

# 1 Introduction to Clay

## Key Terms

ceramic  
plastic  
glaze  
slip  
kiln

**Most of you have experienced** at one time or another how it feels to make something in clay, usually at an early age. This kinship with one of the most naturally occurring substances on the planet is as old as human life and has been repeated throughout history. Whose hand can resist tracing a picture or design on the ground, modeling moist natural earth to make a figure, or building a castle in the sand?

Many techniques used to make pottery were developed thousands of years ago, yet they are still practiced today. Methods of preparing, forming, and decorating pottery used in prehistoric times are still employed by folk artists and artisan potters around the world. Clay is an especially versatile medium.

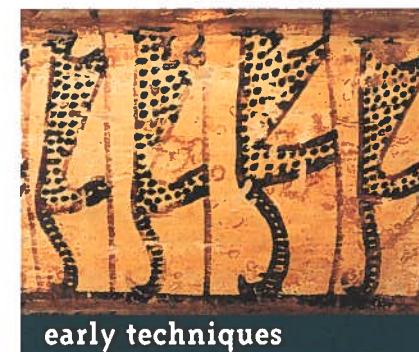
Pottery and spaceship panels are both examples of **ceramics**—things made from clay, the basic material for all ceramic creations. But what is clay exactly, and what separates it from mere mud?

In this chapter, you will:

- Discover the history of ceramics
- Explore ways to form, decorate, glaze, and fire clay
- Paint or incise a story on a clay vessel



earth, water, fire



early techniques



origins

**Fig. 1-1. In Ancient Egypt, artists made clay models that showed scenes from everyday life. These models were often placed in tombs, and were thought to help the dead person adapt to the afterlife.**

*Cattle inspection* (detail), terracotta scale model, about 3000 BCE. Egyptian Museum, Cairo, Egypt. Photo: Erich Lessing / Art Resource, NY.

*“What is so exciting about looking at a sleeping tiger? Nothing. But if you take a stick and poke at it, you will remember that tiger for the rest of your life! In many ways, this parallels my attitude towards clay: it requires poking to awaken it.”*

Fong Choo





**Fig. 1-2.** From humble cooking pots to artistic sculpture to high-tech products like artificial hips, the range of forms and purposes people have devised for clay is almost infinite. This vessel was made with a press mold, drilled, sandblasted, then sprayed with low-fire glazes.

Randy O'Brien, *Erose*, 2001. Clay with perlite, 6" x 14" x 14" (15.2 x 35.5 x 35.5 cm). Courtesy of the artist. Photo by Clemens Roether.



**Fig. 1-3.** Close up of dried clay, Weipa, Queensland, Australia. ©Photolibary/Corbis.



**Fig. 1-4.** What might have been the inspiration for this form?

Student work, Rachel Bodekor, *Untitled Tree Toothache Teapot*, 2009. Pinch, slab, wheel thrown and sculpted, copper oxide wash and cone 04 metallic glaze.

## Earth, Water, Fire

Clay is created as a result of the decomposition of igneous rock, which makes up the entire earth's crust. Igneous rock is produced when rock that is melted by volcanic heat cools and hardens. This action began when the earth was formed millions of years ago and happens each time a volcano erupts and spews magma, or molten rock, from inside the earth onto the surface. Granite, the rock that makes up the earth's crust, is produced from this volcanic activity. An essential element of granite, feldspathic rock, or feldspar, is the geological basis for clay.

Over time, exposure to weathering causes these materials to break down into smaller and smaller elements. The gradual movement of ice, water, wind, and tree roots pulverize the earth's mantle, grinding boulders to rocks, rocks to pebbles, and, ultimately, pebbles to the finest grains of minerals that comprise clay.

**Note It** Clay minerals have microscopic compositions and platelets, or crystallographic structures. Platelets are flat and slide back and forth over one another when moistened. Moisture also helps them cling together. The ability to hold together while being shaped gives clay its **plastic** quality. In its plastic state, it can be formed into different shapes. Fire or heat makes the shape permanent and returns the clay to its rocklike state.

Everything you will do with clay involves the interplay of these three variables: moisture, plasticity, and heat. A delicate porcelain cup and a rough prehistoric cooking pot are still the products of clay (earth), water, and fire. But the porcelain cup is made of a different type of clay and fired (heated) at a vastly different temperature from the earthenware pot. The history of ceramics, then, reveals how people in various places and times discovered new ways to work with these basic materials.

## Origins of Ceramics

Of all the arts, ceramics has perhaps the longest history, dating back to when people first learned to control fire. From clues discovered at Stone Age sites, anthropologists have pieced together theories about the origins of ceramics.

One theory suggests that people first began to model clay as a diversion. They may have formed clay animals and human images to embellish a story or to use in a religious ritual. Some of the clay pieces may have been tossed into a communal fire.

When clay is heated quickly, the water trapped inside expands and turns to steam. This rapid expansion happens with such a powerful force that the clay explodes and shatters. Some anthropologists speculate that people thought these explosions were a magical wonder, something like fireworks, and they most likely repeated the process just for the excitement.



**Fig. 1-5.** Notice the multi-strand belt and elaborate headdress on this terracotta figurine. The Indus Valley culture flourished around 2500 BCE in present-day western India and Pakistan.

Terracotta figurine with characteristic headdress. Harappa Culture, Indus Valley, ca. 2000 BCE. National Museum of Pakistan, Karachi, Pakistan. Photo: Alfredo Dagli Orti. Bildarchiv Preussischer Kulturbesitz / Art Resource, NY.



**Fig. 1-6.** Some of the first clay objects may have been made as a form of entertainment.

Three sheep-like animals. Terracotta figures from Ebla, Syria, ca. 1800 BCE. Private collection, Vienna, Austria. Photo: Erich Lessing / Art Resource, NY.





**Fig. 1-7. This large vessel from Marajo Island is an example of the river island culture's complex geometric pottery. Can you find the faces and figures?**

Brazil, *Large Funerary Urn*, 1000–1200 CE. Ceramic, pigments, 41 3/4" x 32 1 1/16" (106 cm x 84 cm). Brooklyn Museum 33.675 Museum Expedition 1933. Purchased with funds given by Jesse Metcalf.

But some clay figurines may have dried before they were put into the fire. Instead of exploding, they were transformed by the heat into ceramic figures. Another marvel! Mud turned into stone! Such ancient ceramic effigies or images have been found in many parts of the world.

Sometimes clay was used for practical purposes. When people began cultivating crops, they needed containers to cook in, hold water and food, and store seeds. They shaped clay into vessels by pinching, coiling, or pressing it over round stones and gourds. They also pressed clay into woven baskets, using the basket shape as a kind of mold. Most likely, these people baked clay pots in the same fires that they used for cooking. Cooking fires don't get very hot, so the combination of low-temperature firings and impurities in the clay caused this primitive pottery to be extremely fragile and porous.

As populations increased, people wanted stronger vessels in greater quantities. Clay slabs were used to construct huge vessels and granaries (bins) for crop storage. To keep track of what was in storage, people marked symbols on clay. Scholars believe that this was probably the beginning of writing.

Cuneiform script, one of the first writing systems, developed in ancient Mesopotamia to record inventories and accounts, and was later used on clay tablets. Surviving clay tablets include detailed information on laws, historical events, and harvests, and offer rare insights into the nature and concerns of ancient societies.

But ceramic objects weren't used just for everyday purposes. They also had religious and mystical uses. Excavations of prehistoric burial grounds show that pots were widely used as funereal objects. Some contained food meant to accom-

pany the dead on their journey to the spirit world. Others held bodies of infants and small children. Later tombs held not only pottery jars filled with food but also ceramic figures and animals placed there with the intention of protecting the deceased.

## Early Techniques Production

Early potters developed a wide range of production techniques. They passed on information and skills from generation to generation, including:

- knowing where to dig the best clay
- deciding which type of clay was best suited to a particular use
- transporting the clay
- removing any impurities
- blending in other materials to strengthen or improve clay
- forming the desired shape
- adding design elements
- drying the work

- firing the work
- glazing
- developing systems of distribution for ceramics

**Note It** Over time, potters discovered ways to improve each step of the process. Sometimes, the improvements were so revolutionary, potters from another region or society tried desperately to copy them. The delicate blue-and-white glaze that the Chinese developed in the fourteenth century, for instance (see page 150), set off a worldwide craze for pottery of this style. Some potters failed to successfully imitate the blue-and-white glazes, but their attempts led to new discoveries. In this way, technological and artistic innovations leapfrogged from country to country and from era to era.

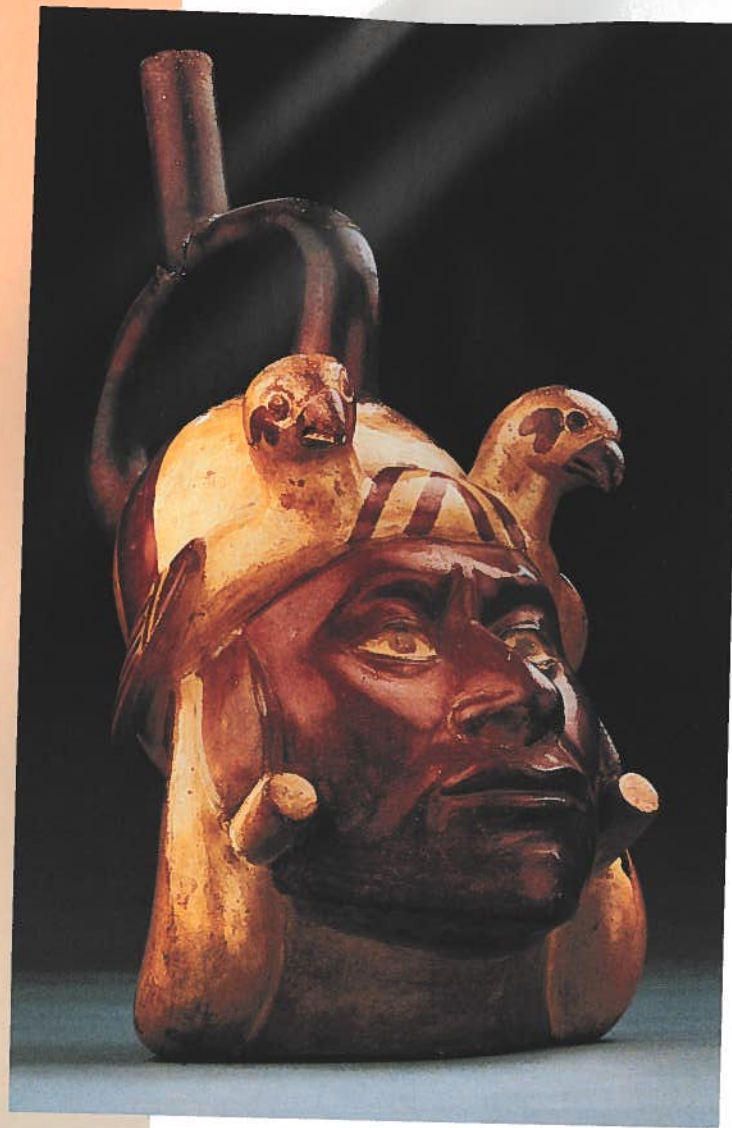
Innovations continue to press ceramic art forward, but the early techniques endure. Folk artists and artisans still work in traditional ways and use many of the techniques described in this chapter.

**Fig. 1-8. Bowls such as this one have been found in ancient tombs in the land now known as Iran. Pottery-making was widespread throughout the Near East, and this type of bowl may have been one of the first vessels to be produced on an early stone potter's wheel.**

Iranian, Chalcolithic, *Conical Bowl with Leopard Design*, 3500–3000 BCE. Ceramic, 3 1/2" (9 cm) high, 5 1/2" (14 cm) diameter. The Detroit Institute of Arts, Founders Society Purchase, Henry Ford II Fund, the Catherine Ogden Estate Fund, Hill Memorial Fund, and the Cleo and Lester Gruber Fund. Photo ©The Detroit Institute of Arts, 2000.







**Fig. 1-9. The Moche people believed the stirrup shape on this type of vessel was a link to their sacred ancestors. What do you think the falcons on this man's headdress tell about his social status?**

Peru, Moche IV, *Portrait Head*, 450–550 CE. Ceramic, 12½" (31.7 cm) high, 8¾" (22.5 cm) diameter. Museo Arqueológico Rafael Larco Herrera XXC-000-012.

## Preparation

The clay that you work with in a studio has typically been processed and prepared to some degree. Early potters dug their raw material out of the ground, and it often contained impurities such as pebbles or plant matter. To remove impurities from the clay before use, some early potters dried their clay in the sun, crushed it into smaller lumps, and picked out unwanted material. Then they rehydrated or slaked the dry clay to make it workable. This method was fine for making only a few pots, but it was difficult and time-consuming.

Eventually, potters discovered that it was much easier and faster to separate impurities by adding water to the clay and then pouring the liquid clay (or **slip**) from one container to another. This process, known as *decanting*, causes the coarser materials to settle on the bottom.

Another traditional method for removing impurities is known as *levigation*. Here, the clay is prepared as a slip and allowed to flow slowly down a gently sloping channel. Finer particles flow over a lip at the end of the channel, while the coarser particles settle behind the lip.

**Try It** Become a clay prospector. Pay attention to the landscape where you live. Cracking patterns on the earth signal sedimentary clay. When you find earth you think may be clay, test a sample:

- Form it into a small ball.
- Add a few drops of water.
- Rub it on the palm of your hand with your fingers.
- It is clay if it feels sticky and greasy.

Remove the impurities from the clay, and use it to make a pinch or coil pot. With adult supervision, fire your work with the ancient pit firing method described on pages 203–205.

Clay that is suitable for producing pottery needs to be plastic (able to be formed into shapes) but not so plastic that it will lose its shape or collapse under the pressure of its own weight. After removing impurities from their clay, early potters also added stabilizing materials to the clay to make it more workable and to decrease its chances of deforming or cracking.

Early potters often mixed additives (such as sand or tiny bits of straw) into large batches of clay by kneading it in with their feet, in much the same way people stomped grapes to make wine. First, they moistened the clay until it was soft. Then, they spread it over a flat area of hard-packed ground. They scattered the additives on the surface and then tramped all over it, systematically kicking down material from the top to mix with the clay at the bottom. Finally, when the clay was the proper consistency, it was allowed to

age. Aging improves the quality of the clay and makes it easier to shape. It was not unusual for potters to store their clay in caves for years. In fact, potters from the same family often used clay processed and stored by their grandparents or great-grandparents.

If clay had been stored for a long time, it had to be wedged to get rid of air pockets and to ensure that the moisture and the additives were evenly distributed. The technique for wedging involves using the hands to rotate or roll the clay evenly. A potter usually repeats this rhythmic cycle until the clay seems ready for the forming process. To learn about wedging, see pages 31–37.

## Forming Clay

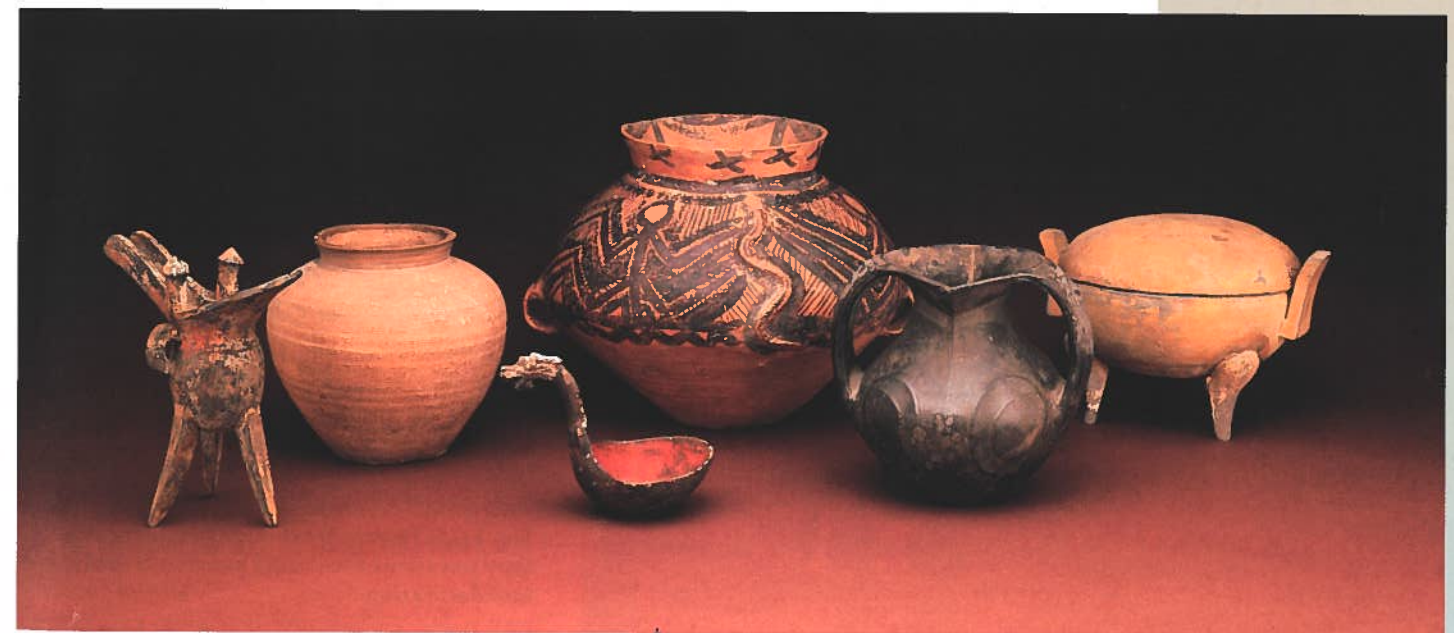
As you work with clay, you'll learn a variety of ways to form it into the desired shape. Even the earliest and simplest methods are still used today by potters to fashion beautiful and inspiring ceramic works, including:

- pinching
- coiling
- slab building
- molding

These methods are described in Chapter 3.

**Fig. 1-10. Look for evidence of coiling, pinching, and molding in these ancient Chinese vessels.**

Left to right: late Anyang period jue, 11th century BCE; Han Dynasty or earlier jar with textile impressions, 206 BCE–220 CE; Eastern Han Dynasty spoon, 25–220 CE; Machang phase of Majiayao culture jar with snakes, late 3rd millennium BCE; Western Han Dynasty two-handled jar, 2nd century BCE; Western Han Dynasty ding, 206 BCE–24 CE. Photo ©Royal Ontario Museum/CORBIS.





Potters of ancient times made drinking and cooking vessels by pinching pots out of clay. Some ornamental and religious pottery was formed into shapes of animals and sacred creatures. In ancient Egypt, for example, a potter joined two pinch pots to form a hippopotamus. In ancient Iran, ceremonial wine and water vessels were pinched into the shape of revered animals like bulls and birds.

Potters often use pinching in conjunction with coiling. In the coil technique, the potter rolls out long, ropelike sections of clay and then coils them on top of a base, adding new coils to build up the walls. The potter can squeeze and pull the clay upward, refining the walls. Some potters keep the coils visible in their pots or even use them as decoration. Others use their hands or a paddle and anvil to smooth them out.



Most early storage and cooking vessels required some form of pinching or coiling. Sometimes only a ceramics expert can identify the exact technique used to make a pot. Coils may be laid on a pinched base or supported by pinched feet (as in two of the vessels in Fig. 1–10). Coils may also be used to decorate a finished pot. For instance, the Jomon potters of ancient Japan adorned their pots with fanciful swirls and jags of coiled clay, creating pots whose strange and exotic appearance delights us to this day. (See page 68.)

To build anything very large in clay—like a statue of a king or a bin for storing the year’s grain harvest—potters preferred to work with big pieces. In slab building, early potters formed large solid cubes of clay and used a bow-like device with a taut string to quickly slice off large slabs. The clay slabs were then pressed or smeared together. This technique produced very large vessels in a short time. For smaller pieces, potters flattened clay with their hands or rolled it out using a smooth tree branch as a roller.

Clay slabs could be used to make rectangular shapes like boxes, or draped over or pressed into molds. A mold could be as simple as a smooth rock or gourd, or as complicated as a clay cast of someone’s face. Potters soon learned that they could decorate the surface of their molds with textures like incised or impressed designs, which transferred to the clay cast. For more about molds, see page 73.

**Fig. 1–11.** Picasso treated clay surfaces as if they were canvases, using paint to create surface decoration.

Pablo Picasso, *Bird Vase*, 1961. ©Leonard de Selva/CORBIS.

## Elements of Design

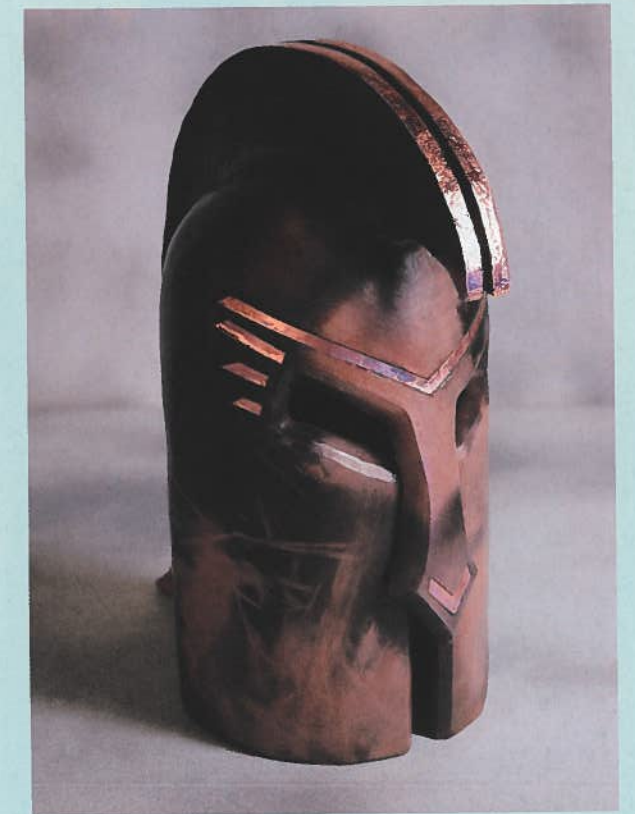
### Shape and Form

The terms “shape” and “form” are often used interchangeably. When referring to design elements, however, shape is a two-dimensional element such as a silhouette or outline. It has height and width, but no depth. Shapes may be drawn upon the surface of a pot as decoration. When you view the profile of a pot in silhouette, you view its shape.

The element of form is three-dimensional and includes an object’s depth. Working with clay is about working with three-dimensional forms, although sometimes clay forms such as tiles can be very flat and take on the characteristics of two-dimensional artworks. Shapes and forms may be geometric or organic, curved or angular, positive or negative, static or dynamic.

**Fig. 1–12.** Describe the mood projected by this slab-built form. What did the artist do to create this atmosphere?

Student work, Andrew Hillmer, *In the End*, 2008. Slab-built earthenware, pit fired and copper accents added.



### Drying Clay

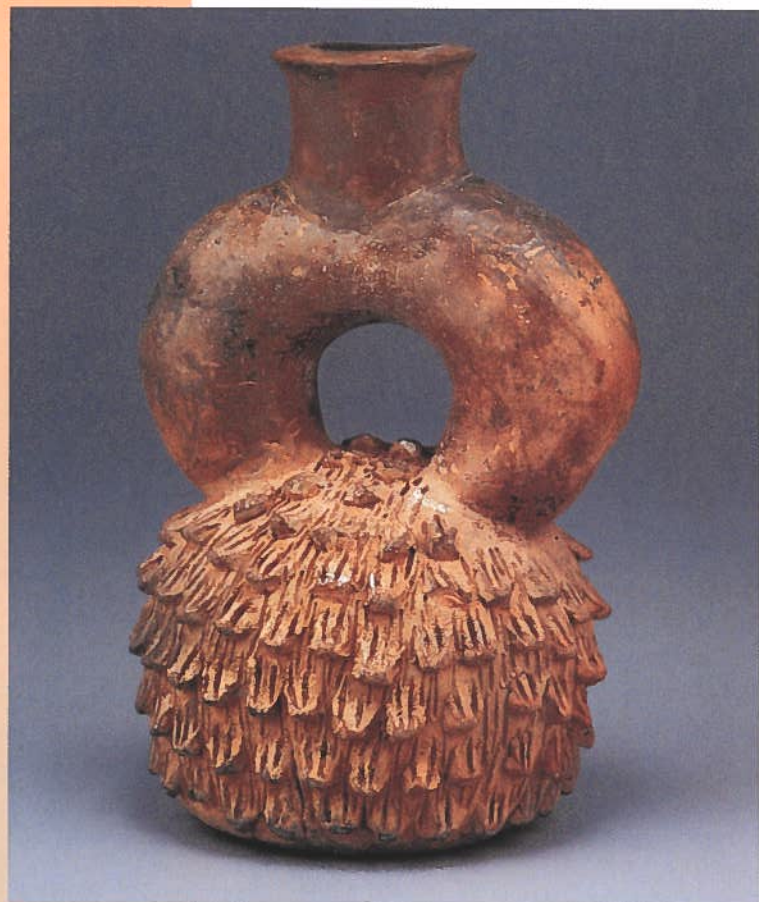
Potters must know how to control the rate at which clay dries. Clay shrinks as it dries and, if it shrinks too rapidly, it can crack. Not all types of clay shrink at the same rate due to their chemical composition. Even some parts of the same work—such as handles—can shrink more rapidly than others due to uneven moisture loss. As you learn to work with clay, you’ll need to monitor the drying process to prevent cracking and breaking.

A potter in ancient times had to consider what type of clay to use, the thickness of the vessel’s walls, and the local climate—among other variables. If the climate was hot and dry, vessels would have to be sheltered from the sun to slow the process. If the climate was damp and cool, the potter might place the work near a heat source.

An experienced potter also knows that moisture affects how clay can be shaped. As clay begins to dry, it loses its plastic properties. Some ceramic pieces must be built in stages, after some of the clay hardens. For example, a coiled pot can be refined with a paddle when the clay stiffens. The upper sections of a large coiled pot can be added only when the lower sections have dried enough to support the weight of additional coils.

Clay that has dried to this point is in the *leather-hard* stage; when pressure is applied to the clay, the form will not easily distort. The potter may scrape the surface of a piece to smooth the walls. Early potters used scraping tools such as shells and sharp-edged stones. After removing bumps and flaws, potters may add finishing touches like handles and decoration.





**Fig. 1-13.** The texture of the incised appliqué creates a rough organic surface on the body of this bottle, which contrasts with the burnished smoothness of the stirrup spout.

Peru, Cupisnique, *Bottle Decorated with Appliqué Nubbins*, 1200–200 BCE. Ceramic, 9¼" x 6¼" (23.5 x 15.5 cm). Museo Arqueológico Rafael Larco Herrera, XXC-00-044.

**Note It** Burnishing helps to press the clay particles closer together. Because clay fired at a low temperature remains porous, early pottery could be made waterproof by burnishing ware before it was fired. Coating a pot with pine pitch after firing was another waterproofing technique.

Beautification of the human form is one of the oldest artistic impulses. From early times, people used colorants, such as iron (red) and manganese or carbon (black), to decorate themselves and paint designs and images on cave walls. Painting designs on clay pots was a natural extension of the artists' individual creativity—decoration could enhance the clay's beauty, tell a story, or communicate religious beliefs.

When vessels were completely dried, they could be decorated with a range of metallic elements. A very fine slip wiped over the surface of a pot gave it a smoother, more uniform texture that helped to make the pot less porous. If a potter added color to the slip, the pot became even more special. A design could be painted on a bone-dry pot using a metallic oxide mixed with water. The dry clay quickly absorbed the water while the clear, crisp lines of the color remained on the surface. When the pot was fired, a change in the range of color could happen depending on the temperature and the atmosphere (oxygen level) of the firing.

## Decorating

For as long as people have been making pots, they've been decorating their surfaces. Some decorative techniques also serve a practical purpose—burnishing makes the clay watertight, for instance.

Early potters used a range of techniques to decorate their clay:

- *Incising* involves carving or cutting the surface with a sharp tool.
- *Impressing* uses an object to press or stamp a design into the clay.
- *Combing* marks the surface of the clay with uniform lines (as if you dragged a comb across it).
- *Burnishing* involves rubbing and polishing the surface with a smooth stone or piece of hard wood.

Modern techniques for surface decoration and glazing are explored in Chapter 5.

**Fig. 1-14.** These sculptures from West Mexico show the fascinating details that pre-Columbian ceramic artists incorporated into their works.

Nayarit, *Male and Female Figures*, 100 BCE–400 CE. The Detroit Institute of Arts, Founders Society Purchase, Henry Ford Fund, Benson and Edith Ford Fund, Mr. and Mrs. Walter Buhl Ford II Fund, Alan, Marianne, and Marc Schwartz Fund, with funds from Lois and Avern Cohn, Robert B. Jacobs, Milford Nemer, Margaret Demant, and Mr. and Mrs. William L. Kahn. Photo ©Detroit Institute of Arts, 1998.



## Principles of Design

### Contrast

Contrast is a term used to describe noticeable differences within a design. Contrast adds interest to a work of art. A potter might use contrasting colors, values, textures, sizes, or shapes to get the viewer's attention. A dramatic contrast in colors, for example, can be achieved by positioning dark blue and light yellow glazes next to each other. A subtle (less dramatic) contrast in value might be achieved by burnishing some areas of a pot to a deeper black than the unburnished areas.

Different materials can be used in combination with clay for a contrasting effect. See Chapter 7 for examples. An artist might even use different styles within the same artwork to provide contrast, perhaps to send a message.



**Fig. 1-15.** Explain where and how the artist used contrast on this piece. Which areas are subtle? Which are dramatic?

Student work, Stephanie R. Skaggs, *Bee Hive Vessel*, 2008. Coil-built, rolled slabs, multiple glaze firings, cone 06.





**Fig. 1-16. Celadon (light green) glazes of China and Korea were developed to duplicate the color of jade.**

Water sprinkler (*kundika*). Korea, Koryo dynasty, 13th century CE. Porcelain with white-slip inlay and celadon glaze with stylized chrysanthemum roundels. Photo ©The Trustees of the British Museum/Art Resource, NY.

## Glazing

Glazing makes pots watertight and easy to clean, and enhances their aesthetic qualities. Before glazes were discovered, potters made their work watertight by coating it with animal fats and plant resins.

Think of **glaze** as a thin coat of glass you give your pot. You must fire the pot at a high enough temperature for the glaze to melt and become glasslike. The glaze fuses to the surface of the clay as it cools and hardens. The beautiful, rich colors and textures of glazes are determined by the chemical composition of the glaze.

Ancient glazes were formulated by trial and error over long periods of time. Most potters tried to keep the composition of their successful glazes a secret. They often added some needless intricate process to the recipe just to confuse their competitors.

The four main glaze types used in early ceramics were alkaline, ash, lead, and salt. The first alkaline glaze appeared around 4000 BCE in the Middle East and was mainly a mixture of sand and ash from burned desert plants, the same materials used to develop glassmaking at that time. These transparent and shiny glazes were used with a wide range of *underglazes*.

In the Far East, potters used the ashes of trees and plants to promote the glassmaking qualities of high-temperature glazes. Later, feldspar minerals were used. These glazes were thin, but hard and watertight. Although the use of ash glazes was limited to China, Japan, Korea, and Thailand until the 1700s, it became more common in the West when people in the Far East increased their contact with Europe.

Lead glazes developed independently in many regions as a result of the prevalence of lead ores in the earth. Lead glazes bind to most clays and mature at low firing temperatures. However, they can be poisonous under certain conditions. When tin oxide is added to a lead glaze, it fires to a white, opaque surface. Islamic potters painted elaborate decorations and designs on these glaze surfaces and, later, the technique spread to Europe.

Salt glazes are a high-temperature form of alkaline glaze that originated in the twelfth century. When firing reaches a particular temperature, salt is thrown into the kiln. The vaporized salt joins with silica in the clay body to form a thin, hard, durable surface. German potters discovered this glaze inadvertently, while trying to achieve the high temperatures that Chinese potters had reached for their stoneware and porcelain firings.

## Firing

The earliest pottery was fired in open fires or cooking hearths. Firing at temperatures ranging between 500° and 800°F changes the physical state of clay mineral crystals into a hard, stable medium. When clays are heated above these minimum temperatures, they become ceramics.

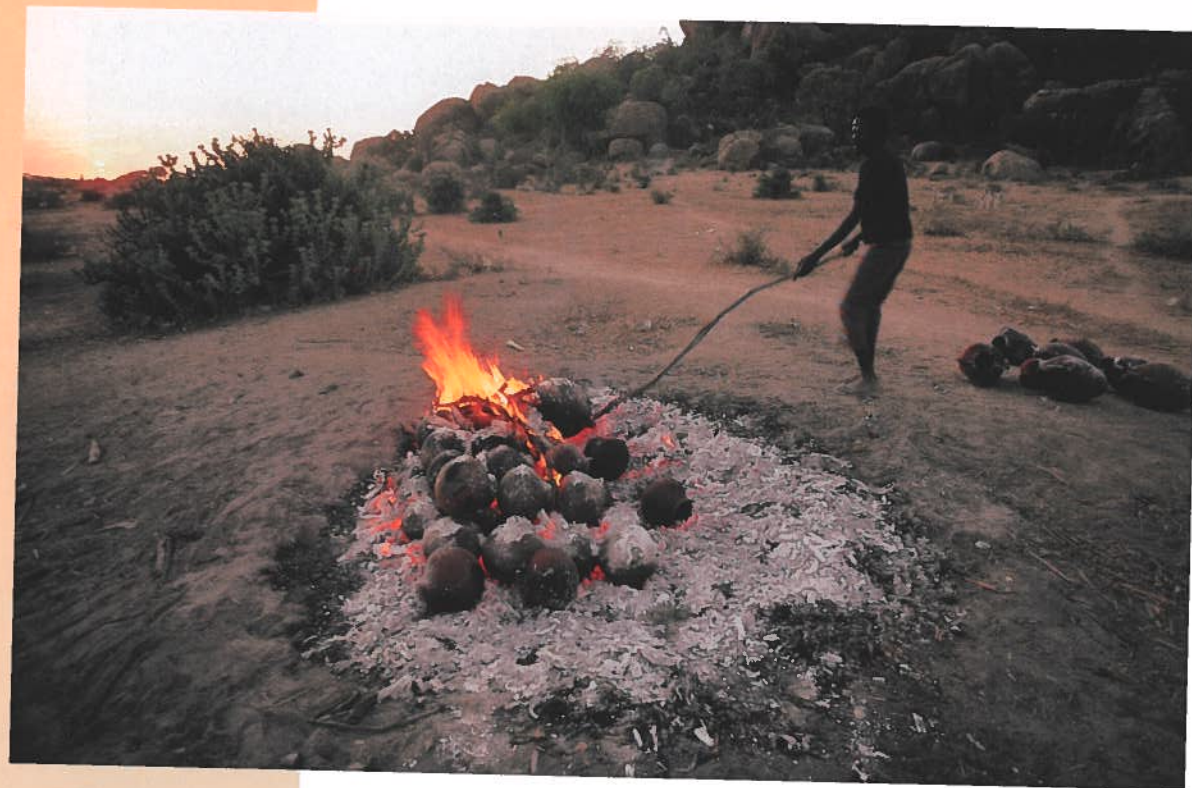
Early firing methods are still used in Asia, South America, North America, Africa, and other areas.

The main methods of firing clay are open firing, in which the vessels and fuels are set together; and **kiln** firing, in which the vessels and fuels are separated.

**Fig. 1-17. P.J. Anderson, Bottomless Vase #3, 2008. Coiled earthenware, barrel fired, 17" x 12" x 12" (43 x 30 x 30 cm). Photo: Stephen Grimmer. Courtesy of the artist.**







**Fig. 1-18. A Somali potter fires clay pots on a wood fire.**  
Photo ©Kevin Fleming/  
CORBIS.

### Open Firing

The earliest pottery was most likely fired in open cooking fires, which required limited structure and upkeep. Variations of the open firing method evolved as potters developed better control of the operation. A potter could control or restrict firing temperatures by setting some fuel beneath the vessels to allow for the rise of the heat, by leaving gaps between the pieces of fuel to facilitate air flow, or by taking advantage of wind to increase combustion.

Using different fuel offered the potter even more control. If a gradual rise in temperature was desired, animal dung, which burns slowly and uniformly, could be used. Cooking vessels would be fired with a slow-burning fuel. Storage vessels tempered with *grog* (an additive, typically crushed pottery, that makes the clay more stable) or straw could be placed in a fire that would rapidly rise in temperature, using twigs, straw, and grasses as a fast-burning fuel.

Potters modified this simple procedure by placing the vessels and fuel on stones spaced far enough apart to allow for air flow. They covered the vessels and fuel with *shards* (pieces of broken pottery), mud, or wet grass to insulate and capture more heat in the firing. They also placed holes in the covering to act as chimneys that would draw the air up through the setting or stacking pattern.

Eventually, potters placed the vessels and fuel in a pit or depression. Then they used more permanent structures in which to pile their vessels. Some enclosures had circular walls or were three- or four-sided.

### Kiln Firing

A kiln is an enclosed structure like an oven or a furnace designed to withstand very high temperatures for firing ceramics. Early kilns were made of stone plastered with clay. Later, they were constructed of brick or adobe. Two types of kilns emerged in the ancient world, the updraft and the downdraft. Such kilns are still in use today.

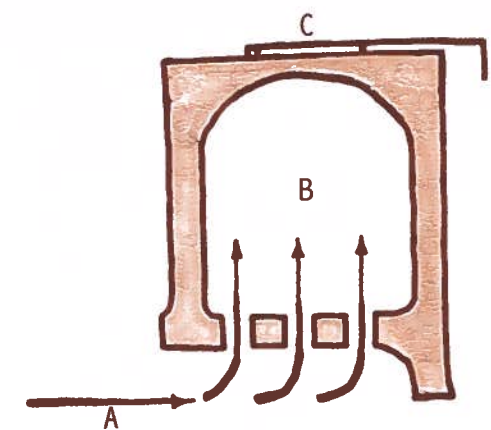
The *updraft kiln* consists of a firebox with a chamber directly above it. Ancient Greek, Roman, Mediterranean, and Islamic pottery was fired in updraft kilns.

The *downdraft kiln* is more complex, and enabled artisans to be more productive. Potters in China and Japan set large kilns into hillsides with several interconnected downdraft chambers. These kilns made efficient use of the heat produced in the firing and accommodated great quantities of pottery. The earth surrounding the chambers was a natural insulator, and very high temperatures could be achieved in these firings.

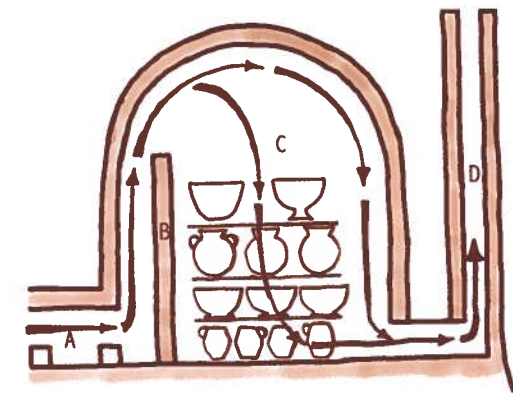
**Try It** Research kilns worldwide and sketch at least three different basic kiln structures. Include views of both interior and exterior. Which one would you like to build? Which one would you like to use? Why?

**Note It** Using kilns instead of cooking fires, potters were able to achieve new and greater effects by controlling the rate of heating, the maximum temperature, and the atmosphere of the firing. Early potters learned that:

- Controlling the rate of heating allowed enough time for chemical reactions to take place within the clay crystals. If the rate was too slow, a lot of fuel was used up unnecessarily. If the rate was too fast, the pieces could explode as a result of the rapid expansion of water in the clay.
- Controlling the maximum temperature allowed for chemical reactions to take place at the ideal temperature. If a firing temperature was higher than optimum, it could cause warping or cracking.
- Controlling the atmosphere allowed the potter to create different decorative effects. The atmosphere refers to the amount of air supplied to burn the fuel.



**Fig. 1-19. Updraft kiln. Fuel is burned in the firebox (A) and the heat flows through the chamber (B), leaving the kiln through flues, or openings at the top of the chamber (C).**



**Fig. 1-20. Downdraft kiln. From a firebox (A) the heat flows upward over a bagwall (B) and downward into the firing chamber (C). From there, the heat passes through holes at the bottom to a chimney (D), where it exits the kiln.**

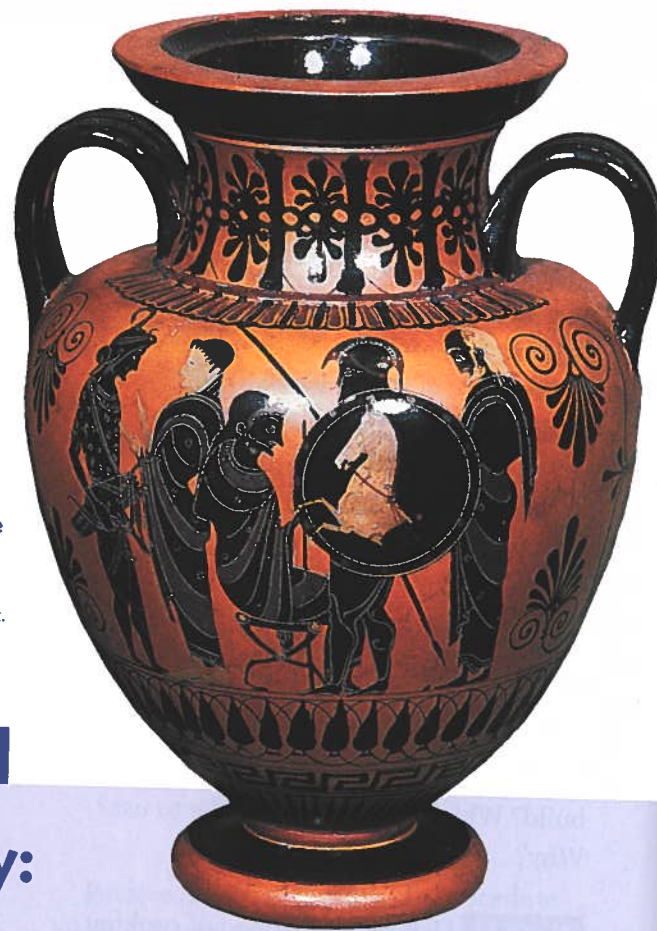
By learning to control the firing atmosphere of the kiln, potters held the final key to the outcome of their labor. Now the range of available colors increased dramatically. This led to a demand for pottery that was more than functional. With the command of design—combined with forming, decorating, and firing skills—potters could create distinctive pieces that were valued for their beauty.

Throughout the history of ceramics, high points of skill and beauty converged at various times in different cultures. Advances in firing techniques were key to such achievements.



What are some of these highlights? The narrative pottery of ancient Greece is renowned for its graceful forms and detailed compositional style (see Figs. 1–21 and 1–22). Other cultures focused on sculpting figures in clay. Etruscans crafted full-sized human figures from terracotta in the fifth century BCE. In Africa, Nok full-sized

**Fig. 1–21.** By reducing the amount of air in the firing chamber, potters in ancient Greece were able to cause their pots to change colors, producing dramatic black-figure ware. Greek, Archaic Period, *Amphora*, ca. 500 BCE. Black-figure terracotta, 12¾" (32 cm) high. The Cleveland Museum of Art. Purchase from the J.H. Wade Fund, 1929.979.



## Art History

### Narratives on Clay: A Global Interest

Narrative art tells a story, and the Greeks were the first to paint on clay pots as a way of telling stories. They painted action scenes featuring the human figure as early as the Bronze Age (around 2900–2000 BCE).

Art that represents a form or the human figure is called “figurative.” During the Greek classical period, figurative imagery reached a high point. Ceramic artists painted elegant pots with monsters, heroes, and mythological figures. In early classical narratives (seventh century BCE), black figures were crafted on the pot’s natural red background. (See Fig. 1–21.) Lines showing facial features, musculature, or clothing were laboriously incised. Later works (fifth century BCE) featured the red-figure style—the background is painted black and the figure

remains in red. (See Fig. 1–22.) Artists began to paint lines and details freehand with a brush. Until this time, potters had been anonymous. Now potters who shaped the form and painters who added the details typically signed their pieces.

Narrative art also flourished in the ancient Americas. About 500 years after the Greeks first developed black-figure technique, the Moche, a people on Peru’s north coast, were chronicling their beliefs and history on intricately painted pots. The Moche, who flourished from about



**Fig. 1–23.** Narrative from a red-figure kylix illustrating the myth of Lapith and the Centaur.



**Fig. 1–24.** Mayan figure in elaborate costume drinking from a bowl. Mayan artists usually painted the face and figure in profile and also used hieroglyphs (picture writing) as a design element.

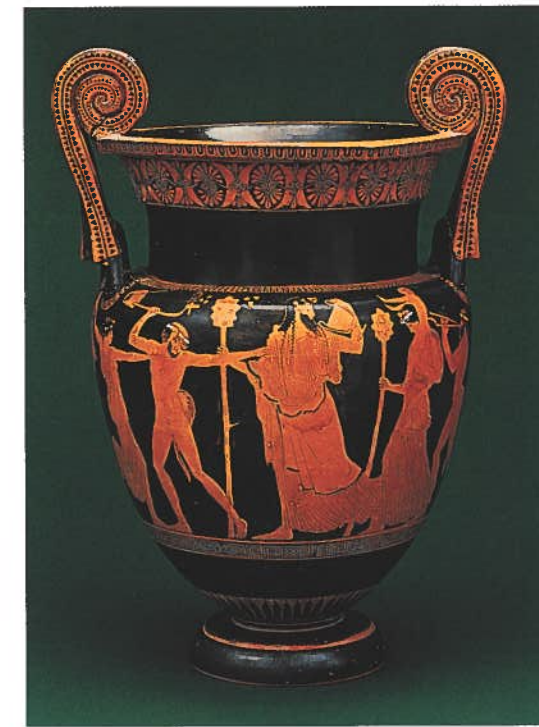
50 to 800 CE, had no writing system. But scholars compare their ceramics to a library, because the Moche recorded so much on their pots. Moche artists applied fine lines to the pot with a clay slip, a technique known as *slip painting*.

North of the Moche people, the Maya—in the region now occupied by Belize, Guatemala, and Mexico’s Yucatan province—created another great civilization. The Mayan classical period (250–850 CE) was marked by multicolor painted ceramics that detailed religious themes, rituals, and history. Mayan artists used basic shapes and relied heavily on lines as

terracotta heads and figures date from fifth century BCE to second century CE. In China around 220 BCE, armies of full-sized terracotta human figures and horses were made to accompany the emperor in his tomb. Consider looking at books, in museums, and on the Internet for examples of these artworks. How were the works fired? Firing techniques and kilns are explored in greater depth in Chapter 6.

**Fig. 1–22.** By adding air to the firing chamber, potters were able to create the bright, clear colors we see on red-figure vases.

Greek, Attica. Attributed to the Methyse Painter, *Athenian Red-figure Volute Krater*, 460–450 BCE. Slip-glazed earthenware, 23¾" x 13¾" (59.69 x 34.93 cm). The Minneapolis Institute of Arts, The Centennial Fund: Gift of funds from Mr. and Mrs. Donald C. Dayton.



an expressive feature. Like the Moche, the Maya used slip painting to create their designs, which were fired at a low temperature. Artists personalized the pots with their names, the names of patrons, and sometimes the workshop where the vessel was created.

Artists in all three cultures—Greek, Moche, and Mayan—mastered the difficult art of painting a narrative scene on the outside of a round pot. Wrapping a composition around a pot requires careful planning, because artists can see and work on only a small portion of the pot’s surface at one time.



**Fig. 1–25.** Two Moche warriors in battle gear.

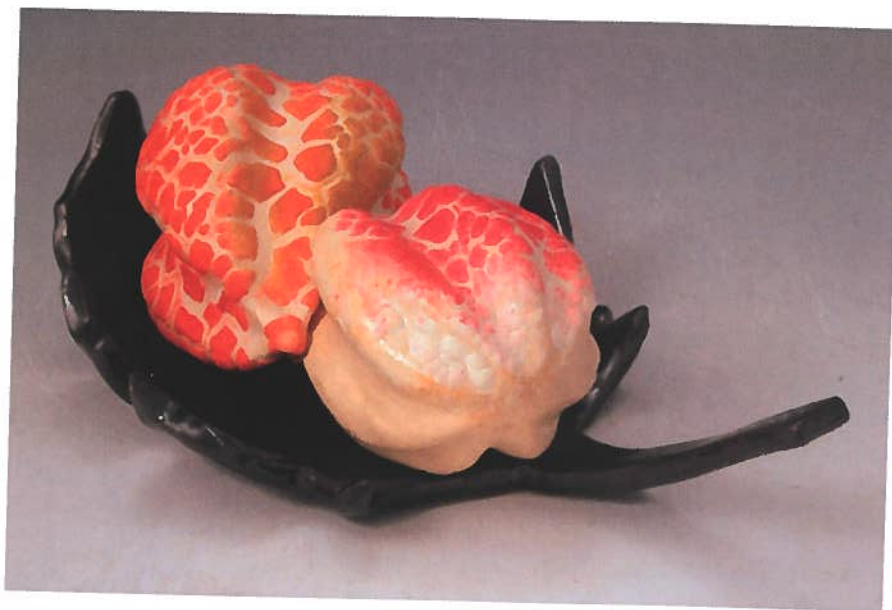


# Student Gallery



Student work, Lauren Chapman, *Snaggle Tooth*, 2009. White earthenware clay, hand-built, low-fire glaze.

Student work, Adrian Sanchez, *Lizard Study*, 2009. Hand-built, low-fire, stoneware clay with acrylic washes and stains.



Student work, Kevin Sakaguchi, *Fall*, 2007. Stoneware slab and sculpture, cone 10 reduction, lichen glaze.



Student work, Brenda Dickinson, *Untitled*, 2009. Slab-built, hand-carved, cone 04 glaze.



Student work, Brittany Nassar, *Running Out of Time*, 2009. Ceramic stoneware.



Student work, Ashley Wittlief, *Honeycomb Seashell*, 2009. Slab-built, stamped texture, cone 04 glaze.