Earth, Water, Air and Fire: Ceramics at the Museum of the Red River

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A significant percentage of the Museum's collections (35,000+ objects) is classified as "ceramic" meaning that it is an artifact of clay, intentionally fired or "cooked" (as opposed to being naturally dried). The process generally involves exposing modeled clay to heat from a fire, usually in an enclosed space. Different clays dry and harden at different temperatures, and any slips, glazes, or additions to the basic clay must also be accounted for during the firing process. Due to this complexity, pieces may be fired several times. The ability to maintain certain temperatures, combined with the knowledge of which additives to use, how much and when, affect the level of complexity possible in the creation of ceramics.

Modeled clay figurines, apparently air or sun-dried, date from the latter Paleolithic period in Germany almost 30,000 years ago. The earliest fired-clay ceramic vessels are from the Xianrendong Cave in southeast China (Jiangxi province), dating back 20,000 years. Previously, it was believed that the use of ceramics coincided with the development of agriculture, but the residents of Xianrendong were hunter-gatherers, living during the last Ice Age. They used ceramic vessels for cooking as well as storage.

Ceramic Technology

Ceramics are created by driving water out of the clay, which then allows the remaining elements (silica or quartz with traces of carbon, aluminum and other minerals) to fuse. Oftentimes, a "tempering" material is added to strengthen the clay and promote a more even distribution of heat during the later firing process. Most objects made from clay are allowed to air-dry first, relying on natural evaporation which, depending on atmospheric conditions, can take anywhere from a few hours to several days. In this "leather" stage, the vessel is often polished or burnished to create a smoother surface, or decorative elements can be added through incising, combing, impressing, etc. Mineral-based enamels can be applied for color, directly to the body or more often, on a "slipped" surface. "Slip" is liquid clay applied to the surface of the air-dried vessel. When dry, it provides a smooth surface for paints or glazes to be used.

The firing process creates the final ceramic product. The methods used will affect the final appearance of the ceramic object. Interaction with air, particularly oxygen, will determine how properties of the constituent elements respond to heat. In an open fire or loosely-closed kiln environment, oxygen becomes a part of the firing process. In a tightly closed or controlled air-flow kiln, the amount of oxygen in the firing environment can be lessened, affecting the surfaces of clays and glazes.

Chemically-bonded water molecules in the clay itself (almost 14% of the total weight) are broken down at about 700 degrees F, and fusion of the remaining elements begins at just above 1000 degrees F, but not completely until 1650 -1700 degrees F is reached, and up to 2000 for certain types of clay. Temperatures of over 1700 degrees F are required for glazes to melt and bond with the ceramic body. Fine grained kaolin clays, used for true porcelain, require minimum temperatures of 2300 degrees F. Fired clays must be allowed to cool gradually and evenly. Differential cooling caused by a breeze (in an open-air firing situation) or the opening of a kiln door too soon or too fast, will cause the ceramic and even the glazes to crack. (Sometimes

this is done on purpose to achieve the fine line "crackling" of certain decorative wares). After cooling, the fired vessel can be further decorated with more paints, engraved to create relief effects, etc.

Before mechanically controlled kilns (with thermometers and other measuring instruments) were available, ceramists relied on experience and simpler technology to achieve their desired results. An open-pit fire can generally reach a temperature of 1800+ degrees F. Controlling the temperature within any "baking chamber" can be achieved by using differing materials for fuel, or by capturing the heat in the chamber. Multi-level kilns or chambers connecting upslope are used to achieve varying temperatures per firing cycle. Temperatures over 3000 degrees F can be reached in the uppermost chambers.

Ceramic Types

Technically, ceramics are typed by the temperature at which they were fired. Not all clays respond the same way to all temperatures and their variability will result in different effects when fired. In general, there are three basic types:

Earthenwares: Most ceramics fall into this category of low-fired (less than 2100 degrees F) larger grained clays, resulting in opaque, breakable forms; their porosity makes them unusable for containing liquids unless they are also glazed (usually a second firing). Earthenwares are sometimes referred to colloquially as "pottery" which is confusing since the term also describes ceramics in general.

Stonewares: Usually finer clays which, when fired between 2100 - 2400 degrees F (melting and fusing the constituent quartz elements and shrinking) can often form watertight vessels. Higher temperatures (above those required for earthenware) were achieved with closed kiln systems, first developed in China about 2000 BC.

Porcelain: Made from very fine clays including kaolin, fired at high temperatures (between 2200 – 2550 degrees F), to completely vitrify, making them impermeable to liquids without a glaze, although oftentimes a glaze is added. The terms "true porcelain" or "chinaware" refer to porcelains made in the Chinese manner of combining kaolin clays with petunse, a micaceous (or feldspathic) rock. They were exporting it by the 7th century AD, during the Tang dynasty. Korean potters developed a porcelain industry at the end of the 14th century and introduced it to Japan in the 16thcentury, after suitable deposits of kaolin were discovered there.

European demand for porcelains, Chinese works originally introduced from the Middle East during the Crusades, led to sponsored research. Tin-glazed earthenwares traded through Delft in Holland used "Oriental" designs copied from porcelains. The Portuguese had smuggled samples of kaolin from China in the early 16th century, and although comparable European deposits were found, the actual process used in China remained a secret. A "soft-paste" porcelain using fine clays with glass was developed by Medici alchemists in Florence about 1570. However, it was not until the 18th century that the information became widely disseminated. A French Jesuit (Francois Xavier d'Entrecolles) witnessed the manufacturing process while living in China, and wrote the details in a letter to his superiors which was eventually published and reprinted. The first European factory for

porcelain (Meissen) was established by the Elector of Saxony at Dresden in 1710. The Sevres manufactory was first established in 1740 at Vincennes, east of Paris. In England "bone china" was developed, which included ash from burnt bones (first used by the Medici for their soft porcelains). When added to the porcelain clays found there, a "cleaner" whiteness was produced. These wares became enormously popular in England especially after Joseph Spode perfected its formula and made "bone china" more affordable.

Creating Ceramic Vessels and Art

Ceramists generally create their wares using one or more techniques that include "pinching and shaping," slabbing, coiling, and wheel-throwing.

Pinching and shaping: The simplest way to form clay into desirable shapes, this method uses simple hand and finger manipulation to model the clay.

Slabbing: This method involves the joining of clay "slabs" cut from a larger, flattened piece of clay. These slabs form walls, used for simple box-type containers, or more creatively to isolate areas on larger sculpture or constructions such as building walls.

Coiling: Clay is rolled into snake-like and joined together to form a continuous coil, spiraling upwards until the size of the finished vessel is met. To facilitate the process, the potter may start the coil on a concave dish which allows for a spinning motion. While coiling, the potter roughly smoothes the coils (inside and out) so they form a wall of near-even thickness. When the coiling and rough smoothing are completed, the potter may use various tools to further refine the thickness; an uneven wall will not distribute heat at an equal rate during firing, and will likely crack.

Wheel-throwing: "Throwing" describes the use of a continuously turning, horizontal wheel on which clay vessels are shaped. The even motion allows for a more uniformly shaped vessel as clay is drawn up by the potter, usually by hand but also with specialized tools. The earliest wheels used for pottery date from ancient Mesopotamia, ca. 3000 B.C. but the technique became widespread across all of Asia and Europe, into Africa. It was introduced into the Americas by Europeans in the 16th century.

Potters will usually polish the surface until smooth for later painting or slipping (applying a liquid clay for contrasting color). Surfaces may also be decorated by using various cutting and engraving techniques, appliqué and sculpting, etc.

North America

In North America, the pottery of the prehistoric peoples living in the Southwest (present-day Arizona, New Mexico, Colorado, and Utah) and the Southeast (from eastern Oklahoma to the Carolinas and southwards) are among the most recognized. Dating back as far as the first century B.C. in the Southwest, the use of fired clay vessels was probably introduced from Mexico, where ceramic use dates back to at least 1500 B.C. The earliest cultures of the American Southwest include the Anasazi (or "Ancestral Puebloan"), Mogollon, Hohokam, and Patayan. Further south, (in present-day Chihuahua state, Mexico) the Casas Grandes culture

developed. They served as intermediary between the American Southwestern cultures and those of central Mexico.

For reasons still unclear, although presumed to be weather-related, the period from the 13th - 15th centuries were characterized by the decline of all these groups and mass migrations. By the time stability was regained, the historic Pueblo cultures described by the Spanish in the 16th century, and continuing through today, were well established.

As the American Southwest was colonized by Europeans, beginning with the Spanish and eventually by American (U.S.) interests, many traditions were disrupted, including crafts. Baskets and pots were replaced with more permanent and durable metal containers. The long history of ceramics manufacture was now limited to the most basic utilitarian wares which could be made at low cost in individual households. The beautifully decorated pots of their ancestors were rarely encountered and became "useless" heirlooms.

It was the souvenir collectors market created by the Santa Fe and other railroads to promote tourism, colonization and other reasons to travel to the American Southwest that inspired a revival among the Pueblos. Travelers fascinated by the natives they encountered wanted tokens and mementoes of their experiences. Older, beautifully decorated pottery were much appreciated and valued, especially as archaeological excavations being conducted at the time revealed the rich tradition of ceramics in the region. The rarity of complete vessels in fine condition made the few available expensive and near impossible to acquire. "Trading posts" established to foster tourism worked with their native clients to create new pots using old designs. Several outstanding potters were instrumental in reviving ceramics in their own pueblos.

In the Southeastern areas, native groups were introduced to European goods early in the colonial sequence, beginning in the 16th century. Their long traditions of making beautifully decorated ceramics ended as they became acculturated to Euroamerican wares. More remote (and less affluent) groups continued to use utilitarian wares into the 19th and early 20th centuries. It was not until political and cultural revivals sprang up to "recapture" lost heritages that native artisans began to make ceramics in the traditions of their ancestors.

Central America

The earliest ceramics in Central America are found in Panama, dating to the end of the 3rd millennium BC, about 2200 BC. They were either brought in from Colombia or influenced by South American prototypes. There is no evidence of wheel-thrown pottery prior to Spanish introductions. Ceramic objects were created through modeling (pinching and shaping), coiling and molding.

Mexico

When Spanish conquistadors captured the valley of Mexico and surrounding areas in the 16th century, there had already been a ceramic tradition over 4000 years old. They were ubiquitous among every culture from the pre-Olmec (before 2000 BC) to the Aztecs and their contemporaries the Spanish encountered.

Today, different areas of Mexico are well-regarded for their ceramic production. The Talavera ware of Puebla is particularly distinctive with its bold patterns and use of color. Less colorful is the lead or tin-glazed, usually

single color "majolica" type wares of Guanajuato, and the ceramics of Oaxaca, particularly unpainted sculpture, and vessels with a simple blackened slip.

Mata Ortiz

The village of Mata Ortiz in Chihuahaua state has become famous for its ceramic production. Inspired by centuries-old ceramic sherds found throughout the area, local laborer Juan Quezada taught himself in the 1960's to create ceramic wares, originally copying the old designs of the Casas Grandes culture of the 12-14th century. As he became more proficient, Quezada began introducing his own designs into his pots, which caught the eye of the decorator's markets of southern California and the American (US) Southwest. Soon, the demand for his works convinced him to teach others in the village and within a generation, hundreds of potters were creatively producing wares for the decorators, and then the collector's markets.

San Juan de Oriente, Nicaragua

A new art tradition is flourishing in Nicaragua. Near its south Pacific coast is the village of San Juan de Oriente, where available clays have made it a ceramic production area for centuries. During colonial times, when the village was known as San Juan de Platas (St. John of Plates), some residents paid their taxes with well-made ceramics. Beginning in the mid-20th century, local potters adopted new design elements introduced from North America. Geometric patterns incorporating numerous colors and incising techniques, joined the more traditional motifs based on Precolumbian designs or environmental scenes.

Emmanuel Maldonado (b. 1977) is among the best potters working today. Born in San Juan de Oriente, he first apprenticed with his stepfather Helio Gutierrez (b. 1965, and usually credited with being the first to promote the contemporary ceramics scene). Maldonado has since won numerous international competitions and been featured in galleries throughout the Americas and Europe.

South America

The earliest ceramics found in the "New World" are in the estuaries of the lower Amazon River basin (in Brazil), dating back as far as 5000 B.C. Ceramics along the coast of Ecuador, dated to ca. 3000 BC were formerly thought to be the oldest and, it was argued, resulted from contact with east Asian fishermen storm-tossed and blown across the Pacific. The Amazon finds indicate that ceramics probably developed locally.

Peru

Along the western edge of South America are the Andes mountains, among the world's tallest and longest ranges. For nearly 10,000 years, cultures have developed into civilizations along both "slopes" but most research has focused on the western side (along the Pacific coast) of the mid-range, particularly in Peru, where pottery appears about 3000 BC. Continuing research in Ecuador, with new initiatives in Bolivia, Chile and Argentina will enhance the understanding and development of the ceramic and all cultural achievements of Andean peoples.

China

In addition to being the location where the world's oldest ceramic vessels have been found—nearly 20,000 years old, China has also been a pioneer in producing ceramics in large quantities. While their porcelains are best known, Chinese potters also mastered earthenware and stoneware, pioneered numerous glazing techniques, and from the 7th century through today, provided hundreds of millions of ceramic wares to people around the world.

Japan

Large-scale earthenware figures were being created in Japan by 10,500 BC. Ceramics continued to develop, and the industry thrived throughout Japanese history. Their stonewares became highly sophisticated as they applied a unique design sense. When the latter Ming dynasty emperors of China closed the country to commerce in the 16th century, Japanese kilns readily provided the ceramics demanded by Europeans. Fortunately, they had just discovered the manufacturing processes for porcelain to add to their own spectacular stonewares. At first their porcelains imitated Chinese wares, but soon their own aesthetic was appreciated by westerners. The beginnings of "japonisme" joined "chinoiserie" as a design movement in Europe. When the Chinese re-entered the international market in the late 17th century, their porcelains included imitation Japanese designs.

Indus Valley

One of the world's great ancient riverine civilizations, the Harappan Culture along the Indus River valley of Pakistan dates back to the fourth millennium BC. It traded with the many cultures of Mesopotamia (along the Tigris and Euphrates rivers), Egypt (on the Nile) and at least indirectly with the cultures of China (developing along the major Huang [Yellow] and Yangtze rivers with their many tributaries).

Prehistoric West Africa

Understanding the ceramic traditions of Africa is an ongoing process as years of colonialism, revolution, and ongoing political strife have made research difficult to conduct. "Prehistoric" in many areas is before the 17th or 18th centuries since the "Dark Continent" was little explored by Europeans until then. Known cultures along the north coast (Mediterranean) had little contact with those in the interior with the Sahara Desert, dangerous jungle and other environmental impediments barring the way. Only after ocean-going ships allowed for easier transportation were significant contacts established. Unfortunately, those early Colonial years focused on exploitation of natural (gold, timber, ivory) and human resources (slaves). Pottery in sub-Saharan Africa appears to have developed independently around 11,000 BC, and the traditions have continued to today.