object represented or to the associated ideas or sounds. Nevertheless, the high quality of the vessels and the depiction of ritual activities—such as acts of offering or dancing—and images with god attributes, suggest that they had also a ritual function. In other areas of the ancient Americas potters created similar objects as well. In the Andean region from the second to the ninth centuries, the Moche of the north coast of Peru finely decorated ceramic vessels with pictography representing episodes of the sacred history and other cultural narratives (see Jackson 2008).

The art of making ritual ceramics continued, or was invented again, in central Mexico during late pre-Hispanic times. Potters from the region made fine polychrome vessels with short pictographic texts that used similar signs and style of representation as the painted books of ritual and historical content of that epoch. The signs depicted on the vessels formed often standardized thematic complexes. That is, complexes of signs that seem to refer to central concepts of Mesoamerican ritual practice, as their context in pre-Hispanic painted books and the information in colonial pictographic books with explanatory alphabetical texts suggest. Some thematic complexes referred to ritual activities in general. For example, a quite frequent complex was formed by a band representing the sun plus bands of feathers and step-frets, common signs of nobility and preciousness (Figure 9). The sun in Mesoamerica was not only the principle of life, but also symbolized the sacred, and the affairs of the gods. This can be observed in the so-called *Codex Mendoza*, where several place names which included the Nahuatl particle *teotl*, ‘god’, or *teoyotl*, ‘sacred thing’, were pictographically represented by a sun (Berdan and Anawalt 1992:208).⁷ On the vessels’ solar band were usually painted the typical symbols of self-sacrifice, agave thorns and bone awls; a pair of signs which was often used in painted books as ideographic reference to piety, penitence and ritual purification (Jansen 1998:144; Nowotny 1961:27). In that way, vessels’ decoration referred to such central notions of Mesoamerican rituality. Other thematic complexes seem to be associated with particular kinds of ceremonies like, for example, the cult to the ancestors, propitiation of agricultural fertility, ceremonial drinking of *pulque*, actions around warfare, and invocation to Quetzalcoatl or to powerful *nahuales* (for a detailed description

⁷ For example, Teoaçingo, the small sacred water, is depicted with half a solar disc, a water basin and the lower limbs of a man (*Codex Mendoza* 1992:16r).

Figure 9. Fine polychrome vessels from Cholula with pictographic decoration representing the “complex of the solar band”: (a) hemispherical bowl deposited at the Universidad de las Américas-Puebla (b) plate deposited at INAH-Puebla (c) crater deposited at INAH-Puebla.

and interpretation of the complexes see Hernández 2005, 2010). In those thematic complexes were included signs with clear religious and ritual connotations, for example, images of gods (e.g., the faces of Xochipilli, Xipe or Tezcatlipoca), attributes of gods (e.g., the snail jewel, earplug or *maxtlatl* of Quetzalcoatl), or ritual symbols (e.g., cut paper, smoke, animated flints) (Figure 10). There were also signs of the late pre-Hispanic iconography of death and the death gods (e.g., skulls, bones, inner organs, severed hands, eyeballs out of their sockets), or of war and military (e.g., arrows, banner and shields, war pathways). In my opinion, the combination of several of those signs on one vessel made possible the transmission of important messages in the context of the Mesoamerican rituality. Not all codex-style vessels had such elaborate decoration, however. There were also vessels with simpler pictography, like bands of signs referring to common notions

Figure 10. Fine polychrome vessels from Cholula with pictographic complexes with religious and ritual connotations: (a) vase referring to the cult of the ancestors deposited at INAH-Tlaxcala (b) vase referring to propitiation of agricultural fertility deposited at INAH-Tlaxcala (c) bi-conical vase referring to *pulque* and fertility deposited at Universidad de las Américas-Puebla (d) goblet referring to actions around warfare deposited at Universidad de las Américas-Puebla (e) censer referring to the invocation of Quetzalcoatl deposited at INAH-Puebla (f) plate referring to the invocation of powerful *nahuales* deposited at INAH-Tlaxcala.

in ceremonial contexts such as feathers (nobility), precious stones or textiles (luxury), flowers (beauty) or stellar eyes (darkness).

Messages were depicted on the vessels in a standardized, simplified and repetitive manner. That is, signs usually appear in bands around the vessel's surface, and are often represented in pairs. A few of them are well-known Mesoamerican *difrasismos*, or diphrastic kennings, that is, couplings of words that in combination produce new meanings (Garibay 1987:67). For example, known *difrasismos* on the vessels are 'the shield, the arrows', which stands for warrior; 'the flower, the song' that stands for poetry (León Portilla 1970:75), or 'the eagle, the fire serpent', which stands for *nahual* priest.⁸ Diphrastic kennings, together with repetitions and parallelisms of ideas, were rhetorical devices used for ceremonial and formal speech and writing in Mesoamerica. This suggests that the messages painted on the vessels were constructed using the distinctive poetic style of such contexts. Original users of the vessels must have understood the messages, at least on a certain level. However it may also be that some complexes of signs, which look simple, were in fact deep metaphorical ritual concepts the meanings of which were difficult to access since they were represented using the conventions of the ceremonial language, like diphrastic kennings. Thus, it may have been the case that beholders of these vessels who were not familiar with such conventions were not able to understand some of their meanings.

Ceramic vessels with pictographic decoration were media to communicate across time and space in pre-Hispanic Mesoamerica. This kind of pictography can be considered as a semasiographic writing system, as ideas were mainly communicated directly through visual marks and not through phonetic symbols (Sampson 1985:29). Although the properties and communicative possibilities of a small text painted on a ceramic vessel are very different from the broad narrative spaces of painted books, vessels were also involved in the dynamics of literacy at that time. The full skills of production and decodification of writing were highly restricted in pre-Hispanic Mesoamerica, nevertheless the orality and performance closely associated with texts permitted various levels of proficiency (for a discussion on this topic see Anders *et al.* 1994:97; Boone 1994:15-17; Grube and

⁸ In Mixtec *yaha yahui*, translated by Alvarado in his vocabulary as 'eagle fire serpent'; and *nigromántico señor* ('lord sorcerer'), was a title equivalent to *nahual* priest (Anders *et al.* 1992:184-186; Jansen and Pérez Jiménez 2003).

Arellano 1998:31-33; Houston 2008:232; Jansen 1998:152; Jansen and Pérez Jiménez 2000; Monaghan 1994:88). In the case of ceramics, they could only be produced by specialists as not only were manufacturing skills required but it was also necessary to be well familiarized with the system of pictographic writing and the religious meanings associated to signs. Texts on vessels were not copies of segments of books or murals. Although all these media shared the same corpus of signs, vessels had their own system of representation, their own themes and their own manner of simplifying complex ritual and religious meanings. Vessels were not mass produced rather than unique works. For example, from a dataset of 467 objects (complete and semi-complete) that I studied elsewhere (Hernández 2005, 2010), and that were taken from archeological collections, museums and publications, constituting all known accessible polychrome vessels with painted decoration in central Mexican style, no two vessels were identical even when in many cases similar complexes of signs were depicted. While only experts could produce complex pictographic texts on ceramics, it is possible that many people could understand them, at least at a certain level, as many signs were common and well-known elements of the Mesoamerican visual culture in ritual contexts at that time. Thus there were probably several levels of literacy related to these objects.

As in other communication processes, vessels and their messages were linked to receivers through performance. These vessels were probably ware for feasting, according to their shape and their frequent archeological association to public and high-status contexts in central Mexico. That is, they have been recovered in excavations of public and ceremonial areas such as the Great Pyramid at Cholula (Marquina 1970), the Great Platform in Tizatlán, and various rooms close to the polychrome altar of Ocotelulco (Contreras 1994). Also they have been found in fills and trash pits in high-status neighborhoods in pre-colonial times, like the barrio of Tianguiznahuac, a sector inhabited by nobles and merchants in Postclassic Cholula according to Gabriel de Rojas (1985:129). Also several of these vessels were deposited in an offering cache in the Templo Mayor in Tenochtitlan (López Luján 1993). Moreover, some vessels were offerings in burials (Suárez 1989). Nevertheless, in domestic areas on the periphery of Cholula, fragments of these vessels have been found in trash pits and building fills (Hernández 2005:42; Suárez *et al.* 1992). This suggests that not only a restricted sector of the population had access to them, although the nature of these Cholultecan domestic deposits still requires more

analysis (see Plunket and Uruñuela 2005). The events represented by those archaeological remains -public ceremonies, feasts, offerings and funerary rituals- were, and still are, essential elements of community life in Mesoamerica. In that environment the common use, understanding and appraisal of these vessels and their messages helped to create feelings of solidarity. In sum, in central Mexico during the last centuries before the conquest, not only did writing have an important role in ritual practice, but ceramics were also major media to connect such writing to ceremonial life. These kinds of vessels had decoration that made them meaningful in the context where they were used.

Summary

Late pre-Hispanic archeological remains suggests that potters from the various regions of central Mexico used similar technology for manufacturing ceramics. That is, in general terms they had comparable methods for forming and firing, and created vessels using similar stylistic and formal canons. Although there was a lot of local variation in decorative patterns, the majority showed the distinctive trends of that time in Mesoamerica, such as the use of polychrome decoration, the manufacture of bowls with large tripod supports or goblets with large pedestal. Local variation in decoration was likely the result of different familiar and communal traditions or idiosyncratic preferences of potters but the political and economic situation at larger scale might also have played a role. For example, the imperial intentions of the Aztecs might have contributed to the differences in decorative patterns in ceramics between the valley of Puebla-Tlaxcala and the valley of Mexico.

In broad terms during the last five hundred years before the conquest clay recipes, forming methods or firing processes in central Mexico did not have significant changes. Decoration in contrast was repeatedly modified. In general, early vessels had less decoration while late vessels were painted with finer linear patterns and more complex motifs, although there were exceptions. For example, a few Early Postclassic polychrome vessels from Cholula show complex figurative decoration (see Rojas 2008). As we will see in the next chapter, some parts of the process of manufacture are modified after the conquest. Ceramic vessels during the last centuries before the conquest were primarily domestic equipment for a variety of uses. Decorated vessels

with fine quality of manufacture were mainly for serving food and drink on special occasions such as feasts. As these objects were costly, they were also more frequent in the houses of noble and more prosperous families. Ceramics were also used as censers; large and elaborately decorated examples were common in temples, but there were also smaller and simpler objects for quotidian and domestic uses. Also, vessels of all kinds could be recipients for offerings in funerary rituals, inauguration of buildings and other ceremonies, as their archeological contexts in central Mexico show. In addition, vessels had other social functions beyond their task as containers; they were in some situations ritual objects and media of literacy. As we will see, some of these functions disappear after the conquest.