The background of the cover is a detailed ancient Egyptian wall painting. It features a grid of rectangular panels, each containing a different scene or figure. The figures are stylized, with large heads and small bodies, typical of ancient Egyptian art. The scenes include various activities, possibly related to crafts or daily life. The overall color palette is earthy, with browns, tans, and blacks.

A Visual Survey of
Craft History

**Global Traditions &
Technological
Innovations
in Clay, Fiber,
Glass, Metal,
& Wood**

**Volume I: The Ancient World
Paleolithic to Roman**

Carol Ventura

A Visual Survey of Craft History:

Global Traditions and Technological Innovations in Clay, Fiber, Glass, Metal, and Wood

Volume I: The Ancient World Paleolithic to Roman

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Cover: *Greek Terracotta Krater*, 750-735 BCE, The Metropolitan Museum of Art, Rogers Fund, 1914, Figure 3.10.

<https://www.metmuseum.org/art/collection/search/248904>

Contents

Volume I: The Ancient World

[Preface](#)

Chapter 1: [Stone Age Period and Mesopotamia](#)

Chapter 2: [Ancient Egypt](#)

Chapter 3: [The Aegean](#) and [Greece](#)

Chapter 4: [Etruscan](#) and [Roman](#)

Volume II: Continental Asia

Chapter 5: China and India

Volume III: Island Nations

Chapter 6: Indonesia, Japan, and Oceania

Volume IV: Sacred Traditions

Chapter 7: Native America and Africa

Volume V: Islamic and Medieval

Chapter 8: Islamic

Chapter 9: Byzantine and Medieval:

Migration, Carolingian, Ottonian, Romanesque, and Gothic

Volume VI: Rebirth to Revolution

Chapter 10: Renaissance

Chapter 11: Baroque, Rococo, and Neoclassical

Volume VII: Rise of the Modern World

Chapter 12: 1800 to 1950

Chapter 13: 1950 to the Present

[Bold Text Glossary](#)

[Bibliography](#)

[Author](#)

Preface

Crafts have played an important role in world history. Over millennia, the search for raw materials, merchandise, and markets has sparked military campaigns, alliances, conquests, and trade networks that built and destroyed empires. For example, the great expense of importing silk and porcelain from Asia enticed Europeans to find better trade routes, resulting in the “discovery” and colonization of the Americas and elsewhere.

We stand on the shoulders of the men and women who appropriated, adapted, and developed the products that changed lives and fortunes over the centuries. The Renaissance was financed in large part by the luxury fabrics woven in Florence. The Industrial Revolution had a tremendous impact on society since all furnishings, clothing, and accessories had been laboriously made by hand before mechanized production. Some types of manufacture are still time consuming and expensive, though, so sweatshops and child labor persist. Machines decreased hand labor, but thanks to increased factory production, many craftspeople may now choose to make utilitarian ware or one-of-a-kind non-functional pieces or both.

This visual overview will introduce and deepen your appreciation of clay, fiber, glass, metal, and wood crafts through time with a focus on who, what, where, when, and how. Hundreds of iconic and innovative examples from around the world demonstrate how craft media evolved in the Americas, Europe, Asia, Africa, and Oceania. References in the bibliography, museum websites, and other internet resources lead to more in-depth knowledge about the cultures and media presented.

The book was divided into volumes because the photographs made the digital files too large to convert into an eBook. As a survey, much was excluded, but great effort was made to present a variety of the most innovative and influential masterpieces from around the world. Numerous sidebars in each chapter focus on craft techniques associated with the examples. The words in the glossary are highlighted with bold text the first time they appear in each volume.

The five media are not represented in every chapter nor in consistent order, but the progression is logical because many styles build on tradition

or are inspired by another medium or technical innovation. Several figures represent more than one medium. For instance, ceramic figurines that depict clothed people illustrate both clothing and ceramics. Paintings and sculptures that depict clothing, jewelry, and/or furniture establish context and show examples when few survive.

How did I become interested in this topic? Along with her other talents, my mother sewed, knitted, crocheted, and made slip-cast pottery. In addition to his military career, my father tinkered with electronics, automobiles, plumbing, and carpentry. Between them, my parents could do just about anything. The Navy relocated our family every few years around the United States and Europe, and we traveled every summer to museums and factories to discover new things and see how they were made. My love of travel and manufacturing continues to this day. Most of the photographs in the sidebars were taken on my journeys to Africa, Europe, Asia, and the Americas. The best way to learn is to teach, but this project has taught me that to really understand relationships, influences, and the evolution of ideas, write a book!

I would like to acknowledge and thank Fulbright, Fulbright-Hays, the National Endowment for the Humanities, the Program for Cultural Cooperation between Spain's Ministry of Culture and United States Universities, Smithsonian National Museum of American Art, the US Department of State, and Tennessee Technological University for their support. I would especially like to thank the museums who shared their photographs, Linda Pastryk, Frances Van Keuren, Luke Anderson, Noreen Grisolano, Vince Pitelka, and the many other friends and craftspeople who made this free eBook possible.

Chapter 1: Stone Age Period and Mesopotamia

Craft history begins during the Paleolithic Period with human history. In Greek, “paleos” “old and “lithos” means “stone,” so Paleolithic literally means, “old stone.” The prehistoric name refers to the stone tools that were used at this time. People followed their food supply in the warm months as they hunted and gathered fruits and vegetables. In cold weather they lived in caves, rock shelters, and oval huts with a depression in the floor for a fire.

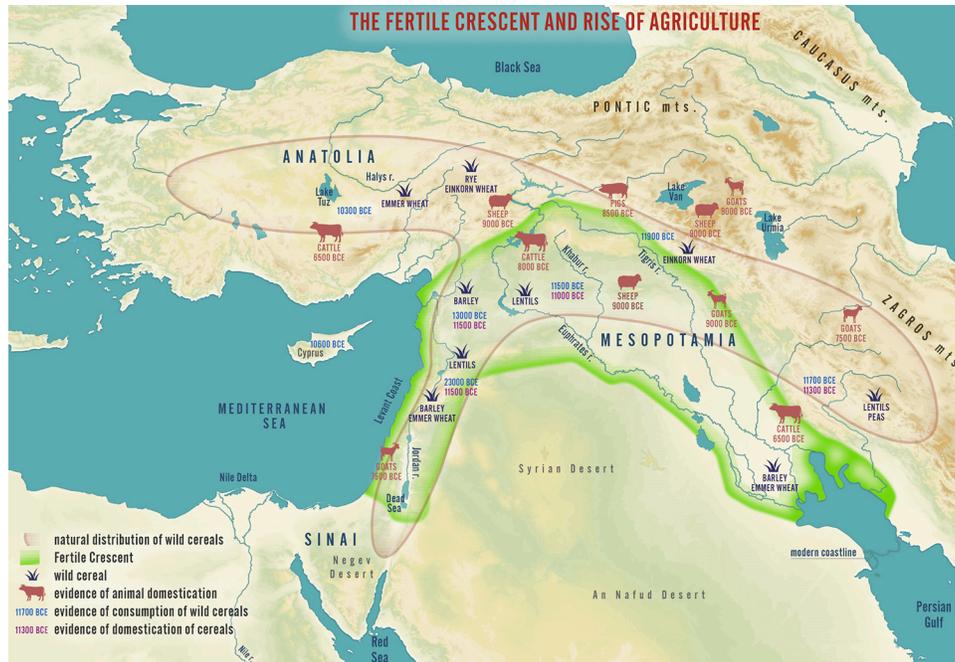
While no Paleolithic **fabrics** have survived, we see them depicted on some of the oldest surviving sculptures. Around sixty Venus statuettes depicting voluptuous naked women that date to between 29,000 and 21,000 BCE were found in Europe. Not all of them are completely nude, though. For instance, the *Venus Figurine* found in Lespugue, France, wears a fringed skirt over her ample buttocks (Figure 1.1) and the *Venus Figurine* from Dolni Vestonice, Czech Republic (Figure 1.2), has something wrapped around her lower torso. The most interesting thing about this Czech sculpture and a few other artifacts found nearby, though, is that they are ceramic. As the oldest known examples of this **medium**, they disprove the formerly accepted idea that people did not know how to successfully fire clay until fifteen thousand years later in the Neolithic Period!



Figure 1.1 *Venus Figurine*, **carved** mammoth **ivory**, 5 3/4 in / 14.7 cm tall, Lespugue, France, Paleolithic Period, ca. 26,000 – 24,000 BCE (Musée de l'Homme, Paris). <https://www.museedelhomme.fr/fr/venus-de-lespugue>



Figure 1.2 *Venus Figurine*, Dolni Vestonice, Czech Republic, ceramic, 4 ½ in / 11.1 cm tall, Paleolithic Period, ca. 29,000-25,000 BCE (Moravské Zemské Muzeum, Brno, Czech Republic, photograph by Petr Novák, Wikipedia).



Neolithic Agricultural Products (map by Simeon Netchev).

<https://www.worldhistory.org/user/simeonnetchev/>

Neolithic (new stone) people took more control of their environment. They built houses, domesticated animals, cultivated plants, wove cloth, and made ceramics. Period dates vary around the world because they are based on these technological developments. The first Neolithic villages and towns were in the “cradle of civilization,” **Mesopotamia**, located in the valley between the Tigris and Euphrates Rivers (in Greek “meso” “middle” and “potamia” means “rivers”). Today this area includes Iraq, Kuwait, western Iran, southeastern Turkey, and northeastern Syria. Mesopotamia saw the rise and fall of the Sumerian, Babylonian, Assyrian, Neo-Assyrian, and Neo-Babylonian Empires. Persian King Cyrus the Great invaded in 539 BCE and then Alexander the Great seized it for the Greeks in 331 BCE after beating Darius at the Battle of Gaugamela. The Parthians began their rule in 150 BCE but eventually lost it to the Romans. The Persians regained control in 226 CE.

The Neolithic period in Mesopotamia began around 7000 BCE when **pottery** centers were established near **terracotta** clay deposits and fuel. “Terra” means “earth” and “cotta” means “baked,” so terracotta is both the raw clay and the fired clay. The high iron content of terracotta (a type of **earthenware** clay) lowers the melting temperature and colors the body red

orange to brown. Earthenware clay is porous and was the only type of clay used around the world for thousands of years, until high fired **vitreous** stoneware and porcelain were developed in China.

Clay is still being transformed with fire into a durable material as it was thousands of years ago in places like rural Guatemala. To prepare the clay it is dried, pulverized, and sifted to remove stones and roots. When appropriate natural deposits are not available, it is mixed with other types of clay. Sand, pumice, mica, plant **fibers**, dung, or crushed **shards** may be added as temper. Tempering strengthens clay and helps it remain intact during firing. Tempering ingredients differ over time and from place to place.

Since the Neolithic Period, this versatile medium has been pinched, flattened into slabs, and **coil built**. Coiling is one of the oldest and most widespread techniques. Clay is rolled into rope-like forms, then spiraled around to build up the walls. The joints are smoothed, then the vessel is given its final shape (Figure 1.3a).



Figure 1.3a María Matías José (Jacaltek Maya) coil builds a vessel that will look like the pitchers in the foreground in Xaomlaj, Jacaltenango, Guatemala (photograph by Carol Ventura, 1986).

Earthenware clay must be heated to around 1000°F / 538°C to make it hard. After drying, it can be **fired** on the ground. On a windless, dry morning, the Maya potter seen here sets her damp clay pitchers around a small fire to warm and completely dry them, then places them next to each other and covers them with dry tree roots (Figure 1.3b). She ignites the wood, then for an hour adds more tinder to gradually raise the temperature. Clay expands and contracts as the temperature changes, so the entire piece must heat and cool at the same rate or it will crack, quite a challenge when firing in the open air. These methods have been used for millennia to produce earthenware.



1.3b María Matías José (Jacalteq Maya) covers two clay pitchers with dry wood to fire them in Xaomlaj, Jacaltenango, Guatemala (photograph by Carol Ventura, 1986).

The Neolithic ceramic *Bowl* in Figure 1.4 was coil built (Figure 1.3a). Coiling clay is similar to the coiling technique used to make baskets, suggesting that this hand building technique might have been inspired by the earlier craft of basket making.

The imagery was painted onto the dry pot with a mixture of red iron oxide and water, then the pot was fired (Figure 1.3b). The swastika motif in the center of Figure 1.4 is found in many cultures. It is surrounded by four large, stylized birds with fish in their beaks and fish between them. The stepped pattern, zigzags, and horizontal lines on the inner and outer rims are popular basket motifs.



Figure 1.4 *Bowl*, painted terracotta, 10 7/8 x 3 in / 27.5 x 7.8 cm, Samarra, Iraq, Mesopotamia, Neolithic Period, ca. 6200-5800 BCE (Staatliche Museen zu Berlin, Vorderasiatisches Museum / Olaf M. Teßmer CC BY-NC-SA 4.0). <https://id.smb.museum/object/1743373/bemalte-schale>

The potter's **slow wheel** (made of stone, clay or wood) was probably invented in Mesopotamia around 4000 BCE. Some had a short shaft on the bottom of a cylindrical wheel head that fit into a socket in the base. The potter would pinch or coil a cylinder, then spin it on the wheel with one hand while perfecting the shape with the other, similar to what is seen in Figure 7.1c.

Most Mesopotamian pottery was fired in updraft **kilns** like the Egyptian kiln illustrated in Figure 2.4. With this type of firing chamber, pots are loaded and unloaded through the top. Combustible material (like wood or dung) is stoked into a firebox at the bottom of the kiln. Perforated floor

supports the ware to be fired above the firebox. Heat and smoke travel up through the ware and out the top of the kiln, which is covered with broken pieces of pottery during the firing.

Broken pieces of ceramics, called shards, are often the only survival of an ancient culture since wood, fabric, and other organic artifacts decompose in damp environments. The same clay source may be mined for centuries, but tempering, construction, shape, and decorations are so distinct through time and place that shards can date archaeological sites. Liquid and dry materials were stored and traded in ceramic vessels, so shards identify ancient foreign trade. Many people included clay vessels or figures in graves, which help archaeologists and historians better understand the cultures that produced them.

Chalcolithic derives from the Greek “chalco,” which means “pertaining to **copper**” and “lithos,” the word for “stone.” The people that lived during the Chalcolithic Period in Mesopotamia (ca. 5500-3000 BCE) still used stone but also began to use copper to make tools, weapons, and jewelry. Chalcolithic Period cities included monumental temples and sacred art.

The city of Susa was founded on the Iranian plateau by an early Chalcolithic Period culture, best known for its terracotta beakers (Figure 1.5). These thin, high walled vessels were popular funerary offerings. The flaring shape and stylized decorations are very distinctive, featuring solid horizontal bands separating friezes of long-necked birds, animals, and geometric motifs.



Figure 1.5 *Beaker*, painted terracotta, 11 3/8 x 6 1/2 in / 28.9 x 16.4 cm, Susa, Iran, Chalcolithic Period, ca. 4000-3500 BCE (© Louvre).

<https://collections.louvre.fr/en/ark:/53355/cl010122742>

The Bronze Age began around 2900 BCE in Mesopotamia. These people added around 10% tin to copper to produce **bronze**, an **alloy** with a lower melting temperature than copper that was better for **casting** and harder. Not much bronze survives, though, because weapons and statues were melted down and recycled as technology improved and politics changed.

The Early Dynastic Period saw the rise and fall of several Mesopotamian empires. The Sumerians controlled southern Mesopotamia for thousands of years. Their early form of writing, cuneiform, was preserved because they impressed the wedge-shaped symbols into damp clay tablets that were later fired; thousands have been excavated. Sumerian potters, leatherworkers, spinners, weavers, and jewelers produced items for both local consumption and export. **Wool** was a major export.

Ur is one of Sumer's most famous cities. Like other Sumerian urban centers, Ur had impressive monumental architecture. It is best known, however, for the exquisite grave goods found in Queen Puabi's tomb, that held stringed instruments, vessels, and jewelry made of **gold, silver, lapis lazuli**, and **carnelian**.

Gold is easily worked because it is softer than other precious metals and it doesn't tarnish very easily, making it the metal of choice for fine jewelry throughout history. The decorative lines on the gold leaf-shaped appendages of the Queen Puabi's headdress (Figure 1.6) were probably **embossed** into the gold (Figure 1.7).



Figure 1.6 *Queen Puabi's Jewelry*, lapis lazuli, gold, and carnelian, Sumerian, Queen Puabi's tomb, Ur, Sumer, Iraq, Bronze Age, ca. 2600-2450 BCE (British Museum / University Museum Expedition to Ur, Iraq, 1928. Courtesy of the Penn Museum).

<https://www.penn.museum/collections/highlights/neareast/puabi.php>

Embossing is a technique used to create textures and low reliefs. Material being worked is supported by a slightly soft material that allows the tools to form indentations. The artisan in Figures 1.7a and 1.7b is crafting embossed mirrors. He presses his embossing tool into the back of a thin

sheet of brass (supported by a piece of leather), then turns the metal over and embosses around the impression to add definition, frequently flipping it back and forth to create more lines and details.

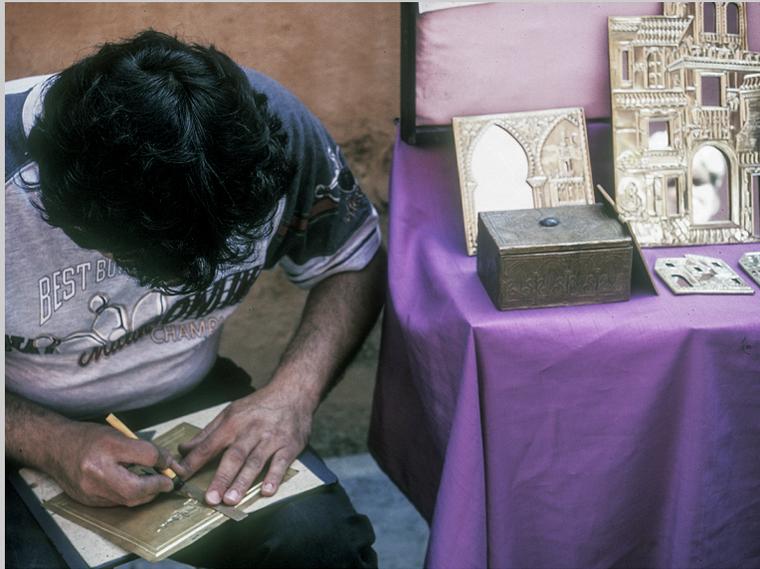


Figure 1.7a A craftsman embosses into the reverse side of a piece of brass while selling his finished embossed mirrors in Seville, Spain (photograph by Carol Ventura, 1997).



Figure 1.7b After turning the metal over, he runs his tool around the raised areas just made from the back, in Seville, Spain (photograph by Carol Ventura, 1997).

The gold beer-drinking cup in Figure 1.8 is one of four vessels found buried with Queen Puabi. The built-in straw helped the Queen avoid drinking the foam head. There are no deposits of gold in Mesopotamia, so the metal was imported. The gold was probably hammered over a **stake** / anvil to form it into a cup (Figure 1.9a). After the three-dimensional shape was made, the vertical ribs were probably formed from the backside with repoussé (Figure 1.9b), then the rim would have been chased (Figures 1.9c and 1.9d) to create the zigzag designs. Attaching the straw was tricky because too much heat would melt the metal.



Figure 1.8a *Cup*, hammered gold, 5 1/2 x 7 in / 14 x 18 cm, Sumerian, Queen Puabi's tomb, Ur, Sumer, Iraq, Bronze Age, ca. 2600 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/W_1928-1010-6



Figure 1.8b *Cup Rim Detail*, hammered gold, Sumerian, Queen Puabi's tomb, Ur, Sumer, Iraq, Bronze Age, ca. 2600 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/W_1928-1010-6

Malleable metal, like gold, silver, copper, and **brass**, may be **forged** over a shaped stake / anvil to gradually **raise / shape** (Figure 1.9a) it into a three-dimensional form. Afterwards, it may be decorated with low relief by hammering variously shaped tools from the back with **repoussé** (Figure 1.9b) and/or from the front with **chasing** tools (Figure 1.9c). The metal is supported by pitch, a resinous waxy mixture with a consistency that allows tools to indent the metal but not pierce it. The color of the pitch varies according to the ingredients used to make it. Pitch is heated until it forms a liquid, the piece to be worked is set onto it, then it is allowed to cool. Repoussé and chasing are cold working techniques. The finished piece is removed by reheating the pitch.



Figure 1.9a Robert Coogan (1952-) raises a copper vessel on a stake in front of a wall of shaped stakes at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2000).



Figure 1.9b Hammering a shaped metal tool into the rim of an offering metal bowl (supported in a large black pitch bowl) to repoussé the rim, at KlungKlung, Bali (photograph by Carol Ventura, 2007).



Figure 1.9c A pattern was transferred to a sheet of metal to help guide the craftsman chase sheet brass at Ramón León Peñuelas Silversmithing in Triana, Seville, Spain (photograph by Carol Ventura, 2005).



Figure 1.9d Chasing brass embedded in red pitch at Ramón León Peñuelas Silversmithing in Triana, Seville, Spain (photograph by Carol Ventura, 2005).

Between 2700 – 539 BCE, the people of Elam dominated southern Mesopotamia. They were conquered but eventually regained their power. Although examples of Mesopotamian clothing have not survived, figures depicted in sculptures and paintings provide clues. The life-size sculpture of *Queen Napirasu* in Figure 1.10 was found in Susa, the Elamite capital city. She is wearing a short-sleeved gown made of woven cloth with **embroidered** details. The Elamite inscription on the front of the skirt gives her name and titles and invokes the protection of the gods. The four bracelets on her right wrist and ring on her left ring finger provide insight into the jewelry worn at the time.



Figure 1.10 *Queen Napirasu*, 50 $\frac{3}{4}$ in / 129 cm tall, cast bronze and copper, Elamite, Susa, Iran, Bronze Age, ca. 1345-1305 BCE (© Louvre).

<https://collections.louvre.fr/en/ark:/53355/cl010176829>

The Elamite relief in Figure 1.11 not only shows clothed figures but also includes jewelry and furniture. The lion's claw feet supporting the legs of the stool and table show the importance of the seated woman, because this type of foot is reserved for royalty. A fish and other food are on a table. A standing figure (wearing a belted garment and six plain bracelets on each arm) is fanning the woman **spinning** wool into yarn with a top **whorl** drop **spindle**. Her long hair is pulled back into a bun, held in place with a headband. The lady's bracelets are decorated with incised lines. Her long garment has an interesting decorative edge.



Figure 1.11 *The Spinner*, carved bituminous stone, 3 5/8 x 5 1/8 in / 9.2 x 13 cm, Neo-Elamite, Susa, Iran, Iron Age, 8-6th century BCE (© Louvre).
<https://collections.louvre.fr/en/ark:/53355/cl010176914>

Sheep were first domesticated in Mesopotamia around 4,000 years ago. When the weather warmed in Spring, the wool began to fall off. Although shedding has been bred out of most modern sheep, Shetlands retain this characteristic. While most wool is harvested with hand or electric shears, Shetland wool can be removed by rooing (pulling it off by hand).

Wool and lanolin grow from a follicle in sheep's skin. Wool is keratin, the same protein found in horns and hoofs. Keratin consists of helical chains of amino acids. Because the chains are coiled, they stretch when pulled, and then recoil back into shape, so wool doesn't shrink; it just recoils. More than 450 breeds of domestic sheep worldwide today produce a variety of fine to coarse wools in shades of white, brown, and black. Wool is also **dyed** in a rainbow of hues.



1.12a White and brown Shetland sheep about to shed their wool at Bountiful Acres Farm in Watertown, Tennessee (photograph by Carol Ventura, 2015).



1.12b Shearing wool in Saugerties, New York (photograph by Carol Ventura, 1974).

Several repoussé and chased vessels like the *Cup* in Figure 1.13 were excavated in Iran. This example features four gazelles walking to the left. Their projecting heads, ears, and horns were made separately, then attached, possibly with **colloidal fusion welding**, a process that uses an organic binder, copper salt, and heat. The indented hooves and eyes might have originally held inlays.



Figure 1.13 *Cup*, gold, 2 1/2 in / 6.5 cm high, Iran, Iron Age, ca. 1st millennium BCE (The Metropolitan Museum of Art, New York, photograph by Carol Ventura).

<https://www.metmuseum.org/art/collection/search/325511>

Although components change from place to place and through time, the main ingredient of **glass** is silica (obtained from clean sand or crushed quartzite pebbles). Other ingredients include alkali (may be soda from salt water evaporitic deposits or ashes obtained from soda-rich plants) that lowers the melting temperature and lime (from shells, limestone, or plant ashes) to stabilize and protect glass against moisture. Various combinations of iron, copper, manganese, tin, cobalt, lead, zinc, and antimony are added to produce a range of colors and opacities.

Solid glass beads and amulets that date to around 2500 BCE were found in Iraq, suggesting that glass was first made in Mesopotamia. In *Natural*

History, the Roman historian Pliny the Elder (23-79 CE) claimed that Phoenician sailors accidentally invented glass when they landed on a sandy beach, propped a cooking pot on blocks of natron they were carrying as cargo, then made a fire. To their surprise, the sand melted and hardened into glass. A nice story but a cooking fire would only reach the necessary temperature required to melt glass if air was forced into it ([Pliny 36.65](#)).

The author suggests it is more likely that glass developed from **slag**, the glossy byproduct of extracting metal from ore. Slag produced from **smelting** copper resembles blue glass, lapis, and turquoise. The blue and green colors and air bubbles in the lower right example in Figure 1.14 are typical of this substance.



Figure 1.14 Slag formed by smelting copper, lower left is 3 ½ in / 8.89 cm wide, Germany, ca. 500 CE (Carol Ventura Collection, photograph by Carol Ventura, 2020).

The earliest hollow glass vessels were formed around a removable core in Mesopotamia around 1500 BCE. To make the **core-formed Perfume Bottle** in Figure 1.15, a mixture of clay, silica, and dung was shaped and attached to the end of a metal rod. The dry core was heated, coated with glass, then shaped by rolling it on a hard smooth surface. After reheating, it was wrapped with strands of different colored hot glass, glass handles were applied, the glass vessel was slowly cooled, the rod and core were removed, then the piece was finished by grinding and polishing the surface.



Figure 1.15 *Perfume Bottle*, core-formed glass, 6 1/2 in / 16.8 cm high, Mesopotamia (Iran), Iron Age, ca. 799-600 BCE (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/2894/jar?ctx=91b60944065bf3762eb266e9fa4860644f5dbeba&idx=0>

Some glass vessels were cast (Figure 1.16), perhaps by filling a **mold** with finely powdered glass, then heating it until the powder melted. After cooling, the surface would be ground and polished with abrasives.



Figure 1.16 *Vessel with Lug Handles and Pedestal Foot*, cast and cut and polished glass, 7 1/2 in / 19 cm high, probably Assyria, Iron Age, ca. 725-600 BCE (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/2109/vase?ctx=cf429788899e7c1540ca46e6ca69075fcff237ca&idx=1>

The Assyrian and Neo-Assyrian Empires expanded and contracted several times between 2500 and 605 BCE. While few artifacts survive, their stone reliefs offer insight into life at the time. The wall reliefs from the Palace of King Sargon II (reigned 722 – 705 BCE) were decorated with processions of larger than life-sized clothed figures wearing jewelry. Two of the men pictured in Figure 1.17 are carrying a chariot.



Figure 1.17 *Men Armed with Swords Carry a Chariot*, carved gypsum relief, 10 ft 8 in / 298 x 243 cm, Palace of King Sargon II, Khorsabad, Iraq, Neo-Assyrian, Iron Age, ca. 721-705 BCE (© Louvre).

<https://collections.louvre.fr/en/ark:/53355/cl010122706>

King Ashurbanipal (reigned 668 – 627 BCE) was the star and hero of many of the reliefs on the walls of his Neo-Assyrian palace. Since no furniture has survived, we need to look to the reliefs to get a glimpse of their furnishings. Figure 1.18 shows the King reclining on a finely carved padded couch facing the Queen who sits on a matching throne with a footstool. The King's long beard indicates his high status because in Mesopotamian culture, the longer the beard, the higher the rank. A musician plays a lyre while attendants fan the royal couple as they drink from shallow bowls in a wonderful garden of palms, conifer trees and vines.



Figure 1.18 *Wall relief of King Ashurbanipal with His Queen in the Royal Garden*, carved alabaster, 23 x 55 / 58.42 x 139.7 cm, Neo-Assyrian, Nineveh, Iraq, Iron Age, ca. 645 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/W_1856-0909-53

A year after King Ashurbanipal died, the Neo-Babylonians rebelled and took control of Mesopotamia. King Nebuchadnezzar II (reigned 604 - 562 BCE) commissioned temples, a magnificent palace, the *Ishtar Gate* (Figure 1.19) and the *Processional Way* that led to the *Ishtar Gate*, for the capital city of Babylon. The *Ishtar Gate* and *Processional Way* were decorated with terracotta reliefs of dragons, young bulls, and lions (Figure 1.20) that were glazed blue, turquoise, yellow, black, and white. The striding lions along the *Processional Way* were sacred to Ishtar, the goddess of love and war. Glazed tiles were first used in Egypt around 3000 BCE, but not on this monumental scale. The Neo-Babylonians ruled for more than a hundred years, until Cyrus the Great conquered them in 539 BCE.



Figure 1.19 *Ishtar Gate*, glazed brick relief, 48 ft 4 in / 14.72 m tall, Neo-Babylonian, Babylonia, Iran, Iron Age, ca. 575 BCE (Pergamon Museum, Berlin).



Figure 1.20 *Striding Lion on the Processional Way to the Ishtar Gate*, glazed brick relief, Neo-Babylonian, Babylonia, Iran, Iron Age, ca. 575 BCE (Pergamon Museum, Berlin, photograph by Carol Ventura, 2009).

Cyrus the Great (600-530 BCE) founded the Achaemenid Persian Dynasty. When Darius I / Darius the Great became the third king in 522 BCE, he added northwestern India, making the Persian Empire the largest

the world had known. The Persian Empire fell to Alexander the Great at the Battle of Issus in 330 BCE.

The glazed relief in Figure 1.21 is from the palace that Darius the Great built in the ancient city of Susa, one of four capitals of the Achaemenid Persian Empire. Each of the life-sized soldiers is armed with a spear, bow, and quiver and is clothed in an appliquéd robe, cap, laced shoes, and jewelry. The Susa relief might have been inspired by the Neo-Babylonian reliefs (Figures 1.19 and 1.20). The glaze colors and raised relief are similar, but instead of clay, these bricks were made with a thousand-year-old silica and lime mixture that dates back to the Elamite Period in Susa.



Figure 1.21 *Armed Soldiers*, glazed quartz body, Palace of Darius the Great, Persian, Susa, Iran, ca. 510 BCE (Pergamon Museum, Berlin, photograph by Carol Ventura, 2009).

Many fine examples of Persian gold and silver have survived, including the *Rhyton* in Figure 1.22. This ceremonial drinking vessel

features a winged lion with a protruding tongue. It was formed from several pieces of gold brazed together almost without a trace. The upper band of the cup is ornamented with 44 rows of gold wire about .008 in / .02 cm in diameter. The lion has a crest on his head and back. Each flank is covered with an ostrich plume, suggesting a supernatural winged lion.



Figure 1.22 *Rhyton*, gold, 6 11/16 x 5 7/17 x 3 5/8 in / 17 x 13.8 x 9.2 cm, Achaemenid Persian, Iran, ca. 5th century BCE (The Metropolitan Museum of Art, New York, Fletcher Fund, 1954, CC0).

<https://www.metmuseum.org/art/collection/search/324291>

The cuneiform inscription on the gold bowl in Figure 1.23 translates to “Darius the Great King.” The exquisite bowl might have belonged to Darius I or II or both.



Figure 1.23a *Fluted Bowl*, gold bowl, 4 3/8 in / 11.1 cm high, Archaemenid, Iran, ca. 6th–5th century BCE (The Metropolitan Museum of Art, New York, Harris Brisbane Dick Fund, 1954, CC0).
<https://www.metmuseum.org/art/collection/search/324289>



Figure 1.23b *Fluted Bowl*, gold bowl, 4 3/8 in / 11.1 cm high, Archaemenid, Iran, ca. 6th–5th century BCE (The Metropolitan Museum of Art, New York, photograph by Carol Ventura)
<https://www.metmuseum.org/art/collection/search/324289>

The *Armlet* in Figure 1.24 is one of a pair from the Oxus Treasure, a group of 170 pieces and 200 coins found near the Oxus River in present-

day Tajikstan. Armlets were gifts of honor at the Persian court. The hoop is almost solid metal on the bottom but becomes tubular towards the winged griffins. The hollow areas were originally filled with semi-precious stones and possibly **enamel**. Had the glass survived, it would have been a good example of both *champlevé* (glass melted into depressions) and *cloisonné* (glass melted into cells made with flat wire) enameling.



Figure 1.24 *Armlet*, gold, 5 in / 12.8 cm high, Achaemenid Persian, Takht-i Kuwad, Tadjikistan, ca. 5-4th century BCE (Victoria and Albert Museum).

<https://collections.vam.ac.uk/item/O140678/armlet-unknown/>

Chapter 2: Ancient Egypt



Ancient Upper and Lower Egypt (map by Tina Ross).

<https://www.worldhistory.org/user/tinaross/>

Predynastic Period (ca. 6000-3000 BCE)

The climate in Africa and Europe used to be very different. For instance, the Sahara Desert was a grassy plain during the Ice Age. As the glaciers in Europe receded, North Africa became so dry that most Paleolithic people migrated east to the Fayum Oasis and the Nile Valley of Egypt.

The first Egyptian Neolithic settlements date to around 6,000 BCE. Water from the annual Nile flood deposited a rich layer of soil, making it ideal for cultivating crops like barley and wheat. Terracotta clay was also plentiful along the banks

Several distinct cultures developed in both Lower and Upper Egypt. “Lower” and “Upper” refer to the elevation, so Upper Egypt was mountainous, dry, and rocky, while Lower Egypt occupied the lush delta where the Nile flowed north and emptied into the Mediterranean. Lower Egypt was more opulent, urban, and populous than Upper Egypt.

The Egyptian Predynastic Period began around 5,000 BCE and lasted two thousand years. Naqada II was one of several cultures that lived in isolated villages in Upper Egypt and then in both Upper and Lower Egypt between 5,000 and 3300 BCE. These people cultivated crops along the fertile banks of the Nile, raised cows, hunted, fished, wove cloth, worked copper, and made **ceramics**.

The Naqada II buried their dead in the fetal position surrounded by hand built **burnished** terracotta **pottery** like the *Jar* in Figure 2.1. Burnishing leather-hard clay (Figure 7.1d) produces a glossy surface and makes earthenware less porous.

The color of terracotta can be beige, red or black, depending on the composition of the clay and the amount of oxygen and carbon in the atmosphere while it is being fired. Oxygen is taken from the metal oxides in the clay when it is lacking, which changes the color of the fired piece.

Figure 2.1 was burnished and then fired on the ground with the bottom partially buried to stop it from turning black when plants or dung were added at the end of the firing to smother the flames and increase the carbon. The top of the jar turned black as the oxygen was drawn from the iron oxides in the clay to continue combustion and the surface blackened even more as it absorbed the carbon.



Figure 2.1 *Jar*, burnished terracotta, 10 ¼ in / 26 cm tall, Naqada II, Hierakonpolis, Upper Egypt, Predynastic, ca. 3650–3300 BCE (Metropolitan Museum of Art, Rogers Fund, 1936, CC0).

<https://www.metmuseum.org/art/collection/search/547291>

Late Naqada II people lived in rectangular houses constructed with mud-brick and timber. The earliest known Egyptian painting survives on vessels like the *Water Jar* in Figure 2.2, that was **oxidation** fired.



Figure 2.2 *Water Jar*, painted terracotta, 11 13/16 x 12 3/16 in / 30 x 31 cm, Late Naqada II, Egypt, Predynastic, ca. 3500–3300 BCE (Metropolitan Museum of Art, Rogers Fund, 1920, CC0).

<https://www.metmuseum.org/art/collection/search/545755>

Dynastic Period (ca. 3100 - 30 BCE)

The Bronze Age in Egypt corresponds with the Early Dynastic Period, believed to have begun when King Narmer, the ruler of Upper Egypt, conquered Lower Egypt and unified the country. His large-scale irrigation projects increased agricultural production, which supported the growing population of the Nile Valley. The formal style associated with Egyptian art was born in his royal workshops. Upper and Lower Egypt separated and reunited a few times during the Old, Middle, and New Kingdoms. The Dynastic Period ended with the death of Cleopatra VII in 30 BCE.

Egyptian burials gradually became more elaborate. Furniture, jewelry, clothing, pottery, and other grave goods were buried with the deceased in tombs that were decorated with paintings of the afterlife and

everyday life. Fortunately, the dry climate preserved most of the tombs and their contents, even organic materials like wood and cloth that perished in damper regions. Tomb sculptures and paintings of sculptors, weavers, potters, jewelers, metalsmiths, and woodworkers provide tremendous insight into ancient craft production.

Several tomb paintings and a small sculpture show that Egyptian potters used a slow wheel with a shaft between the base and the wheel head. Figure 2.3 is one of twenty-five carved limestone statues found in the tomb of Ony-kau-Inapu, a cemetery official. This potter is turning the wheel head with his left hand while forming the rim of a bowl.



Figure 2.3 *Potter*, painted limestone, 5 1/5 in / 13.2 cm tall, Tomb of Ny-kau-Inpu, Giza, Lower Egypt, 5th Dynasty, Old Kingdom, ca. 2474-2444 BCE (©Courtesy of the Institute for the Study of Ancient Cultures of the University of Chicago, E10628). <https://isac-idb.uchicago.edu/id/07f886fb-8bc7-4c5c-9c50-3fa29350b47d>

Figure 2.4 is based on a wall painting in the main chamber of Nomarch (Governor) Amenemhat's tomb at Beni Hasan with men loading and firing tall kilns, mixing clay with their feet, and forming vessels on the wheel.



Figure 2.4 Pottery production, based on a painting in the Tomb of Nomarch Amenemhat, Egypt, 12th Dynasty, Middle Kingdom, ca. 1880 BCE (Newberry 1893: pl. XI). <https://archive.org/details/beni-hasan-v-1/page/n129/mode/2up?view=theater>

The potter's kick wheel did not appear in Egypt until the 5th century BCE. The distinct angled spiral marks on the pottery from this time onwards suggest its use. Since it was powered by the potter's feet, both hands could be used to form the clay. The quickly turning wheel allowed potters to throw clay, greatly speeding up production.

Tall wheel-thrown *Wine Vases* (Figure 2.5) are depicted in the lower right corner of the tomb painting in Figure 2.6. The shape resembles the "hes" hieroglyph, which means "to favor" or "to praise." These elegant vessels, known as "hes" vases, were used in purification rituals and for libations, or liquid offerings. They were often painted with white, black, yellow, blue, and red brown **pigments**. Cobalt aluminate oxide was mined in Egypt to create blue decorations on pottery and Egyptian faience. Manganese was used for black and iron oxides for red brown.



Figure 2.5 *Wine Vase*, painted earthenware, 38 7/8 in / 93.5 cm high, Egypt, 18th Dynasty, New Kingdom, ca. 1353-1190 BCE (University of Pennsylvania, Gift of Sophia Cadwalader in memory of Eckley B. Coxe Jr., 1926). <https://www.penn.museum/collections/object/91040>

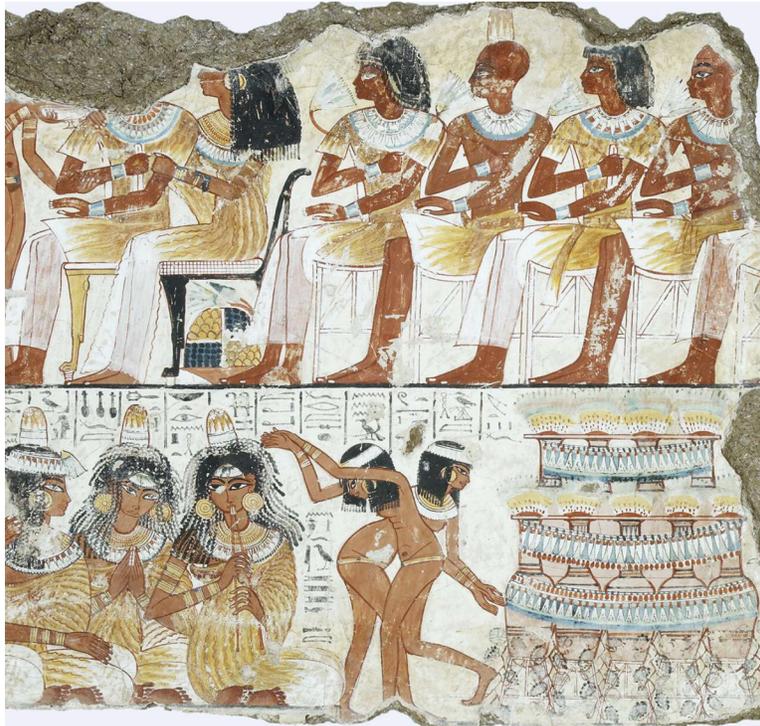


Figure 2.6 *Banquet with Guests, Musicians, and Dancers*, wall painting from Tomb of Nebamun, 34 5/8 in / 88 cm high, Thebes, 18th Dynasty, New Kingdom, ca. 1370 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license)

https://www.britishmuseum.org/collection/object/Y_EA37984

Egyptian paste / Egyptian faience is a self-glazing ceramic used as early as 3000 BCE to make colorful small sculptures, tiles, furniture inlays, amulets, and beads that imitated more expensive stones. This medium was also used to glaze steatite, a soft stone. Turquoise green and lapis blue were the most popular colors, but red, yellow, black, brown, and white were also crafted. Although the ingredients vary, it is made with ground quartz or sand mixed with plant ashes or natron (sodium carbonate and sodium bicarbonate), limestone, and/or a colorant (antimony, cobalt, copper, iron, and/or manganese). Egyptian faience is difficult to work, so

most pieces were formed in clay molds, dried, then fired to around 1472-1832°F / 800-1000°C.

The musicians, dancers, and seated guests in Figure 2.6 are wearing a variety of styles of broad collar necklaces that were popular with both men and women in ancient Egypt. The most expensive necklaces were made of turquoise, lapis lazuli, carnelian, and gold, but others were strung with ceramic and/or Egyptian faience beads that imitated the more costly materials. The *Broad Collar Necklace* in Figure 2.7 was worn by the mummy of Wah, a man. Diminishing lengths of turquoise-colored faience beads strung on **linen** thread enhance the curved form.



Figure 2.7 *Broad Collar Necklace*, Egyptian faience strung on linen thread, 13 9/16 x 15 3/8 in / 34.5 cm x 39 cm, Tomb of Wah, Upper Egypt, Thebes, 12th Dynasty, Middle Kingdom, ca. 1981–1975 BCE (Metropolitan Museum of Art, Rogers Fund and Edward S. Harkness Gift, 1940, CC0).

<https://www.metmuseum.org/art/collection/search/544321>

The tomb of Sobekhotep includes a painting (Figure 2.8) that illustrates the steps involved in making a broad collar necklace. Three craftsmen are boring several holes at the same time with multiple **bow drills** (Figure 5.32c) while a man in the upper right rubs beads on an abrasive surface to polish them. A man in the lower left is beading a wide

collar necklace. Beads of different shapes and sizes are depicted in rows on the right.

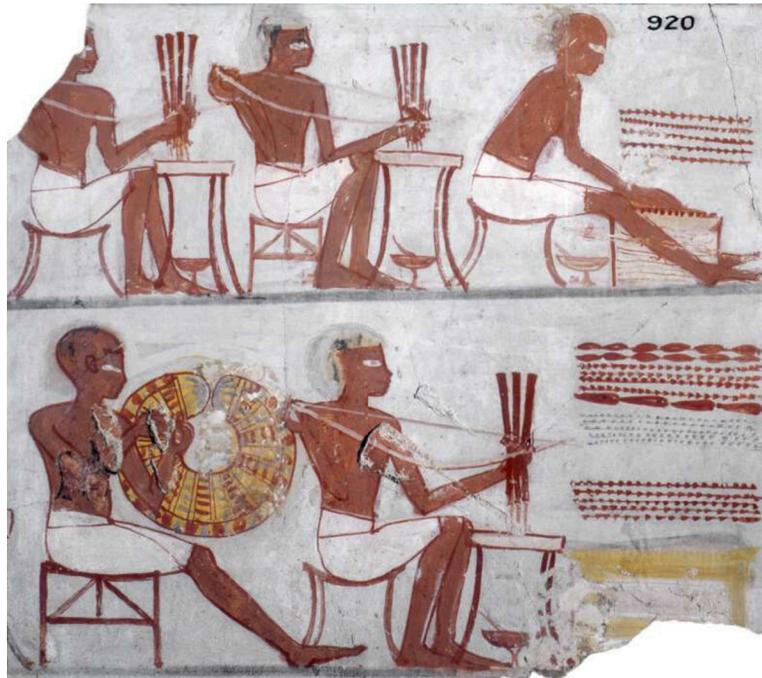


Figure 2.8 *Men Drilling Holes, Polishing Beads, and Beading a Necklace*, 26 in / 66 cm wide, Tomb of Sobekhotep, Thebes, Egypt, 18th Dynasty, New Kingdom, ca. 1400 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/Y_EA920

There is a lot of speculation about how ancient Egyptian faience and glass beads were crafted. A moist mixture could have been modeled or pressed into a mold, removed, dried, and fired. But beads could also have been made with molds that were filled with dry ingredients and fired, in the manner that glass beads are produced today in Ghana.

The Krobo use termite mound clay to build the shell of the kiln. The floor, located directly over the firebox, is constructed from automotive leaf springs supported by recycled car axles. The fuel consists mostly of dry branches. In fact, the less dense the fuel, the more quickly and hotly it burns.

Ghanaian terracotta molds are hand built and stamped to form specially shaped cavities. The molds are dried, fired, then covered with kiln wash

before use so that the glass will not stick to them. A cassava stem is inserted into (Figure 2.9a) or across (Figure 2.9b) depressions in the cavity to form a hole in the finished bead. Some Egyptian molds have similar depressions in the bottom (Figure 2.9c) on the sides (Figure 2.9d), suggesting a similar technique.



Figure 2.9a A cassava stem is set into a depression on the bottom of the cavity in the mold, then cut to the height of the mold (to form a hole in the finished bead), Odumase Krobo, Ghana (photograph by Carol Ventura, 2008).



Figure 2.9b Multicolored glass beads are made by filling the bottom of the mold with one color, placing a cassava stem into the depressions on the sides of the opening (to form the hole), then covering the top with another color in Daabaa, Ghana (photograph by Carol Ventura, 2008).



Figure 2.9c Round bead mold, terracotta, 1 in / 2.3 cm diameter, El-Amarna, New Kingdom, 18th Dynasty, New Kingdom, 1539-1292 BCE (Object E672. Courtesy of the Penn Museum).

<https://www.penn.museum/collections/object/255132>



Figure 2.9d Scarab mold, terracotta, 1 ¼ in / 3.28 cm wide, El-Amarna, New Kingdom, 18th Dynasty, ca. 1539-1292 BCE (Object E743. Courtesy of the Penn Museum).

<https://www.penn.museum/collections/object/120442>

The molds are filled with colorful layers of powdered glass, placed in the kiln and heated (Figure 2.9e) for around a half hour until the powder melts (1112° F to 1472° F / 600° C to 800° C), then removed from the kiln. The hot mold allows each bead to slowly cool in place.



Figure 2.9e Firing terracotta molds filled with powdered glass in Odumase Krobo, Ghana (photograph by Carol Ventura, 2008).

Figure 2.9f shows the remains of the stem that kept the glass at bay before charring, forming a perfect hole in the bead. The beads contract as they melt in the molds and thanks to the release agent, pop out of the cold reusable molds with a fairly smooth finish. Depending on the type of glass used and the temperature fired, the surface may be flat or curved and either mat or glossy (Figure 2.9g). See <https://www.carolventura.com/beadmaking.htm> and <https://www.carolventura.com/glassbeadmaking.htm> for more about this process.



Figure 2.9f Fired clay bead cooling in the warm mold with the remains of a charred stem in the hole in Odumase Krobo, Ghana (photograph by Carol Ventura, 2008).



Figure 2.9g Finished cast glass ornament still in the mold in Odumase Krobo, Ghana (Carol Ventura Collection, photograph by Carol Ventura, 2008).

Egyptian core-formed vessels look so much like those made in other places that it was assumed they were imported. Thanks to recent excavations, experimentation, and chemical analysis, it is now known that glassware was produced in several Egyptian cities.

The perfume bottle in Figure 2.10 that is shaped like an **amphora** was formed around a removable core like the bottle in Figure 1.15. A sharp tool was dragged through the molten yellow, white, and turquoise stripes on the Egyptian cobalt blue bottle to create the chevron patterns, a **combing** technique. The Corning Museum of Glass video at <https://www.youtube.com/watch?v=uM-HqT1v2C4> demonstrates the process. Twisted white and blue canes decorate the top and bottom rims and twisted yellow and blue canes embellish where the body joins the foot.



Figure 2.10 *Jar*, core-formed glass, 6 x 2 3/8 in / 15.3 x 6 cm, Egypt, 18th Dynasty, New Kingdom, ca. 139–1336 BCE (The Metropolitan Museum of Art, Purchase, Edward S. Harkness Gift, 1926, CC0).

<https://www.metmuseum.org/art/collection/search/544828>

Female tilapia fish shelter their young in their mouth, suggesting birth and regeneration to the Egyptians as the live brood emerge. The core-formed glass Nile tilapia in Figure 2.11 was made in Amarna. People wonder why Pharaoh Akhenaton chose to build his new capital there. The author thinks the abundance of terracotta (for making pottery and molds) and the special type of silica used to make glass probably influenced his decision.



Figure 2.11 *Fish*, core-formed glass, 5 ½ x 2 ¾ in / 14.1 x 7 cm, Amarna, Egypt, 18th Dynasty, New Kingdom, ca. 1350 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/Y_EA55193

Although core-forming was probably introduced from abroad, cast glass (Figure 2.12) might have developed locally from Egyptian faience, because similar molds are used for both and when faience ingredients are mixed in slightly different proportions, they form glass when heated to higher temperatures.

Figure 2.12 is one of the earliest known glass portraits. It might be Amenhotep II, who ruled Egypt around 60 years before Tutankhamen.



Figure 2.12 *Head of a Pharaoh*, perhaps Amenhotep II, cast glass (originally blue), 1 ½ x 1 1/8 x 1 1/3 in / 4 x 2.9 x 3.4 cm, New Kingdom, 18th Dynasty, New Kingdom, ca. 1426-1400 BCE (Corning Museum of Glass, Purchased in part with funds from the Museum Endowment Fund).

<https://www.cmog.org/audio/king-amenhotep-ii-121>

While Egyptian glassmakers used molds to craft three-dimensional and low relief pieces, a different technique was used to create matching sets of intricately patterned flat pieces. To accomplish this, long pieces of colored glass were bundled and fused together with heat to form a design that is visible on both ends (Figure 2.13) that could be reheated and stretched to miniaturize and refine the image (Figure 11.8). It was then cut apart, with each slice repeating the motif, which could be used individually or arranged in patterns as mirror images. These techniques produced the *Inlay from a Shrine* (Figure 2.14), which features the eye of Horus in the middle, flanked by mirrored figures of the god Heh (the personification of eternity) kneeling on the hieroglyph for gold while holding hieroglyphs for a multitude of years.



Figure 2.13 *Inlay with Eye*, fused glass, 1 1/8 in / 3 cm high, Egypt, New Kingdom, 18th Dynasty, New Kingdom, ca. 1304-1080 BCE or possibly later (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/10717/inlay?ctx=23baa981b4aa1e198771adeed404f01410557563&idx=0>



Figure 2.14 *Inlay from a Shrine*, mosaic glass, 3 3/8 x 9/16 x 3/16 in / 8.5 x 1.5 x .5 cm, Ptolemaic, ca. 100 BCE-100 CE (Museum of Fine Arts, Boston, Gift of John Jermain Slocum).

<https://collections.mfa.org/objects/262678/mosaic-glass-inlay-from-a-shrine?ctx=00a5afd7-7523-482c-861d-72acfa8e88d4&idx=0>

Egyptians crafted metal vessels and jewelry from bronze, copper, gold, silver, and **electrum**. Gold was mined in Egypt, and perhaps because it did not tarnish and shone like the sun, it was associated with the sun god and called the “Flesh of the Gods.” Silver was associated with the moon.

Jewelry began to play an important role as a status symbol during the 12th Dynasty (ca. 1900 BCE). It was also believed to have amuletic properties. Bracelets, diadems, necklaces, **pectorals**, and rings were often embellished with inlays of contrasting metals, faience, glass, and precious stones. Agate, amethyst, calcite, carnelian, garnet, green feldspar, jasper, rock crystal, and turquoise were mined in Egypt, but lapis lazuli and obsidian were imported.

The colorful *Pectoral* in Figure 2.15 is one of twenty-seven that were found in the tomb of Pharaoh Tutankhamun. The central scarab is made of pale green desert glass (formed by a meteor impact in sand). The silver and gold masterpiece is inlaid with carnelian, calcite, lapis lazuli, obsidian, turquoise and red, blue, green, black, and white glass. The imagery spells out the Pharaoh’s name in hieroglyphs and symbolizes the birth of the sun and the moon. The scarab represents the sun and the disk at the top, the moon. Alternating blue lotus flowers, buds, and **papyrus** flowers emerge from poppy buds. The lotus symbolizes Upper Egypt, while the papyrus symbolizes Lower Egypt, communicating that the country was united when this *Pectoral* was made.



Figure 2.15 *Pectoral*, gold and silver with inlay of carnelian, lapis lazuli, calcite, obsidian, turquoise, desert glass, red, blue, green, black and white glass, 5 7/8 in / 14.9 cm high, Tomb of Pharaoh Tutankhamun, 18th Dynasty, New Kingdom, ca. 1323 BCE (Egyptian Museum, Cairo).
<https://egypt-museum.com/winged-scarab-pendant-of-tutankhamun/>

Tutankhamun's *Signet Ring* (Figure 2.16) shows signs of wear from frequent use as a seal. Glyphs that form his name are surrounded by "beloved of Amun, lord of eternity." It is one of many pieces that were cast in molds. The high temperatures needed to melt metal were difficult to achieve over an open fire, but blowing air into the embers (Figure 2.17) increased the temperature high enough to do the job. The wall painting in the tomb of the Vizier Rekhmire (Figure 2.18) includes men pumping air into fires with bellows to smelt and heat metal in crucibles while others remove and maneuver crucibles with large sticks and pour molten metal into molds. Many Egyptian casting techniques are still used today to cast metal and glass.



Figure 2.16 *Signet Ring with Tutankhamun's Throne Name*, mold-cast gold, 1 1/8 x 3/4 x 1 5/16 in / 2.9 x 1.9 x 3.3 cm, New Kingdom, ca. 1336–1327 BCE (The Metropolitan Museum of Art, Gift of Edward S. Harkness, 1922, CC0). <https://www.metmuseum.org/art/collection/search/549200>



2.17 *Four Workmen Blow Air into the Fire through Blowpipes with Bulbous Ceramic Tips to Smelt Metal*, bas relief in the Tomb of Khnumhotep, Beni Hasan, Egypt, Middle Kingdom, 12th Dynasty, ca. 1897–1878 BCE.

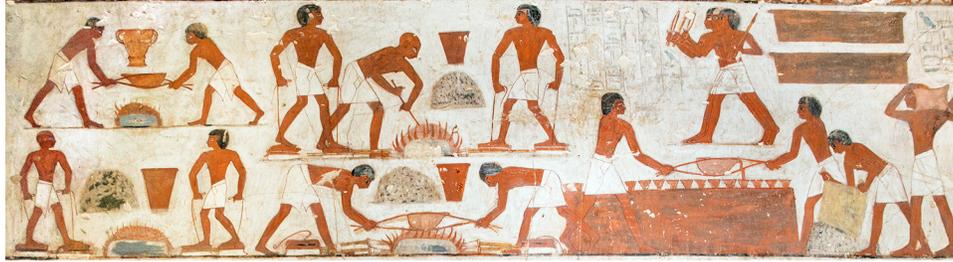


Figure 2.18 *Melting and Casting Metal*, wall painting in the Tomb of Vizier Rekhmire, Thebes, Upper Egypt, 18th Dynasty, New Kingdom, ca. 1479–1400 BCE. <https://www.flickr.com/photos/mana4u/32513653582>

Gold, silver, copper, and electrum can be worked cold, but they become brittle after repeated hammering. To keep these metals malleable, they must be **annealed** (heated, then quickly cooled) several times during the forming process. Another painting from Vizier Rekhmire's tomb (Figure 2.19) illustrates annealing and cold working techniques. On the top left, a man sits on a three-legged stool as he blows air into a brazier to anneal a metal object held with tongs. To the right, a man smooths the surface of a slender silver base while another shapes a silver over a stake supported by a stand (Figure 1.9a). Their annealing hearth, blow pipe, and tongs can be seen above. In the lower left, two standing men shape a large silver jar on a long stake supported by the foot of the left worker and a stand. A tall, lidded gold vessel is behind a seated **engraver** who is tapping his chisel into a silver vase resting on a padded support. In the lower right, a man hammers gold to flatten it into a sheet while a man walks away with a finished covered jar.



Figure 2.19 *Heating, Shaping, and Engraving Silver and Gold*, wall painting in the Tomb of Vizier Rekhmire, Thebes, Upper Egypt, 18th Dynasty, New

Kingdom, ca. 1479–1400 BCE.

<https://www.flickr.com/photos/mana4u/32513562352/in/gallery-pic-photo-ture-72157722750366945/>

The yellow color of the pieces in Figure 2.20 suggests the craftsmen are working with gold. The rectangular object on the thigh of the man on the left is an Egyptian paint palette, so he might be marking the vase for the engraver (Figure 7.61a). The engraver next to him is tapping a chisel to decorate the headdress of a sphinx. Two men are polishing gold vessels on the right. Finished gold products are depicted above their heads.



Figure 2.20 Norman de Garis Davies (1865–1941), detail of reproduction of *Craftsmen Painting in the Tomb of Nebamun and Ipuky*, 18th Dynasty, New Kingdom, ca. 1390–1349 BCE (The Metropolitan Museum of Art, Rogers Fund, 1930, CC0).

<https://www.metmuseum.org/art/collection/search/548568>

A twenty-four-pound gold mask (Figure 2.21) was placed over the wrapped head and shoulders of Tutankhamun's mummified body. It was constructed with at least eight pieces of worked gold that were **soldered** and riveted together.

Tutankhamun is wearing a nemes headdress and false beard, symbols of kingship. The plaited beard and headdress are inlaid with blue glass. Tutankhamun ruled both Upper and Lower Egypt, symbolized by the goddesses depicted on his forehead, Wadjet (vulture) and Nekhbet (cobra). The beak of the cast solid gold vulture is made of horn-colored glass. The cast solid gold cobra is inlaid with dark blue faience, translucent quartz backed with red pigment, carnelian, lapis lazuli, turquoise-colored glass, and quartz. The eyebrows and eyelids are made of lapis lazuli. The pupils of

the eyes are made of obsidian and the whites are quartz. The pierced ear lobes are solid gold. The broad collar necklace is inlaid with lapis lazuli, quartz, and green feldspar and the lotus-bud border is decorated with cloisonné enamel (Figure 9.7). The falcon heads on both ends are inlaid with obsidian and colored glass. The inscription engraved on the shoulders and on the back (Figure 2.21b) invokes the protection of the gods.

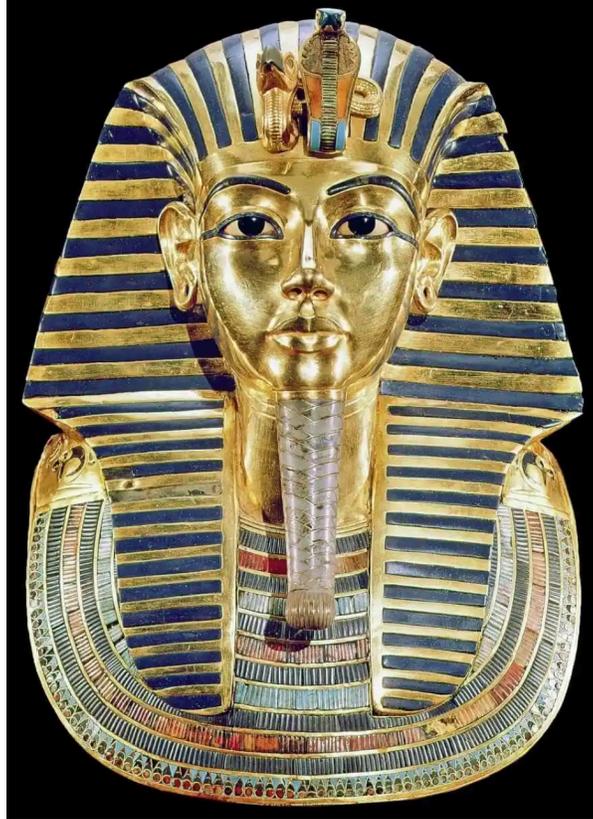


Figure 2.21a *Death Mask of Pharaoh Tutankhamun*, cast and chased gold, with inlays of lapis lazuli, carnelian, quartz, turquoise, obsidian, and colored glass, 21 1/4 in / 54 cm high, Tomb of Pharaoh Tutankhamun, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo).

<https://egypt-museum.com/mask-of-tutankhamun/>



Figure 2.21b Back of *Death Mask of Pharaoh Tutankhamun*, cast and chased gold, with inlays of lapis lazuli, carnelian, quartz, turquoise, obsidian, and colored glass, 21 1/4 in / 54 cm high, Tomb of Pharaoh Tutankhamun, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo). <https://egypt-museum.com/mask-of-tutankhamun/>

Excavated furniture and tools, workshop models, and tomb paintings provide tremendous insight into Egyptian woodworking techniques. The Egyptian *Woodworking Tools* in Figure 2.22 include an ax, saws, adzes, a bow-drill with bits (Figure 5.32c), chisels, an oil horn and a hone for sharpening tools. Logs were split and trimmed with the rounded blade axe set into a wooden handle. Wood was cut with saws with their teeth set away from the handle to cut on the pull rather than push of the blade. Adzes of different sizes were used to shape, plane, and smooth wood. A small hole could be made with an awl then a larger hole drilled with a bow drill that rotated a metal bit through the wood. Wooden mallets were used to drive copper and bronze chisels.



Figure 2.22 *Woodworking Tools*, bronze with wood handles, adze is 9 $\frac{3}{4}$ in / 24.8 cm long, Thebes, Egypt, New Kingdom, ca. 1300 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/Y_EA6061

Egyptian woodworkers crafted furniture, boxes, and coffins with variations of the **miter**, **butt**, **mortise and tenon**, **box**, and **dovetail joints** (Figure 2.23a) that were often reinforced with dowels or pins.

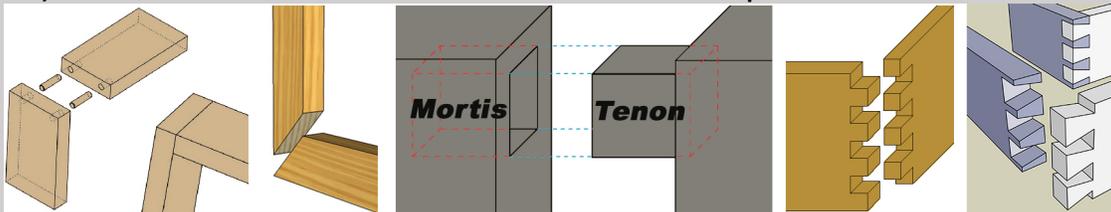


Figure 2.23a Doweled butt joint, miter joint, mortise and tenon joint, box joint, and dovetail joint. https://en.wikipedia.org/wiki/Mortise_and_tenon, and https://en.wikipedia.org/wiki/Box_joint, and <https://commons.wikimedia.org/w/index.php?curid=6929549>



Figure 2.23b Patrick White trims box joints with a chisel at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2012).



Figure 2.23c Micah Seals works on dovetail joints at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2012).

Native acacia, carob (locust-bean), fig, palm, persea, poplar, sidder, tamarisk, and willow were used to build furniture in Egypt. Ash, beech, box, cedar, cypress, **ebony**, elm, fir, juniper, lime, maple, oak, pine, plum, and yew logs were imported. Acacia was the most popular local wood, and

ebony was the favorite import because of its hardness and dark color that dramatically contrasted with glass and ivory inlays.

Figure 2.24 is one of twenty-five carved and painted wooden models found in the rock-cut tomb of Meketre, who began his career under King Mentuhotep II of the 11th Dynasty. This very informative diorama shows a man sawing boards from a log tied to a post. Another woodworker hammers a chisel with a large wooden mallet to carve a mortise into a thick board. Men against the right and bottom walls shape wooden beams with adzes.



Figure 2.24a *Model of a Carpentry Workshop*, painted wood, 10 ¼ x 20 ½ x 36 5/8 in / 26 x 52 cm x 93 cm, Tomb of Meketre, Luxor, 11th Dynasty, Middle Kingdom, ca. 2134-1991 BCE (Egyptian Museum, Cairo).
<https://egypt-museum.com/model-of-a-carpentry-workshop/> and
<https://medievalsworlds.tumblr.com/post/188586477004/model-of-carpentry-workshop>



Figure 2.24b *Model of a Carpentry Workshop*, painted wood, 10 ¼ x 20 ½ x 36 5/8 in / 26 x 52 cm x 93 cm, Tomb of Meketre, Luxor, 11th Dynasty, Middle Kingdom, ca. 2134-1991 BCE (Egyptian Museum, Cairo).
<https://medievalsworlds.tumblr.com/post/188586477004/model-of-carpentry-workshop>

Another tomb painting (Figure 2.25) shows men working alone and in teams to carve wood with chisels and mallets, smooth a beam with sandstone, saw ebony, and, in the lower right, drill holes into an ebony bed frame with a bow drill. The artisan on the right supports the top of the drill with a concave support while the other moves the bow back and forth to rotate the drill bit in a manner similar to how they are still used in India (Figure 5.32c). The sleeping surface of the Egyptian bed was interlaced with reeds.

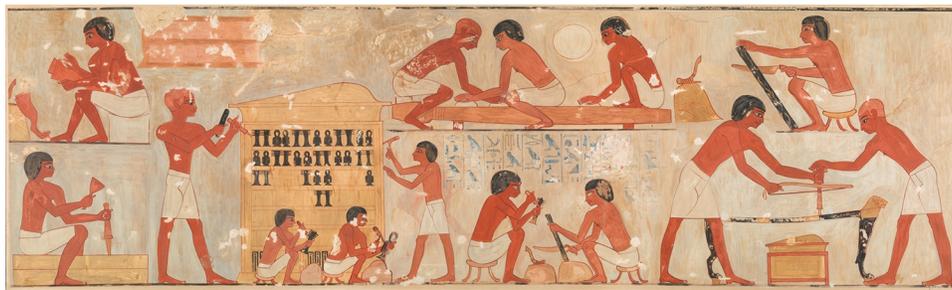


Figure 2.25 Nina de Garis Davies (1881-1965), reproduction of *Carpenters at Work*, wall painting in the Tomb of Vizier Rekhmire, Thebes, Upper

Egypt, 18th Dynasty, New Kingdom, ca. 1504-1425 BCE (The Metropolitan Museum of Art, Rogers Fund, 1935, CC0).

<https://www.metmuseum.org/art/collection/search/544639>

To make precious wood go further, it was cut into thin slabs of **veneer** and glued to the surface of the inexpensive wood. The tomb painting in Figure 2.26 shows woodworkers smoothing wood with sandstone, painting glue onto a sheet of veneer (the gluepot is in the fire above them), sawing wood while standing, and shaping wood with an adze while seated on a three-legged stool.



Figure 2.26 Woodworkers Smoothing, Gluing, and cutting, wall painting in the Tomb of Vizier Rekhmire, Thebes, Upper Egypt, 18th Dynasty, New Kingdom, ca. 1479–1400 BCE.

Some furniture and accessories were covered with thin sheets of gold and silver and decorated with carved, painted, varnished, oiled, and inlaid figurative and geometric patterns made of ivory, faience, and glass. The most impressive example is the wooden *Throne of Pharaoh Tutankhamen* (Figure 2.27a), which is covered with gold and silver **leaf** and multi-colored inlay. The relief on the back support (Figure 2.27b) shows the crowned King's wife, Ankhesenamun, anointing him with perfumed oil as they receive life-giving rays from the sun god, Aton. They wear silver pleated linen garments and broad collar necklaces (Figure 2.7). Another wide collar necklace rests on a table behind Queen Ankhesenamun. The outer and inner arms of the throne (Figure 2.27c) feature winged cobras wearing the double crown of Egypt and holding a cartouche of Tutankhamen's name by their wing tips. The legs of the throne are decorated with lion's heads and feet resting on cylindrical supports.



Figure 2.27a *Throne of Pharaoh Tutankhamen*, wood covered with gold and silver with glass and semiprecious stone inlay, 40 $\frac{1}{8}$ x 21 $\frac{1}{4}$ x 23 $\frac{5}{8}$ in / 102 x 54 x 60 cm, Tomb of Pharaoh Tutankhamun, Valley of the Kings, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo).
<https://egypt-museum.com/golden-throne-of-tutankhamun/>



Figure 2.27b *Pharaoh Tutankhamen and Queen Ankhesenamun Under Aton Disk on the throne back, wood covered with gold and silver with glass and semiprecious stone inlay, Tomb of Pharaoh Tutankhamun, Valley of the Kings, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo).*
[https://en.wikipedia.org/wiki/Tomb_of_Tutankhamun#/media/File:Respaldo del trono de oro de Tutankam%C3%B3n.jpg](https://en.wikipedia.org/wiki/Tomb_of_Tutankhamun#/media/File:Respaldo_del_trono_de_oro_de_Tutankam%C3%B3n.jpg)



Figure 2.27c *Side detail of throne with crowned, winged cobra, wood covered with gold and silver with glass and semiprecious stone inlay, Tomb*

of Pharaoh Tutankhamun, Valley of the Kings, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo). <https://egypt-museum.com/golden-throne-of-tutankhamun/>

The chair in Figure 2.28 is from the tomb of Reniseneb. Veneered ivory panels decorate the curved back and side supports. Carved lion's legs with feet resting on cylindrical supports support the seat. Chairs with this style of interlaced reed or leather seat are comfortable, and the open mesh allows air to circulate. The interlacements were strung through holes in the wood along the edge of the opening. The tomb painting in Figure 2.29 shows how craftsmen bored holes with a bow-drill. An adze and carpenter's square are shown behind the chair in the painting.



Figure 2.28 *Chair of Reniseneb*, wood, ebony, ivory, 33 15/16 in / 86.2 cm, Thebes, Egypt, 18th Dynasty, New Kingdom, ca. 1450 BCE (The Metropolitan Museum of Art, Purchase, Patricia R. Lassalle Gift, 1968, CC0). <https://www.metmuseum.org/art/collection/search/547687>



Figure 2.29 Nina de Garis Davies (1881-1965), reproduction of *A Carpenter Boring a Hole in a Chair with a Bow Drill*, wall painting in the Tomb of Vizier Rekhmire, Thebes, Upper Egypt, 18th Dynasty, New Kingdom, ca. 1479–1400 BCE (The Metropolitan Museum of Art, Rogers Fund, 1931, CC0).

<https://www.metmuseum.org/art/collection/search/544640>

The *Chest* in Figure 2.30 is from the tomb of Pharaoh Tutankhamun. This exquisite box was constructed with light red wood, then **gilded** and inlaid with ebony, faience, ivory, and painted calcite (attached with glue and copper pins). The feet are capped with bronze or copper. The side panels are decorated with similar motifs framed with bands of rectangular pieces of ebony, ivory, painted calcite and blue faience. Each side panel is bordered on the sides and bottom with curved garlands of lotus and papyrus, topped with horizontal bands of ivory and ebony, stylized ivory lily petals set in calcite and faience, and a checkerboard pattern of ebony and ivory. The low relief central panels on the sides and lid are carved and painted ivory. The side panels portray various hunting scenes with animals, fish, Tutankhamun, his wife, and their servants. The central panel of the lid (Figure 2.30b) shows Tutankhamun leaning on his cane in a garden facing Ankhesenamun, who offers him bouquets of lotus and papyrus flowers. Each of them wears a wig, a broad collar necklace, and a pleated linen garment secured with a long sash around their waist.



Figure 2.30a *Chest*, ivory, ebony, faience, semi-translucent calcite, and ivory inlays, Tomb of Pharaoh Tutankhamun, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo). <https://egypt-museum.com/tutankhamun-and-ankhesenamun-in-garden/>



Figure 2.30b *Tutankhamun and Ankhesenamun in a Garden*, chest lid, ivory, ebony, faience, semi-translucent calcite, and ivory inlays, Tomb of Pharaoh Tutankhamun, 18th Dynasty, New Kingdom, ca. 1352 BCE (Egyptian Museum, Cairo). <https://egypt-museum.com/tutankhamun-and-ankhesenamun-in-garden/>

Long fibers extracted from the stem of the **flax** plant (*Linum usitatissimum*) have been processed into linen for over 12,000 years, dating back to the Neolithic Period. Before processing it is called “flax,” but the final product is “linen.” The word comes from the Celtic word, “Llin” and the Latin word, “Linum.” Because of its strength, and because it wicks moisture and dries quickly, linen was very popular in ancient Egypt. Linen was used earlier than **cotton** in Egypt and is twice as strong.

A wall painting from the Tomb of Khnumhotep (Figure 2.31a) shows flax being harvested, retted in a field, rippled, scutched with paddles, plied into cord, woven on a **loom**, and spun.



Figure 2.31a *Flax Processing*, reproduction of a wall painting in the tomb of Khnumhotep, Beni Hasan, Egypt, Middle Kingdom, 12th Dynasty, ca. 1897–1878 BCE.

Two types of flax are cultivated today: branching short plants that produce lots of seeds (that can be eaten or pressed to produce linseed oil) and varieties that are approximately 36 in / 91 cm tall with few branches that are grown for the **bast** fiber inside the stem for fabric production.

Textile production flax is harvested by pulling the plants out of the ground because the best fibers run into the roots. Stems are tied into small bundles and hung to dry, then the seeds are rippled off with a metal or wooden comb (Figure 2.31b). The flax is then retted to remove the pectin that holds the stalk together by either laying the plants for a month or two on the ground where dew accumulates or by soaking it in water for several days. The retted flax is then dried.

The dry flax stalks are then crushed between the ridges of a brake to help separate the brittle pith and outer layer from the fiber (Figure 2.31c). Next, the flax is scutched by striking it with a flat paddle against a vertical board (Figure 2.31d). The flax is then pulled through a hackle (seen in Figure 2.31e), also known as a hetchel or heckle, to separate and align the fibers, beginning with a coarse tooth hackle then to hackles with smaller teeth. Next, the fibers are twisted into a strick to safeguard them until they are spun (Figure 2.31f). The shorter fibers that the hackles remove are used to

make tow linen for rough fabric. The long fiber, called line flax, is placed on a distaff and spun (Figure 2.31gh) into a strong thread, which can be used to weave fine linen cloth. Although some people still carry on this labor-intensive tradition, today most flax is processed by machine. For more about spinning, see Figure 7.14.



Figure 2.31b Les Harding holds a flax seed pod. The wood tool on the right is used to ripple off the seeds by pulling the bundle through the dowels of the comb (photograph by Carol Ventura, 1999).



Figure 2.31c Andrea Myklebust breaks a bundle of flax by repeatedly raising and lowering a hinged flax brake onto the stems at the John C. Campbell Folk School, NC (photograph by Carol Ventura, 2023).



Figure 2.31d Andrea skutches flax with a flat paddle against a board to further clean the long fibers. A dried bundle of retted flax leans against the wall on the right at the John C. Campbell Folk School, NC (photograph by Carol Ventura, 2023).



Figure 2.31e Andrea runs flax through large iron hackles to align the fibers and remove the core and shive. The short flax that remains in the hackle will be spun to produce tow linen at the John C. Campbell Folk School, NC (photograph by Carol Ventura, 2023).



Figure 2.31f After combing the fiber on the finest hackles, Andrea twists it into a strick to store the fiber until it is spun at the John C. Campbell Folk School, NC (photograph by Carol Ventura, 2023).



Figure 2.31g The long fibers are separated and arranged on a distaff, then spun to make thread. Tansy Sears and Emily Wright pull a few fibers from the fluffy mass to twist them together with drop spindles. Sadie Rapp, in

the background, is **weaving** the spun threads on a loom to produce linen cloth at the John C. Campbell Folk School, NC (photograph by Carol Ventura, 2023).



Figure 2.31h Andrea pulls long flax fibers from the distaff as she spins them together on a foot-powered spinning wheel to produce linen thread at the John C. Campbell Folk School, NC (photograph by Carol Ventura, 2023).

Woven cloth is made by interlacing vertical (the **warp**) and horizontal (the **weft**) elements together at right angles. The **selvedge** / **selvage** is the

lengthwise finished edges of a textile where the weft turns around to complete the next pass. With **plain weave** (Figure 2.32a), a single weft passes over a single warp then under a single warp, reversing the sequence with each pass of the weft.

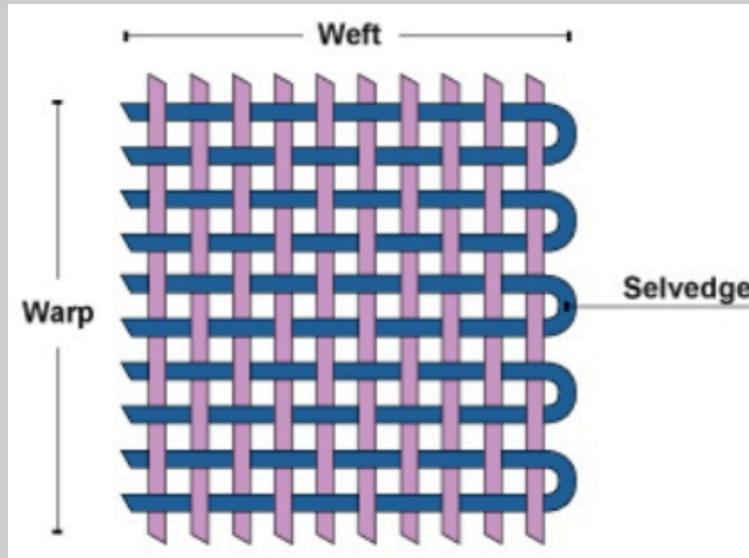


Figure 2.32a Warp, weft, and selvedge of a plain-woven textile.

<https://crashcourseweek.weebly.com/weaving/weaving-technology>

With **twill weave** (Figure 2.32b), the weft passes over and under two or more warps, moving each pass of the weft to the right or left to create a diagonal. Twill is often used to weave sturdy cloth because the warps and wefts can be placed very close together; denim is a good example.

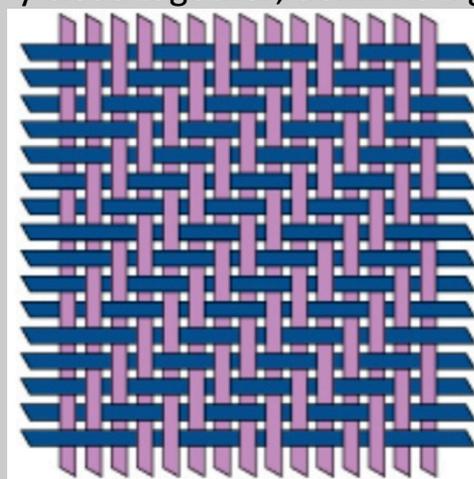


Figure 2.32b Warp and weft of a twill woven textile.

<https://textilelearner.net/types-of-fabric-weave-structure/>

Both warp and weft are visible in a balanced weave because they are equally spaced. The warp is hidden in a **weft faced** weave by spacing the warp further apart than the weft. **Tapestry** woven fabric is weft faced (Figure 2.32c). Two or more contrasting wefts are inserted across each **shed** opening to produce tapestry woven motifs.



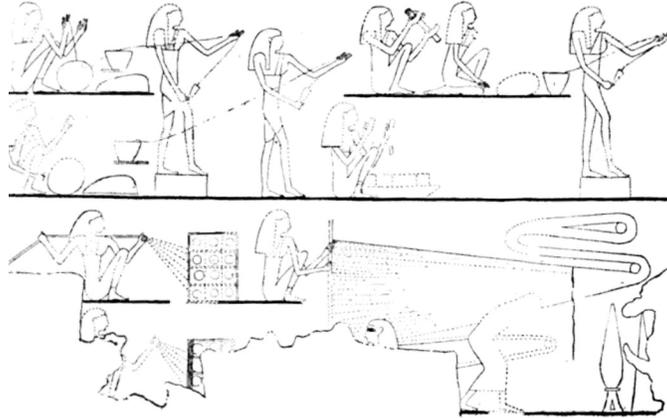
Figure 2.32c Tapestry weaving with discontinuous weft in Pitumarca, Peru (photograph by Carol Ventura, 2017).

Wool was rarely used in Egypt because of the aversion to wear it and be buried in animal fibers. Cotton was not introduced until the first century CE, so linen was the fabric of choice in ancient Egypt. A Predynastic ceramic vessel dating to 5000 BCE depicts a loom, suggesting that linen has been woven in Egypt for at least 7,000 years. Most cloth was plain woven (Figure 2.32a), although some was **brocaded** (extra decorative weft inserted as the cloth was woven; Figure 7.18c). Many different qualities of fabric were produced, from course to fine, some of it very sheer.

Paintings, statues, and the remains of linen garments reveal a lot about ancient Egyptian cloth. Men cultivated, harvested, retted, and scutched flax, transforming the plant into 23 5/8 in / 60 to 31 1/2 in / 80 cm long strips composed of 20 to 40 single fibers each. Women divided the strips, spliced them together end to end, and spun them.

The upper register of a wall painting from the Tomb of Djehutihotep (Figure 2.33) depicts spinners at work and a warp being measured for a loom on wall pegs. At the end of each pass, the warp is crossed over itself to keep the threads in order and to facilitate mounting them on the loom.

The bottom register shows threads being pulled from creels next to a loom being prepared for weaving. The creel supports multiple spools; instead of measuring one thread at a time, several are measured at once, a common time-saving practice today around the world (Figure 7.72c).



2.33 *Spinners and Weavers*, drawing of a wall painting in the Tomb of Nomarch Djehutihotep, 12th Dynasty, Middle Kingdom, ca. 1900 BCE (Roth 1913: Figure 11).

https://www.google.com/books/edition/Ancient_Egyptian_and_Greek_Looms/yiv0CdA4iaoC?hl=en&gbpv=1&pg=PA3&printsec=frontcover

Ceramic **plying** bowls (Figure 2.34) had one or two loops on the inside bottom to separate the threads and provide tension as they were being twisted together. The looped vessels were probably filled with water to dampen the fiber because flax is stronger when wet.



Figure 2.34 *Plying Bowl*, terracotta, 13th-11th century BCE (Warsaw Archaeological Museum, Poland, photograph by Carol Ventura, 2009).

Linen was woven on the bottom floors of homes and temples because flax is easier to weave when damp. Fabric was produced with a selvedge on both sides or with a fringe on one side. The first Egyptian looms were pegged to the floor. The warp was tied to a warp beam at the far end and a cloth beam that could be rotated for winding on the cloth. Cords securing the warp beam to the pegs could be adjusted to accommodate the shrinking length as it was being woven.

Two or more crouching women operated each loom. A shed was made by lifting one of the rods. The weft was inserted into the open shed, then beat into place with a curved beater.

Although the loom in another wall painting from the Tomb of Khnumhotep (Figure 1.35) appears to be vertical, the four corners are actually pegged to the ground. The female weaver on the left is handling the rods used to separate the warp while the woman on the right is either inserting a weft **shuttle** or pushing the weft into position with a beater. The standing woman on the right is plying two threads together with a drop spindle.

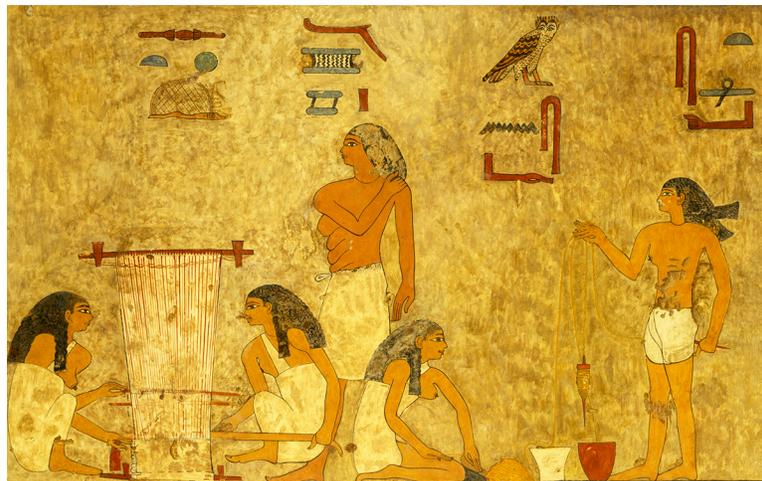


Figure 2.35 Norman de Garis Davies, reproduction of *Weavers* in a wall painting in the Tomb of Khnumhotep, Beni Hasan, Egypt, 12th Dynasty, Middle Kingdom, ca. 1897–1878 BCE (The Metropolitan Museum of Art, Rogers Fund, 1933, CC0).

<https://www.metmuseum.org/art/collection/search/548575>

The *Model of a Weaving Workshop* found in the tomb of Meketra (Figure 2.36) shows three crouching women preparing flax for spinning while three standing women spin or ply it with the spindles in their right and left hands. On the opposite wall, two women measure a warp on pegs in the wall. Two teams of weavers are operating horizontal looms that have the warp and cloth beams pegged to the floor.



Figure 2.36 *Model of a Weaving Workshop*, painted wood, 9 7/8 x 16 1/2 x 36 5/8 in / 25 x 42 x 93 cm, Tomb of Meketre, 11th Dynasty, Middle Kingdom, ca. 2134-1991 BCE (Egyptian Museum, Cairo, JE 46723).

In Figure 2.37 a standing woman spins flax while two others weave cloth on a horizontal loom pegged to the ground.



Figure 2.37 *Model of Weavers*, painted wood, 15 15/16 x 5 1/2 x 10 5/8 in / 40.5 x 14 x 27 cm, Tomb of Djehutynakht, late 11th Dynasty, Deir el-Bersha, Egypt, Middle Kingdom, ca. 2010-1961 BCE (Harvard University—Boston Museum of Fine Arts Expedition, 21.891).

<https://collections.mfa.org/objects/143965/model-of-weavers>

The vertical loom was introduced during the Second Intermediate Period (ca. 1650-1550 BCE). A New Kingdom wall painting in the tomb of Djehutynefer (a royal scribe and treasurer under Pharaoh Amenhotep II) depicts men weaving cloth on vertical looms on the ground floor of his house (Figure 2.38). An adjustable warp beam was moved as weaving progressed. They might be weaving tubular cloth because woven fabric does not appear to be wrapped around the bottom beam. Tubular cloth is still woven in Africa on a similar vertical loom today (Figures 2.40a, 2.40b and 2.40c).

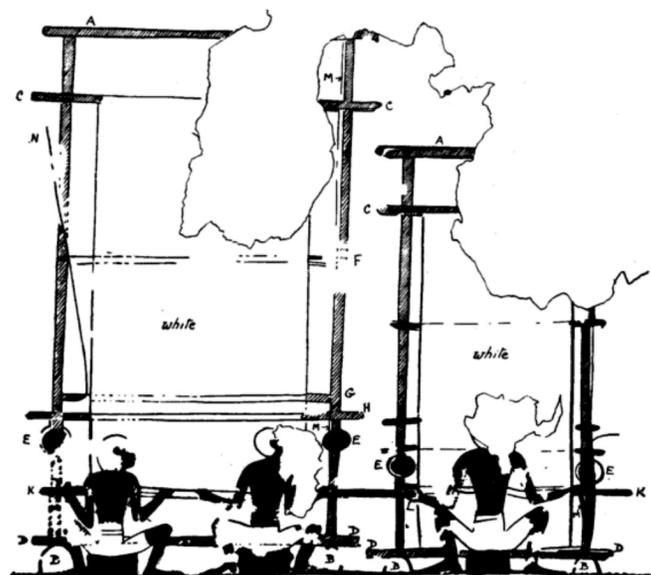


Figure 2.38 *Upright Loom Weavers*, drawing of a tomb painting showing upright or vertical looms from the Tomb of Djehutynefer at Thebes, 18th Dynasty, New Kingdom, ca. 1425 BCE (from drawings by N. de G. Davies in Roth 1913: 14).

https://www.google.com/books/edition/Ancient_Egyptian_and_Greek_Looms/yiv0CdA4iaoC?hl=en&gbpv=1&pg=PA3&printsec=frontcover

A weaving workshop is depicted in a wall painting from the tomb of Nefer-ronpet, a weaving workshop supervisor (Figure 2.39). On the left, two women measure warp on vertical posts, similar to how it is still done elsewhere today (Figures 6.18a and 7.9c).

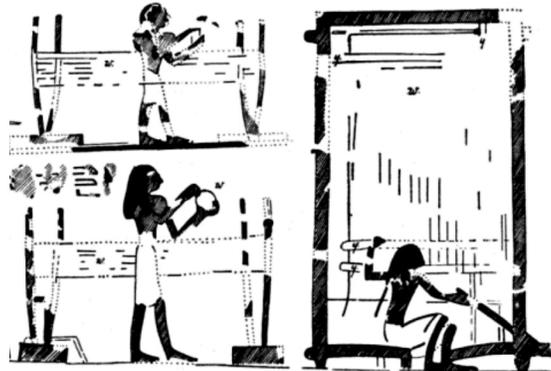


Figure 2.39 *Weavers at Work* from painting in the Tomb of Nefer-ronpet, Superintendent of Weavers at Thebes, New Kingdom, ca. 1200 BCE (from drawing by N. de G. Davies in Roth 1913: 18).

https://www.google.com/books/edition/Ancient_Egyptian_and_Greek_Looms/yiv0CdA4iaoC?hl=en&gbpv=1&pg=PA3&printsec=frontcover

Weavers around the world use the vertical loom to weave rectangular and tubular cloth. In Foumban, Cameroon, it is utilized to weave striped tubular cloth (Figure 2.40a). Every other warp is tied to **heddles** on the heddle rod. The shed roll supports the other half of the warp. The heddle rod is lifted to create a shed opening (Figure 2.40b). After the weft shuttle is passed through, the other shed is formed by allowing the warp on the shed roll to pop up through the heddles (Figure 2.40c). The beater pushes down the weft before turning at the selvedge to go through the new shed opening. The cloth will be moved down and around the cloth beam after a few inches have been woven.



Figure 2.40a Vertical loom with a tubular striped warp in Foumban, Cameroon (photograph by Andrzej Gutek, 2001).



Figure 2.40b The heddle rod and pointed beater separate the warp to create a shed, the beater will be turned to open the shed and then the weft shuttle will be passed through (photograph by Andrzej Gutek, 2001).



Figure 2.40c This shed was formed by allowing the warp over the shed roll (thick bar over the heddles) to spring up through the heddles. The beater opens the shed even more so that the weft shuttle may pass through (photograph by Andrzej Gutek, 2001).

Linen was washed, bleached, polished, and sometimes pleated and dyed. Vertical pleats made the clothing comfortable and form fitting. Most linen was white, but saffron dyed it yellow and protected the fabric from bugs.

Clothing was usually made from rectangular pieces of fabric. The oldest surviving woven garment in the world (Figure 2.41) consists of three pieces of linen sewn together, then pleated. The *Tunic* in Figure 2.42 has a similar construction.



Figure 2.41a *Dress, linen, 22-23 warp threads per 3/8 in / 1 cm, 42 wefts per 1 in / 2.54 cm, 30 in / 76 cm wide, Tarkhan, Egypt, Predynastic, ca. 3482-3103 BCE (Petrie Museum of Egyptian Archeology UCL UC28614B).* <https://www.ucl.ac.uk/news/2016/feb/ucl-petrie-museums-tarkhan-dress-worlds-oldest-woven-garment> and <https://egypt-museum.com/tarkhan-dress/>



Figure 2.41b Detail of *Dress front*, linen, 22-23 warp threads per 3/8 in / 1 cm, 42 wefts per 1 in / 2.54 cm, 30 in / 76 cm wide, Tarkhan, Egypt, Predynastic, ca. 3482-3103 BCE (photograph by Carol Ventura in the Petrie Museum of Egyptian Archeology, UCL UC28614B).



Figure 2.41c *Dress back*, linen, 22-23 warp threads per 3/8 in / 1 cm, 42 wefts per 1 in / 2.54 cm, 30 in / 76 cm wide, Tarkhan, Egypt, Predynastic, ca. 3482-3103 BCE (photograph by Carol Ventura in the Petrie Museum of Egyptian Archeology UCL UC28614B).



Figure 2.42 *Tunic*, linen, 47 5/8 x 22 1/2 in / 121 x 57 cm wide, Assiut, Egypt, end of 11th dynasty-beginning of 12th dynasty, ca. 2035-1875 BCE (Louvre). <https://collections.louvre.fr/en/ark:/53355/cl010005890>

Egyptian linen was usually woven with 37 to 50 threads per inch, but the linen in Tutankhamun's tomb had almost 200 threads per inch, making it extremely fine. Many of his garments were embroidered and appliquéd with gold rosettes and Egyptian faience and glass beads. Loincloths, tunics, shawls, sashes, gloves, and socks were found stacked in ornate wooden chests, on statues, and bundled up on the floor of his tomb.

Tapestry woven cloth incorporates imagery into the structure (Figure 2.32c) while embroidery is stitched onto fabric (Figure 9.15). The earliest example of these two decorative techniques was found in the tomb of Pharaoh Tuthmosis IV (ca. 1412-1364 BC), decorated with a cartouche of his father's name (Amenhotep II), lotuses, and papyri (Figure 2.43).

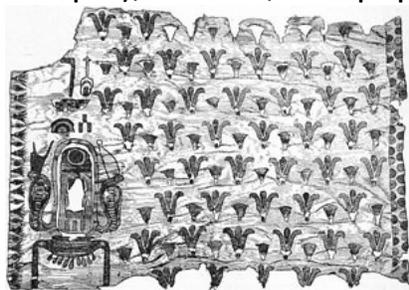


Figure 2.43a *Robe Fragment*, tapestry woven linen embroidered with blue, green, black, and white linen, Tomb of Tuthmosis IV, Thebes, New Kingdom, ca. 1400 BCE (Egyptian Museum, Cairo).

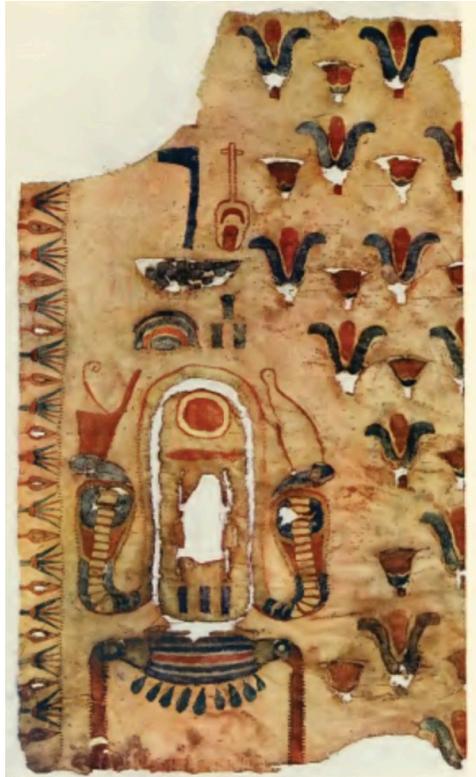
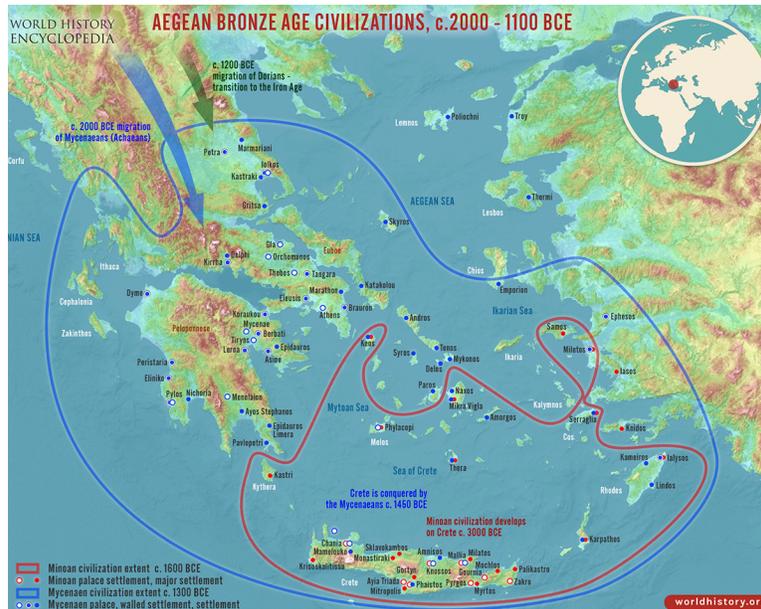


Figure 2.43b *Robe Fragment*, illustration on **paper** (Carter, Howard, Percy Newberry, Gaston Maspero and G. Elliot Smith, *The Tomb of Thoutmôsis IV*, The Emma B. Andrews Diary Project, accessed December 17, 2024, CC0) <https://www.emmabandrews.org/project/items/show/204>

Chapter 3: The Aegean and Greece

Minoan (3000-1100 BCE)



Minoan and Mycenaean Civilizations, ca. 2000-1100 BCE (map by Simeon Netchev). <https://www.worldhistory.org/user/simeonnetchev/>

There are two significant Aegean Bronze Age (3000-1000 BCE) cultures, the Minoans and the Mycenaeans. The Minoans lived on the island of Crete. Ships protected them from invaders and transported their trade goods. Minoans lived in and around unfortified palaces that were the center of political and social activities. The massive structures were built around open courtyards and included living quarters for the elite and food storage facilities for the larger community.

Hand-powered potter's wheels were introduced to Crete around 2000 BCE. Large pithoi (Figure 3.1) made on **potter's wheels** (Figure 3.14a) were found in palace storerooms at Knossos. Pithoi primarily held olive oil used for food, soap, and lamp fuel, but other substances such as grain, peas, beans, and lentils were also stored in them. Oil stored in pithoi was exported in beautiful Minoan pottery that has been found throughout the Aegean and Egypt.



Figure 3.1 *Pithos*, terracotta, 27 ½ x 45 in / 69.85 x 114.3 cm, Minoan, Knossos, Crete, Bronze Age, ca. 1450-1375 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1884-0807-1

Nature-inspired Minoan imagery was often curvilinear and dynamic and covered the entire surface. The *Kamares Ware Jug* in Figure 3.2 was found in Phaestos. It is typical of Minoan pottery with its small base, and wide, flaring belly. This style of polychromed pottery was named for the Kamares cave on Mount Ida, Crete, where it was first found.



Figure 3.2 *Kamares Ware Jug*, slip-decorated terracotta, 10 5/8 in / 27cm high, Minoan, Crete, Bronze Age, ca. 1700-1750 BCE (Heraklion Archaeological Museum, Crete).

<https://www.heraklionmuseum.gr/syloges#syloges>

Mycenaean (1700-1100 BCE)

The Mycenaeans lived on the Peloponnese peninsula of mainland Greece. Like the Minoans, they were traders, seafarers, and lived in agricultural towns dominated by large palaces. Unlike the Minoans, though, Mycenaeans were militaristic, and they built their fortified palaces on hills. Mycenaeans prospered during the 16th Century BCE, while helping expel the Hyksos from Egypt during the Second Intermediate Period (1650-1550 BCE). By 1400 BCE, the Mycenaeans were the dominant power in the Aegean until the Dorians conquered them in 1100 BCE.

The gold *Death Mask* in Figure 3.3 covered the face of an elite man buried in the palace cemetery in Mycenae. The specific face and features depicted, such as the eyebrows, eyes, mustache, suggest it is a portrait of the diseased. It was probably formed with repoussé and chasing (Figures 1.9b, 1.9c and 1.9d) techniques.



Figure 3.3 *Death Mask*, gold, Mycenaean, Bronze Age, ca. 1500 BCE
(National Archeological Museum, Athens).

<https://www.namuseum.gr/en/collection/syllogi-mykinaikon-archaiotiton/>

The gold *Vapheio Cups* (Figures 3.4a and 3.4b) were found together in a Mycenaean tomb at Vapheio. The Mycenaeans might have imported it because the bulls and wasp-waisted men are stylistically Minoan. A cow is shown luring a bull into a trap on one of the cups. Each vessel was made from two pieces of gold that were shaped and fastened together. The inner surface of the cups is smooth, and the outside is decorated with repoussé and engraving. The handle of each cup was attached with rivets.



Figure 3.4a *Vapheio Cup*, gold, 3 in / 7.62 cm high, Minoan or Mycenaean, Vapheio, Laconia, Greece, Bronze Age, ca. 1500-1450 BCE (National Archeological Museum, Athens, photograph by Zde - Own work, CC BY-SA 3.0). <https://commons.wikimedia.org/w/index.php?curid=99517748>



Figure 3.4b *Vapheio Cup*, gold, 3 ½ in / 8.89 high, Minoan or Mycenaean, Vapheio, Laconia, Greece, Bronze Age, ca. 1500-1450 BCE (National Archeological Museum, Athens). <https://www.namuseum.gr/en/collection/syllogi-mykinaikon-archaiotiton/>

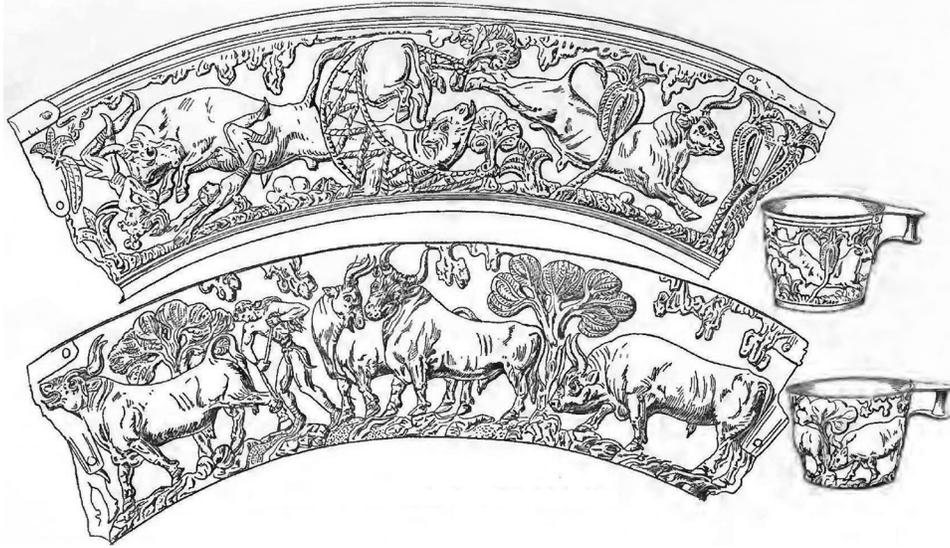


Figure 3.4c *Vapheio Cups* rollouts (illustration by Kaiserlich Deutsches Archäologisches Institute).

[https://en.wikipedia.org/wiki/Vaphio#/media/File:Goldbecher_von_Vafio.J](https://en.wikipedia.org/wiki/Vaphio#/media/File:Goldbecher_von_Vafio.JPG)
[PG](#)

Pierced sets of cast glass ornaments (Figure 3.5) have been found in several Mycenaean tombs. Although the string did not survive, their placement in tombs suggests they were strung together and worn as diadems and necklaces.



Figure 3.5 *Ornaments*, cast glass, each piece in middle row is 1 in / 2.6 cm, Mycenaean, Bronze Age, ca. 1370–1200 BCE (The Metropolitan Museum of

Art, Fletcher Fund, 1925, CC0).

<https://www.metmuseum.org/art/collection/search/251807>

“Krater” is the Greek word for “to mix.” The restored *Warrior Krater* in Figure 3.6 was probably used to serve wine that was mixed with water, a popular drink. The painting around the outside includes a woman on the left, waving to a column of warriors, each of whom wears a helmet, cuirass, greaves, shield and carries a sack of supplies hanging from a spear. No landscape is indicated, and the figures are not individualized. The double looped handles on the sides appear to be large horns sprouting from bull’s heads.



Figure 3.6 *Warrior Krater*, terracotta, Mycenaean, Bronze Age, ca. 12th century BCE (National Archeological Museum, Athens).

<https://www.namuseum.gr/en/collection/syllogi-mykinaikon-archaiotiton/>

Ancient Greece

Proto-Geometric Period (1025 – 900 BCE)

The Dorians introduced **iron**, a strong metal used for weapons, tools, and statuettes, when they conquered the Mycenaeans around 1100 BCE. The Dorians didn't conquer the area around Athens, known as **Attica**, though. Ten of the seventeen vase shapes produced there were derived from Mycenaean prototypes, demonstrating an artistic continuity. The Proto-Geometric and Geometric Periods were named for the style of decoration found on the pottery.

Potters in Corinth and Athens were in competition, but their work is easy to distinguish because Corinthian clay fired beige, while Athenian clay fired a reddish color. The finest pottery was made in Attica. Athenian pottery workshops (Kerameikos) were located next to the Dipylon Cemetery (location of the Dipylon Gate), so that area is called both names.

Many fine amphoras have been excavated from the Kerameikos / Dipylon Cemetery. "Amphora" is derived from *amphoreus*, which "carried on both sides" in Greek, referring to the handles. Women used belly-handled amphoras to carry and store water. Neck-handled amphoras were used for wine. Amphoras were used daily and placed in graves. Stripes and concentric circles and semi-circles typically decorate Proto-Geometric pottery (Figure 3.7a).

A complicated triple firing technique that involved increasing, reducing, then increasing the amount of oxygen in the atmosphere of the kiln during firing was used to achieve the black color of the geometric **slip** (fine clay suspended in water; not a glaze, which is a glassy mixture) decorations. Even today, it is a challenge to assure an even temperature during firing. Only some of the decorations on the amphoras in Figure 3.7a are black because only those areas were hot enough when **reduction** took place in that part of the kiln. Close examination of the concentric slip decorations reveals a dimple left by the tip of the special multi-brushed compass used to paint the unfired pots with slip (Figure 3.7b).



Figure 3.7a *Belly-handled Amphoras*, terracotta, left is 20 in / 50.8 cm tall, Greek, Dipylon Cemetery, Protogeometric, ca. 1000 BCE (Archaeological Museum of Kerameikos, Athens, photograph by Carol Ventura, 2002).



Figure 3.7b Detail of concentric circles with central dimple on a *Belly-handled Amphora*, terracotta, Greek, Dipylon Cemetery, Protogeometric, ca. 1,000 BCE (Archaeological Museum of Kerameikos, Athens, photograph by Carol Ventura, 2002).

Geometric Period (900-700 BCE)

As Greek population increased during the 8th and 7th centuries BCE, they colonized the southern shore of the Black Sea, Sicily, and Italy.

Clothing was often held in place by a safety-pin-like fibula. The *Double Spiral Fibula* in Figure 3.8 is one long piece of squared bronze wire,

sharp on one end and hooked on the other. It was wound into double spirals with a central figure-eight arabesque and the pointed tip, and, like a safety pin, the fibula was secured in the bend on the other end. Pure genius!



Figure 3.8 *Double Spiral Fibula*, bronze, 3 x 1 in / 7.5 x 2.5 cm, 41 oz / 11.7 g, Arcadia, Greece, Greek, Geometric, 800-700 BCE (Louvre Museum).

<https://collections.louvre.fr/ark:/53355/cl010257680>

Geometric Period graves were marked with earth mounds or stone markers, but some were topped with large ceramic vessels. Female graves were marked with a belly handled amphora. A smaller belly-handled amphora with the ashes of the deceased was buried below. The very tall belly-handled *Amphora* in Figure 3.9a marked a grave in the Dipylon Cemetery in Athens. The double loop handles are stylized bulls-horns. The friezes around the neck include geometric motifs, grazing does, and recumbent goats. The central frieze (Figure 3.9b) shows the deceased woman in a long skirt laid out on a bier under a large checkerboard shroud. She is surrounded by mourners with long legs and short triangular torsos. Two skirted females and two males with swords sit under the bier, while other mourners stand.



Figure 3.9a Dipylon Painter, *Amphora*, terracotta, 60 $\frac{3}{4}$ in / 154.3 cm tall, Greek, Geometric, ca. 760-750 BCE (National Archeological Museum, Athens). <https://www.namuseum.gr/en/collection/geometriki-periodos-3/>



Figure 3.9b Dipylon Painter, detail of *Amphora*, terracotta, Greek, Geometric, ca. 760-750 BCE (National Archeological Museum, Athens, photograph by inyuch0 Flickr, CC BY 2.0)

<https://commons.wikimedia.org/w/index.php?curid=37953222>

Male graves were topped with a large krater decorated with stripes, geometric motifs, and military scenes. A neck-handled amphora with the ashes of the deceased was buried below. The double loop handles of the krater in Figure 3.10 are stylized bull horns. A geometric meander decorates the upper frieze. Below, a corpse with separated legs is laid out on a bier with two small mourners, topped by a checkerboard shroud. To the left is a seated figure with a child on his lap. That man and the standing figure on the right hold branches in

their hands. Standing figures with raised arms flank the central scene. Horizontal lines and a short geometric frieze separate it from the frieze below, which features a funeral procession of chariots and helmeted warriors marching to the right while holding shields. More geometric bands and stripes decorate the base.

Grave marker vessels were often pierced on the bottom. Modern cemetery vases have a hole in the bottom to keep water from accumulating, freezing, and cracking the containers. The hole in the geometric vases might have served the same purpose. It could also have been used for libations and/or to accommodate a support to keep the tall vessel from toppling.



Figure 3.10 Hirschfeld Workshop, *Krater*, terracotta, 42 5/8 x 28 1/2 in / 108.3 x 72.4 cm, Greek, Attica, Geometric, ca. 750–735 BCE (The Metropolitan Museum of Art, Rogers Fund, 1914, CC0).

<https://www.metmuseum.org/art/collection/search/248904>

Orientalizing Period (ca. 700-600 BCE)

Greeks produced jewelry, household articles, tools, armor, and vessels with alloys of bronze, silver, and gold. They were prosperous during the Orientalizing Period, and as their world grew, new techniques and styles were introduced from Egypt, Mesopotamia, and Persia.

The Greeks offered wine and oil to their gods by pouring it onto sacred ground from a phiale, a ceramic or metal bowl with a rounded protuberance in the bottom. The segmented phiale in Figure 3.11 is one of the earliest surviving examples made of precious metal. The bottom of the interior is embellished with a beading pattern. Just below the outer rim, an incised inscription reads, "The sons of Kypselos dedicated [this bowl] from Heraklea." Kypselos was the first tyrant of Corinth, who took control of the city-state in a coup in 657 BCE. His sons donated the bowl at Olympia after a battle at Heraklea. Metalware was often given as an offering after a victory.

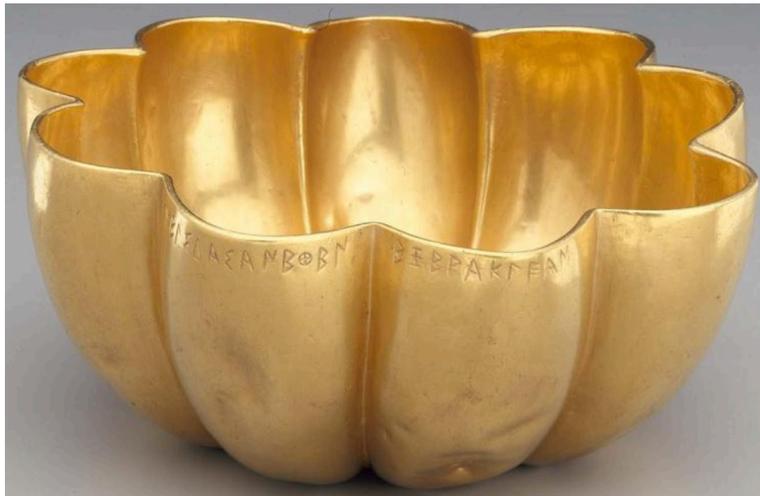


Figure 3.11a *Libation Bowl / Phiale Mesomphalos*, 5 7/8 x 5 7/8 in / 15 x 15 cm, 28 ½ oz / 800 gm, hammered and engraved gold, Greek, Late Orientalizing Period, ca. 625 BCE (Museum of Fine Arts, Boston, Bartlett Collection - Museum purchase with funds from the Francis Bartlett Donation of 1912). <https://collections.mfa.org/objects/238352/libation-bowl-phiale-mesomphalos?ctx=cae5cb68-4057-4655-809b-f15bdc560166&idx=0>



Figure 3.11b Interior of *Libation Bowl / Phiale Mesomphalos*, 5 7/8 x 5 7/8 in / 15 x 15 cm, hammered and engraved gold, Greek, Late Orientalizing Period, ca. 625 BCE (Museum of Fine Arts, Boston, Bartlett Collection - Museum purchase with funds from the Francis Bartlett Donation of 1912).
<https://collections.mfa.org/objects/238352/libation-bowl-phiale-mesomphalos?ctx=cae5cb68-4057-4655-809b-f15bdc560166&idx=0>

Greek Archaic Period (ca. 600-480 BCE)



Late Archaic Greece, ca. 500 BCE (map by Simeon Netchev).

<https://www.worldhistory.org/user/simeonnetchev/>

Archaic means “old fashioned,” reflecting the mind-set of the later historians who named the Archaic Period. It was a time when the ruling aristocratic tyrants, their court, landed aristocracy, and wealthy mercantile aristocrats supported the arts. The public was granted more power, which prepared the way for democracy, established around 507 BCE.

Archaic bronze kraters, **hydrias**, jugs, amphorae, cups, plates, and bowls were decorated with recumbent lions and rams, female busts, foreparts of horses, palmettes, and figures. Few original Greek metalworks survive, but ancient descriptions and Roman copies help us piece together their history.

The monumental *Vix Krater* in Figure 3.12a was found in a tomb near Chatillon-sur-Seine, in France. The neck of this enormous bronze vessel is decorated with repoussé and chased decorations and cast warriors and chariots around the rim and Medusas and lions on the handles (Figure 3.12b). The central handle of the lid features a woman wearing a **peplos** (Figure 3.12c). The metal would have been glossy and reflective when it was new. Bronze is golden in color but depending on the conditions, it develops a green or black **patina** with age.

In *The History*, Herodotos (Greek, 484-425 BCE), describes a similar gigantic vessel with figures around the rim that the Spartans were going to give to Croesus of Lydia.



Figure 3.12a *Vix Krater*, repoussé, chased, and cast bronze, 5' 4 1/2 in / 164 cm tall, 460 lbs / 208.6 kg, Greek, Archaic, ca. 530 BCE (Gaul Chaillon-sur-Seine Museum). <https://www.musee-vix.fr/en/visite-collection/7#sthash.pKtFAz9u.dpbs>



Figure 3.12b *Vix Krater Handle*, repoussé, chased, and cast bronze, Greek, Archaic, ca. 530 BCE (Gaul Chaillon-sur-Seine Museum). <https://www.musee-vix.fr/en/visite-collection/7#sthash.pKtFAz9u.dpbs>



Figure 3.12c *Vix Krater Lid*, repoussé, chased, and cast bronze, Greek, Archaic, ca. 530 BCE (Gaul Chaillon-sur-Seine Museum).

<https://www.musee-vix.fr/en/visite-collection/7#sthash.pKtFAz9u.dpbs>

When new, the helmet in Figure 3.13 would have been golden in color and reflective. Engraved lotuses and palmettes fill the space between the raised serpentine eyebrows that were formed with repoussé and chasing techniques (Figures 1.9b, 1.9c and 1.9d).



Figure 3.13 *Corinthian Helmet*, 8 7/8 x 7 ¼ in / 22.6 x 18.5 cm, Greek, Archaic, ca. 600–575 BCE (The Metropolitan Museum of Art, Dodge Fund, 1955, CC0). <https://www.metmuseum.org/art/collection/search/254824>

Archaic ceramic vessels were no longer used as grave markers, having been replaced by statues and stelai. The **black figure** technique developed in Corinth around 700 BCE, but Athens overcame her rival and became the center of painted vase production after 550 BCE. At first, figural scenes covered most of the vase, but afterwards only one large figural frieze decorated each side (Figure 3.15).

Greek terracotta vessels were made on a wheel rotated by an assistant. The potter in Figure 3.14a might be forming the lower part of an amphora because large Greek pots were made in sections that were trimmed and joined together before they were fired.



3.14a Leagros group, detail of a hydria showing a potter making a tall clay vessel while an assistant turns the wheel and another man carries away a similar vessel, black figure terracotta, Greek, Attica, Archaic, ca. 510 BCE (Staatliche Antikensammlungen und Glyptothek, Munich).

Potters worked in a special district of the city. They formed the pots and owned the kilns, but very few decorated their own ware. Instead, painters

were hired to decorate the pottery with slip (fine clay suspended in water; not a glaze). The terracotta clay and slip shared the same basic ingredients, but the **terra sigillata** slips <https://www.vincepitelka.com/wp-content/uploads/2022/10/Super-Refined-Terra-Sig.pdf> included varying amounts of alkali (soda ash, marsh borax, or another water-soluble alkaline material) that kept the particles in suspension, formed a smooth surface, and lowered the maturation temperature.



Figure 3.14b Reproductions of a 510 BCE red figure amphora by Euthymides before firing (left) and after firing, Mycenaean Center, Fichti, Greece (photograph by Carol Ventura, 2001).

After covering the surfaces with red slip, imagery was painted over it with another slip that (when fired correctly) turned black (Figure 3.14b). With the black figure technique (Figures 3.14a, 3.15, 3.17, and 3.18), stylized figures were painted in silhouette over the red slip background with details generally incised through the layers of slip with the **sgraffito** technique (Figure 3.14c) to reveal the contrasting color of the clay. With the red figure technique (Figures 3.18, 3.20 and 3.21), the background was usually painted with the slip that turned black along with the details of the more realistically developed figures, so they fired red. White and red slips were occasionally used with both styles, too.



Figure 3.14c Using the sgraffito technique, Juan Pablo Tito uses a sharp tool to cut through a layer of slip to reveal the reddish-brown color of the **leather hard** clay below, Ubeda, Spain (photograph by Carol Ventura, 2005). <https://www.carolventura.com/ceramic.htm>

Greeks fired their ware in dome shaped kilns with an opening on one side for stoking the fire (Figure 3.14d), a side door for loading and unloading, and a chimney vent on the top that allowed the draft / atmosphere to be controlled.

Some paintings on pottery from that era show potters opening or closing vents during firing. Kilns were fired with the vents open until they reached around 1652°F / 900°C, then the vents were partially closed to create a smoky flame to reduce the amount of oxygen. The smothered flame drew the oxygen necessary for combustion from the red iron oxides in the slip and clay, which turned the slip and clay black.

The vent was reopened to allow more oxygen to enter when the kiln cooled to a little below 1472°F / 800°C. The areas not coated with matured slip reabsorbed oxygen and the reddish color returned. The firing was very tricky, because the red-black contrast would only occur if done correctly (Figures 3.7 and 3.21).

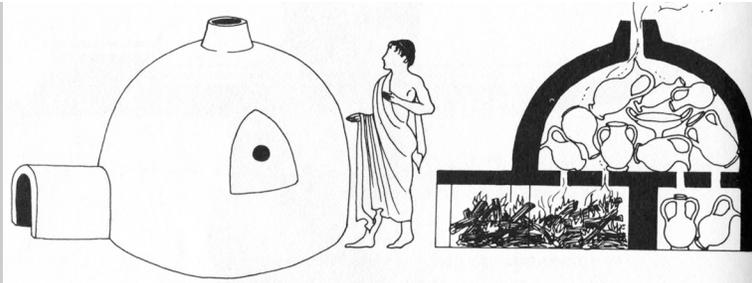


Figure 3.14d Reconstruction of a Greek kiln of about 500 BCE made from a number of decorated plaques from Corinth (Henry Hodges, *Technology in the Ancient World*, Barnes and Noble Books, 1970/1992, p. 182, Figure 172).

Exekias signed fourteen of the twenty-nine vases attributed to him as the painter and/or potter between 545 and 530 BCE. Most potters did not paint, and most painters did not work the clay, but Exekias (Figure 3.15) and Amasis (Figure 3.17) did both. That is probably why the imagery on their pieces interrelates so well with the shapes of their vessels.

Exekias was the first vase painter to depict several themes that were copied by his contemporaries. His large *Achilles and Ajax Amphora* (Figure 3.15) was the most famous, one of two vessels that he signed as both painter and potter.

Double palmette and lotus buds frame the top of the figurative panels. The panel on one side features Achilles (the bravest Greek warrior) and Ajax (the strongest Greek warrior) in full body armor sitting on stools, playing a board game. The inscriptions (in retrograde) identify the players and document that Achilles is winning four to three. Both hold a spear and bend inwards with great concentration. Their profiled bodies have long, well-formed limbs. Each wears a leather corselet topped with an elaborate cloak incised with rosettes, meanders, and swastikas. Ajax's leather corselet has a shoulder strap with a feline animal head. They also wear thigh guards and greaves on their calves.

The composition relates especially well to the shape of the pot. The men's backs reflect the curve of the pot, the spears bring the eye up into the top of the handles. The ivy leaves painted on the flat face of the handles visually connect to the shields resting against the walls below. A satyr's head, snake, and panther or spotted leopard is on the shield behind

Achilles and behind Ajax is a shield with a Gorgon's head with snakes above and below, surmounted by a helmet.

The figurative panel on the other side of the vase is equally detailed and intimate. It features the return of the Dioscuri brothers to Sparta, greeted by their mother, Queen Leda, and King Tyndarus. A happy dog greets naked Polydeukes (heroic Greek men were depicted naked, even though they were probably clothed at the time). Queen Leda offers a flower to Kastor, who turns to greet his mother. He stands behind his horse, Kylaros, depicted with an incised lotus and palmette collar. King Tyndarus strokes the horse's muzzle. An aryballos hangs from the wrist of a small adult servant supporting folded clothes on a stool on his head.

Exekias lavished a lot of attention on clothing. Leda's exquisite peplos is incised with fine details, suggesting it was tapestry woven. Ajax's and Achilles' cloaks are equally stunning.



Figure 3.15a Exekias, *Achilles and Ajax Amphora*, black figure terracotta, 23 1/2 in / 59.69 cm high, Greek, Archaic, ca. 530 BCE (Vatican Museum 344, photograph by Carol Ventura, 2009). <https://smarthistory.org/exekias-attic-black-figure-amphora-with-ajax-and-achilles-playing-a-game/>



Figure 3.15b Exekias, *Achilles and Ajax on the Achilles and Ajax Amphora*, black figure terracotta, Greek, Archaic, ca. 530 BCE (Vatican Museum 344, photograph by Carol Ventura, 2009).



Figure 3.15c Exekias, back frieze of *Achilles and Ajax Amphora* with *Polydeukes and Kastor Welcomed by Queen Leda and King Tyndarus*, black figure terracotta, Greek, Archaic, ca. 530 BCE (Vatican Museum 344, photograph by Carol Ventura, 2009).

Greek literature provides clues about textile production, a respected female craft. Penelope puts off her suitors in the *Odyssey* by tapestry weaving a splendid shroud by day and unweaving it at night. The *Iliad* describes the Trojan battle scenes that Helen wove into her purple cloth and the colorful flowers on Andromache's shimmering purple mantle.

Euripides mentions Creusa's fabric that featured a gorgon head fringed with serpents.

Greek women wove wide, rectangular cloth on the type of warp-weighted loom seen in Figure 3.16a. Weights on the bottom hold groups of vertical warp threads. To weave (from the top down), the shed bar (tied to every other warp) is pulled forward to create an opening to pass through the weft. When the shed bar is set in the back position, the weights pull on the warp to form the other opening for the weft. Woven cloth can be rolled around the top cloth beam, where the warp is suspended.



Figure 3.16a Reproduction of a warp-weighted loom, Central Museum of Textiles, Lodz, Poland (photograph by Carol Ventura, 2009).

Tapestry woven and embroidered garments, bed covers, and pillows are represented in paintings and sculptures. People are shown wearing loosely fitted garments made from rectangular fabrics pinned at the shoulders. Men and women dressed in long or short linen **chitons**, sometimes topped

with a himation (mantle). A short chiton was worn under bronze armor. In cooler weather, women could wear a woolen peplos over a long chiton, as does the Peplos Kore in Figure 3.16b. The peplos was folded over at the top before being pinned and secured with a belt.

Remnants of paint preserved on marble sculptures from the Athenian Acropolis suggest that some fabric was very decorative. Woolen garments had colorful figurative and geometric motifs, while linen garments were simpler, sometimes with a decorative border.



Figure 3.16b *Peplos Kore* (left), marble, 4 ft / 1.2 m high, Greek, Archaic, ca. 530 BCE, and painted reproduction (Acropolis Museum, Athens).

<https://www.theacropolismuseum.gr/en/statue-kore-peplos-kore>

Amasis was both a potter and a painter. He signed eight of his 123 pieces as potter between 560 BCE and 515 BCE. The small black figure *Weaving Workshop Lekythos* (oil flask) attributed to him (Figure 3.17a) depicts women in various stages of textile production dressed in woolen peploi. The rollout (Figure 3.17b) shows them holding a cloth over a stool topped with two folded fabrics, women spinning, a weaver separating

warp with a heddle rod on a warp weighted loom (woven cloth at the top and weights on the bottom) while another weaver inserts weft, women weigh cloth, and women spin.



Figure 3.17a Amasis Painter, *Weaving Workshop Lekythos* (oil flask), black figure terracotta, 6 $\frac{3}{4}$ in / 17.15 cm high, Greek, Attica, Archaic, ca. 550–530 BCE (The Metropolitan Museum of Art, Fletcher Fund, 1931, CC0).

<https://www.metmuseum.org/art/collection/search/253348>



Figure 3.17b Amasis Painter, rollout of *Weaving Workshop Lekythos* (oil flask), black figure terracotta, Greek, Attica, Archaic, ca. 550–530 BCE (The Metropolitan Museum of Art, Fletcher Fund, 1931, CC0).

<https://www.metmuseum.org/art/collection/search/253348>

The red figure technique developed in Athens around 520 BCE and remained popular until around 480 BCE. It is the opposite of the black figure technique because the background is painted with slip instead of the figures. Decorative borders separate the painted panels from the rest of the vase. Both black figure and red figure techniques were used until around 500 BCE. Afterwards, the red figure technique dominated. More accurate anatomical treatment and natural poses that portray a more three-dimensional body also gradually developed.

The Andokides Painter might have invented the red figure technique. We do not actually know his name, but he painted for the potter named Andokides between 530 and 510 BCE. The amphora in Figure 3.18 is one of his “bilingual” vessels with black figure on one side and red figure on the other. The scene on both sides shows a grape vine and Athena (wearing a helmet and dressed in an exquisite peplos) visiting Heracles (wearing a chiton) who is resting on a **kline**, next to a table.

On the black figure side, Hermes (in winged sandals and hat) stands behind Athena while a servant faces a dinos on a stand behind Herakles. A kylix cup is on the table with food. The red figure side shows Athena handing a flower to Heracles, who is holding a stemmed kantharos drinking vessel.



Figure 3.18 Andokides Painter, *Athena and Heracles Amphora*, bilingual terracotta, 20 3/4 in / 52.7 cm high, Greek, Archaic, 520-510 BCE (Staatliche Antikensammlung Museum, Munich 2301).

https://commons.wikimedia.org/wiki/File:Athena_Herakles_Staatliche_Antikensammlungen_2301_A_full.jpg

White ground developed in Attica around 500 BCE and was popular for around a hundred years. With this technique, white slip was painted on the pot, then black and red slip were used to paint imagery over the white base. The white ground jug in Figure 3.19 shows a woman drawing out wool with her right hand while spinning it into yarn on a drop spindle. Her left hand supports the rotating weighted spindle and holds a distaff with the unspun wool. She is wearing earrings, bracelets, sandals, and a himation over her chiton.

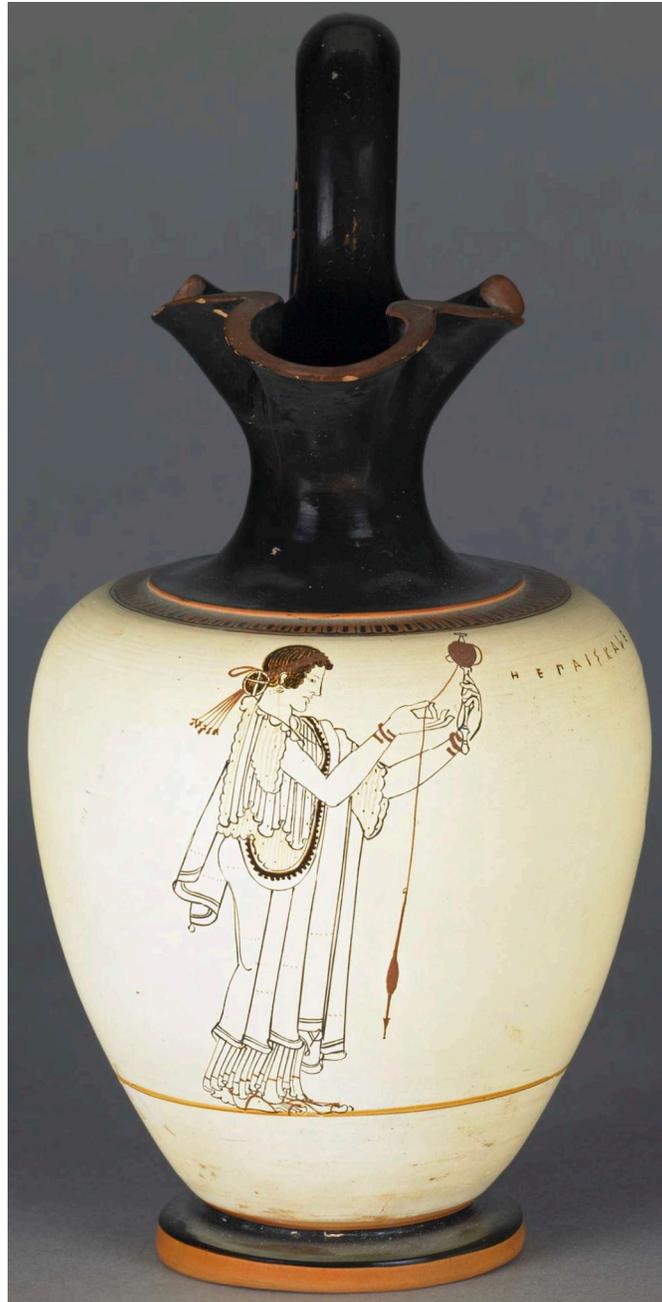


Figure 3.19 Brygos Painter, *Woman Spinning Jug*, white ground terracotta, 8 ½ in / 21.59 cm high, Greek, Attica, Archaic, ca. 490-470 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1873-0820-304

Greek Classical Period (ca. 480 – 330 BCE)

“Classical” is derived from the Latin word “classicus,” the adjective from the Latin “classis,” meaning “class” or “rank” and came to mean “of the highest or best rank.” “Classical Period” can be defined as referring to the entire time that the Greek and Roman cultures flourished. Since the end of the 19th century, however, most art historians begin the Classical Period when the Persians burned Athens and end it when Alexander the Great burned Persepolis in retribution for the destruction of the Athenian Acropolis.

It was during the Classical Period that Aeschylus, Sophocles, and Euripides produced their dramas; the philosophers, Socrates, Plato, and Aristotle, taught; and the orator, Demosthenes, spoke. Classical sculptors include Myron, Phidias, Polykleitos, and Praxiteles.

The red figure *Caputi Hydria* in Figure 3.20 depicts either a pottery or metalworking workshop. We know that terracotta was painted with slip before it was fired but we also know that designs were laid out on metal as guides for chasing and repoussé reliefs like those seen on the Vix Krater (Figure 3.12), helmet (Figure 3.13), and the Derveni **Volute** Krater (Figure 3.31). Unfired clay would be too fragile to stack (as seen in front of the central figures) and ceramics have thicker base supports. Whichever interpretation you prefer, it is an exquisite water container.



Figure 3.20a *Caputi Hydria*, red figure terracotta, Greek, Classical, ca. 470-460 BCE (Vicenza Banca Intesa C 278).

<https://eredibibliotecadonne.wordpress.com/2023/02/26/una-giovane-ceramografa-nella-splendida-hydria-caputi/>



Figure 3.20b *Caputi Hydria* frieze, red figure terracotta, Greek, Classical, ca. 470-460 BCE (Vicenza Banca Intesa C 278).

Around 450 BCE, some Athenian potters emigrated to southern Italy, where an important red figure center developed and eventually dominated the Italian markets. The *Stamnos* in Figure 3.21ab was made there. The side seen in Figure 3.21a was in a cooler part of the kiln during reduction, so the slip painted in the background lost its black color when it reabsorbed oxygen towards the end of the firing. On the right side of the frieze, Bellerophon is seen in a chlamys pinned at the throat, standing in front of Pegasus. Proitos wrapped a himation around his lower body and holds a scepter with a bird-topped finial. On the left between Ionic columns, Stheneboea wears a chiton, himation, necklace, and white bracelets and earrings.



Figure 3.21a *Jar / Stamnos with Banishment of Bellerophon*, red figure terracotta, 11 13/16 x 10 1/16 in / 30 x 25.6 cm, Greek, Apulia, Italy, Classical, ca. 400-390 BCE (Museum of Fine Arts, Boston, Henry Lillie Pierce Fund). <https://collections.mfa.org/objects/154074>

The other side of this *Stamnos* (Figure 3.21b) features Theseus abandoning half-naked Ariadne, who rests on a striped pillow on a low couch. She is wearing a white bracelet on each arm. Athena is seated above, holding a spear in her right hand. She is wearing an aegis on her

chest over a chiton, a himation, a sphenone in her hair and white bracelets, earrings, and a necklace. Winged Hypnos holds a phiale in his left hand and wears a white fillet in his hair. Theseus moves to the left, nude except for the himation gathered over his arms.



Figure 3.21b *Jar / Stamnos with Theseus and Ariadne*, red figure terracotta, 11 13/16 x 10 1/16 in / 30 x 25.6 cm, Greek, Apulia, Italy, Classical, ca. 400-390 BCE (Museum of Fine Arts, Boston, Henry Lillie Pierce Fund). <https://collections.mfa.org/objects/154074>

Core-formed glass vessels (Figure 3.22) and beads from Greek and Etruscan tombs of the sixth to the fourth centuries BCE might have been imported from Egypt, or elsewhere. The glass vessels were shaped like contemporary Greek terracotta amphorae, jars, and jugs. Greek glass was primarily yellow, red, blue, and white, but not as bright as earlier Egyptian examples. Greek and later Egyptian glass beads, though, are often indistinguishable because both cultures produced them with the same brilliant colors. Some were plain, while others were decorated with spiral and zigzag patterns.



Figure 3.22 *Amphoriskos*, core-formed glass, blue one is 3 $\frac{3}{4}$ x 2 $\frac{1}{16}$ in / 9.5 x 5.2 cm high, Greek, Eastern Mediterranean, Classical, late 6th - 5th century BCE (The Metropolitan Museum of Art, Gift of J. Pierpont Morgan, 1917, CC0). <https://www.metmuseum.org/art/collection/search/250019>

Egyptian and Greek women used several types of hand-held and free-standing mirrors made of polished bronze (sometimes silver). The standing example in Figure 3.23 features a woman wearing a woolen peplos (similar to the Peplos Kore in Figure 3.16b). One side of the disc is concave, while the other is convex. Both sides of the mirror were probably polished, which would have produced a minimized reflection on the concave side and a magnified reflection on the convex side. Unfortunately, the patina has eliminated the reflective quality of the metal.

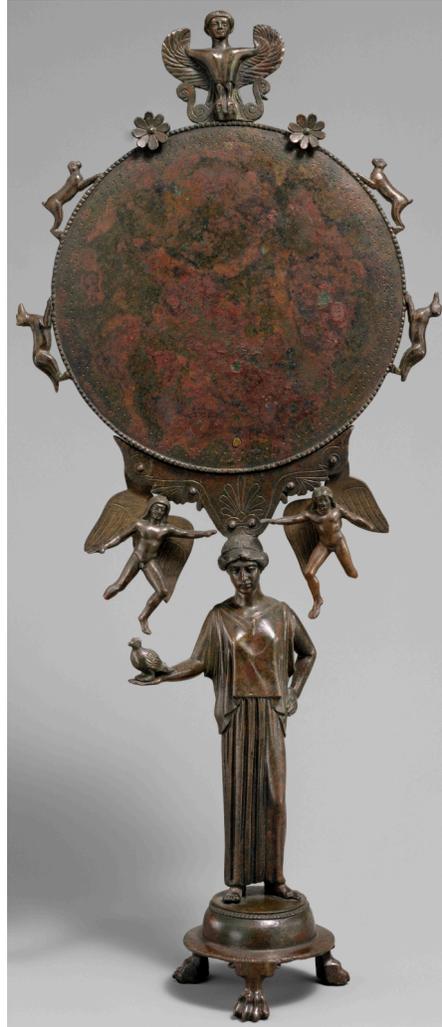


Figure 3.23 *Mirror with a Support in the Form of a Draped Woman*, cast bronze, 15 15/16 in / 40.4 cm high / 2 lbs / 0.9 kg, Greek, Argive, Classical, mid-5th century BCE (The Metropolitan Museum of Art, Bequest of Walter C. Baker, 1971, CC0).

<https://www.metmuseum.org/art/collection/search/255391>

Jewelry represented on Classical sculptures and in paintings shows how it was worn and helps with dating since styles changed over time. Few pieces survive from the Archaic Period, but many examples have been excavated from Classical Period tombs and sanctuaries. Temple inventories of the jewelry given to the resident god or goddess also provide clues to the types of jewelry used. Gold, silver, electrum, and bronze (and occasionally lead, iron, and terracotta) were cut, modeled, cast, and decorated with repoussé, chasing, engraving, inlay, **granulation**, and

filigree to produce diadems, crowns, wreaths, necklaces, earrings, armlets, bracelets, rings, pendants, fibulae, pins, buttons, and plaques.

Pins for fastening garments were plain or embellished with knobs in the form of human heads, statuettes, or fruit. Similar to a modern safety pin, fibulae had a semicircular bow and an elongated catch and were often decorated with filigree (Figure 9.9). Other pins were disk shaped.

Gold and silver finger rings were often set with seal stones or engraved as signets. The seated figure on the signet ring in Figure 3.24 has her hair bound in a netlike sakkos. She is clothed in a belted chiton and himation (bunched around her waist), and wears earrings, a necklace, and a double bracelet on her right hand that holds a frond. Eros is flying up toward her face, touching her right shoulder with one hand and raising a wreath to her head with the other.



Figure 3.24 *Finger Ring with a Seated Woman and Flying Eros*, engraved gold, 7 1/16 x 7/16 in / 18 x 1.1cm, Greek, Classical, second half of the 5th century BCE (The Metropolitan Museum of Art, Purchase, The Bothmer Purchase Fund and Lila Acheson Wallace Gift, 1994, CC0).

<https://www.metmuseum.org/toah/works-of-art/1994.230.1>

Nike, the goddess of victory, drives a two-horse chariot on the earring pendant suspended from a decorative disc in Figure 3.25. Wearing a belted chiton and jewelry, she leans forward while pulling on the reins with her left hand. Her feathery chased wings counterbalance the rearing horses. The figures are embellished with filigree, granulation, and beaded wire (crafted to resemble beads placed next to one another). The honeysuckle palmette disk has curved petals and circular stamens outlined with fine twisted wires with remnants of enamel on the stamens.



Figure 3.25 *Earring with Nike Driving a Two-Horse Chariot*, gold with filigree, granulation, and enamel, 1 15/16 in / 5 cm. high, ½ oz / 15.8 gm, Greece, Classical, ca. 350–325 BCE (Museum of Fine Arts Boston, Henry Lillie Pierce Fund). <https://collections.mfa.org/objects/155707/earring-with-nike-driving-a-twohorse-chariot?ctx=fd8af17e-c3d7-4762-8576-21f56442e540&idx=0>

With granulation (from the Latin word, “granum,” meaning “grain”), metal is embellished with small spheres of the same alloy arranged in patterns or figurative motifs. The Greeks did not invent granulation but crafted some of the finest masterpieces. Today both high karat gold and fine silver are

utilized, but the Greeks preferred gold. Gold does not tarnish, which assures a good bond.

One of the ways to transform a piece of metal into a sphere is to apply heat until it liquifies, allowing it to form the smallest ratio of surface area to volume (Figure 3.26). After cooling, they may be sorted for size.

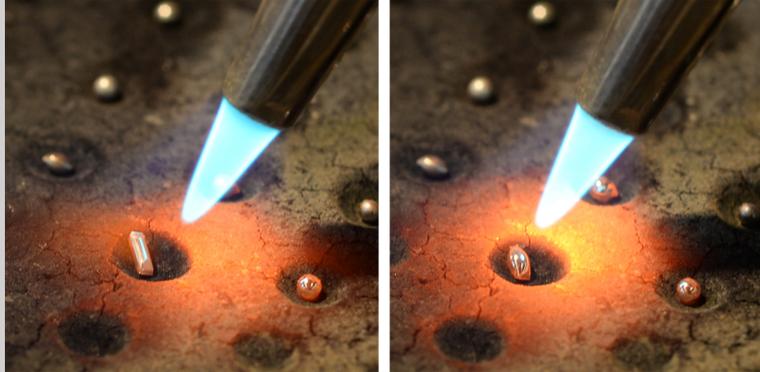


Figure 3.26 Robert Coogan heats a small piece of fine silver in a depression carved into charcoal until the silver melts into a sphere, like the red-hot ball to its right, at the Appalachian Center for Craft in Smithville, TN (photographs by Carol Ventura, 2015).

Grains can be fused to metal with heat alone or attached with colloidal or eutectic welding that uses tragacanth gum and copper salts to lower the melting temperature of the granules and the base. With this technique, metal is painted with a colloidal mixture, grains are arranged on the wet metal, then heated with a reducing flame to burn away the copper salt. At the eutectic welding temperature (1634°F / 890°C) copper diffuses into the granules and base, which joins them together. Too much heat will melt and flatten the sphere, the reason granulation is such a difficult technique.

Stamping and **die-forming** are efficient methods to make multiples with soft metals like gold. Dies were used to form the rosettes, boats, shells, and sirens (female headed birds that lure sailors) of the gold *Boat-Shaped Earrings* in Figure 3.27. The filigree covering the boats consists of spirals and rows of twisted and beaded wires. Beaded wire also outlines the rosettes over the boats. Minute traces of enamel on the inner petals suggest they were originally more colorful. The shells that hang from loop-in-loop chains on the bottom would have jingled when the earring moved.



Figure 3.27 *Boat-Shaped Earrings*, die-formed gold with filigree and granulation, 2 ¼ in / 5.6 cm high, 4 oz / 11.4 gr each, Athens, Greece, Classical, ca. 420-400 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1893-1103-1

Necklaces fit snugly around the neck and usually consisted of loop-in-loop chains or beads, with decorative clasps at the ends. They were often embellished with pendants in the form of heads, elongated beads, acorns, birds, or amphorae.

Lotus-palmettes, female head-pendants, and triple layered rosettes decorate the gold *Necklace* in Figure 3.28 that was crafted in the southern Italian town of Taranto. The rosettes and palmettes were cut from sheet gold, shaped, then bordered with spiraling and beaded wires. They include tubes on the backs for stringing.

The pendants have flat backs and die-formed fronts, and some are decorated with filigree and beaded wire. Each of the large female heads wears spiral earrings, a necklace with a central pendant, and a diadem in her hair and rows of twisted wires decorate the bottom of the neck. Two of

the heads have small bull's horns and ears, representing Io, the priestess that Hera changed into a heifer.



Figure 3.28 *Necklace*, chased and die-formed gold with filigree and beaded wire, 7 in / 18 cm long, Taranto, Italy, Greek, Classical, ca. 350-330 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license). https://www.britishmuseum.org/collection/object/G_1872-0604-667

Corresponding to the contemporary trend towards realism in sculpture, the Classical *Cuirass* (covered the upper torso of a Greek warrior) in Figure 3.29 features an idealized male physique. The bronze would have been smooth and golden when new.

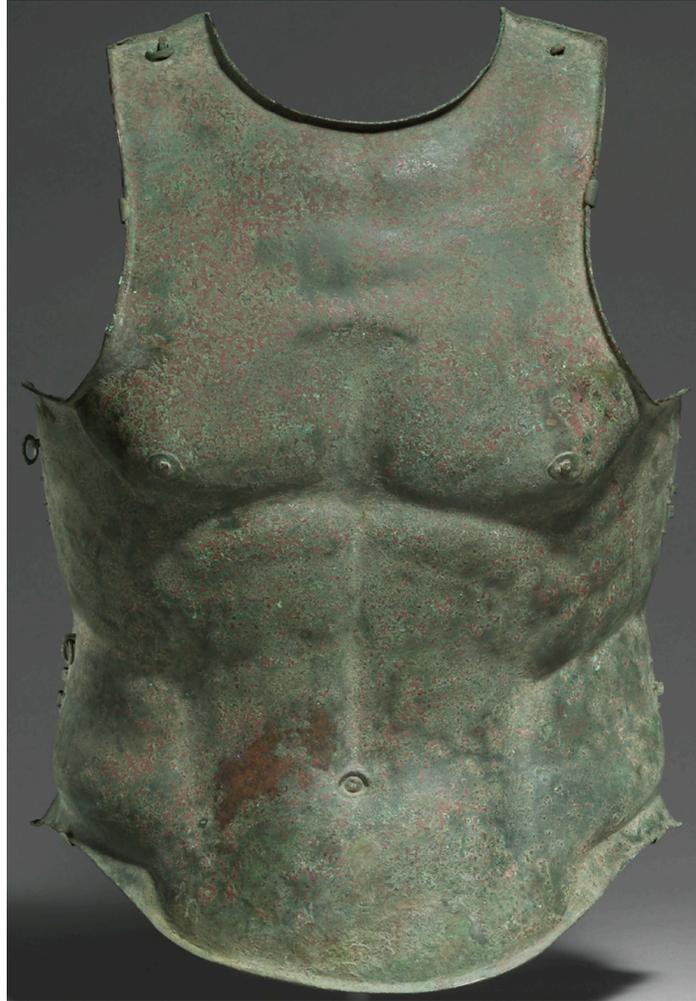


Figure 3.29 *Cuirass* (front), 19 5/8" in / 49.8 cm high, bronze, Classical, 4th century BCE, Greek, Apulian (The Metropolitan Museum of Art, Gift of Estée Lauder Inc., 1992, CC0).

<https://www.metmuseum.org/art/collection/search/256134>

Although no wooden examples survive, bronze and wooden chairs, chests, stools, klines, and tables are depicted in paintings and sculptures and described in Greek writings. Furniture makers used the axe, saw, plane, hammer, and **lathe** to work maple, beech, willow, citron, cedar, and oak. Wooden dowels and round, rectangular, or dovetailed tenons were joined with glue and metal nails. Greeks decorated their furniture with carved reliefs, painted scenes, and inlay. Legs were straight or curved, rectangular, turned on a lathe and cut, or carved to look like animals. A respected

profession, the *Odyssey* (XVII, 382ff.) tells us that furniture makers were “welcomed the world over.”

The thronos was a formal chair used by gods, heroes, and important people. The leather or **plaited** seat was usually topped with a pillow. The back often included palmette, volute, or animal head finials. Some armrests terminated with a ram's head supported by a sphinx or column.

The painter in Figure 3.20 and spinner in 3.17b are seated on a **klismos**, a comfortable chair whose back and front legs curve in the opposite direction. The curved horizontal back was supported by three uprights.

The diphros was a plain seat with four legs (often turned) as shown in Figure 3.24. The legs of the diphros okladias were crossed, like modern folding stools. The joint where they cross is often marked with concentric circles, suggesting a pivot.

Footstools with four straight or curving legs were used not only for resting one's feet while sitting, but also as a step for getting onto the thronos / armed chair.

Chest sizes varied according to use: large for storing folded clothes and small for jewelry and toiletry articles. Most chests were rectangular with lion-paw feet, plain or decorated paneled sides, and a horizontal hinged lid. In his *Guide to Greece*, Pausanias (Greek, 110-180 CE) describes the carved cedar-wood *Chest of Cypselus* he saw in the Temple of Hera at Olympia covered with inscriptions and mythological scenes populated with figures made of ivory and gold (5.17.5 - 5.19.10, <https://www.theoi.com/Text/Pausanias5B.html>).

The relief in Figure 3.30 shows Persephone wearing a chiton standing by a cushioned thronos, holding open the lid of a finely decorated Chest while placing a neatly folded garment inside. Reliefs of an unknown object (a basket?), a hand-mirror, lekythos, and kantharos are shown above.



Figure 3.30 *Persephone Storing Folded Cloth into the Chest of Cypselus*, terracotta relief, Sanctuary of Persephone at Locri, Greek, Classical, mid 5th century BCE (Museo Archeologico Nazionale di Reggio Calabria, Italy).

The kline (from the Greek word, *klino*, which means “cause to lean”) was a couch-like piece of furniture that was used not only for sleeping and lounging but also for formal dining (Figure 3.18). Made of wood or bronze, it had four legs with one side raised on which to lean. The interlaced frame had a mattress, covers, and pillows to make it more comfortable, like the padded couch depicted on the 645 BCE relief of Neo-Assyrian King Ashurbanipal (Figure 1.18).

Only a few Greek tables and bronze legs have survived. In the banquet scenes on Greek vases and reliefs, tables are shown laden with bread and meat, just as Homer described (*Odyssey*, IX, 8; cf. *Plato Republic*, 390b). A long table supported dishes and food next to the kline, as seen in Figure 3.18. When the meal was finished, the table could be pushed under the kline. Legs were fastened to the tabletop with tenons or dowels and were reinforced with stretchers.

Rectangular and circular tables with three or four legs (sometimes in animal form) were popular. Tripod tables were stable on uneven surfaces, perhaps the reason for their popularity.

Greek Hellenistic Period (ca. 330 – 31 BCE)

The Hellenistic Period began when Alexander the Great burned Persepolis and ended with the rise of the Roman Empire. “Hellenistic” is derived from a Greek word that means “a non-native Greek speaker who uses the Greek language.” Alexander the Great expanded the Greek world to include Egypt, Anatolia, and the Near East. Greek became the official language, and Greek art became the official means of expression. The Greeks formed the ruling class, and local people performed the necessary services.

Hellenistic gold, silver, and bronze plates, platters, cups, bowls, jugs, and strainers have been found, but the largest and finest example is the *Derveni Volute Krater* in Figure 3.31. The golden color is due to the unusually high tin content of the bronze. Two layers were formed and decorated, then joined together around the neck. The repoussé and chased reliefs on the outer layers features Ariadne and Dionysus surrounded by partying satyrs, maenads, and a warrior. The statuettes on the shoulder, handles, volutes, and base were cast. An inscription around the lip translates to, “Astion, son of Anaxagoras, of Larissa.”



Figure 3.31 *Derveni Volute Krater*, repousséd and chased cast bronze, 35 ½ in / 90.5 cm high, 88 lbs / 40 kg, Hellenistic, ca. 370-320 BCE (Archaeological Museum of Thessaloniki, photograph © Michael Greenhalgh, CC BY-SA).

https://commons.wikimedia.org/wiki/File:Crat%C3%A8re_de_Derveni_0001.jpg

Gold necklaces with pendants were still in style during the Hellenistic Period. The strap of the gold necklace in Figure 3.32 is made of seven loop-in-loop chains joined together. Floral and seed pendants hang on individual loop-in-loop chains. The terminals on each end are decorated with granulation, filigree, and beaded wire.



Figure 3.32a *Strap Necklace*, gold filigree, granulation, die-formed pendants, 1 $\frac{1}{4}$ x 12 $\frac{3}{4}$ in / 3.2 x 32.3 cm, Greek, Hellenistic, ca. 330–300 BCE (The Metropolitan Museum of Art, Rogers Fund, 1906, CC0).
<https://www.metmuseum.org/art/collection/search/247593>



Figure 3.32b Detail of *Strap Necklace*, gold filigree, granulation, die-formed pendants, Greek, Hellenistic, ca. 330–300 BCE (The Metropolitan Museum of Art, Rogers Fund, 1906, CC0).
<https://www.metmuseum.org/art/collection/search/247593>

In addition to making gold more plentiful, the conquests of Alexander the Great also made multi-colored stones readily available. Perhaps that is why Hellenistic jewelry included colorful glass and stone inlay. Chalcedony, carnelian, and Indian garnet were very popular during the 4th century BCE. Emeralds, Egyptian amethysts, and seed pearls from

the Red Sea were favored during the 3rd century BCE, then sapphire became fashionable in the 2nd and 1st centuries BCE.

The *Diadem* in Figure 3.33 is composed of twisted flat gold ribbons and a Herakles knot (associated with marriage). The central ribbon is embellished with rosettes made with convex petals bordered with spiral-beaded wire and enamel. A round garnet decorates the middle of the knot. Seven twisted wire ropes, six small rosettes with green and blue enamel, filigree, and enameled scale patterns decorate the spaces between the ribbons and the knot.



Figure 3.33a *Diadem*, gold, enamel, filigree, and garnet, 11 in / 27.9 cm long, Melos, Greek, Hellenistic, ca. 300-280 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1872-0604-815



Figure 3.33b *Diadem* detail, gold, enamel, filigree, and garnet, Melos, Greek, Hellenistic, ca. 300-280 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1872-0604-815

A gold, silver, bronze, or crystal hoop terminating at either end with lions, bulls, or ram's heads was the most popular type of Hellenistic bracelet. The rock-crystal hoops of the *Ganymede Jewelry Bracelets* in Figure 3.34 were cut, carved, and polished before gold wire was fit into the depressions. Ram's heads emerge from collars decorated with friezes enclosed within bands of darts with beaded wire borders. The upper frieze depicts grapes hanging from ivy on a vine tied in the middle with a Herakles knot. Palmettes decorate the other friezes.



Figure 3.34 Pair of *Ganymede Jewelry Bracelets*, rock crystal and gold, 3 1/8 in / 8 cm wide, Greek, Hellenistic, ca. 330-300 BCE (The Metropolitan Museum of Art, Harris Brisbane Dick Fund, 1937, CC0).

<https://www.metmuseum.org/toah/works-of-art/37.11.8-.17>

Women in Hellenistic sculptures and paintings are often shown wearing armlets on their upper arms. The serpentine *Armbands* in Figure 3.35 represent male and female tritons, each holding a small, winged Eros. The hoops behind the tritons' heads could be used to attach the armbands to clothing to help keep them in place.



Figure 3.35 Pair of gold *Armbands*, gold, 10 7/16 in / 26.5cm. high, Greek, Hellenistic, ca. 200 BCE (The Metropolitan Museum of Art, Rogers Fund, 1956, CC0). <https://www.metmuseum.org/collection/the-collection-online/search/254842>

Glass is hard when cold, liquid when hot, and malleable when warm (the name given to the state between cold and hot). Although called “warm,” the glass is actually around 1251°F / 677°C, much too hot to be touched. Ancient and modern glassworkers formed three-dimensional vessels with **glass canes** (Figure 11.8) some of which they cut to make murrini (Figure 3.36a), arranged (Figure 3.36b), and fused together (Figure 3.36c) to produce a patterned slab that may be reheated and manipulated into the desired shape. The Hellenistic Greeks placed the warm slab over a mold to form it into a bowl. John and Claire Kelly attached the slab to a gather of glass on the end of a **blowpipe** to transform it into a patterned vessel (Figures 3.36d, 3.36e, and 3.36f).



Figure 3.36a John Kelly cuts glass cane to make murrini at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2010).



Figure 3.36b Glass cane and murrini before fusing at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2010).



Figure 3.36c Red hot fused murrini and cane at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2010).

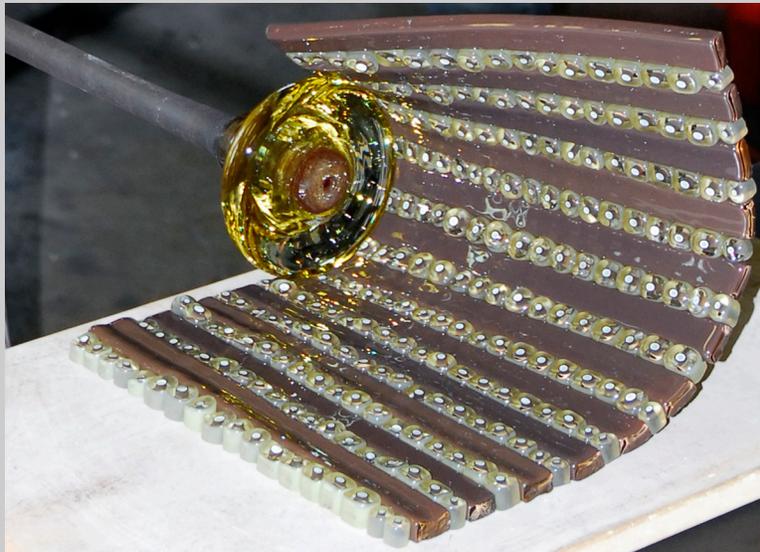


Figure 3.36d Claire Kelly rolls the end of the hot slab around a gather of hot glass on a blowpipe at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2010).



Figure 3.36e Careful measuring assures that the ends of the hot fused glass will join together perfectly at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2010).

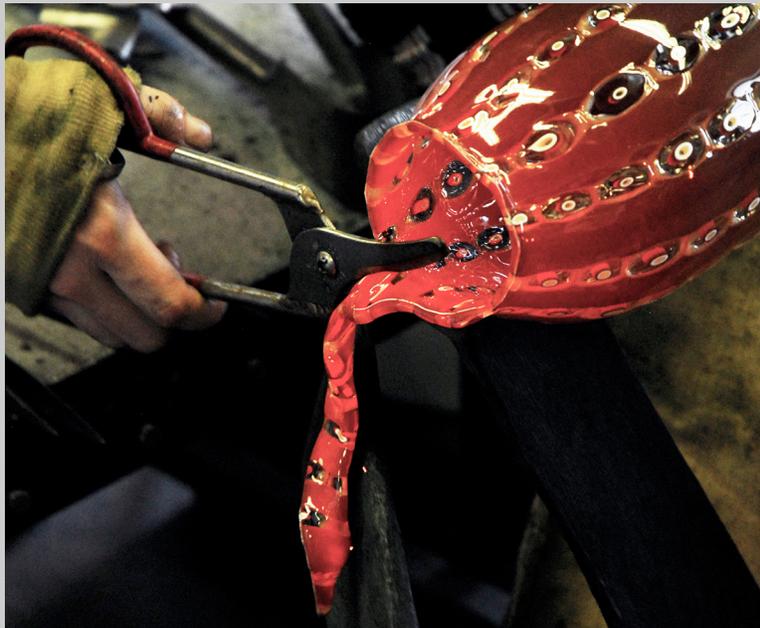


Figure 3.36f After reheating the glass, Kelly shapes it, then cuts off the top with metal shears to refine the lip of the vessel she is making at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2010).

Mosaic glass bowls with striped rims were first produced during the Hellenistic Period in eastern Mediterranean glass workshops. Colorful **murrini** were arranged into a circular shape and fused together to make the *Mosaic Bowl* in Figure 3.37. The warm disk would have been draped

over a convex mold, reheated on the mold, removed from the mold, slowly cooled, then finished by grinding and polishing.



Figure 3.37 *Mosaic Bowl*, fused, assembled, **slumped**, and polished glass, 2 7/8 x 4 7/8 in / 7.4 cm x 12.3 cm diameter, Hellenistic, Eastern Mediterranean, ca. 125-1 BCE (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/5107/bowl?ctx=936f2247e1191c55850656dff7ce8c4fc0e23758&idx=0>

The diagonal decorations on the exterior of the *Ribbed Bowl* in Figure 3.38 were made by pressing a tool into the hot, malleable glass before or after draping it on a convex mold. The two grooves below the inside of the rim were cold worked with rotary abrasive tools.



Figure 3.38 *Ribbed Bowl*, tooled, slumped, and cut glass, 2 1/8 x 6 in / 5.4 x 15.3 cm diameter, Hellenistic, Greek, Eastern Mediterranean, 1st century BCE (The Metropolitan Museum of Art, Gift of J. Pierpont Morgan, 1917, CC0). <https://www.metmuseum.org/art/collection/search/249440>

tomb inscriptions. Etruscan paintings and sculptures often show women and men enjoying each other's company as equals.

Etruscans dressed in wool, cotton, and linen fabrics. Although organic materials did not survive in the damp tombs, animated paintings of dancers and banquet scenes from the walls of the *Tomb of the Triclinium* (Figure 4.1) and the *Tomb of the Leopards* (Figure 4.2) illustrate Etruscan clothing. They are certainly enjoying themselves! Although the colors have faded over the millennia, the fabrics depicted retain their red, white, blue, and brown colors.



Figure 4.1 *Dancing Scene, Tomb of the Triclinium, Etruscan, Tarquinia, Italy, ca. 470 BCE.*

Triclinium (“three klines”) is the Greek word for a “banquet room” that held three klines. The wall painting in Figure 4.2 shows that Etruscans continued the tradition of eating while reclining, except that women were included in Etruscan festivities. Notice the patterned cloth covering the kline mattresses and the striped chiton of the woman on the right. The men and women being served wear mantles with blue and white decorative borders. The couple on the left appear to be signaling to the male server holding the empty jug, “Please bring us another.”



Figure 4.2 *Banquet Scene, Tomb of the Leopards, Etruscan, Tarquinia, Italy, ca. 480-450 BCE* (photograph by Sailko - Own work, CC BY 3.0, <https://commons.wikimedia.org/w/index.php?curid=75893036>)

Etruscan Ceramics

Some Etruscans cremated their dead and put the ashes in decorative urns. Others placed the deceased in a sarcophagus in a family tomb built to imitate a house that was decorated with sculptures, reliefs and wall paintings that showed ceremonies, dancers (Figure 4.1), banquet scenes (Figure 4.2), and sporting events. Tombs were filled with things used in life and that would be needed in the afterlife, including clothing, pottery, jewelry, and furniture.

Chiusi, in northern Etruria, specialized in the production of terracotta cinerary urns. The ash urn was placed in a family tomb or put inside a larger terracotta vessel and buried. The terracotta ash urn from Chiusi in Figure 4.3 has moveable arms and a head-shaped lid.



Figure 4.3 *Canopic Vase*, terracotta, 19 5/8 in / 50 cm high with lid, Chiusi, Etruscan, Italy, Archaic, ca. 600-575 BCE (© Louvre).

<https://collections.louvre.fr/en/ark:/53355/cl010298415>

Several styles of Etruscan ceramic vessels were produced. The black, burnished surfaces of bucchero ware imitated metal and were a less expensive alternative. This style of pottery was decorated with incisions, press-molded (Figure 5.6) reliefs, and/or roller stamped designs. The clay turned black during firing when the oxygen entering the kiln was partially blocked to produce an oxygen-reduced atmosphere.

The server in Figure 4.2 holds a jug similar in shape to the bucchero ware water jar in Figure 4.4. The five women's heads on the rim and the female head and two swans on the neck were first pressed into a mold, then removed and applied to the vessel with slip. **Press molded** sphinxes alternate with winged lions on the shoulder. The large strap handle is ornamented with chevrons, while the pair of horizontal handles were

twisted to look like ropes. The bottom part of the vessel is decorated with a press molded frieze of men's upper torsos and winged horses.



Figure 4.4 *Hydria*, bucchero ware terracotta, 23 7/8 in / 60.5 cm high, ca. 550-500 BCE, Etruscan, Chiusi, Tuscany, Italy (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1873-0820-356

Sculptors were especially adept at making large-scale terracotta sculptures – a difficult challenge. Like the paintings, these sculptures reveal a lot about Etruscan traditions, furniture, clothing, and jewelry. The lid of the life-size terracotta sarcophagus in Figure 4.5a shows a happy couple relaxing on a kline with a comfortable mattress and pillows. Figure 4.5b shows the bottom of the woman's shoes and the folds of the finely woven clothing. Unfortunately, little of the paint survives.



Figure 4.5a *Sarcophagus of the Spouses*, painted terracotta, 43 x 62 in / 114 x 190 cm long, Etruscan, Cerveteri, ca. 520 BCE (Museo Nazionale di Villa Giulia, Rome, photograph by Sailko, derived from: Sarcofago degli sposi, produzione etrusca di influenza ionica, 530-520 ac ca., dalla banditaccia 01.jpg, CC BY-SA 4.0).

<https://www.museoetru.it/masterpieces/sarcophagus-of-the-spouses>



Figure 4.5b Detail of feet of *Sarcophagus of the Spouses*, painted terracotta, 43 x 62 in / 114 x 190 cm long, Etruscan, Cerveteri, ca. 520 BCE (Museo Nazionale di Villa Giulia, Rome, photograph by Steven Zucker, CC BY-NC-SA 2.0). <https://www.museoetru.it/masterpieces/sarcophagus-of-the-spouses>

The paint survived much better on the terracotta sarcophagus in Figure 4.6 that is topped by a portrait of an Etruscan woman reclining on a

mattress and pillow. She is wearing a long Greek-inspired chiton and himation, which she adjusts with her right hand while holding an open lidded mirror in her left hand. Figure 4.6b provides a closer view of her clothing, gold diadem, earrings, necklace, bracelet, armband, and rings.



Figure 4.6a *Sarcophagus of Seianti Hanunia Tlesnasa*, modeled, molded, and painted terracotta, 72 in / 183 cm long, Etruscan, Tuscany, Italy, ca. 150-140 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license). [https://www.britishmuseum.org/collection/object/G_1887-0402-](https://www.britishmuseum.org/collection/object/G_1887-0402-1)

1



Figure 4.6b Detail of the *Sarcophagus of Seianti Hanunia Tlesnasa*, modeled, molded, and painted terracotta, Etruscan, Tuscany, Italy, ca. 150-140 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license). https://www.britishmuseum.org/collection/object/G_1887-0402-1

Etruscans not only imported Greek black and **red figure ware** but also produced Greek-inspired pottery of their own. The Etruscan red figure pieces in Figure 4.7 include a *Stamnos Jar* (decorated with a horseman and Eros), a duck-shaped *Askos* (with press molded reliefs of a girl and a youth), a *Calyx Krater* (with a seated Apollo above a young Herakles strangling snakes), a *Plate*, and a beaked *Oinochoe Jug* (with profiled female faces).



Figure 4.7 *Stamnos Jar, Askos, Calyx Krater, Plate, and Oinochoe Jug*, red figured terracotta, tallest is 19 5/8 in / 49.85 cm high, Etruscan, Vulci, Italy, ca. 400 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license). https://www.britishmuseum.org/collection/object/G_1836-0224-146

Etruscan Metalwork

Iron was the metal of choice for weapons, knives, and axes because it kept a sharp cutting edge better than bronze. Tools and jewelry were also made of iron, but few survive because the damp Italian climate caused the iron to rust and disintegrate.

Etruscans mined and smelted 10,000 tons of iron annually. This hard metal melts around a thousand degrees higher than does copper and

bronze, so it was very difficult to extract. Etruscan smelting techniques were only able to extract 30% of the iron from the ore, but more efficient **furnaces** allowed 20th century Italians to recover the remaining 70% of the iron during World Wars I and II.

The iron *Tripod* in Figure 4.8 was found in an Etruscan tomb. The horizontal ring on top would originally have held a large vessel. Lion-paw feet support the three long legs.



Figure 4.8 *Tripod*, iron, 22 5/16 in / 56.7 cm tall, Etruscan, Archaic, ca. 575-550 BCE (The Metropolitan Museum of Art, Rogers Fund, 1903, CC0).

<https://www.metmuseum.org/art/collection/search/247067>

Romans smelted iron ore with charcoal, then hammered it into long ingots. To make a sword, knife, **brooch**, nails, or tools, a blacksmith would heat an ingot until it was red hot, then cut and hammer it into shape on an anvil. A

short piece of hot iron was held with tongs and later cold-worked with files.

A relief found on a Roman tombstone (Figure 4.9a) of a **blacksmith** shows the tools and production methods. A standing assistant (behind a protective shield) blows air into the fire with bellows while a seated blacksmith holds a piece of hot metal with tongs and hammers it on an anvil. Blacksmithing tools are shown on the right.



Figure 4.9a *Blacksmith's Tombstone*, limestone relief, Roman Imperial, ca. CE 100 (Museo Archeologico Nazionale di Aquileia, Italy).

<https://www.worldhistory.org/image/10423/funerary-stele-of-a-blacksmith/>

The components that make up the wrought iron window grill in Figure 4.9b were forged, welded, ground smooth, and painted. How were the many curves formed so precisely? Blacksmith Lorenzo Leiu shows how in Figures 4.9c through 4.9h.



Figure 4.9b *Window Grill*, forged iron, Alcazar, Seville, Spain (photograph by Carol Ventura, 2005).

Lorenzo strikes while the iron is hot—yellow, orange, and red hot, because that is how iron is still forged today. He heats the tip of an iron rod until it glows red, hammers it to a point on the anvil (Figure 4.9c), curves the tip (Figures 4.9d, 4.9e and 4.9f), then places it in a jig (Figure 4.9g) to finish the curve at the dimension needed. He checks it against the pattern drawn with chalk on the metal table (Figure 4.9h).

<https://www.carolventura.com/blacksmith.htm>



Figure 4.9c Lorenzo Leiu strikes while the iron is hot in Ubeda, Spain (photograph by Carol Ventura, 2005).



Figure 4.9d Lorenzo Leiu shapes iron around the horn of the anvil in Ubeda, Spain (photograph by Carol Ventura, 2005).



Figure 4.9e Lorenzo Leiu forges red hot iron into a spiral in Ubeda, Spain (photograph by Carol Ventura, 2005).



Figure 4.9f Lorenzo Leiuja forges iron in Ubeda, Spain (photograph by Carol Ventura, 2005).



Figure 4.9g Lorenzo Leiuja bends the red-hot metal spiral around a metal jig in Ubeda, Spain (photograph by Carol Ventura, 2005).



Figure 4.9h Lorenzo Leiva compares the spiral to the chalk drawn pattern in Ubeda, Spain (photograph by Carol Ventura, 2005).

Etruscans cast and hammered bronze to transform it into mirrors, vessels, jewelry, tools, armor, and weapons. Many examples have been found and are depicted in sculptures and paintings.

A *cista* is a unique type of Etruscan vessel. Like other cylindrical examples, the *Cista* in Figure 4.10 has a lid, figurative handles, and three feet. The Greek-inspired imagery on this example commemorates the end of the Trojan War. The large, engraved frieze around the middle depicts thirteen warriors, some in their armor, others partially naked. The upper and lower friezes include dynamic battle scenes, griffins attacking a horse, and racing chariots. A charioteer and his team are depicted on the top of each of the solid-cast lion paw-feet. The sides are further embellished with chains hanging from studs evenly spaced around, regardless of the incised imagery. The lid is engraved with winged sea nymphs riding dolphins and sea monsters while carrying the armor of Achilles, the Greek hero of the Trojan War. The handle is formed by two solid-cast nude winged genii holding a nude deceased man.



Figure 4.10a *Cista*, bronze; 23 x 13 3/8 in / 58.4 x 34 cm, Praenestine, Etruscan, Classical, ca. 350-325 BCE (The Metropolitan Museum of Art, Gift of Courtland Field Bishop, 1922, CC0).

<https://www.metmuseum.org/art/collection/search/251175>



Figure 4.10b *Cista* lid, bronze; Praenestine, Etruscan, Classical, ca. 350-325 BCE (The Metropolitan Museum of Art, Gift of Courtland Field Bishop, 1922, CC0). <https://www.metmuseum.org/art/collection/search/251175>

Etruscan jewelers were influenced by the style of Greek jewelry and used many of the same techniques, including filigree, inlay, enameling, granulation, casting, chasing, and repoussé. Etruscans loved color, though, so their jewelry often included semi-precious stones, glass, and **faience** beads.

The gold necklace in Figure 4.11 is similar to the Greek necklace in Figure 3.32; they both have gold loop-in-loop chain straps and pendants suspended from the chains, but the Etruscan example has **bezels** set with colorful onyx and amber (originally seven, but now only four stones). The missing gems let us see how the bezels were constructed. The pendants on the Etruscan necklace include bearded heads, winged harpies, acorns with filigree, and granulated lotus flowers.



Figure 4.11a *Necklace*, plaited, filigree and granulation with gold, onyx, and glass, 10 7/8 in / 27.6 cm, Etruscan, Italy, 480-460 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1856-0625-17



Figure 4.11b *Necklace*, plaited, filigree and granulation with gold, onyx, and glass, 10 7/8 in / 27.6 cm, Etruscan, Italy, 480-460 BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1856-0625-17

The exquisite earrings in Figure 4.12 are called “bauletto” (“little bag” in Italian), because of their cylindrical shape. It was a very popular Etruscan style. Each earring includes a large rose made of filigree wire and sheet

gold on one side and rectangular compartments filled with either a filigree rosette or a granulated boss.



Figure 4.12 Pair of *Bauletto Earrings*, gold, granulation, $1 \frac{7}{8} \times \frac{7}{8} \times \frac{31}{32}$ in / 4.76 x 2.23 x 2.46 cm, Etruscan, 6th century BCE (Dallas Museum of Art). <https://dma.org/art/collection/object/3250839>

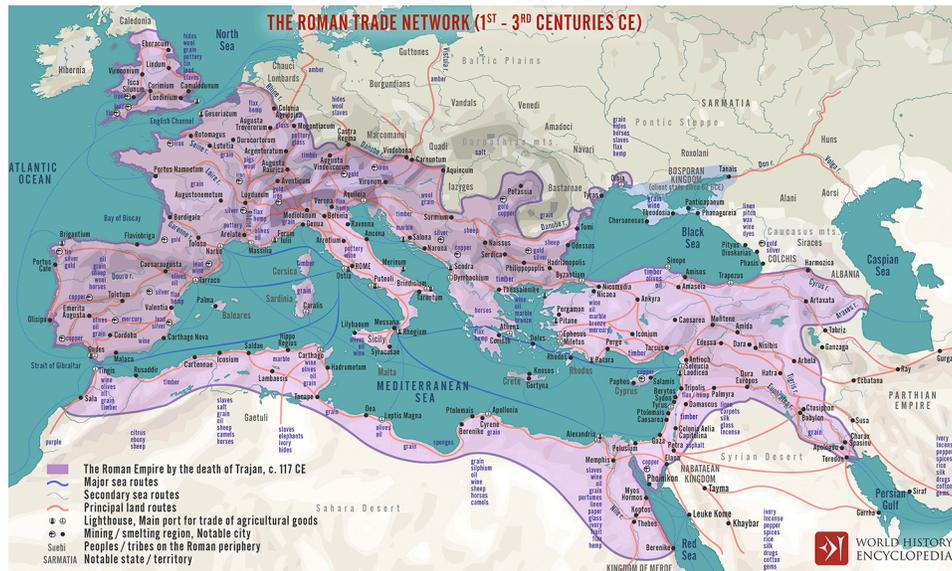
Beaded wire outlines each of the twelve petals on the rosettes that decorate the disks of the gold *Earrings* in Figure 4.13. Granulation and more beaded wire embellish the top of the hollow suspended pendants embossed with flowers and leaves.



Figure 4.13 Pair of *Earrings*, gold, granulation and embossing, $2 \frac{3}{4} \times 1 \frac{1}{8} \times \frac{3}{4}$ in / 7.1 x 2.7 x 2 cm, Chiusi, Italy, Etruscan, ca. 300BCE-200BCE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1872-0604-547

Imperial Rome (31 BCE-476 CE)



Imperial Roman Empire Raw Materials and Trade Routes, 1st-3rd Century CE (map by Simeon Netchev).

<https://www.worldhistory.org/user/simeonnetchev/>

Imperial Roman Glass

The Romans were the next world power after the Hellenistic Greeks. Founded as a monarchy in 753 BCE, Rome became a Republic in 510 BCE, then expanded to become an empire in 31 BCE when Octavian defeated Antony and Cleopatra. The Roman Empire controlled the Mediterranean, Europe, the Middle East, and a strip of North Africa.

Craft production continued to develop under Roman rule, and prosperity increased the demand for finely made objects. The Macedonian Greeks that ruled Egypt between the third and first century BCE and the Romans that succeeded them enjoyed Greek drama. The actors wore masks to represent various characters, one of which inspired the glass plaque in Figure 4.14. As with the Egyptian piece in Figure 2.14, long pieces of colored glass were **fused** together (Figure 2.13), reheated and then stretched to miniaturize the image of the cross section (Figure 11.8f). Two sections were sliced off, arranged to complete the face, fused together, cooled, and then ground smooth.



Figure 4.14 *Plaque with Satyr*, mosaic glass, half is 1 x ½ x 1/8 in / 2.7 x 1.3 x .4 cm, ca. 99 BCE - 25 CE, Roman Imperial, possibly made in Egypt or Rome (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/4614/inlay?ctx=07a71ebdef366040cb6d102d8d7ebf72421f0e02&idx=0>

The bowl in Figure 4.15 combines the techniques used to craft the Hellenistic Greek examples in the previous chapter (Figures 3.37 and 3.38). Murrini were fused together to produce a flat disk. Ridges were formed by pressing a tool into the hot, malleable glass before or after draping it over a convex mold. The glass was heated while still on the mold until the glass slumped down and formed the bowl shape. It was removed from the mold, annealed, cooled, and then the rim was ground smooth.

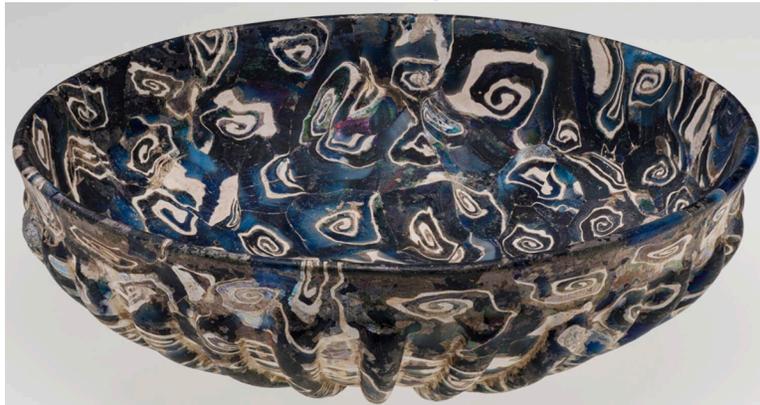


Figure 4.15 *Bowl with Pressed Ribs*, 4.7 cm high x 16.4 cm diameter, Roman Imperial, possibly made in the Western Roman Empire, ca. 25 BCE-99 CE

(Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/3044/bowl?ctx=2f896b2e79552c314edba6e1eb721e3cabf77ad9&idx=0>

Fifty-seven spirally twisted translucent and opaque canes inside a circular twisted blue-green glass ring were probably fused together in a kiln, then slumped into a concave mold in a kiln to make the *Lace Mosaic Bowl* in Figure 4.16.



Figure 4.16 *Lace Mosaic Bowl*, 4.9 cm high x 18.8 cm diameter, Roman Imperial, probably made in Italy, ca. 25 BCE - 99 CE (Corning Museum of Glass). <https://glasscollection.cmog.org/objects/5927/bowl?ctx=549e8c65d9666bfb7e87c3b3f7f22238a73fc07b&idx=0>

Several new glass techniques developed during the Roman Imperial Period, including **glassblowing** (free-blowing and mold-blowing), painting, gilding, engraving, and carving. Increased demand resulted in Roman glass being made in batches in temporary furnaces built on the spot where abundant raw materials were available. Iron and other impurities in the silica (sand) tinted the glass pale green, blue, or grey. After the glass cooled, the furnaces were broken apart leaving large blocks of glass that were fragmented and shipped to production workshops around the empire.

Making a vessel by dipping a hollow clay tube into molten glass, blowing a bubble into the gather, then shaping it while still hot on the pipe was first done in the eastern part of the Roman Empire (present day Lebanon, Israel, Palestine, and Cyprus) around 100 BCE. The basic glassblowing tools and techniques that developed thousands of years ago

have not changed much over the millennia, although metal pipes have replaced the clay tubes.

Romans valued glass containers for shipping and storage because the vessels were transparent, reusable, odorless, and did not impart a taste to their contents. Romans free blew and shaped hot glass on the end of a blowpipe, but to more quickly produce a decorative shaped vessel (Figure 4.18) they blew the molten bubble into a mold (Figures 4.17a through 4.17p).

Although there are many ways to blow glass, it is usually done by a **gaffer** and one or more assistants. Figure 4.17a shows two small teams at work in the hot glass studio at the Appalachian Center for Craft in Smithville, TN. The gaffers to the far left and right are reheating the glass in glory holes (ca. 2,250°F / 1232°C) while the assistant on the left **gathers** molten glass from the furnace on the tip of his **punty** and the other selects a hot punty from the pipe warmer.



Figure 4.17a Hot glass studio at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).

To begin a new piece, Andrew Najarian dips and turns the tip of a blowpipe into molten glass (ca. 2300°F / 1260° C) in the furnace for the first gather, lets it cool for a few minutes, then dips it again. Figure 4.17b shows him

rolling the pipe back and forth on the metal bench to shape the glass in a wet spoon-shaped block of cherry wood.



Figure 4.17b Andrew Najarian shapes hot glass at the end of a blowpipe with a concave damp block of wood at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).

Andrew blows a bubble into the glass (Figure 4.17c), refines the shape with folded, damp newspaper (Figure 4.17d), then reheats the glass in the glory hole to keep it hot and malleable.



Figure 4.17c Andrew Najarian blows a bubble into the hot glass at the Appalachian Center for Craft in Smithville, TN (photographs by Carol Ventura, 2015).



Figure 4.17d Andrew Najarian shapes the glass bubble with wet newspaper at the Appalachian Center for Craft in Smithville, TN (photographs by Carol Ventura, 2015).

Andrew then places the molten glass inside a wet hinged two-part cherry mold, and Matthew Cummings blows air into the mouthpiece of the pipe to expand the bubble into the mold (Figure 4.17e). The moisture in the mold helps protect it from the hot glass, and the burning wood produces a layer of steam that smooths the surface of the molten glass.



Figure 4.17e Matthew Cummings blows into the pipe to expand the glass inside a wet wooden mold that Andrew holds shut at the Appalachian Center for Craft in Smithville, TN (photographs by Carol Ventura, 2015).

Andrew opens the mold to release the shaped glass (Figure 4.17f), then Matthew brings it to the bench and rolls the pipe away from and towards himself with his left hand while using his right hand to refine the shape with jacks (Figure 4.17g) and a damp cherry wood paddle (Figure 4.17h). The glass is constantly rolled away from and towards the gaffer to keep it on center while working the hot, flexible bubble.



Figure 4.17f The open mold reveals the shaped glass at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).



Figure 4.17g Matthew reduces the diameter of the neck with jacks at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).



Figure 4.17h Matthew refines the bottom of the vessel with a wet wood paddle at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).

A hot glass-tipped punty is guided to the center of the vessel with tweezers (Figure 4.17i), then pushed into the bottom to attach it.



Figure 4.17i A hot glass-tipped punty is guided to the bottom center of the vessel with tweezers at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).

Shears scratch around the neck (Figure 4.17j), a few drops of water are dripped onto the scratches, then the blowpipe is tapped with a metal tool to break the vessel off the blowpipe (Figure 4.17k). The glass (now attached to the punty) is reheated in the glory hole, then returned to the

bench to open and shape the mouth with jacks (Figure 4.17l) and a parchoffi (Figure 4.17m).



Figure 4.17j Shears scratch the neck to help break the vessel off the blowpipe at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).



Figure 4.17k The blowpipe is tapped to break off the vessel at the Appalachian Center for Craft in Smithville, TN (photograph by Carol

Ventura, 2015).



Figure 4.17| The mouth of the vessel is opened with jacks at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).



Figure 4.17m The mouth is shaped with a parchoffi at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).

When shaping is finished, water is dripped onto the glass where the punty is attached (Figure 4.17n), then the punty is tapped with a metal tool to break off the vessel. The punty mark is smoothed by fire polishing the bottom of the glass vessel with the flame of a torch (Figure 4.17o), then the hot glass is placed into a hot annealer (Figure 4.17p). The temperature of the annealer drops slowly so that the glass pieces cool evenly to avoid stresses. If not cooled properly, glass may crack hours or years later.



Figure 4.17n Water is dripped from tweezers onto the punty joint at the Appalachian Center for Craft in Smithville, TN (photograph by Carol

Ventura, 2015).



Figure 4.17o The bottom of the vessel is fire polished at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).



Figure 4.17p The hot vessel is placed with tongs into the annealer at the Appalachian Center for Craft in Smithville, TN (photograph by Carol Ventura, 2015).

The finest **mold-blown** Imperial glass vessels include Ennion's signature. "Ennion made [it]" is written in Greek in the rectangular panel under the handle of the **Ewer** in Figure 4.18. This piece was blown into a four-part mold. The handle was added in the last step of the production. See how Roman glass and this ewer were made at <https://www.youtube.com/watch?v=jaODucearU8&t=29s>.



Figure 4.18 Ennion, *Ewer*, mold-blown glass, 9 3/8 x 4 1/4 in / 23.8 x 10.8 cm, Eastern Mediterranean, Roman Imperial, ca. 30 - 70 CE (Corning Museum of Glass). <https://glasscollection.cmog.org/objects/9323/ewer?ctx=a4dcba3fc60c9b8baeed111e5b90e3f255f1b1a3&idx=1>

Painted decorations rarely survive the centuries because they are easily rubbed off, but most of the cold-painted and gilded decorations on the *Daphne Ewer* in Figure 4.19 are intact. The imagery around the belly of the ewer depicts Apollo chasing Daphne, who turned into a tree just as he was about to catch her.



Figure 4.19 *Daphne Ewer*, cold painted and gilded blown glass, 8 3/4 in / 22.2 cm high, Eastern Mediterranean, Roman Imperial, 175-225 CE (Corning Museum of Glass). <https://glasscollection.cmog.org/objects/5115/the-daphne-ewer?ctx=6f74ebd86addf1f72c1aec4d3278bf9672b31040&idx=0>

Adding bits of molten glass to a hot glass vessel is not new, but Roman glass blowers developed the technique further by increasing the size of the bits to craft pieces like the mouse in Figure 4.20. The head, ears, eyes, feet, and linear snake thread decorations were added and sculpted while the hot body of the mouse was still malleable.



Figure 4.20 *Mouse Shaped Flask with Snake Thread Decoration*, blown and tooled and trailed glass, 2 ½ x 2 x 5 ¾ in / 6.3 x 5.1 x 14.6 cm, Roman Imperial, 3rd Century CE (The Metropolitan Museum, Gift of Renée E. and Robert A. Belfer, 2012, CC0).

<https://www.metmuseum.org/art/collection/search/257875>

Some Roman glass was made to imitate rock crystal and semiprecious materials. **Cameos** were made from stones with colored layers. The upper layer was partially removed to reveal the contrasting colors below. To create a glass cameo, Roman glassblowers produced glass with layers of different colors, cooled it, then removed portions of the upper layer. It was very difficult to make glass that included different colors because if the layers did not expand and contract at the same rate, the vessel would crack.

The *Portland Vase* in Figure 4.21 was made by partially dipping an elongated bubble of dark blue glass into opaque white glass, shaping the vessel, adding the handles, then slowly cooling the vessel in an annealer. The white layer was ground off with abrasives to produce the relief (Figure 12.30). See how a similar cameo glass vessel was made at <https://www.youtube.com/watch?v=e8wf8jVnTJg>

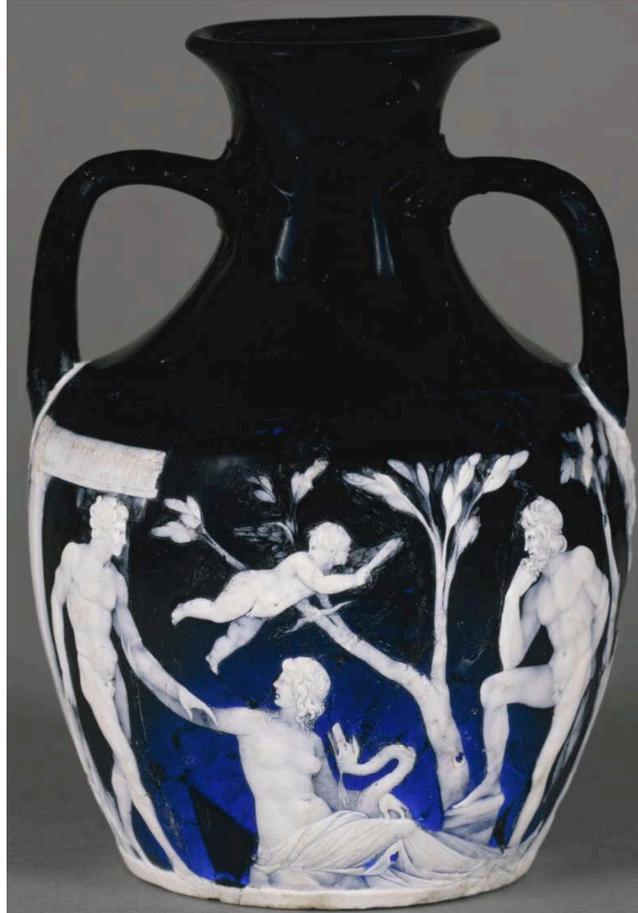


Figure 4.21 *Portland Vase*, cobalt blue and cameo cut white blown glass, 9 ½ x 6 5/8 in / 24 x 17 cm, probably city of Rome, Roman Empire, ca. 15-25 CE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).
https://www.britishmuseum.org/collection/object/G_1945-0927-1

Cage cups (also called diatretum) were the most complex glass objects made by the Romans. The *Cage Cup* in Figure 4.22 began as a thick blown blank. After cooling, the glass was carefully ground away to create the fragile cage. Figure 4.22c shows a blown blank (upper left), design layout, a partially cut cup, and a finished cup (lower right).



Figure 4.22a *Cage Cup*, cast or blown wheel-cut glass and copper alloy, 4 7/8 in / 12.2 cm diameter, Roman Imperial, ca. 300 - 399 CE (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/19093/cagecup?ctx=f8920a9b34f389de59746422b3bc31d971b4c4c8&idx=0>



Figure 4.22b *Cage Cup*, cast or blown wheel-cut glass and copper alloy, 4 7/8 in / 12.2 cm diameter, Roman Imperial, ca. 300 - 399 CE (Corning Museum of Glass).

<https://glasscollection.cmog.org/objects/19093/cagecup?ctx=f8920a9b34f389de59746422b3bc31d971b4c4c8&idx=0>



Figure 4.22c Steps for making a cage cup at the Corning Museum of Glass (photograph by Carol Ventura).

Imperial Roman Furniture

Because wood, cloth, and other organic materials did not survive, we need to look at Roman literature, painting and sculpture to learn about furniture and textiles. Greek and Etruscan woodworking techniques were used, but Roman furniture was often more luxurious, as seen in Figure 4.23. Literary sources describe precious woods with inlay of gold, silver, copper, bronze, ivory and tortoiseshell. Upholstery had not yet developed, but decorative cushions, pillows, and cloth added comfort and elegance.



Figure 4.23 *Couch and Footstool*, 41 ½ x 30 x 84 1/2 in / 105.4 x 76.2 x 214.6 cm, footstool: 9 1/4 x 17 ½ x 25 ½ in / 23.5 x 44.5 x 64.8 cm, restored with fragments of wood, bone carvings, and glass inlay, Roman Imperial, 1st–2nd century CE (The Metropolitan Museum of Art, Gift of J. Pierpont Morgan, 1917, CC0).

<https://www.metmuseum.org/art/collection/search/249232>

A couch with a back that developed in Imperial Rome can be seen in the reliefs that line the interior of the sarcophagus in Figures 4.24a and 4.24b. A buffet, shelves, cabinets, vases, boxes, and a semicircular table accompany the woman reclining on the couch.



Figure 4.24a *Sarcophagus interior*, sandstone, 7 ft 6 in / 228 cm long, Roman Imperial, ca. 150-175 CE (Rijksmuseum van Oudheden).

<https://hdl.handle.net/21.12126/138212>



Figure 4.24b *Sarcophagus* interior, sandstone, 7 ft 6 in / 228 cm long, Roman Imperial, ca. 150-175 CE (Rijksmuseum van Oudheden).
<https://hdl.handle.net/21.12126/138212>



Figure 4.24c *Sarcophagus* interior, sandstone, 7 ft 6 in / 228 cm long, Roman Imperial, ca. 150-175 CE (Rijksmuseum van Oudheden).
<https://hdl.handle.net/21.12126/138212>

The relief on a funerary monument (Figure 4.25) shows a woman getting hair styled as she looks at her reflection in a polished metal mirror. She is seated in a wicker chair with a high curved back and low armrests. Her feet rest on a footstool.



Figure 4.25 *Woman Sitting in a Wicker Chair Having Her Hair Styled*, relief from a family tomb monument in Neumagen, Roman Imperial, ca. 220 CE (Landesmuseum, Trier, Germany, photograph by Carole Raddato from Frankfurt, Germany, CC BY-SA 2.0, Wikimedia Commons).

[https://commons.wikimedia.org/wiki/File:Funerary_relief_from_Neumagen_depicting_a_woman%27s_hair_being_dressed_by_her_slaves,_circa_220_AD,_Rheinisches_Landesmuseum_Trier,_Germany_\(34626922225\).jpg](https://commons.wikimedia.org/wiki/File:Funerary_relief_from_Neumagen_depicting_a_woman%27s_hair_being_dressed_by_her_slaves,_circa_220_AD,_Rheinisches_Landesmuseum_Trier,_Germany_(34626922225).jpg)

Imperial Roman Metalwork

The *Circular Tripod Table* in Figure 4.26 is very decorative, with its winged sphinxes and spiral plant motifs. Inspired by Greek and Etruscan furniture, Roman four legged and three-legged tables were made of wood, stone, and metal.



Figure 4.26 *Circular Tripod Table*, bronze, 36 3/8 in / 92.39 cm high, Temple of Isis, Pompeii, Roman Imperial, before 79 CE (National Archaeological Museum of Naples).

Five pieces of silver were worked then skillfully combined to produce the cup in Figure 4.27: two handles (one now missing), a cast foot, a smooth raised inner liner, and a (now incomplete) repoussé (Figure 1.9b) and chased and partially gilded outer surface. Some of the gilding survived on the animal skin hanging next to the altar. The damaged outer layer reveals the smooth interior.



Figure 4.27a *Cup with Bacchic Motifs*, gilt repoussé and chased silver, 4 15/16 in / 11 cm high, Roman Imperial, early 1st century CE (Image courtesy of the Princeton University Art Museum).

<https://static.artmuseum.princeton.edu/mirador/?manifest=https://data.artmuseum.princeton.edu/iiif/objects/38924&canvas=https://data.artmuseum.princeton.edu/iiif/objects/38924/canvas/38924-canvas-71764>



Figure 4.27b *Cup with Bacchic Motifs*, gilt repoussé and chased silver, 4 15/16 in / 11 cm high, Roman Imperial, early 1st century CE (Image courtesy of the Princeton University Art Museum).

<https://static.artmuseum.princeton.edu/mirador/?manifest=https://data.artmuseum.princeton.edu/iiif/objects/38924&canvas=https://data.artmuseum.princeton.edu/iiif/objects/38924/canvas/38924-canvas-71764>)

Roman jewelry was crafted with gold, silver, copper, bronze, bone, glass, and gems. Precious and semi-precious stones were added for color.

Goldsmithing tools and techniques are shown in the playful painting in Figure 4.28. From left to right, we see a putto holding metal on an anvil while another shapes it with a hammer. Next, a comfortably seated putto or customer observes metal being weighed on a balance scale. A pedestal with scales and jewelry displayed in three open drawers is followed by a figure doing close work, perhaps engraving, chasing, or repoussé. On the far right a putto holds metal in the forge with tongs while another raises the temperature of the fire by pumping air into it with bellows

<https://www.gutenberg.org/files/42715/42715-h/42715-h.htm#fig167> .



Figure 4.28 *Goldsmithing Putti*, fresco, House of the Vetti, Pompeii, Roman Imperial, ca. 79 CE (photograph by Nora Garibotti

<https://x.com/noragaribotti/status/1187616379916079105>).

In addition to making a political or fashion statement, jewelry was often worn for its protective power. Snakes (Figure 4.29) and gemstones were believed to be apotropaic (averts evil), especially when they included images of gods and goddesses.



Figure 4.29 *Snake Bracelet*, 3 1/4 in / 8.2 cm diameter, gold, Pompeii, Roman Imperial, ca. 1st century CE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1946-0702-2

The bas-relief cameo of Augustus in Figure 4.30 was carved from onyx with three different colored layers. The beige profile and hand contrast with the dark background and light brown wreath and clothing. Gems and cameos were often removed from old settings and placed into new ones. Around 1000 CE, this cameo of Augustus was set into the center of the Lothar Cross.



Figure 4.30 *Augustus Holding an Eagle Scepter*, three-layered onyx cameo, Roman Imperial, ca. 14 CE (Aachen Cathedral Treasury, © photograph by Geneva Kornbluth

<https://kornbluthphoto.com/images/Lothar%20cross%20cameo.jpg>).

Imperial Roman jewelers used hard stones like diamonds, sapphires, and emeralds, in their original crystalline form. Jewelers did not begin to facet stones until the 15th century. To craft the *Necklace* in Figure 4.31, a hole was drilled into the center of twenty-one hexagonal emeralds, then they were joined together with gold wire and quatre-foil (4 part) links. Two pieces of gold wire were bent to make the hook and eye clasp.



Figure 4.31 *Necklace*, emerald and gold, 16 3/8 in / 41.6 cm long, Roman Imperial, 2nd to 3rd century CE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1814-0704-1203

Imperial Roman Textiles

Romans preferred wool over linen and sometimes combined the two fibers into a single cloth. Linen is difficult to dye, but wool accepts color more readily. Imperial Romans dyed wool mostly with madder (for red) the kermes insect (for crimson), saffron (for yellow) indigo and woad (for blue). The most expensive color was murex shellfish (for royal purple). Over dyeing (one over another) produced even more colors. These were not the only dyes used they were the most common.

In addition to rooing (pulling wool off sheep by hand), Romans sheared their sheep (Figure 1.12), invented the distaff to hold unspun fiber, and developed new methods of bleaching and dyeing. Their clothing was

inspired by the loosely fitting garments of the Greeks and Etruscans, as can be seen in the *Villa of the Mysteries* painting in Pompeii.



Figure 4.32 *Villa of the Mysteries*, fresco, Pompeii, Italy, Roman Imperial, ca. 50 BCE. <https://pompeisites.org/en/comunicati/the-villa-of-the-mysteries-reopens-on-the-19th-july/>

Built to commemorate the peace that Augustus achieved after ninety years of civil wars, the marble reliefs on the *Altar of Peace* include both legendary and historic scenes that were originally colorfully painted. Each of the figures in the procession in Figure 4.33 wears an Etruscan inspired woolen toga wrapped around their body.



Figure 4.33 *Altar of Augustan Peace* detail, Carrara marble relief, ca. 13-9 BCE (Museum of the Ara Pacis, photograph by Carol Ventura, 2010).

Imperial Roman Ceramics

The Roman Empire included North Africa, Western Asia, and most of Europe, so it is not surprising that many regional styles of earthenware ceramics were produced during that time. It was a prosperous era, so demand was high. Metal vessels with relief decorations like the cup in

Figure 4.27 probably inspired pottery that was decorated with high and /or low relief decorations. Several methods were used to produce the clay reliefs.

Thick earthenware molds with concave designs around the interior allow potters to more efficiently produce matching tableware with low reliefs. The thick mold in Figure 4.34 was made on a potter's wheel, then stamped while still soft to create the concave motifs. After firing, this thick mold would be attached to a potter's wheel, then fresh clay would be put inside. As the wheel turned, the potter's hands would press into the clay to shape the vessel and pick up the decoration. After the clay dried a bit and shrunk, it was removed from the mold. After drying, the surfaces would be covered with slip or **glaze**.



Figure 4.34 Marcus Perrenius Tigranus (Roman), Mold for making *Bowl with Triton, Nereids, and Dolphins*, earthenware, 4 1/8 x 8 3/4 / 10.5 x 22.2 cm, Arretium, Roman Imperial, late 1st century BCE – early 1st century CE (The Walters Art Museum, CC0).

<https://art.thewalters.org/detail/31309/mold-for-a-bowl-with-triton-nereids-and-dolphins/>

The red slip ware / terra sigillata style originated in modern western Turkey and Syria in the 2nd century BCE, then the technique spread to Egypt and Europe. The delicate pieces could not withstand thermal shock, so they were not used for cooking but were popular tableware. The red

color came from both the clay and the slip that were rich in red iron oxide. A seal with the name of the maker or the owner of the workshop was often included in the decoration. A stamp on the bottom of the vessel in Figure 4.35 says “OFF BASSI COELI” from the workshop of Bassus and Coelus). This red slip ware bowl was **thrown** in a mold similar to Figure 4.34, allowed to dry and shrink in the mold, removed, slipped, dried, then fired. The fired bowl would have been rubbed with a soft cloth to make it shine.



Figure 4.35 Workshop of Bassus and Coelus, *Bowl* with relief decoration of tendrils and buds, terra sigillata / red slip earthenware, 4 x 9 in / 10.16 x 22.86 cm, made at La Graufesenque, France, Roman Imperial, ca. 20-40 CE (© The Trustees of the British Museum, CC BY-NC-SA 4.0 license).

https://www.britishmuseum.org/collection/object/G_1869-0205-5

To make the high relief skulls on the *Wine Cup* in Figure 4.36, clay was pressed into sprig molds, removed, then attached to the wheel-thrown leather hard vessel. The low reliefs were created by applying thick slip a la barbotine (French for “slip”). Once dry, the vessel was covered with lead-based glaze, then fired in a kiln. Lead glaze most likely developed in Mesopotamia around 2000 BCE but did not become popular until the 1st century BCE in the Eastern Roman Empire.

Glazed earthenware is not only decorative but also makes this porous ware more watertight. Since acidic foods and beverages release the lead in the glaze, the decoration on this beaker is quite appropriate! Romans would not have realized the danger, though, since it was not until the 20th century that people became aware of lead poisoning.



Figure 4.36 *Wine Cup*, lead glazed earthenware with slip and sprig molded decorations, 6 1/4 in / 15.5 cm high, Komotini in Southern Thrace, Roman Imperial, 1st century CE (Altes Museum).

<https://recherche.smb.museum/detail/678756/weinbecher-skelettbecher>

Bold Text Glossary

Adinkra – Cloth from Ghana hand-printed with symbolic motifs.

Adire – Yoruba cloth that is resist-dyed in indigo from Nigeria.

Agave / Maguey / Sisal – Bast fiber extracted from the pointed leaves of large succulents native to the Americas.

Albarello – Cylindrical ceramic jar used to store drugs and medicinal ingredients.

Alloy – Two or more metals mixed together while molten.

Amate / Bark “Paper” – Paper-like material made in Mexico by macerating, cooking, then beating the inner bark of certain trees.

Amphora – Double-handled ceramic vessel used to store wine and oil.

Annealer – A kiln used to slowly cool glass.

Anneal (glass) – To cool finished hot-worked glass slowly in a kiln so that the thick and thin parts cool at the same rate to prevent stresses within the glass.

Anneal (metal) – Metal is heated, then cooled to make it more pliable.

Anvil / Stake – A tool used to support metal during raising. Usually made of hard steel, stakes come in a variety of shapes and sizes.

Art Glass – Glass that is decorative and often functional.

Asymmetrical / Persian Knot – Used to create pile in rugs. The right and left sides of the knot are not the same.

Attica / Attic – The region around Athens, Greece.

Backstrap Loom – Warp is tensioned between a stationary object and the weaver's body on this loom.

Barkcloth / Tapa – Fabric made by pounding the inner bark of suitable vines, shrubs, and trees to the desired width and length.

Basse-Taille Enamel – French for “shallow cut.” Low relief on metal covered with translucent glass enamel.

Bast – Fiber extracted from the stem of a plant or the inner bark of a tree.

Batik – Wax resist is applied to select areas, then removed after the fabric has been dyed.

Bentwood Lamination – Thin strips of wood are glued, joined together, then clamped to a curved form to produce a strong, curvilinear piece.

Bezel – Rim that holds a cabochon or other media in place.

Bisque / Biscuit – Fired unglazed ceramic that is durable, but absorbent enough for glaze application.

Bit Work – Molten glass sculpted and/or added to other hot glass.

Black Figure – Greek Archaic and Classical terracotta ware that features large black figures on a red background.

Blacksmith – A metalsmith who forges and shapes hot iron and steel.

Blowpipe – Hollow metal tube used for blowing air.

Bobbin Lace – Threads wound around bobbins are moved back and forth around pins (stuck into a pattern mounted on a pillow) to form an open fabric.

Bombé – The “blown out” shape of 17th century French Louis XIV Rococo style furniture.

Bone China – A type of white, translucent porcelain containing a high percentage of bone ash.

Bouille Work – Sixteenth, seventeenth, and eighteenth-century marquetry technique using metal (often brass or pewter), wood veneer, and/or tortoise shell; perfected by André-Charles Bouille (1642-1732), the French cabinetmaker of Louis XIV.

Box Joint – Two pieces joined together with interlocking “fingers” cut at right angles.

Bow Drill – A drilling tool consisting of a bow and string.

Brass – An alloy of copper and zinc, sometimes with other trace elements.

Brooch – A woman’s ornament worn pinned to clothing at or near her neck.

Brocade – Cloth with decorative discontinuous supplementary weft. The extra weft is inserted into part of the textile as it is woven.

Bronze – An alloy of around 9 parts copper and 1 part tin, sometimes with other trace elements. Bronze is harder than copper and melts at 1742°F / 950°C, a lower temperature than copper.

Burnish – To rub the surface with a hard, smooth object.

Butt Joint – Two pieces joined together along their edges either on the same plane or at a right angle.

Cabochon – Semiprecious stone with a curved, convex face and flat back.

Cage Cup – Roman glass vessel that incorporates an intricately carved free-standing outer layer of glass.

Camelid – Fiber from alpaca, llama, and vicuña used to produce fabrics.

Cameo – Stone, shell, glass, or ceramic with multicolored layers whose top has been selectively removed to create a relief that contrasts in color with the background.

Canting – Batik tool used to draw lines and dots of molten wax resist onto fabric.

Cap – Copper block batik tool used to apply patterns of molten wax resist onto fabric.

Carcass – The framework of a piece of furniture.

Card Weaving / Tablet Weaving – Individual warp threads are inserted into holes punched into the corners of sturdy cards. The warp is tensioned, then one or more cards are turned to produce the various

sheds for the weft to pass through to weave narrow bands of patterned warp faced fabric.

Carnelian – A brownish-red semi-precious stone.

Cartoon – A full-scale preparatory drawing.

Carve – Cutting into a surface to create a pattern.

Cased glass – Glass composed of differently colored glass layers fused together with heat.

Cassapanca – Long wooden Italian bench with a back, sides, and hinged seat that opens for storage, popular during the Renaissance.

Cassone – Carved wooden Italian marriage chest with a hinged lid, popular during the Renaissance.

Casting – The process of filling a hollow mold with molten or flexible media. Once the medium solidifies, the mold is removed to produce the product, called a cast.

Celadon – Greenish high fired stoneware and porcelain glaze of Chinese origin.

Ceramic / Pottery – Clay that has been fired to maturity.

Ceramist / Potter – A person who makes functional and/or non-functional objects with clay.

Champlevé Enamel – French for “to gouge out,” recesses in metal filled with opaque or translucent glass enamel.

Chasing – Hammering metal punches into the front side of metal to create or refine textured decorations. Often used in conjunction with repoussé to create a relief.

Chasuble – An ornate sleeveless outer vestment worn by some Christian priests when celebrating Mass.

China Clay / Kaolin – White firing clay that is the essential ingredient of hard paste porcelain.

China Paint / Enamel – A colorful low-fired overglaze.

Chiton – A loosely fitting rectangular linen garment worn in ancient times by Greek men and women.

Chintz – Cotton cloth printed or painted with floral patterns in India.

Cloisonné Enamel – Cloison is French for “cell.” Compartments formed by thin metal bands on a metal base filled with opaque or translucent glass enamel. The exposed tops of the bands add a linear element to the design.

Coil Building (clay) – Clay is squeezed and rolled into long, slender cylinders that are joined together in a spiral, then the joints are smoothed over.

Coil Building (basketry) – A flexible material is wrapped around a core and connected to its neighbor to form a spiraling structure.

Colloidal Fusion Welding / Colloidal Hard Soldering – A mixture of an organic binder (like tragacanth gum) and copper salts is painted where two pieces of metal meet. The piece is then heated to 1634°F / 890°C in a reducing atmosphere, which allows the copper to diffuse into both pieces at the point of contact. No solder is used, so “Colloidal Fusion Welding” is the correct term.

Combing – Manipulating bands of color on the surface of clay or glass with a pointed tool.

Compound Weave – Has more than one set of warp and weft elements, manipulated individually for weaving a patterned textile.

Copper – A reddish-brown colored metal that melts at (1984°F / 1085°C).

Core-Formed Glass – A mixture of clay, sand, and dung was shaped and attached to the end of a metal rod. The dry core was heated, coated with glass, then shaped by rolling on a smooth hard surface. After reheating, it was wrapped with strands of different colored hot glass, the rod and core were removed, then the glass was slowly cooled to produce a small striped vessel.

Cotton – Seed fiber of several *Gossypium* plants grown in shades of white, brown, and green.

Coverlet – Bedcover woven with a loom-controlled pattern.

Crochet – French for “hook.” Interlooped fabric made with a hand-held hook.

Damascene – Soft metal inlaid with pressure into hard metal—usually gold, silver, brass, or copper forced into engraved depressions in steel, bronze, or nickel.

Damascus Steel / Wootz – Flattened iron is heated, folded, and forge-welded many times until hundreds of layers are formed. Carbon absorbed while heating converts the metal to wrought iron.

Damask – A monochrome reversible patterned textile made by weaving a single warp and weft together, using warp face and weft face satin weaves to create the figure and ground.

Depletion Gilding and Silvering – An alloy of copper and gold or silver is bathed in acid to dissolve the copper on the surface, leaving an almost pure layer of gold or silver.

Diamond Point Engraving – Diamond tipped tool used to scratch decorations on the surface of glass.

Die – A mold made of metal, wood, or stone.

Die Forming – Method of shaping metal, plastic or other material into a relief by pressing it into a concave die or between a pair of convex and concave dies.

Ding – Container for cooking, serving and storing food items. When made of clay, they were used for daily cooking, serving, and storing food. Cast bronze dings (Figure 5.1) were used during elite feasting and ceremonies.

Discontinuous Weft – Does not extend across the textile from selvage to selvage.

Dovetail Joint – Two pieces joined together with interlocking “fingers” cut at slight angles.

Drawloom – A loom with harnesses to weave the ground and individual heddles that are raised by draw boy (assistant) to produce a textile with complex imagery.

Dye – Soluble natural or synthetic colorant that soaks into fiber.

Earthenware – Clay that matures at temperatures below 2100°F / 1150°C. This low fired porous ceramic is often glazed to make it more watertight.

Ebony – Very hard, black or extremely dark colored fine-grained wood.

Egyptian Paste / Egyptian Faience – Mixture of ground quartz or sand and natron (a naturally occurring mixture of sodium carbonate and sodium bicarbonate found on dried-out salt lakes in the Nile Delta) that is mixed, molded, dried, and fired. At around 1600°F / 870°C, some of the carbonate migrates to the surface and forms a glaze. Copper, manganese, or iron oxides are added to produce blue or black. It is sometimes used to glaze stone.

Electroforming – Electrodes are attached to source metal and an object (coated with a metallic surface) in the same electrolytic bath, then a low-voltage current dissolves the source metal to deposit a thick layer on the other piece.

Electroplating – Electrodes are attached to source metal and an object (coated with a metallic surface) in the same electrolytic bath, then a low-voltage current dissolves the source metal to deposit a thin layer on the other piece.

Electrum – Naturally occurring alloy of gold and silver.

Embossing – A soft sheet of metal is placed onto leather (or another yielding surface) or over a mold, then the metal is rubbed with a tool to create a raised line or shape on the other side.

Embroidery – Decorative stitches usually applied to fabric with a threaded needle.

Enamel – Glass fused to the surface of glass or metal with heat.

Enamel / China Paint – In ceramics, it is a colorful overglaze that matures at a relatively low temperature.

Engobe – A clay slip that may be applied before or after bisque firing.

Engrave – To remove part of a surface with a sharp tool or rotating abrasive disk.

Etch – To remove part of a surface with acid.

Ewer – A vessel to hold and pour a liquid, like water or wine.

Fabric – From the Latin word, “fabricare,” to fabricate. Many construction techniques can produce fabric, including bobbin lace, crochet, knitting, needle lace, weaving, etc.

False-Filigree – Thin wax threads are used to create a piece that is transformed into metal through the lost-wax process. These cast pieces are often confused with the fine soldered wirework of true filigree.

Faience (vitreous) – Crushed quartz core covered with ceramic glaze.

Fiber – Plant, animal, or synthetic material capable of being spun into thread or yarn.

Fibula / Fibulae – A decorative Roman or Medieval pin (like a large safety pin) used to fasten clothing.

Filigree – Open or backed delicate pattern made with fine metal wires.

Firing / Fire – Heating clay until it matures and transforms into a hard ceramic.

Fire Gilding / Mercury Gilding – Technique used to deposit a thin layer of gold or silver on the surface of another metal. A mixture of mercury

and gold or silver was applied then heated until the mercury evaporated, leaving only the precious metal.

Flamework / Lampwork – Glass worked with a torch.

Flashed Glass – A clear or tinted piece of glass fused to one or more thin layers of colored glass.

Flax – The stem of this plant is processed to produce fiber to make linen.

Float – A warp or weft thread that passes unbound over or under two or more of the opposite elements.

Flux (clay and glass) – Ingredient that lowers the melting temperature.

Flux (metal) – Applied to metal components to be joined together to prevent oxidation during fusing, soldering, and welding. Clean surfaces are essential during these processes. Different fluxes are used with different metals.

Foot Loom / Treadle Loom – Foot-operated harnesses control the warp while weaving a textile.

Forge – A blacksmith's workshop. A furnace used to heat metal with solid or gas fuel.

Forge Welding – Hammering together two or more fluxed pieces of metal heated to just below the melting temperature.

Forging / Forged – Forming or shaping cold or hot metal by placing it against a hard surface, then stretching or compressing it with a hammer or press.

Furnace – An oven / kiln that can achieve the high temperatures needed to melt glass or metal.

Fuse / Fusing (glass and metal) – Two or more materials joined together or melted together with heat.

Gaffer – The glassblower who does the most critical steps when working glass on a blowpipe or pontil.

Gather – In glassblowing, the blob of molten glass on the end of the pipe.

Ghiordes / Turkish / Symmetrical Knot – Used to create pile in rugs; the right and left sides of the knot are the same.

Gilding / Gilded – Applying a very thin layer of gold or silver to the surface of an object. Techniques vary, according to the medium (see Depletion Gilding, Leaf, Luster, and Mercury Gilding).

Glass – Made by melting together silica (sand or crushed quartz), flux (soda ash), and a stabilizer (lime) at temperatures around 2400°F / 1316°C.

It is worked cold (room temperature), warm (around 1251°F / 677°C), and hot (2000°F / 1093°C).

Glassblowing – Air is blown through the mouthpiece of a hollow metal blowpipe to inflate a bubble of molten glass on the other end.

Glass Cane – A slender rod of glass.

Glaze – A glassy mixture applied to the surface of clay, then fired. Various ingredients determine the color and melting temperature and whether it will be glossy, matte, or clear.

Gold – A lustrous yellow metal that does not easily corrode. Pure gold is expensive and soft, so it is often mixed with another metal to make it less expensive and more durable. The final color of the alloy depends on the type and quantity of metal added; the most popular being yellow, white, pink, and green.

Granulation – A small piece of gold or silver is heated until it melts and forms a ball, then it is cooled. Multiple balls are arranged in a decorative pattern on another piece of metal, then heated to fuse them to the surface without solder.

Greenware – Dry clay object before it has been fired.

Handbuilding – Forming clay by hand without the use of a potter's wheel.

Hard-Paste – European term for true porcelain.

Harness / Shaft – A frame that holds a group of heddles on a loom.

Heddle – A warp thread is held by a heddle on a loom. Heddles are moved up and down to weave cloth.

High Fired – Kiln temperatures between 2192°F / 1200°C and 2552°F / 1400°C used to mature stoneware and porcelain.

Huipil – A traditional blouse worn by Indigenous women in Guatemala and Mexico made with one or more pieces of fabric joined together into a rectangular shape then folded in half with a head opening in the center. The sides are usually sewn together, leaving openings for the arms.

Hydria – A three-handled Greek vessel used to hold water.

Ikat / Kasuri / Jaspe – Sections of warp and/or weft are wrapped to resist dye. The wrapping is removed after the thread has been dyed, then the threads are woven to produce a patterned cloth.

Interlace – Decorative, intertwined linear elements.

Intarsia / Inlay – From Italian for inlay, “intarsiare,” some of the surface is removed, then filled with decorative stone, wood, ivory, metal, shell, etc.

Iron – A gray hard metal that turns melts at 2800°F / 1538°C.

“Istoriato” – The Italian word for “history,” features colorful figurative scenes painted with glaze onto 16th century Italian ceramics.

Ivory – From animal teeth and tusks; elephant ivory being the most common.

Jacquard Loom – Invented by Jacquard in 1804, a mechanized loom with ground cloth harnesses and punched cards that control individual warp heddles for producing textiles with complex imagery.

Kaolin / China Clay – Essential high fire clay ingredient of porcelain.

Kente – Strip cloth woven in Ghana.

Kilim / Kelim – A sturdy weft faced slit tapestry woven from Eastern Europe.

Kiln – An insulated chamber that is heated to fire clay or to fuse, slump, or cast glass.

Kline – Greek and Roman reclining couch or bed.

Klismos – A curvy wooden chair that developed in 5th century Greece; the back and front legs curve in the opposite direction.

Knit – Interlooped fabric made with a pair of hand-held knitting needles or a knitting machine.

Krater / Crater – Large Greek and Roman ceramic bowl, often with a tall foot.

Lamination – Several thin layers joined together.

Lampas – A double layered cloth with a reversible pattern that was first woven in 11th century Iran on a drawloom with two sets of warp and weft; each set of warp and weft of the same color.

Lampwork / Flamework – Glass worked with a torch.

Lapidary – Cutting and polishing precious and semi-precious stones.

Lapis Lazuli – A blue semi-precious stone mined in Afghanistan for more than eight thousand years.

Lathe – Machine that rotates a workpiece on a horizontal axis.

Leaded Glass – Clear pieces of flat glass held together with strips of lead.

Leaf – A very thin piece of metal.

Leather Hard – Clay that is dry enough to be stiff, but damp enough to work.

Lekythos – Slender Greek ceramic vessel used to hold oils and perfumes.

Linen – Fiber and fabric made from flax.

Loom – Weaving device that holds warp in sequence and under tension so that weft may be inserted to produce a textile.

Looping – A strand is crossed over itself, leaving an opening for the free end and full length to pass through.

Lost-Wax Casting – A wax model is covered with plaster or clay to create a mold. The mold is heated to melt out the wax, molten metal or glass is poured or melted into the cavity, then the mold is removed to reveal the casting.

Low Fired – Kiln temperature below 2100°F / 1150°C used to mature earthenware and overglaze.

Luster – Metal oxides painted onto the surface of cold glass or clay, then fired to create a metallic appearance.

Maiolica / Majolica / Faience – Earthenware with bright colors over a white tin-based opaque glaze; originally made to imitate porcelain.

Marquetry – Geometric patterns or pictorial compositions created with contrasting colors of veneer or other thin media fitted together and glued to the surface of a support.

Medium / Media (plural) – Raw material.

Mercury Gilding / Fire Gilding – Mercury is mixed with gold, then applied to the surface of a piece to be gilded. The object is heated to evaporate the mercury, leaving a thin layer of gold.

Mesoamerica – Geographical area bounded by Central Mexico in the north and Honduras and El Salvador in the south that was home to many Pre-Columbian people (including the Maya and Aztec) that shared cultural traits.

Mesopotamia – The valley between the Tigris and Euphrates rivers corresponding to modern-day Iraq, southwestern Iran, Kuwait, northeast Syria and southeastern Turkey.

Miter / Mitre – Joint formed by abutting two 45 degree-angled surfaces at right angles.

Mokumé Gane – Japanese metalworking technique; alternating layers of non-ferrous metals are forge-welded, then manipulated to create

patterns.

Mold – Negative impression that is used to replicate a positive three-dimensional form.

Mold-Blown Glass – Molten glass on a blowpipe is inserted into a mold, then inflated.

Mordant – French for “to bite,” it is used to fix dye to fabric. Mordants help dyes “bite” into cloth to keep the colors from washing out.

Mortise and Tenon Joint – Formed with a tongue (tenon) inserted into a hole of the same shape (mortise).

Mosaic Glass / Millefiori – Italian for “thousand flowers,” murrini or slices of a multicolored bundle of fused glass are placed closely together, then fused with heat to form a single piece.

Murrini – Small colorful glass cylinders and cubes made by cutting cross-sections of cane.

Needle Lace – Made by stitching with a needle and thread over a pattern.

Niello – Black inlay on metal made by filling depressions on metal with a mixture of ground silver, lead, copper, and sulphur. It is fused to the surface with heat, cooled, then polished.

Overglaze / Enamel – A colorful glaze that cannot be high fired is applied to the surface of a ceramic piece that has already been glazed and fired. The piece is then fired at a low temperature.

Oxidation – Firing with an oxygen-rich atmosphere.

Paper – Made with macerated pulp mixed with water, strained, and dried.

Papyrus – Laminated fabric made by slicing papyrus reed into strips, then aligning, layering, and pounding them together.

Parquetry / Parquet – Pieces of wood arranged in repeating geometric patterns on furniture or floors.

Pâte de Verre – French for “glass paste,” it is produced by pressing a mixture of glass granules, a binder and flux into a mold. The filled mold is left to dry, fused with heat, cooled, then cleaned.

Patina – Coloration that forms on a surface as it reacts to environmental elements.

Pectoral – A large ornament worn on the chest.

Penannular Brooch – Used to fasten clothing, it consists of a long sliding pin attached to a C-shaped metal ring.

Peplos – A long, rectangular woolen garment folded at the top and gathered at the waist, worn by Greek women.

Pigment – Insoluble coloring agent that adheres to the surface.

Pile – Decorative loops or tufts formed by hand-knotting or with supplementary warp that protrude above the surface of a textile.

Pithos / Pithoi (plural) – Large Minoan ceramic storage vessel(s).

Plain Weave / Tabby – A balanced weave made by passing a single weft over one then under one warp, reversing the sequence in each row. Both the warp and weft are visible on the finished cloth.

Plaiting – Diagonal interlacing of two or more elements, often used to produce baskets and fabrics.

Ply – Number of spun fibers twisted together.

Porcelain / Hard Paste – Ceramic developed in China that becomes vitreous, nonporous, white, and translucent when fired to between 2192°F / 1200°C and 2552°F / 1400°C.

Potter's Wheel – A disk on a vertical rotating shaft that enables a potter to form a cylindrical clay object with both hands.

Potter / Ceramist – A person who uses clay to make functional or non-functional objects.

Pottery / Ceramic – Clay that has been fired to maturity.

Press Molding Clay – Soft clay is pressed into a decorative mold.

Press Molding / Pressed Glass – Molten glass is poured into a patterned metal mold, followed by a plunger, to quickly forms a decorative glass object.

Punty / Pontil – Solid metal rod that supports the bottom of a molten glass piece after it has been removed from the blowpipe.

Quilt – A top fabric composed of many pieces is sewn to a backing fabric, usually with a layer of batting in between. Decorative stitches secure the layers.

Raising – A technique that transforms a flat sheet of metal into a three-dimensional form by hammering the surface into a hollow form or against an anvil or stake.

Raku – Originally a Japanese firing method; red-hot glazed ceramics are removed from the kiln and cooled quickly.

Red Figure Ware – Greek Classical Period terracotta that features large red figures on a black background.

Reduction – Firing with an oxygen-starved atmosphere.

Reliquary – Container for a relic.

Repoussé – Hammering or pressing into the reverse side of metal to shape the form or to raise the surface on the front. Often followed by chasing to refine the details. From the French word, “repousser,” which means, “to push back.”

Resist – Applied to a surface before glazing, printing, or dyeing to prevent absorption in the covered area.

Rhyton – Cylindrical drinking vessel that usually includes a sculpted head on the bottom.

Sagger – Ceramic container used to protect delicate clays and glazes in a kiln during firing.

Sagging / Slumping – Glass is placed over a mold in a kiln, then heated until the glass is flexible enough to collapse into / onto the mold.

Salt Glaze – Sodium chloride introduced into the kiln at its maximum temperature vaporizes and combines with silica on the surface of high fired clay to form a textured glaze.

Sandblasting – Sand is forcibly sprayed onto a surface to remove the outer layer.

Sarong – Traditional cloth worn wrapped around the lower body of Malay men and women.

Satin – Smooth, glossy textile with intermittent warp floats on one side and weft floats on the other side.

Sgraffito / Scraffito – From Italian “graffiare” (to scratch); a sharp tool cuts through an unfired layer of slip or glaze to reveal the contrasting clay below.

Selvedge / Selvage – Finished edge of a textile where the warp or weft turns around.

Shard / Sherd – A broken piece of fired clay.

Shed – Temporary opening created by raising or lowering select portions of warp for passage of the weft while weaving on a loom.

Shibori – Japanese resist dye technique for cloth using stitches, gathering, folding, binding, and/or twisting.

Shuttle – Holds the weft and passes it through the shed during weaving.

Silk – Strong protein filament produced by a silkworm while making its cocoon used to produce fabrics.

Silver – A lustrous white metal that tarnishes to black. Fine silver is 99.9% silver, but too soft for most applications. Sterling silver is alloyed with 7.5% copper to make it stronger.

Slab Building – Clay is rolled into a flat slab, cut, then joined together while still soft or leather hard.

Slag – A glass-like by-product of smelting.

Slip – Fine clay suspended in water, sometimes colored, used for mold casting, for joining together pieces of clay, or for decorating damp clay surfaces.

Slow Wheel – Base with a moveable disk on top that is rotated by hand; used by a potter to produce symmetrical clay vessels. A stone example from Mesopotamia (dating to 3500 BCE) has a central shaft on the bottom that fits into a hole in the base. Another type, consisting of two convex ceramic disks placed curve to curve, is utilized in Coyotepec, Mexico, to make earthenware vessels.

Slumping / Sagging – Glass is placed over a mold in a kiln, then heated until the glass is flexible enough to collapse into / onto the mold.

Smelting – Extracting metal from ore in a furnace.

Soda Glaze – Sodium carbonate and water mixture sprayed into the hot kiln at the end of the firing vaporizes and combines with silica on the clay surface to form a glaze.

Soft Paste Porcelain – Low fired European white translucent ware made to imitate porcelain.

Solder – An alloy used to join hot metal together. Solder melts at a lower temperature than the metals it is uniting.

Songket – Brocade fabric hand woven in Indonesia (and some neighboring countries) with real or synthetic gold and silver threads on a silk, rayon, or cotton base cloth.

Spindle (fiber) – A notched shaft with a weight towards one end that is rotated to twist loose fiber, transforming it into yarn or thread. A drop spindle spins freely in the air.

Spindle Whorl – The circular weight placed towards the bottom of a spindle to help maintain momentum and keep the spun yarn from sliding off the bottom.

Spinning (fiber) – The process of twisting loose fibers together to produce a continuous strand.

Sprang – Warp is fixed at both ends and crossed over one another, twisting the top and bottom elements then securing the central part.

Sprig Mold – Mold made of fired clay, plaster, or other material, with a decorative concave surface. Damp clay is pressed into the mold then removed and attached to leather hard clay.

Stained Glass – Colored and painted window glass held together with strips of metal.

Stake / Anvil – A tool used to support metal during raising. Usually made of hard steel, stakes come in a variety of shapes and sizes.

Stamping – A patterned punch or stamp is hammered into a surface to impress or print a decoration.

Steel – A gray-colored alloy of iron, carbon, and other elements.

Stippling – A pattern of dots that forms a picture.

Stoneware – Ceramic that developed in China that becomes vitreous, nonporous, and stone-like when fired between 2192°F / 1200°C and 2372°F / 1300°C in a kiln.

Supplementary Warp / Supplementary Weft – Non-structural warp or weft used to embellish a textile during the weaving process. If this extra warp / weft is removed, the ground cloth is still intact.

Symmetrical / Ghiordes / Turkish Knot – Used to create pile in rugs; the right and left sides of the knot are the same.

Tabby / Plain Weave – Textile with a single weft passing over a single warp then under a single warp, reversing the sequence with each pass of the weft.

Tablet Weaving / Card Weaving – Individual warp threads are inserted into holes punched into the corners of sturdy cards. The warp is tensioned, then one or more cards are turned to produce the various sheds for the weft to pass through to create warp faced fabric.

Tapestry – Patterned textile of weft faced tabby or twill weave with multiple colors of discontinuous wefts.

Tapa / Barkcloth – Fabric made by pounding the inner bark of suitable vines, shrubs, and trees to the desired width and length.

Terracotta – Latin for “baked earth” so it is both the raw clay and fired clay. A type of porous earthenware that matures around 1000°F / 538°C. The high iron content lowers the melting temperature and colors the body red orange to brown.

Terra Sigillata – Glossy terracotta ceramic made by applying highly refined slip, then burnishing and polishing the slipped surface before firing.

Textile – From the Latin word, “texere,” to weave, it specifically refers to cloth that has been woven on a loom. Although all textiles are fabrics, the reverse is not true.

Throwing – Clay is centered on the head of a spinning potter’s wheel, then formed by hand.

Torc – A metal neck ring with a front opening worn by high-ranking tribal men in Europe from the 8th century BCE through the 3rd century CE.

Treadle Loom / Foot Loom – Foot-operated harnesses / shafts control the warp while weaving a textile.

Turkish / Ghiordes / Symmetrical Knot – Used to create pile in rugs; the right and left sides of the knot are the same.

Twill Weave – Textile with diagonally aligned floats, formed by passing the weft over two or more warp elements, then under one or more warp elements in sequence, moving over one or more warp elements with each pass.

Twining – Two or more wefts pass in front and behind warp and then twist together between the warp to produce a basket or fabric.

Underglaze – Colorful oxides applied to clay, then covered with a transparent glaze.

Velvet – As it is being woven, wires are inserted into the open shed to form loops of supplementary warp over all or part of the surface of a fabric. Cut velvet is produced by cutting the loops before removing the wire.

Veneer – Thin slices of decorative wood glued to the surface of less expensive, more stable wood.

Vitrify – Transform into glass.

Vitreous – Glass like and not porous.

Volute – A spiral or “S” curved ornament.

Wabi-Sabi – Japanese aesthetic of imperfection.

Warp – Lengthwise elements held in tension on a loom.

Warp Faced – Warp placed close together to mostly or completely cover the weft of the textile.

Washi – Hand-made Japanese paper.

Wax resist – a protective layer of wax is applied to protect a cloth, ceramic, or other material, from being dyed, glazed, or painted. The original surface is revealed when the wax is removed.

Weaving – Interlacing warp and weft elements at right angles to each other to produce a textile.

Wedging Clay – Kneading or pounding clay until it has a uniform consistency and air pockets have been removed.

Weft – Crosswise elements inserted over and under the warp to produce a textile.

Weft Faced – Weft placed close together to mostly or completely cover the warp of the textile.

Woodturning – Cutting wood on a horizontal axis while it is spinning on a lathe.

Wool – Protein fiber shorn from sheep used to produce fabrics.

Bibliography

- Adams, Blair, *Craft: The Art of Work*, Austin: Colloquium Press, 1996.
- Adams, Elizabeth Bryding, *The Dwight and Lucille Beeson Wedgwood Collection at the Birmingham Museum of Art*, Birmingham, AL: Birmingham Museum of Art, 1992.
- Adamson, Glenn, editor, reprint, *The Craft Reader*, London: Bloomsbury Visual Arts, 2010/2019.
- _____, *Thinking Through Craft*, London: Bloomsbury Visual Arts, 2007/2020.
- _____, *The Invention of Craft*, London: Bloomsbury Visual Arts, 2013/2020.
- _____, *Craft: An American History*, London: Bloomsbury Visual Arts, 2021.
- Adler, Pete, and Nicholas Barnard, *African Majesty: The Textile Art of the Ashanti and Ewe*, London: Thames and Hudson, 1992.
- Agrawal, Yashodhara, reprint, *Silk Brocades*, India: Roli Books, 2003/2004.
- Agricola, Georius, translated by Herbert Clark Hoover and Lou Henry Hoover, *De Re Metallica*, New York: Dover Books, 1556/1950.
- Ahlberg Yohe, Jill, and Teri Greeves, *Hearts of Our People: Native Women Artists*, Seattle: University of Washington Press, 2019.
- Albers, Annie, edited by Brenda Danilowitz, *Anni Albers: Selected Writings on Design*, Hanover: University Press of New England, 2000.
- Albers, Annie, *On Weaving*, new expanded edition, Princeton, NJ: Princeton University Press, 1965/2017.
- Allen, Elsie, *Pomo Basketmaking*, Happy Camp, CA: Naturegraph Publishers, 1972.
- Altman, Patricia B., and Caroline D. West, *Threads of Identity: Maya Costume of the 1960's in Highland Guatemala*, Los Angeles: Fowler Museum of Cultural History, 1992.
- Alva, Walter, and Christopher B. Donnan, *Royal Tombs of Sipan*, Los Angeles: Fowler Museum of Cultural History, 1993.
- Alvarez, Nilda Callañaupa, *Weaving in the Peruvian Highlands*, Cuzco, Peru: Center for Traditional Textiles, 2007.
- _____, *Secrets of Spinning, Weaving, and Knitting in the Peruvian Highlands*, Loveland: Thrums Books, 2017.

- Alvic, Philis, *Weavers of the Southern Highlands*, Lexington: University of Kentucky Press, 2003.
- Anawalt, Patricia Rieff, *Indian Clothing Before Cortés: Mesoamerican Costumes from the Codices*, Norman: University of Oklahoma Press, 1981.
- Anderson, June, *Return to Tradition: The Revitalization of Turkish Village Carpets*, Seattle: University of Washington Press, 1998.
- Anderson, Marilyn, *Guatemalan Textiles Today*, New York: Watson-Guptill Publications, 1978.
- Anderson, Ross, and Barbara Perry, *The Diversions of Keramos, 1925-1950*, Syracuse: Everson Museum of Art, 1983.
- Andrews, Jack, *Samuel Yellin: Metalworker*, Ocean City, MD: SkipJack Press, 1992.
- Anton, Ferdinand, *Ancient Peruvian Textiles*, English edition, New York: Thames and Hudson, 1984/1987.
- Arnold, Denise Y., and Elvira Espejo, *The Andean Science of Weaving*, New York: Thames and Hudson, 2015.
- Arnold, Janet, editor, *Queen Elizabeth's Wardrobe Unlock'd*, Leeds, Great Britain: Maney, 2000.
- Arnow, Jan, *By Southern Hands: A Celebration of Craft Traditions in the South*, Birmingham, AL: Oxmoor House, 1987.
- Arroyo Ortiz, Leticia, *Tintes Naturales Mexicanos: Su Aplicación en Algodón, Henequén, y Lana*, Mexico: Universidad Nacional Autónoma de México, 2014.
- Asamoah-Yaw, Ernest, and Osei-Bonsu Safo-Kananka, *Kente Cloth: History and Culture*, NY: Matchstick Literary, 2019.
- Aslan, Chris, *Unraveling the Silk Road: Travels and Textiles in Central Asia*, UK: Icon Books, 2023/2024.
- Asturias de Barrios, Linda, *Xomalapa: Native Dress and its Significance*, Guatemala: The Ixchel Museum of Indian Dress of Guatemala, 1985.
- Atasoy, Dr. Nurhan, *Splendors of the Ottoman Sultans*, Memphis, TN: Wonders, 1992.
- Atwater, Mary Meigs, reprint, *Byways in Hand-weaving: An Illustrated Guide to Rare Weaving Techniques*, New York: Macmillan, 1954/1973.
- Ayensu, Edward S., *Ashanti Gold*, London: Marshall Editions, 1997.

- Baines, Patricia, *Linen Hand Spinning and Weaving*, London: B. T. Batsford, 1989.
- _____, reprint, *Spinning Wheels, Spinners, and Spinning*, London: B. T. Batsford, 1977/1991.
- Baker, Hollis S., *Furniture in the Ancient World: Origins and Evolution, 3100-475 B.C.*, New York: Macmillan, 1966.
- Baker, Patricia, *Islamic Textiles*, London: British Museum Press, 1995.
- Banks, George, *Peruvian Pottery*, Aylesbury, England: Shire Publications, 1989.
- Barber, E. J. W., *Prehistoric Textiles: The Development of Cloth in the Neolithic and Bronze Ages with Special Reference to the Aegean*, Princeton, NJ: Princeton University Press, 1991.
- _____, *Women's Work: The First 20,000 Years: Women, Cloth and Society in Early Times*, New York: W. W. Norton and Company, 1994.
- Barley, Nigel, *Smashing Pots: Feats of Clay from Africa*, London: British Museum Press, 1994.
- Barnard, Nicholas, *Arts and Crafts of India*, London: Conran Octopus, 1993.
- Battie, David, and Simon Cottle, editors, *Sotheby's Concise Encyclopedia of Glass*, London: Conran Octopus, 1995.
- Beckerdite, Luke, editor, *American Furniture*, Hanover: University Press of New England, 2003.
- Bell, Nicholas R., *A Revolution in Wood: The Bresler Collection*, Washington, DC: Renwick Gallery of the Smithsonian American Art Museum, 2010.
- Bennett, Anna Gray, *Five Centuries of Tapestry from the Fine Arts Museums of San Francisco*, revised edition, San Francisco: Chronicle Books, 1976/1992.
- Benson, Jonathan, *Woodworker's Guide to Bending Wood*, East Petersburg, PA: Fox Chapel Publishing Company, 2008.
- Berlo, Janet C., and Ruth B. Phillips, *Native North American Art*, Oxford: Oxford University Press, 1998.
- Bernsted, Anne-Marie Keblow, *Early Islamic Pottery: Materials and Techniques*, London: Archetype Publications, 2003.
- Bernstein, Bruce, and Gerald McMaster, editors, *First American Art: The Charles and Valerie Diker Collection of American Indian Art*, Seattle: University of Washington Press, 2004.

Bernstein, David J., *The Mystery of the Bayeux Tapestry*, London: Weidenfeld and Nicholson, 1986.

Berrin, Kathleen, editor, *The Spirit of Ancient Peru: Treasures from the Museo Arqueológico Rafael Larco Herrera*, New York: Thames and Hudson, 1997.

Black, David, editor, *The Atlas of Rugs and Carpets*, third edition reprint, London: Tiger Books International, 1985/1996.

Blake-Roberts, Gaye, *Wedgwood Jasperware*, Botley, Oxford: Shire Publications, 2011.

Blandino, Betty, *The Figure in Fired Clay*, Woodstock, NY: The Overlook Press, 2001.

Bhanddari, Vandana, *Costumes, Textiles, and Jewellery of India: Traditions in Rajasthan*, London: Mercury Books, 2005.

Bliss, Anne, *North American Dye Plants*, Loveland: Interweave Press, 1993.

Blondel, Nicole, and Tamara Préaud, *La Manufacture Nationale de Sévres*, Charenton, France: Flohic Editions, 1996.

Blumer, Thomas John, *Catawba Indian Pottery*, Tuscaloosa: The University of Alabama Press, 2004.

Boardman, John, *Athenian Black Figure Vases*, London: Thames and Hudson, 1974.

Bolton, Eileen, *Lichens for Vegetable Dyeing*, US edition, McMinnville, OR: Robin and Russ Handweavers, 1960/1972.

Bonar, Eulalie H., editor, *Woven by the Grandmothers: Nineteenth-Century Navajo Textiles from the National Museum of the American Indian*, Washington, DC: Smithsonian Institution Press, 1996.

Boulay, Anthony du, *Chinese Porcelain*, London: Octopus Books, 1973.

Bowman, Leslie Greene, *American Arts and Crafts: Virtue in Design*, Boston, MA: Bullfinch Press, 1997.

Brack-Kaiser, Carol Leigh, *Nature Provides Dyes for Rainbows: A Workshop Approach*, Naples, FL: Whitehall Printing Company, 2016.

Brennan, Archie, and Brenda Osborn, *Archie Brennan*, Atglen PA: Schiffer Publishing, 2021.

Breward, Christopher, *Fashion*, Oxford: Oxford University Press, 2003.

Bridenbaugh, Carl, *The Colonial Craftsman*, reprint, New York: Dover Publications, 1950/1990.

- Brincard, Marie-Therese, editor, *The Art of Metal in Africa*, New York: The African American Institute, 1982.
- Brody, J. J., Catherine J. Scott, Stephen A. LeBlanc, and Tony Berlant, *Mimbres Pottery: Ancient Art of the American Southwest*, New York: Hudson Hills Press, 1983.
- Brose, David S., James A. Brown, and David W. Penney, *Ancient Art of the American Woodland Indians*, New York: Harry N. Abrams, 1985.
- Broudy, Eric, *The Book of Looms: A History of the Handloom from Ancient Times to the Present*, Hanover: University Press of New England, 1979.
- Brown, Diedre, *Maori Arts of the Gods*, Auckland, Australia: Reed Books, 2005.
- Brown, Robin C., *The Crafts of Florida's First Peoples*, Sarasota: Pineapple Press, 2003.
- Brown, Sarah, and David O'Connor, *Glass Painters: Medieval Craftsmen*, London: British Museum Press, 1991.
- Brown, Sarah, *Stained Glass: An Illustrated History*, New York: Crescent Books, 1992.
- Brunello, Franco, *The Art of Dyeing in the History of Mankind*, American edition, Vicenza: Neri Pozza Editore, 1968/1973.
- Brunhammer, Yvonne, *The Jewels of Lalique*, Paris: Flammarion, 1998.
- Buchanan, Rita, *A Weaver's Garden*, Loveland: Interweave Press, 1987.
- _____, *A Dyer's Garden*, Loveland: Interweave Press, 1995.
- Bühler, Alfred, Eberhard Fischer, and Marie-Louise Nabholz, *Indian Tie-Dyed Fabrics*, vol. IV, Historic Textiles of India at the Calico Museum, Ahmedabad, India: 1980.
- Bunzel, Ruth L., *The Pueblo Potter: A Study of Creative Imagination in Primitive Art*, reprint, New York: Dover Books, 1929/1972.
- Burgard, Timothy Anglin, *The Art of Craft: Contemporary Works from the Sax Collection*, San Francisco: Fine Arts Museums of San Francisco, 1999.
- Burnard, Joyce, *Chintz and Cotton: India's Textile Gift to the World*, Kenthurst, Australia: Kangaroo Press, 1994.
- Burnham, Dorothy K., *Warp and Weft: A Textile Terminology*, Toronto: Royal Ontario Museum, 1980.
- Burrison, John A., *Global Clay: Themes in World Ceramic Traditions*, Bloomington: Indiana University Press, 2017/2020.

- Busby, Sharon, *Spruce Root Basketry of the Haida and Tlingit*, Seattle: Marquand Books, 2003.
- Buss, Chiara, editor, *Silk Gold Crimson: Secrets and Technology at the Visconti and Sforza Courts*, Milan: Silvana Editoriale, 2009.
- Cahlander, Adele, and Suzanne Baizerman, *Double-Woven Treasures from Old Peru*, St. Paul, MN: Dos Tejedoras, 1985.
- Calderón, Cándida Fernández de, Alberto Sarmiento, Victoria Fuentes de Álvarez, editors, *Great Masters of Mexican Folk Art*, México, D. F: Fomento Cultural Banamex, 1998.
- Calderón, Cándida Fernández de, *Grandes Maestros del Arte Popular de Oaxaca*, México, D. F: Fomento Cultural Banamex, 2011.
- Campbell, Marian, *Decorative Ironwork*, New York: Harry N. Abrams, 1997.
- Camusso, Lorenzo, and Sandro Bortone, editors, *Ceramics of the World*, New York: Harry N. Abrams, 1991.
- Cantor, Jay E., reprint, *Winterthur: The Foremost Museum of American Furniture and Decorative Arts*, New York: Harry N. Abrams, 1985/1986.
- Carboni, Stefano, and David Whitehouse, *Glass of the Sultans*, New York: The Metropolitan Museum of Art, 2001.
- Cardew, Michael, *Pioneer Pottery*, reprint, London: A and C Black, 1969/2002.
- Carvalho, Pedro de Moura, editor, *The World of Lacquer: 2000 Years of History*, Lisbon: Calouste Gulbenkian Museum, 2001.
- Chambers, Letitia, *Clearly Indigenous: Native Visions Reimagined in Glass*, Santa Fe: Museum of New Mexico Press, 2020.
- Chandler, Deborah, and Teresa Cordón, *Traditional Weavers of Guatemala: Their Stories, Their Lives*, Loveland: Thrums Books, 2015.
- Chapman, S. D., and S. Chassagne, *European Textile Printers in the Eighteenth Century: A Study of Peel and Oberkampf*, London: Heinemann Educational Books, 1981.
- Charbonneau, Diane, editor, *Chihuly*, Munich: DelMonico Books, 2013.
- Cheminée, Matthieu, *Legacy: Jewelry Techniques of West Africa*, Brunswick, ME: Brynmorgen Press, 2014.
- Chishti, Rta Kapur, and Rajul Jain, *Handcrafted Indian Textiles: Tradition and Beyond*, New Delhi: Roli Books, 2011.
- Chung, Young Yang, *Painting with a Needle*, New York: Harry N. Abrams, 2003.

- Clare, Claudia, *Subversive Ceramics*, London: Bloomsbury Academic, 2016.
- Clark, Andrew J., Maya Elston, and Mary Louise Hart, *Understanding Greek Vases: A Guide to Terms, Styles, and Techniques*, Los Angeles: The J. Paul Getty Museum, 2002.
- Clark, Garth, *American Ceramics, 1876 to the Present*, New York: Abbeville Press, 1979.
- Coe, Michael D., and Stephen Houston, *The Maya*, ninth edition, New York: Thames and Hudson, 2015.
- Cohen, Beth, *The Colors of Clay: Special Techniques in Athenian Vases*, Los Angeles: The J. Paul Getty Museum, 2006.
- Cohen, David, and Catherine Hess, *Looking at European Ceramics: A Guide to Technical Terms*, Malibu: The J. Paul Getty Museum, 1993.
- Collingwood, Peter, *The Techniques of Sprang; Plaiting on Stretched Threads*, New York: Watson-Guptill Publications, 1974.
- _____, *The Maker's Hand: A Close Look at Textile Structures*, Asheville: Lark Books, 1987.
- _____, *Rug Weaving Techniques: Beyond the Basics*, Loveland: Interweave Press, 1990.
- Conn, Richard, *Native American Art in the Denver Art Museum*, Seattle: University of Washington Press, 1979.
- Constantine, Mildred, and Jack Lenor Larson, *The Art Fabric: Mainstream*, Tokyo: Kodansha International, 1985.
- _____, and Jack Lenor Larson, reprint, *Beyond Craft: The Art Fabric*, Tokyo: Kodansha International, 1973/1986.
- Conway, Kelly A., and Lindsay R. Parrott, *Tiffany's Glass Mosaics*, Corning: Corning Museum of Glass, 2017.
- Conway, Susan, *Thai Textiles*, London: British Museum Press, 1992.
- Cooke, Edward S, Jr., reprint, *New American Furniture: The Second Generation of Studio Furnituremakers*, Boston: Museum of Fine Arts, 1989/1990.
- _____, *Global Objects; Toward a Connected Art History*, Princeton: Princeton University Press, 2022.
- Cooper, Emmanuel, *Ten Thousand Years of Pottery*, Philadelphia: University of Pennsylvania Press, 2000.
- Cooper, Wendy A., *Classical Taste in America, 1800 – 1840*, New York: Abbeville Press, 1993.

- Cordry, Donald, and Dorothy Cordry, third printing, *Mexican Indian Costumes*, Austin: University of Texas Press, 1968/1978.
- Corkhill, Thomas, *The Complete Dictionary of Wood*, New York: Dorset Press, 1979.
- Couldrey, Vivienne, *The Art of Louis Comfort Tiffany*, London: Grange Books, 1996.
- Coutinho, Maria Isabel Pereira, *18th Century French Furniture*, Lisbon: Calouste Gulbenkian Museum, 1999.
- Cumming, Elizabeth, *The Arts and Crafts Movement*, New York: Thames and Hudson, 1991.
- Daly, Greg, *Lustre*, Philadelphia: University of Pennsylvania Press, 2012.
- Darbyshire, Lydia, editor, *Furniture: A Visual Celebration of the World's Great Furniture-Making Traditions*, Edison, NJ: Chartwell Books, 1996.
- Davenport, Millia, *The Book of Costume*, volume 1, New York: Crown Publishers, 1948.
- Davies, Lucy, and Mo Fini, *Arts and Crafts of South America*, San Francisco: Chronicle Books, 1995.
- Davis, Susan Schaefer, *Women Artisans of Morocco: Their Stories, Their Lives*, Loveland: Thrums Books, 2018.
- Dayan, Ruth, and Wilburt Feinberg, *Crafts of Israel*, New York: Macmillan, 1974.
- Degl'Innocenti, Daniela, and Mattia Zupo, *Seta ad Art, Storia e tecniche dell'eccellenza Toscana / The Art of Silk: A History of Silk Manufacturing in Tuscany*, Florence: Edizioni Firenze, 2010.
- Del Río y Dueñas, Ignacio, *Grana Fina Cochinilla: Regalo de México para el Mundo*, Oaxaca, Mexico: Instituto Estatal de Ecología de Oaxaca, 2006.
- Denamur, Isabelle, *Moroccan Textile Embroidery*, Paris: Flammarion, 2003.
- Desai, Chelna, *Ikat Textiles of India*, San Francisco: Chronicle Books, 1988.
- Deuss, Krystyna, *Indian Costumes from Guatemala*, Twickenham, Great Britain: Paladin Graphics, 1981.
- Dhamija, Jasleen, and Jyotindra Jain, editors, *Handwoven Fabrics of India*, Ahmedabad, India: Mapin Publishing, 1989.
- D'Harcourt, Raoul, *Textiles of Ancient Peru and Their Techniques*, Seattle: University of Washington Press, 1962.

- Diran, Richard K., *The Vanishing Tribes of Burma*, London: Seven Dials, 1997/1999.
- Dockstader, Frederick J., *Weaving Arts of the North American Indian*, revised edition, New York: Harper Collins, 1978/1993.
- Doellah, H. Santosa, *Batik: The Impact of Time and Environment*, Java, Indonesia: Danar Hadi, 2002.
- Domestici, Fiamma, *Della Robia: A Family of Artists*, Florence, Italy: Scala, 1992.
- Donnan, Christopher B., *Ceramics of Ancient Peru*, Los Angeles: Fowler Museum of Cultural History, 1992.
- Dormer, Peter, *The Culture of Craft: Status and Future*, Manchester, UK: Manchester University Press, 1997.
- Draper, James David, *French Terracottas*, New York: The Metropolitan Museum of Art, 1992.
- Drewal, Henry John, and John Mason, *Beads, Body, and Soul: Art and Light in the Yoruba Universe*, Los Angeles: Fowler Museum of Cultural History, 1998.
- Dubin, Lois Sherr, *North American Indian Jewelry and Adornment: From Prehistory to the Present*, New York: Harry N. Abrams, 1999.
- _____, *Glittering World: Navajo Jewelry of the Yazzie Family*, Washington, DC: National Museum of the American Indian, 2014.
- Duncan, Alastair, *Louis Majorelle: Master of Art Nouveau Design*, New York: Harry N. Abrams, 1991.
- Dunnewold, Jane, *complex Cloth: A Comprehensive Guide to Surface Design*, Bothell, WA: Fiber Studio Press, 1996.
- Dunsmore, Susi, *Nepalese Textiles*, London: British Museum Press, 1993.
- Edwards, Eiluned, *Textiles and Dress of Gujarat*, Ahmedabad, India: Mapin Publishing, 2011.
- _____, *Imprints of Culture: Block Printed Textiles of India*, New Delhi: Niyogi Books, 2016.
- Eiseman, Fred B., Jr., *Ulat-ualatan: Traditional Basketry in Bali*, Bangkok, Thailand: White Lotus Press, 1999.
- Elliot, Inger McCabe, *Batik: Fabled Cloth of Java*, Singapore: Periplus Editions, 1985/2004.
- Elsdon, Sheila M., *Later Prehistoric Pottery in England and Wales*, Aylesbury, England: Shire Publications, 1989.

- Emery, Irene, *The Primary Structures of Fabrics*, London: Thames and Hudson, 2009.
- Emmerich, André, *Sweat of the Sun and Tears of the Moon*, New York: Hacker Art Books, 1984.
- Evans, Angela Care, *The Sutton Hoo Ship Burial*, revised edition, London: British Museum Press, 1986/1995.
- Evans, Jane A., *A Joy Forever: Latvian Weaving, Traditional and Modified Uses*, Saint Paul: Dos Tejedoras Fiber Arts Publications, 1991.
- Evans, Miriam, and Ranui Ngarimu, *The Art of Maori Weaving*, Wellington, New Zealand: Huia Publishers, 2005.
- Evans, Nancy Goyne, *American Windsor Chairs*, NY: Hudson Hills Press, 1996.
- _____, *American Windsor Furniture, Specialized Forms*, NY: Hudson Hills Press, 1997.
- _____, *Windsor-Chair Making in America: From Craft Shop to Consumer*, Hanover: University Press of New England, 2006.
- Ezra, Kate, *Royal Art of Benin: The Perls Collection*, New York: The Metropolitan Museum of Art, 1992.
- Falick, Melanie D., reprint, *Knitting in America: Patterns, Profiles and Stories of America's Leading Artisans*, New York: Artisan, 1996/1997.
- Faraday, Cornelia, Bateman, *European and American Carpets and Rugs*, new edition, Suffolk, England: Antique Collectors' Club, 1929/1990.
- Fariello, M. Anna, *Cherokee Basketry: From the Hands of Our Elders*, Charleston, SC: The History Press, 2011.
- _____, *Cherokee Pottery: From the Hands of Our Elders*, Charleston, SC: The History Press, 2009/2013.
- _____, *Cherokee: Images of America*, Charleston, SC: Arcadia Publishing, 2018.
- _____, and Paula Owen, editors, *New Perspectives on Art and Craft*, Lanham, MD: Scarecrow Press, 2004.
- Faulkner, Rupert, *Japanese Studio Crafts: Tradition and the Avant-Garde*, London: Laurence King, 1995.
- Fee, Sarah, editor, *Cloth that Changed the World: The Art and Fashion of Indian Chintz*, New Haven: Yale University Press, 2019.
- Feest, Christian F., *Native Arts of North America*, updated edition, New York: Thames and Hudson, 1980/1992.

- Feng, Zhao, Sandra Sardjono, and Christopher Buckley, editors, *A World of Looms: Weaving Technology and Textile Arts*, China: Zhejiang University Press, 2019.
- Ferreira, Maria Teresa Gomes, *Sala Lalique*, Lisbon: Museu Calouste Gulbenkian, 1997.
- Fine, Ruth, *William Daley: Ceramic Artist*, Atglen, PA: Schiffer Publishing, 2013.
- Fisch, Arline M., *Textile Techniques in Metal*, Asheville: Lark Books, 1996.
- Fisher, Nora, editor, reprint, *Mud, Mirror and Thread: Folk Traditions of Rural India*, Ahmedabad, India: Mapin Publishing, 1996/2006
- Fitzhugh, William W. and Elisabeth I. Ward, editors, *Vikings: The North Atlantic Saga*, Washington, DC: Smithsonian Institution Press, 2000.
- Fleming, John, and Hugh Honor, *The Penguin Dictionary of Decorative Arts*, revised edition, London: Penguin, 1977/1989.
- Forrest, Tim, *The Bullfinch Anatomy of Antique Furniture: An Illustrated Guide to Identifying Period, Detail, and Design*, Boston: Bullfinch Press, 1996.
- Frank, Isabelle, editor, *The Theory of Decorative Art: An Anthology of European and American Writings 1750-1940*, New Haven: Yale University Press, 2000.
- Fraser, David W., *A Guide to Weft Twining and Related Structures with Interacting Wefts*, Philadelphia: University of Pennsylvania Press, 1989.
- Fraser-Lu, Sylvia, *Handwoven Textiles of South-East Asia*, Singapore: Oxford University Press, 1988.
- Friedman, Florence Dunn, editor, *Gifts of the Nile: Ancient Egyptian Faience*, Providence: Rhode Island School of Design, 1998.
- Fuchs, Ronald W. II, and David S. Howard, *Made in China: Export Porcelain from the Leo and Doris Hodroff Collection at Winterthur*, Winterthur, DE: Winterthur Publications, 2005.
- Fundaburk, Emma Lila, and Mary Douglas Fundaburk Foreman, *Sun Circles and Human Hands*, Fairhope, AL: Southern Publications, 1985.
- Gable, Carl I., *Murano Magic: Complete Guide to Venetian Glass, Its History and Artists*, Atglen PA: Schiffer Publishing, 2004.
- Galloway, Patricia, editor, *The Southeastern Ceremonial Complex: Artifacts and Analysis*, Lincoln: University of Nebraska Press, 1989.

- Gänsicke, Susanne, and Markowitz, Yvonne J., and, *Looking at Jewelry: A Guide to Terms, Styles, and Techniques*, Los Angeles: J. Paul Getty Museum, 2019.
- Garrard, Timothy F., *Gold of Africa: Jewellery and Ornaments from Ghana, Cote d'Ivoire, Mali, and Senegal in the Collection of the Barbier-Mueller Museum*, Geneva: Prestel-Verlag, 1989.
- Garrett, Valery M., *Chinese Clothing: An Illustrated Guide*, New York: Oxford University Press, 1994.
- Geijer, Agnex, *A History of Textile Art*, London: Sotheby Parke Bernet, 1979.
- Gettinger, Mattiebelle, *Master Dyers to the World*, Washington, DC: The Textile Museum, 1982.
- Gettys, Marshal, editor, *Basketry of Southeastern Indians*, Idabel, OK: Museum of the Red River, 1984.
- Ghose, Madhuvanti, editor, *Vanishing Beauty: Asian Jewelry and Ritual Objects from the Barbara and David Kipper Collection*, Chicago: The Art Institute of Chicago, 2016.
- Gianturco, Paola, and Toby Tuttle, *In Her Hands: Craftswomen Changing the World*, New York: The Monacelli Press, 2000.
- Gibbon, Kate Fitz, and Andrew Hale, *Ikat: Splendid Silks of Central Asia*, London: Laurence King Publishing, 1997.
- Gibson, Alex, *Neolithic and Early Bronze Age Pottery*, Aylesbury, England: Shire Publications, 1986.
- Gillow, John, *Printed and Dyed Textiles from Africa*, Seattle: University of Washington Press, 2001.
- _____, *African Textiles*, San Francisco: Chronicle Books, 2003.
- _____, and Nicholas Barnard, *Indian Textiles*, revised edition, London: Thames and Hudson, 1991/2008.
- _____, and Bryan Sentance, *World Textiles*, London: Thames and Hudson, 1999.
- Ginsburg, Madeleine, editor, *The Illustrated History of Textiles*, New York: Portland House, 1991.
- Gittinger, Mattiebelle, *Splendid Symbols: Textiles and Tradition in Indonesia*, updated edition, Singapore: Oxford University Press, 1979/1991.
- Gloag, John, *A Social History of Furniture Design from B.C. 1300 to A.D. 1960*, New York: Bonanza Books, 1966.

- Glob, P. V., reprint, *The Bog People: Iron Age Man Preserved*, Ithaca: Cornell University Press, 1969/1988.
- Goffen, Rona, *Museums Discovered: The Calouste Gulbenkian Museum*, Greenwich, CT: New York Graphic Society, 1982.
- Goldstein, Sidney M., Leonard S. Rakow, and Juliette K. Rakow, *Cameo Glass: Masterpieces from 2000 Years of Glassmaking*, Corning: The Corning Museum of Glass, 1982.
- Goodwin, Jill, *A Dyer's Manual*, Hessle, England: Ashmans Publications, 1982.
- Gordon, Beverly, *Textiles: The Whole Story*, New York: Thames and Hudson, 2011.
- Gordon, John Stewart, *American Glass: The Collections at Yale*, New Haven: Yale University Press, 2018.
- Goswamy, B. N., *Indian Costumes in the Collection of the Calico Museum of Textiles*, third edition, Ahmedabad, India: Calico Museum, 1992/2010.
- Graham-Campbell and James Dafydd Kidd, *The Vikings*, New York: Tabard Press, 1980.
- Graves, Margaret S., et al, *Ceramic Art*, Princeton: University of Princeton Press, 2023.
- Green, Kevin, *Roman Pottery*, Berkeley: University of California Press, 1992.
- Greenbaum, Toni, *Messengers of Modernism: American Studio Jewelry 1940-1960*, Paris: Flammarion, 1996.
- Greenhalgh, Paul, *Ceramic Art and Civilisation*, London: Bloomsbury, 2021.
- Grierson, Su, reprint, *The Color Cauldron: The History and Use of Natural Dyes in Scotland*, Perth, Scotland: Mill Books, 1986/1989.
- Groneman, Isaïc, *The Javanese Kris*, Leiden, the Netherlands: C. Zwartenkot Art Books, 2009.
- Grose, David Frederick, *Early Ancient Glass*, New York: Hudson Hill Press, 1989.
- Gruber, Alain, editor, *The History of Decorative Arts: The Renaissance and Mannerism in Europe*, New York: Abbeville Press, 1994.
- Gusler, Wallace B., reprint, *Furniture of Williamsburg and Eastern Virginia 1710-1790*, Williamsburg: The Colonial Williamsburg Foundation, 1979/1993.
- Gutarp, Else Marie, *Medieval Manner of Dress: Documents, Images, and Surviving Examples of Northern Europe, Emphasizing Gotland in the*

- Baltic Sea*, Gotland, Sweden: Gotlands Fornsal, 2001.
- Guy, John, *Woven Cargoes: Indian Textiles in the East*, New York: Thames and Hudson, 1998.
- Hall, Barry, *From Mud to Music: Making and Enjoying Ceramic Musical Instruments*, Westerville, OH: The American Ceramic Society, 2015.
- Hall, Rosalind, reprint, *Egyptian Textiles*, Aylesbury, England: Shire Publications, 1986/1990.
- Hald, Margrethe, *Ancient Danish Textiles from Bogs and Burials*, Denmark: The National Museum of Denmark, 1980.
- Hamer, Frank, and Janet Hamer, *The Potters Dictionary of Materials and Techniques*, sixth edition, London: Herbert Press, 1975/2024.
- Harden, Donald B., *Glass of the Caesars*, Milan: Olivetti, 1987.
- Harris, Jennifer, editor, *5,000 Years of Textiles*, Washington, DC: Smithsonian Books, 2011.
- Harrod, Tanya, *The Crafts in Britain in the 20th Century*, New York: Bard Graduate Center, Yale University Press, 1999.
- _____, editor, *Craft*, Cambridge: MIT Press, 2018.
- Harvey, Janet, *Traditional Textiles of Central Asia*, London: Thames and Hudson, 1997.
- Haslam, Jeremy, *Medieval Pottery*, second edition, Aylesbury, England: Shire Publications, 1978/1989.
- Hauser-Schäublin, Brigitta, Marie-Louise Nabholz-Kartaschoff, and Urs Ramseyer, *Balinese Textiles*, Singapore: Periplus Editions, 1997.
- Hecht, Ann, *The Art of the Loom: Weaving Spinning and Dyeing across the World*, New York: Rizzoli, 1989.
- Hedlund, Ann Lane, *Reflections of the Weaver's World*, Denver: Denver Art Museum, 1992.
- Heinrich, Tanya, editor, *Lenore Tawny: Mirror of the Universe*, Chicago: The University of Chicago Press, 2019.
- Heisinger, Kathryn B., *Porcelain*, Philadelphia: Philadelphia Museum of Art, 1984.
- Held, Shirley E., *Weaving: A Handbook of the Fiber Arts*, third edition, Belmont, CA: Thomson Wadsworth, 1973/1999.
- Herald, Jacqueline, *World Crafts*, Asheville: Lark Books, 1992.

- Harvey, Nancy, *Tapestry Weaving: A Comprehensive Guide*, Loveland: Interweave Press, 1991.
- Heringa, Rens, and Harmen C. Veldhuisen, et. al., *Fabric of Enchantment: Batik from the North Coast of Java*, Los Angeles: Weatherhill, 1996.
- Herodotus, *The History*, translated by David Greene, Chicago: University of Chicago Press, 440 BCE/1988.
- Hess, Catherine, editor, *The Arts of Fire: Islamic Influences on Glass and Ceramics of the Italian Renaissance*, Los Angeles: The J. Paul Getty Museum, 2004.
- Hewitt, Mark, and Nancy Sweezy, *The Potter's Eye: Art and Tradition in North Carolina Pottery*, Chapel Hill: University of North Carolina Press, 2005.
- Heyl, Norbert, and Cristina Gregorin, *Venice Master Artisans*, Italy: Edizioni Grafiche Vianello, 2003.
- Hill, Sarah H., *Weaving New Worlds: Southeastern Cherokee Women and their Basketry*, Chapel Hill: University of North Carolina Press, 1997.
- Hirschstein, Joshua, and Maren Beck, *Silk Weavers of Hill Tribe Laos*, Loveland: Thrums Books, 2017.
- Hitchcock, Michael, *Indonesian Textile Techniques*, Aylesbury, England: Shire Publications, 1985.
- Hodges, Henry, *Technology in the Ancient World*, NY: Barnes and Noble Books, 1970/1992.
- Hoffmann, Marta, reprint, *The Warp-Weighted Loom*, Oslo, Norway: Robin and Russ Handweavers, 1964/1974.
- Holyoke, Julie, *Digital Jacquard Design*, London: Bloomsbury, 2013.
- Holm, Bill, *Northwest Coast Indian Art: An Analysis of Form*, 50th Anniversary edition, Seattle: University of Washington Press, 1962/2015.
- Hope, Colin, *Egyptian Pottery*, Aylesbury, England: Shire Publications, 1987.
- Holcomb, Melanie, editor, *Jewelry: The Body Transformed*, New Haven: Yale University Press, 2018.
- Horton, Elizabeth T., "Ancient Innovations: Rivercane Basketry from Cobb Cave," *Artifact of the Month*, October, 2019, <https://archeology.uark.edu/artifacts/cobbcavebasketry/>

- Horn, Robyn, *Living with Form: The Horn Collection*, Little Rock: Arkansas Arts Center and Bradley Publishing, 1999.
- Hurst, Ronald L., and Jonathan Prown, *Southern Furniture 1680-1830: The Colonial Williamsburg Collection*, New York: Harry N. Abrams, 1997.
- Jackson, Anna, editor, *Kimono: Kyoto to Catwalk*, London: Victoria and Albert Museum, 2022.
- Jain, Rahul, *Mughal Patkas, Ashavali Saris, and Indo-Iranian Metal-Ground Fragments in the Collection of the Calico Museum of Textiles and the Sarabhai Foundation*, Ahmedabad, India: Sarabhai Foundation, 2008.
- _____, *Rapture: The Art of Indian Textiles*, New Delhi: Niyogi Books, 2011.
- _____, *Mughal Velvets in the Collection of the Calico Museum of Textiles*, Ahmedabad, India: Sarabhai Foundation, 2011.
- _____, *Textiles and Garments at the Jaipur Court*, New Delhi: Niyogi Books, 2016.
- Jaitly, Jaya, *Crafts Atlas of India*, New Delhi: Niyogi Books, 2012.
- _____, *Woven Textiles of Varanasi*, New Delhi: Niyogi Books, 2014.
- Jefferies, Janis, editor, *The Handbook of Textile Culture*, London: Bloomsbury Visual Arts, 2016.
- Jenkins, David, editor, *The Cambridge History of Western Textiles*, Cambridge: Cambridge University Press, 2003.
- Jernigan, W. Wesley, *Jewelry of the Prehistoric Southwest*, Santa Fe: School of American Research, 1978.
- Johnston, Meda Parker, and Glen Kaufman, *Design on Fabrics*, New York: Reinhold Publishing Corporation, 1967.
- Jonaitis, Aldona, *Art of the Northwest Coast*, Seattle: University of Washington Press, 2006.
- Jones, Julie, *The Art of Pre-Columbian Gold: The Jan Mitchell Collection*, Boston: Little, Brown and Company, 1985.
- Jordan, John, "Turned and Carved Hollow Vessel" in *American Woodturner*, https://www.johnjordanwoodturning.com/uploads/9/6/4/2/9642134/american_woodturner_-_turned_and_carved_hollow_vessel_use_this_one.pdf, Spring 2009: 52-63.
- Jørgensen, Lise Bender, *North European Textiles until AD 1000*, Aarhus, Denmark: Aarhus University Press, 1992.

- Kaeppler, Adrienne L., *The Pacific Arts of Polynesia and Micronesia*, Oxford: Oxford University Press, 2008.
- Kalter, Johannes, *The Arts and Crafts of Turkestan*, London: Thames and Hudson, 1984.
- Kangas, Matthew, John Perreault, Edward S. Cooke, Jr., and Tran Turner, *Expressions in Wood: Masterworks from the Wornick Collection*, Seattle: University of Washington Press, 1996.
- Kangas, Matthew, *Craft and Concept: The Rematerialization of the Art Object*, New York: Midmarch Arch Press, 2006.
- Kardon, Janet, editor, *The Ideal Home: The History of Twentieth Century American Craft, 1900-1920*, New York: Harry N. Abrams, 1993.
- _____, editor, *Revivals! Diverse Traditions: The History of Twentieth Century American Craft, 1920-1945, African-American, Appalachian, Colonial Revival, Hispanic, Native American*, New York: Harry N. Abrams, 1994.
- _____, editor, *Craft in the Machine Age: The History of Twentieth Century American Craft, 1920-1945*, New York: Harry N. Abrams, 1995.
- Karmason, Marilyn G., and Joan B. Stacke, *Majolica: A Complete History and Illustrated Survey*, New York: Harry Abrams, 1989.
- Kartiwa, Suwati, *Kain Songket Indonesia: Songket-Weaving in Indonesia*, third edition, Jakarta, India: Penerbit Djambatan, 1989/1996.
- Katz, Marshall P., and Robert Lehr, *Palissy Ware: Nineteenth Century French Ceramists from Avisaieu to Renoleau*, London: The Athlone Press, 1996.
- Kelsey, John, editor, *Fine Woodworking on Bending Wood*, Newtown, CT: Taunton Press, 1985.
- Kent, Kate Peck, *Pueblo Indian Textiles: A Living Tradition*, Santa Fe: School of American Research Press, 1983.
- Kerlogue, Fiona, *Batik: Design, Style and History*, London: Thames and Hudson, 2004.
- Khatri, Ismail, Judy Frater, and Latha Tummuru, *The Art of the Dyer in Kutch: Traditional Block Printed Textiles: Culture and Technique*, Middletown, DE: Kindle Direct Publishing, 2021.
- King, Brenda M., *The Wardle Family and its Circle: Textile Production in the Arts and Crafts Era*, Woodbridge, England: The Boydell Press, 2019.
- Kingery, W. David, and Pamela B. Vandiver, *Ceramic Masterpieces: Art, Structure, Technology*, New York: The Free Press, 1986.

- Kirkham, Pat. and Susan Weber, editors, *History of Design: Decorative Arts and Material Culture, 1400-2000*, New York: Bard Graduate Center, 2013.
- Klein, Dan, and Ward Lloyd, editors, *The History of Glass*, London: McDonald and Co, 1991.
- Klein, Kathryn, editor, *The Unbroken Thread: Conserving the Textile Traditions of Oaxaca*, Los Angeles: The Getty Conservation Institute, 1997.
- Knöpfli, Hans, *Crafts and Technologies: Some Traditional Craftsmen of the Western Grasslands of Cameroon*, London: British Museum, 1997.
- _____, *Sculpture and Symbolism, Crafts and Technologies: Some Traditional Craftsmen of the Western Grasslands of Cameroon, Part 2: Woodcarvers and Blacksmiths*, Limbe, Cameroon: Presbook, 1998.
- _____, *Grasland: Eine Afrikanische Kultur*, Wuppertal, Germany: Peter Hammer Verlag, 2008.
- Koeninger, Kay, Mary Davis MacNaughton, and Martha Drexler Lynn, *Revolution in Clay: The Marer Collection of Contemporary Ceramics*, Seattle: University of Washington Press, 1994.
- Koeppe, Wolfram, editor, *Making Marvels: Science and Splendor at the Courts of Europe*, New Haven: Yale University Press, 2019.
- Kopf, Silas, *A Marquetry Odyssey: Historical Objects and Personal Work*, Manchester, VT: Hudson Hills Press, 2008.
- Koplos, Janet, and Bruce Metcalf, *Makers: A History of American Studio Craft*, Chapel Hill: The University of North Carolina Press, 2010.
- Kumar, Ritu, reprint, *Costumes and Textiles of Royal India*, Suffolk: Antique Collectors' Club, 1999/2006.
- Kuo, Susanna, *Katagami: Japanese Textile Stencils in the Collection of the Seattle Art Museum*, Seattle: Seattle Art Museum, 1985.
- Laing, Lloyd and Jennifer Laing, *The Art of the Celts*, London: Thames and Hudson, 1992.
- Lamb, Venice, *West African Weaving*, London: Duckworth, 1975.
- _____, and Judy Holmes, *Nigerian Weaving*, Hertingfordbury, Great Britain: Roxford Books, 1980.
- _____, and Alastair Lamb, *Au Cameroun: Weaving – Tissage*, Hertingfordbury, Great Britain: Roxford Books, 1981.

- Langsner, Drew, *The Chairmaker's Workshop: Handcrafting Windsor and Post-and-Rung Chairs*, Asheville: Lark Books, 1997.
- Lauria, Jo, and Steve Fenton, *Craft in America*, New York: Clarkson Potter, 2007.
- Larson, Jack Lenor, *The Dyers Art: Ikat, Batik, Plangi*, New York: Van Nostrand Reinhold, 1977.
- Lavalle, José Antonio de, *Cobre del Antiguo Peru, The Copper of Ancient Peru*, Lima, Perú: AFP Integra, 1998.
- Laver, James, *Costume and Fashion: A Concise History*, revised edition, New York: Thames and Hudson, 1969/1995.
- Leach, Bernard, *Kenzan and His Tradition: The Lives and Times of Koetsu, Sotatsu, Korin and Kenzan*, New York: Transatlantic Arts, 1966/1967.
- _____, *Hamada Potter*, Tokyo: Kodansha International, 1975.
- _____, *A Potter's Book*, edited reprint, London: Unicorn Press, 1940/2015.
- Lee, Dayna Bowker, and H. F. Gregory, editors, *The Work of Tribal Hands: Southeastern Indian Split Cane Basketry*, Natchitoches, LA: Northwestern State University Press, 2006.
- Lee, Lawrence, George Seddon, and Francis Stephens, *Stained Glass*, Secaucus: Chartwell Books, 1976/1989.
- LeFree, Betty, *Santa Clara Pottery Today*, Albuquerque: University of New Mexico Press, 1975.
- Leftwich, Rodney L., *Arts and Crafts of the Cherokee*, Cherokee, NC: Cherokee Publications, 1970.
- Legge, Margaret, *Three Centuries of Wedgwood: Art, Industry, and Design*, Melbourne: National Gallery of Victoria, 1995.
- Levey, Santina M., *Lace: A History*, London: Victoria and Albert Museum, 1983.
- Levin, Elaine, *The History of American Ceramics: From Pipkins and Bean Pots to Contemporary Forms*, New York: Harry N. Abrams, 1988.
- Levine, Marc N., "Ceramic Molds for Mixtec Gold: A New Lost-Wax Casting Technique from Prehispanic Mexico," in *Journal of Archaeological Method and Theory*, June 2019, 26: 423-456.
- Lin, Zhang, *The Qin Dynasty Terra-Cotta Army of Dreams*, Xi'an, China: Xi'an Press, 2005.
- Litto, Gertrude, *South American Folk Pottery*, New York: Watson-Guptill Publications, 1976.

- Livingstone, Andrew, and Kevin Petrie, editors, *The Ceramics Reader*, London: Bloomsbury, 2017.
- Lopez, Ana M., *Metalworking Through History*, Westport, CT: Greenwood Press, 2009.
- Lucas, A., and J. R. Harris, *Ancient Egyptian Materials and Industries*, revised fourth edition, London: Histories and Mysteries of Man Ltd, 1926/1989.
- Lucero, Helen R., and Suzanne Baizerman, *Chimayó Weaving: The Transformation of a Tradition*, Albuquerque: University of New Mexico Press, 1999.
- Lucie-Smith, Edward, *The Story of Craft: The Craftsman's Role in Society*, New York: Van Nostrand Reinhold Company, 1981/1984.
- _____, Edward, *Furniture: A Concise History*, London: Thames and Hudson, 1985.
- _____, *The Art of Albert Paley: Iron, Bronze, Steel*, New York: Harry N. Abrams, 1996.
- Lynggaard, Finn, *Pottery: Raku Technique*, translated from Danish by Joan Bulman, New York: Van Nostrand Reinhold, 1970/1973.
- Lynn, Martha Drexler, *Clay Today: Contemporary Ceramists and Their Work*, San Francisco: Chronicle Books, 1990.
- Mack, John, *Malagasy Textiles*, Aylesbury, England: Shire Publications, 1989.
- Mackie, Louise W., *Symbols of Power: Luxury Textiles from Islamic Lands, 7th-21st Century*, New Haven: Yale University Press, 2015.
- MacNaughton, Mary Davis, *Revolution in Clay: The Marer Collection of Contemporary Ceramics*, Seattle: University of Washington Press, 1994.
- Mallett, Marla, *Woven Structures: A Guide to Oriental Rug and Textile Analysis*, Atlanta: Christopher Publications, 1998.
- Mallon, Sean, *Samoan Art and Artists: O Measina a Samoa*, Honolulu: University of Hawaii Press, 2002.
- Manginis, George, *China Rediscovered: The Benaki Museum Collection of Chinese Ceramics*, London: Haus Publishing, 2016.
- Manners, Errol, *Ceramics Source Book: A Visual Guide to a Century of Ceramics*, London: Grange Books, 1997.

- Markowitz, Yvonne J., and Susanne Gänsicke, *Beyond Adornment: Jewelry and Identity in Art*, Los Angeles: J. Paul Getty Museum, 2025.
- Matos, Maria Antónia Pinto de, and João Pedro Monteiro, *Oriental Influence on 17th Century Portuguese Ceramics*, translated by Elizabeth Plaister, Lisbon, Portugal: Electa, 1994.
- Mau, August, translated by Francis Kelsey, *Pompeii, Its Life and Art*, Project Gutenberg eBook, 1902/2013,
<https://www.gutenberg.org/files/42715/42715-h/42715-h.htm#fig167>
- Maxwell, Robyn, *Textiles of Southeast Asia: Tradition, Trade and Transformation*, revised edition, Singapore: Periplus Editions, 1990/2003.
- _____, *Sari to Sarong: Five Hundred Years of Indian and Indonesian Textile Exchange*, Canberra: National Gallery of Australia, 2003.
- McFadden, Davie Revers, et al, *Elegant Fantasy: The Jewelry of Arline Fisch*, San Diego: Arnoldshe Art Publishers, 1999.
- McGrath, Jinks, *The Encyclopedia of Jewelry-Making Techniques*, Philadelphia: Running Press, 1995.
- McKay, Mary Terrence, and Lisa Trujillo, *The Centinela Weavers of Chimayo: Unfolding Tradition*, Chimayo, NM: Centinela Traditional Arts, 1999.
- McKinnon, Jean, *Vessels of Life: Lombok Earthenware*, Bali, Indonesia: Saritaksu, 1996.
- McCreight, Tim, *Complete Metalsmith*, Portland, ME: Brynmorgen Press, 2004.
- Medley, Margaret, *The Chinese Potter*, third edition, New York: Phaidon Press, 1976/2001.
- Meisch, Lynn A., editor, *Traditional Textiles of the Andes: Life and cloth in the Highlands*, London: Thames and Hudson, 1997.
- Mera, H. P., *Spanish-American Blanketry: Its Relationship to Aboriginal Weaving in the Southwest*, Santa Fe: School of American Research Press, 1987.
- Meyer, Marilee Boyd, and David Acton, *Inspiring Reform: Boston's Arts and Crafts Movement*, New York: Harry N. Abrams, 1997.
- Miller, Mary Ellen, *Maya Art and Architecture*, second edition, London: Thames and Hudson, 2014.

- _____, *The Art of Mesoamerica*, sixth edition, London: Thames and Hudson, 2019.
- Mindling, Eric Sebastian, *Oaxaca Stories in Cloth: A Book about People, Belonging, Identity, and Adornment*, Loveland: Thrums Books, 2016.
- Mirza, Viloo, and Vinutha Mallya, editors, *Handloom and Handicrafts of Gujarat*, Ahmedabad, India: Mapin Publishing, 2012.
- Mohanty, Bijoy Chandra, K. V. Chandramouli, and H. D. Naik, *Natural Dyeing Processes of India*, Ahmedabad, India: Calico Museum of Textiles, 1987.
- _____, *Ikat Fabrics of Orissa and Andhra Pradesh*, second revised edition, Ahmedabad, India: Calico Museum of Textiles, 1974/2003.
- Monroe, Michael W., *The White Collection of American Crafts*, New York: Harry N. Abrams, 1995.
- Montupet, Janine, and Ghislaine Schoeller, *Lace: The Elegant Web*, New York: Harry N. Abrams, 1990.
- Moraga, Vanessa Drake, *Weaving Abstraction: Kuba Textiles and the Woven Art of Central Africa*, Washington, DC: The Textile Museum, 2011.
- Morley, John, *The History of Furniture: Twenty-Five Centuries of Style and Deign in the Western Tradition*, Boston: Bullfinch Press, 1999.
- Morrell, Anne, *The Techniques of Indian Embroidery*, London: B. T. Batsford Ltd, 1994.
- Morley-Fletcher, Hugo, editor, *Techniques of the World's Great Masters of Pottery and Ceramics*, Edison: Chartwell Books, 1997.
- Morris, Kathleen M., *The Art of Iron: Objects from the Musée Le Secq des Tournelles, Rouen, Normandy*, New Haven: Yale University Press, 2018.
- Morris, Walter F., Jr., *Living Maya*, New York: Harry Abrams, 1987.
- _____, Alfredo Martínez, Janet Schwartz, and Carol Karasik, *Guía Textil de los Altos de Chiapas / A Textile Guide to the Highlands of Chiapas*, Loveland: Thrums Books, 2011.
- _____, and Carol Karasik, *Maya Threads: A Woven History of Chiapas*, Loveland: Thrums, 2015.
- Munsterber, Hugo and Marjorie, *World Ceramics from Prehistory to Modern Times*, New York: Penguin Studio Books, 1998.
- Murphy, Veronica, and Rosemary Crill, *Tie-Dyed Textiles of India*, New York: Rizzoli, 1991.

- Muthesius, Anna, "From Seed to Samite: Aspects of Byzantine Silk Production, *Textile History*, 20 (2), 135-49, 1989.
- Nash, June, editor, *Crafts in the World Market: The Impact of Global Exchange on Middle American Artisans*, Albany: State University of New York Press, 1993.
- Needleman, Carla, *The Work of Craft: An Inquiry into the Nature of Crafts and Craftsmanship*, NY: Kodansha International, 1993.
- Neel, David, *The Great Canoes: Reviving a Northwest Coast Tradition*, Seattle: University of Washington
- Neri, Antonio, translated by Christopher Merrett, Michael Cable, editor, *The Art of Glass*, The Society of Glass Technology, 1662/2006.
- Nestor, Sarah, editor, *Spanish Textile Tradition of New Mexico and Colorado*, Santa Fe: Museum of New Mexico Press, 1979.
- Newberry, Percy E., *Beni Hasan, Part 1*, London: Archaeological Survey of Egypt, 1893.
- Newton, Douglas, *The Pacific Islands, Africa, and the Americas*, New York: The Metropolitan Museum of Art, 1987.
- Nicholson, H. B., and Alana Cordy-Collins, *Pre-Columbian Art from the Land Collection*, San Francisco: California Academy of Science, 1979.
- Nicholson, Paul T., *Brilliant Things for Akhenaten: The Production of Glass, Vitreous Materials and Pottery at Amarna Site O45.1*, London: Egypt Exploration Society, 2007.
- Noble, Joseph Veach, *The Techniques of Painted Attic Pottery*, revised edition, New York: Thames and Hudson, 1965/1988.
- Nosan, Gregory, editor, *Clothed to Rule the Universe: Ming and Qing Dynasty Textiles at the Art Institute of Chicago*, Seattle: University of Washington Press, 2000.
- Ogden, Jack, *Jewellery of the Ancient World*, London: Trefoil Books, 1982.
- _____, *Diamonds: An Early History of the King of Gems*, New Haven: Yale University Press, 2018.
- Olney, Judith, *Choctaw Diagonal Twill Plaiting: A Workshop with Claude Medford, Jr.*, Westland, MI: MKS Publications, 1990.
- Orsi Landini, Roberta, and Bruna Niccoli, *Moda a Firenze 1540-1580 / Florentine Style 1540-1580*, Florence, Italy: Edizioni Polistampa, 2005.
- Osborne, Harold, editor, *The Oxford Companion to the Decorative Arts*, Oxford: Oxford University Press, 1991.

- Osborne, Lilly de Jongh, *Indian Crafts*, Norman: University of Oklahoma Press, 1975.
- Pachas, Ulla Holmquist, *Museo Larco: Treasures from Ancient Peru*, Lima, Peru: Asociación Rafael Larco Hoyle, 2010.
- Padilla, Carmella, and Barbara Anderson, editors, *A Red Like No Other: How Cochineal Colored the World: An Epic Story of Art, Culture, Science, and Trade*, New York: Skira Rizzoli, 2015.
- Page, Jutta-Annette, *The Art of Glass: Toledo Museum of Art*, Toledo: Toledo Museum of Art, 2006.
- Paludan, Liz, *Crochet: History and Technique*, English edition, Loveland: Interweave Press, 1986/1995.
- Parker, Mary S., *The Folkwear Book of Ethnic Clothing: Easy Ways to Sew and Embellish Fabulous Garments from Around the World*, New York: Lark Books, 2002.
- Parker, Rozsika, *The Subversive Stitch: Embroidery and the Making of the Feminine*, London: Bloomsbury Visual Arts, 2010/2021.
- Parry, Linda, *William Morris Textiles*, London: Weidenfeld and Nicolson, 1983.
- Pasztory, Esther, *Pre-Columbian Art*, Cambridge: Cambridge University Press, 1998.
- Pausanias, translated by Peter Levi, *Guide to Greece, Volume 2*, London: Penguin Books, 2nd century/1979.
- Paydar, Niloo Imami, and Ivo Grammet, *The Fabric of Moroccan Life*, Seattle: University of Washington Press, 2002.
- Paz, Octavio, *In Praise of Hands, Contemporary Crafts of the World*, Greenwich, CT: New York Graphic Society, 1974.
- Peck, Amelia, editor, *Interwoven Globe: The Worldwide Textile Trade, 1500-1800*, New Haven: Yale University Press, 2013.
- Pellatt, Apsley, *Curiosities of Glass Making*, London: David Bogue, 1849.
- Pete, Lynda Teller, and Barbara Teller Ornelas, *Spider Woman's Children: Navajo Weavers Today*, Loveland: Thrums Books, 2018.
- _____, and Barbara Teller Ornelas, *How to Weave a Navajo Rug and Other Lessons from Spider Woman*, Loveland: Thrums Books, 2020.
- Peterson, Susan, *Shoji Hamada: A Potter's Way and Work*, New York: Weatherhill, 1974/1995.

- Petiot, Fabien, and Chloé Braunstein-Kriegel, *Crafts: Today's Anthology for Tomorrow's Crafts*, Paris: Editions Norma, 2018.
- Pevsner, Nikolaus, *Pioneers of Modern Design: From William Morris to Walter Gropius*, fourth edition, New Haven: Yale University Press, 1936/2005.
- Phillips, Clare, *Jewelry*, London: Thames and Hudson, 1996.
- Phipps, Elena, *The Peruvian Four-Selvaged Cloth: Ancient Threads – New Directions*, Los Angeles: Fowler Museum at UCLA, 2013.
- Piatkiewicz-Dereniowa, Maria, *Delft Faience in the Collections of the Wawel Royal Castle*, Kraków, Poland: Malopolska Poligrafia, 1996.
- Piccolpasso, Cipriano, translated by Ronald Lightbrown and Alan Caiger-Smith, *The Three Books of the Potter's Art / Li Tre Libri dell'Arte del Vasaio*, London: Scolar Press, 1557/1980.
- Pickett, Barbara, "Rahul Jain's Reimagined Velvet Drawloom" in *The Social Fabric - Deep Local to Pan Global: Textile Society of America 16th Biennial Symposium Proceedings*, Vancouver, Canada, September 2018, <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2103&context=tsaconf>
- Picton, John, and John Mack, *African Textiles*, New York: Harper and Row, 1989.
- Piepenburg, Robert, *Raku Pottery*, New York: Collier Books, 1972.
- Pillsbury, Joanne, Miriam Doutriaux, Reiko Ishihara-Brito, and Alexandre Tokovinine, editors, *Ancient Maya Art at Dumbarton Oaks*, Washington, DC: Dumbarton Oaks Research Library and Collections, 2012.
- Piña, Leslie, *Furniture in History: 3000 B.C.-200 A.D.*, New Jersey: Prentice Hall, 2010.
- Piponnier, Françoise, and Perrine Mane, second English reprint, *Dress in the Middle Ages*, New Haven: Yale University Press, 1995/2000.
- Pitelka, Morgan, *Handmade Culture: Raku Potters, Patrons, and Tea Practitioners in Japan*, Honolulu: University of Hawaii Press, 2005.
- Pliny the Elder, translated by Henry T. Riley (Henry Thomas), *The Natural History / Naturalis Historia*, London: H. G. Bohn, 1855. <https://catalog.perseus.org/catalog/urn:cts:latinLit:phi0978.phi001.perseus-eng1>

- Poli, Doretta Davanzo, *The Spirit of Tradition: Eight Centuries of Venetian Velvets at the Tessitura Bevilacqua*, Venice: Cicero Editore, 2004.
- Postrel, Virginia, *The Fabric of Civilization: How Textiles Made the World*, New York: Basic Books, 2020.
- Potter, Annie Louise, *A Living Mystery: The International Art and History of Crochet*, United States of America: A. J. Publishing International, 1990.
- Power, Susan C., *Early Art of the Southeastern Indians*, Athens, GA: University of Georgia Press, 2004.
- Preu, Nancy, editor, *Defining Craft*, New York: American Craft Museum, 2000.
- Prior, Katherine, and John Adamson, *Maharajas' Jewels*, New York: Vendome Press, 2000.
- Pritchard, Frances, editor, *Crafting Textiles: Tablet Weaving, Sprang, Lace and other Techniques from the Bronze Age to the Early 17th Century*, Oxford: Oxbow Books, 2021.
- Proctor, Richard M., and Jennifer F. Lew, second printing, *Surface Design for Fabric*, Seattle: University of Washington Press, 1984/1985.
- Puma, Richard Daniel De, *Etruscan Art in the Metropolitan Museum of Art*, New Haven: Yale University Press, 2013.
- Raizman, David, *History of Modern Design*, Upper Saddle River, NJ: Prentice Hall, 2004.
- Raku Museum*, translated by Junko Ando, Turin, Italy: Umberto Allemandi, no date.
- Ranjan, Aditi, and M. P. Ranjan, *Handmade in India: A Geographical Encyclopedia of Indian Crafts*, New York: Abbeville Press, 2007.
- Rathbun, William Jay, *Beyond the Tanabata Bridge: Traditional Japanese Textiles*, New York: Thames and Hudson, 1993.
- Raymond, Pierre, *Marquetry*, revised English edition, Los Angeles: The J. Paul Getty Museum, 1978/2002.
- Raymond, Robert, *Out of the Fiery Furnace: The Impact of Metals on the History of Mankind*, University Park: The Pennsylvania State University Press, 1986.
- Rawson, Philip, *Ceramics*, fifth printing, Philadelphia: University of Pennsylvania Press, 1971/1984.

- Regensteiner, Else, *The Art of Weaving*, New York: Van Nostrand Reinhold Company, 1970.
- Rehren, Thilo, and Ian C. Freestone, "Ancient Glass: From Kaleidoscope to Crystal Ball," in *Journal of Archaeological Science*, April 2015, 56: 233-241.
- Rhodes, Daniel, *Kilns*, Philadelphia: Chilton Book Company, 1968.
- Ribeiro, Maria Queiroz, *Louças Iznik Pottery*, Lisbon, Portugal: Museu Calouste Gulbenkian, 1996.
- Ricardo do Espírito Santo Silva Foundation*, second edition, Lisbon: Printer Portuguesa, 1995/2002.
- Richter, Anne, *The Jewelry of Southeast Asia*, New York: Harry N. Abrams, 2000.
- Riley, Noël, *A History of Decorative Tiles*, London: Grange Books, 1987.
- Risatti, Howard, *A Theory of Craft: Function and Aesthetic Expression*, Chapel Hill: The University of North Carolina Press, 2007.
- Rivard, Paul E., *A New Order of Things: How the Textile Industry Transformed New England*, Hanover: University Press of New England, 2002.
- Rodgers, Susan, Anne Summerfield, and John Summerfield, *Gold Cloths of Sumatra: Indonesia's Songets from Ceremony to Commodity*, Leiden, Netherlands: KITLV Press, 2007.
- Ronald, Emma, *Ajrakh: Patterns and Borders*, Jaipur, India: Anokhi Museum of Hand Printing, 2007.
- _____, *Balotra: The Complex Language of Print*, Jaipur, India: Anokhi Museum of Hand Printing, 2007.
- Ross, Doran H., *Wrapped in Pride: Ghanaian Kente and African American Identity*, Los Angeles: UCLA Fowler Museum of Cultural History, 1998.
- Roth, H. Ling, *Ancient Egyptian and Greek Looms*, Halifax, England: Bankfield Museum, 1913.
- https://www.google.com/books/edition/Ancient_Egyptian_and_Greek_Looms/yiv0CdA4iaoC?hl=en&gbpv=1&pg=PA3&printsec=frontcover
- Rowe, Ann Pollard, *Warp-Patterned Weaves of the Andes*, Washington, DC: The Textile Museum, 1977.
- _____, *A Century of Change in Guatemalan Textiles*, New York: The Center for Inter-American Relations, 1981.

- _____, *Costumes and Featherwork of the Lords of Chimor: Textiles from Peru's North Coast*, Washington, DC: The Textile Museum, 1984.
- _____, *Costume and Identity in Highland Ecuador*, Washington, DC: The Textile Museum, 1998.
- _____, and John Cohen, *Hidden Threads of Peru: Q'ero Textiles*, London: Merrell, 2002.
- Rowland-Warne, L., *Costume*, New York: Alfred A. Knopf, 1992.
- Saltzman, Ellen Lewis, *Overshot Weaving*, New York, Van Nostrand Reinhold Company, 1983.
- Samuels, Cheryl, *The Chilkat Dancing Blanket*, Seattle: Pacific Search Press, 1982.
- _____, *The Raven's Tail*, Vancouver: University of British Columbia Press, 1987.
- Sandberg, Gösta, *Indigo Textiles: Technique and History*, English edition, London: A and C Black, 1986/1989.
- Sarabhai, Mrinalini, and Jasleen Dhamija, reprint, *Patolas and Resist Dyed Fabrics of India*, Ahmedabad, India: Mapin Publishing, 1988/1989.
- Sawyer, Alan R., *Ancient Peruvian Ceramics from the Kehl and Nena Markley Collection*, University Park, PA: Museum of Art, 1975.
- Sayer, Chloë, *Costumes of Mexico*, Austin: University of Texas Press, 1985.
- Schevill, Margot Blum, *Maya Textiles of Guatemala: The Gustavus A. Eisen Collection, 1902*, Austin: University of Texas Press, 1993.
- Schlein, Alice, and Bhakti Ziek, second printing, *The Woven Pixel: Designing for Jacquard and Dobby Looms Using Photoshop*, Greenville, SC: Bridgewater Press, 2006/2007.
- Schoeser, Mary, *World Textiles: A Concise History*, London: Thames and Hudson, 2003.
- Schreiber, Toby, *Athenian Vase Construction: A Potter's Analysis*, Malibu: The J. Paul Getty Museum, 1999.
- Scott, Philippa, *The Book of Silk*, London: Thames and Hudson, 1993.
- Secretan, Thierry, reprint, *Going into Darkness: Fantastic Coffins from Africa*, London: Thames and Hudson, 1994/1995.
- Seiler-Baldinger, Annemarie, *Textiles: A Classification of Techniques*, Washington, DC: Smithsonian Institution Press, 1994.
- Selk, Karen, *In Search of Wild Silk: Exploring a Village Industry in the Jungles of India*, Atglen, PA: Schiffer Publishing, 2022.

Sembach, Klaus-Jürgen, Gabriele Leuthäuser, and Peter Gössel, *Twentieth-Century Furniture Design*, Germany: Taschen, 1991.

Sennett, Richard, *The Craftsman*, New Haven: Yale University Press, 2008.

Sentance, Bryan, *Wood: The World of Woodwork and Carving*, London: Thames and Hudson, 2003.

_____, *Ceramics: A World Guide to Traditional Techniques*, London: Thames and Hudson, 2004.

Shadbolt, Doris, *Bill Reid*, Seattle: University of Washington Press, 1998.

Shales, Ezra, *The Shape of Craft*, London: Reaktion Books, 2017.

Shapiro, H. Alan, Carlos A. Picón, and Gerry D. Scott, III, editors, *Greek Vases in the San Antonio Museum of Art*, San Antonio: San Antonio Museum of Art, 1995.

Sherr Dubin, Lois, *Glittering World: Navajo Jewelry of the Yazzie Family*, Washington, DC: National Museum of the American Indian, 2014.

Shortland, Andrew, *Lapis Lazuli from the Kiln: Glass and Glassmaking in the Late Bronze Age*, Leuven, Belgium: Leuven University Press, 2012.

Skidmore, Suki, reprint, *Sanganer: Traditional Textiles - Contemporary Cloth*, Jaipur, India: Anokhi Museum of Hand Printing, 2009/2013.

_____, *Hand Blockopedia*, Jaipur, India: Anokhi Museum of Hand Printing, 2014.

Smayda, Norma, Gretchen White, Jody Brown, and Katherine Schelleng, *Weaving Designs by Bertha Gray Hayes; Miniature Overshot Patterns*, Atglen, PA: Schiffer Publishing, 2009.

Sober, Marion Burr, *Chair Seat Weaving for Antique Chairs*, Manchester, Ct: Finestkind Books, 1964.

Sonntag, Hans, translated by Victor Dewsbery, *Meissen in Meissen*, third edition, Germany: Edition Leipzig, 2000/2007.

Sparke, Penny, *An Introduction to Design and Culture*, fourth edition, London: Routledge, 1986/2020.

Sperlich, Norbert, and Elizabeth Katz Sperlich, *Guatemalan Backstrap Weaving*, Norman: University of Oklahoma Press, 1980.

Spivey, Richard L. *The Legacy of Maria Povenka Martinez*, Santa Fe: Museum of New Mexico Press, 2003.

Spring, Christopher, *African Textiles*, Wakefield, RI: Moyer Bell, 1997.

St Clair, Kassia, *The Golden Thread*, London: John Murray, 2018.

- Staniland, Kay, *Medieval Craftsmen Embroiderers*, London: British Museum Press, 1991.
- Steel, Hillary, *Ikat Traditions: The Mexican Jaspe Rebozo*, Hillary Steel, 2024.
- Stevenson, alic, editor, *The Petrie Museum of Egyptian Archaeology: Characters and Collections*, London: UCL Press, 2015.
- Stewart, Hilary, *Cedar: Tree of Life to the Northwest Coast Indians*, Seattle: University of Washington Press, 1884.
- Stern, E. Marianne, and Birgit Schlick-Nolte, *Early Glass of the Ancient World, 1600 B.C. – A.D.50*, Germany: Verlag Gerd Hatje, 1994.
- Stone, Michael A., *Contemporary American Woodworkers*, Salt Lake City: Gibbs M. Smith, 1986.
- Stone-Miller, Rebecca, *To Weave for the Sun: Ancient Andean Textiles in the Museum of Fine Arts, Boston*, New York: Thames and Hudson, 1982.
- Strickler, Carol, *American Woven Coverlets*, Loveland: Interweave Press, 1987.
- Sullivan, Donna Lee, *Weaving Overshot: Redesigning the Tradition*, Loveland: Interweave Press, 1996.
- Taber, Barbara, and Marilyn Anderson, *Backstrap Weaving: Step-by-Step Techniques on one of the Oldest and Most Versatile Looms*, New York: Watson-Guptill Publications, 1975.
- Tait, Hugh, editor, *Glass: 5,000 Years*, New York: Harry N. Abrams, 1991.
- _____, editor, *Jewelry: 7,000 Years*, New York: Harry N. Abrams, 1991.
- Tanavoli, Parviz, *Persian Flat Weaves: A Survey of Flatwoven Floor covers and Hangings and Royal Masnads*, Woodbridge, England: Antique Collectors' Club Ltd, 2002.
- Tarlo, Emma, *Clothing Matters: Dress and Identity in India*, Chicago: University of Chicago Press, 1996.
- Tate Museum, *Faith Ringgold: In Conversation – Tate Talks*, London, 2018, <https://www.youtube.com/watch?v=g5tbljNwyrq>
- Teague, Ken, *Metalcrafts of Central Asia*, Princes Risborough, England: Shire Publications, 1990.
- Teague, Lynn S., *Textiles in Southwestern Prehistory*, Albuquerque, University of New Mexico Press, 1998.
- Terraroli, Valerio, *Skira Dictionary of Modern Decorative Arts 1851-1942*, Milan: Skira, 2001.

- Thomas, Nicholas, *Oceanic Art*, second edition, London, England: Thames and Hudson, 2018.
- Thompson, Paul, *The Works of William Morris*, third edition, Oxford: Oxford University Press, 1967/1993.
- Thurman, Christa C. Mayer, *Textiles in the Art Institute of Chicago*, Chicago: Art Institute of Chicago, 1992.
- Tomita, Jun, and Noriko Tomita, *Japanese Ikat Weaving*, London: Routledge and Kegan Paul, 1982.
- Torgenrud, Heather, *Norwegian Pick-Up Bandweaving*, Atglen, PA: Schiffer Publishing, 2014.
- Toso, Gianfranco, *Murano: A History of Glass*, Italy: Arsenale Editrice, 2000/2007.
- Trapp, Kenneth R., and Howard Risatti, *Skilled Work: American Craft in the Renwick Gallery*, Washington, DC: Smithsonian Institution Press, 1998.
- Treasures of Tutankhamun*, New York: Metropolitan Museum of Art, 1976.
- Trench, Lucy, editor, *Materials and Techniques of the Decorative Arts: An Illustrated Dictionary*, Chicago: University of Chicago Press, 2000.
- Tsunoyama, Yyukihiro, editor, *Textiles of the Andes: Catalog of Amano Collection*, English edition, San Francisco: Heian International, 1977/1979.
- Tunis, Edwin, *Colonial Craftsmen and the beginning of American Industry*, Baltimore: The Johns Hopkins University Press, 1965.
- Turok, Marta, *Cómo Acercarse a la Artesanía*, Mexico: Plaza y Valdes, 1988.
- _____, "Un Acercamiento al Significado de El Huipil Ceremonial de Magdalenas, Chiapas," presentation, November 5, 2015, <https://www.youtube.com/watch?v=AWxM3NC1rfc>
- _____, editor, reprint, *El Caaracol Púrpura: Una Tradición milenaria en Oaxaca*, Mexico: Ediciones Corunda, 1988/2003.
- Tylecote, R. F., *A History of Metallurgy*, second edition, London: Maney Publishing, 1976/2002.
- Ulmer, Sean M. *Uncommon Threads: Contemporary Artists and Clothing*, Ithaca, NY: Herbert F. Johnson Museum of Art, 2000.
- Untracht, Oppi, *Metal Techniques for Craftsmen*, Garden City, New York: Doubleday and Company, 1968.
- _____, *Jewelry Concepts and Technology*, Garden City, New York: Doubleday and Company, 1982.

- Van Duuren, David, *The Kris*, Wijk en Aalburg, the Netherlands: Pictures Publishers, 1998.
- Van Lemmen, Hans, *5000 Years of Tiles*, Washington, DC: Smithsonian Books, 2013.
- Van Roojen, Pepin, *Batik Design*, Boston: Shambhala, 1997.
- Van Stralen, Trudy, *Indigo, Madder, and Marigold: A Portfolio of Colors from Natural Dyes*, Loveland: Interweave Press, 1993.
- Ventura, Carol, "Sisal Production in Highland Guatemala," *FiberArts*, March/April 1987: 44-45.
- _____, "Guatemalan Cotton Spinners," *Shuttle Spindle and Dyepot*, Winter 1988/1989: 47-49.
- _____, "Sisal: Its History and Production in Jacaltenango, Guatemala," *Ars Textrina*, 1989, 11: 107-152.
- _____, "A Traditional Mayan Corn Strainer," *Ceramic Review*, July/August 1989: 32-34.
- _____, "Choctaw Cane Baskets," *Shuttle Spindle and Dyepot*, Summer 1990: 56-58.
- _____, "Native American Paper, Pottery, Spinning, Weaving, and Printing" essay, illustrations, and catalog entries included in *Testimony of Images: Pre-Columbian Art*, Donald McVicker, editor, Miami University Art Museum, Oxford, OH, 1992: 124-140, 173-200.
- _____, "Pre-Columbian Spindle Whorls," *Shuttle Spindle and Dyepot*, Fall 1994: 45-48.
- _____, "Pre-Columbian Press Molds," *Ceramics Monthly*, November 1994: 12-16.
- _____, "The Interrelationship of Weaving with Fertility in Mesoamerica," *Ars Textrina*, June 1994, 21: 179-221.
- _____, *More Tapestry Crochet*, Carol Ventura, Cookeville, TN, 2002.
- _____, "An Ongoing Haida Tradition: Cedar-Bark Hats," *Shuttle Spindle and Dyepot*, Spring 2002: 40-45.
- _____, *Maya Hair Sashes Backstrap Woven in Jacaltenango, Guatemala / Cintas Mayas Tejidas con el Telar de Cintura en Jacaltenango, Guatemala*, Carol Ventura, Cookeville, TN, 2003.
- _____, "A Maya Ceramics Tradition Survives in the Yucatan," *Ceramics Monthly*, December 2003: 64-65.

- _____, "Raphia-Palm Basketmaking in Western Cameroon, Africa," *Shuttle Spindle and Dyepot*, Winter 2003/2004: 21-24.
- _____, "Traditions of the Haida Gwaii," *Woodcarving Magazine*, May/June 2004, 78:56-59.
- _____, "Women's Hair Sashes of Mesoamerica" chapter included in *Berg Encyclopedia of World Dress and Fashion: Latin America and the Caribbean*, Vol. II, Margot Blum Schevill, volume editor, Berg, Oxford, 2010: 208-214.
- _____, "The Twenty-first Century Voices of the Ashanti Adinkra and Kente Cloths of Ghana," in *Textiles and Politics: Textile Society of America 13th Biennial Symposium Proceedings*, Washington, DC, September 2012, <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1750andcontext=tsaconf>
- _____, "A Trip to Dye For: Purpura Patula Pansa Mollusks in Oaxaca, Mexico," *Shuttle Spindle and Dyepot*, Summer 2019: 37-41.
- Verlet, Pierre, Michel Florisoone, Adolf Hoffmeister, and François Tabard, *The Book of Tapestry: History and Technique*, New York: Vendome Press, 1965.
- Villechenon, Marie-Noëlle Pinot de, *Sèvres Porcelain from the Sévres Museum: 1740 to the Present day*, translated by John Gilbert, London: Lund Humphries Publishers, 1993/1997.
- Vincent, Gilbert T., *Masterpieces of American Indian Art from the Eugene and Clare Thaw Collection*, New York: Harry N. Abrams, 1995.
- Von Neuman, Robert, *The Design and Creation of Jewelry*, third edition, Philadelphia: Chilton Book Company, 1982.
- Wada, Yoshiko, Mary Kellogg rice, and Jane Barton, *Shibori: The Inventive Art of Japanese Shaped Resist Dyeing, Tradition, Techniques, Innovation*, Tokyo: Kodansha International Ltd, 1983.
- Wade, Edwin L., *The Arts of the North American Indian: Native Traditions in Evolution*, New York: Hudson Hill Press, 1986.
- Ward, Rachel, *Islamic Metalwork*, London: British Museum Press, 1993.
- Wardropper, Ian, and Lynn Springer Roberts, *European Decorative Arts in the Art Institute of Chicago*, Chicago: Art Institute of Chicago, 1991.
- Wasserspring, Lois, *Oaxacan Ceramics*, San Francisco: Chronicle Books, 2000.

- Watson, Aldren A., *Country Furniture*, New York: Thomas Y. Crowell Company, 1974.
- Weiner, Annette B., and Jane Schneider, editors, *Cloth and Human Experience*, Washington, DC: Smithsonian Institution Press, 1989.
- Weinstein, Laura, *Ink, Silk, and Gold*, Boston: Boston Museum of Fine Arts, 2015.
- Weisberg, Gabriel P., *Art Nouveau Bing, Paris Style 1900*, New York: Harry N. Abrams, 1986.
- Weltge, Sigrid, *Bauhaus Textiles: Women Artists and the Weaving Workshop*, London: Thames and Hudson, 1993.
- Wescoat, Bonna D., *Poets and Heroes: Scenes of the Trojan War*, Atlanta, GA: Emory Museum of Art and Archaeology, 1987.
- Westphal, Katerine, et al., *The Surface Designer's Art: Contemporary Fabric Printers and Dyers*, Asheville: Lark Books, 1993.
- Wheat, Joe Ben, *Blanket Weaving in the Southwest*, Tucson: University of Arizona Press, 2003.
- Whitehouse, David, *Glass of the Roman Empire*, Corning: The Corning Museum of Glass, 1988.
- Whitaker, Francis, and Gary Mansfield, *My Life as an Artist Blacksmith*, Boise: LithoCraft, 1995.
- Whitford, Frank, *Bauhaus*, reprint, London: Thames and Hudson, 1984/1991.
- Williams, Dyfri, and Jack Ogden, *Greek Gold: Jewelry of the Ancient World*, London: British Museum Press, 1994.
- Wilson, Gillian, *Selections from the Decorative Arts in the J. Paul Getty Museum*, Malibu: The J. Paul Getty Museum, 1983.
- Wilson, John, *Making Wood Tools*, third edition, Charlotte, MI: Home Shop Books, 2021.
- Wilson, John, *Shaker Oval Boxes*, Volumes 1-3, Charlotte, MI: Home Shop Books, 2014-2019.
- Wilson, Kathleen Curtis, *Textile Art from Southern Appalachia: The Quiet Work of Women*, Johnson City, TN: The Overmountain Press, 2001.
- Wilson, Kax, *A History of Textiles*, Boulder: Westview Press, 1979.
- Wilson, Timothy, *Ceramic Art of the Italian Renaissance*, London: British Museum Publications, 1987.

- _____, *Maiolica: Italian Renaissance Ceramics in the Ashmolean Museum*, second edition, Oxford: Ashmolean Museum, 1989/2003.
- Winter, Mark, and Thomas McCormick, *Saltillo Serapes, A Survey: 1850-1920*, Chicago: McCormick Gallery, 2011.
- Wissinger, Joanna, *Arts and Crafts Pottery and Ceramics*, San Francisco: Chronicle Books, 1994.
- Wood, Donald A., Teruhisa Tanaka, and Frank Chance, *Echizen: Eight Hundred Years of Japanese Stoneware*, Birmingham: Birmingham Museum of Art, 1994.
- Wood Turning in North America Since 1930*, Philadelphia: Wood Turning Center, 2001.
- Woodward, Arthur, *Navajo Silver: A Brief History of Navajo Silversmithing*, Flagstaff: Northland Press, 1975.
- Wright, Robin K., *Northern Haida Master Carvers*, Seattle: University of Washington Press, 2001.
- Xun, Zhou, and Gao Chunming, English reprint, *5000 Years of Chinese Costume*, China: The Commercial Press, 1984/1988.
- Yanagi, Soetsu, *The Beauty of Everyday Things*, UK: Penguin Books, 2017/2018.
- Yang, Sunny, and Rochelle M. Narasin, *Textile Art of Japan*, Tokyo: Shufunotomo, 1989/2000.
- Yarwood, Doreen, reprint, *The Encyclopedia of World Costume*, New York: Bonanza Books, 1978/1986.
- Yohe, Jill Ahlberg, and Teri Greeves, *Hearts of Our People: Native Women Artists*, Seattle: University of Washington Press, 2019.
- Zerwick, Chloe, *A Short History of Glass*, Corning: Corning Museum of Glass, 1990.
- Zicafoose, Mary, *Ikat: The Essential Handbook to Weaving with Resists*, New York: Interweave, 2020.

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Professor Carol Ventura taught the Paleolithic through twenty-first century art surveys, Mesoamerican art, and craft history at Tennessee Technological University until her retirement in 2021.

In addition to a PhD in Art, she has an MA in Ceramics and an MFA in Printmaking, Papermaking and Book Arts. Her award-winning ceramics, fiber art, glass, jewelry, and photographs have been included in more than a hundred invitational and juried exhibitions. Carol has also taught batik, ceramics, photography, printmaking, silversmithing, cloisonné enameling and weaving on the college level. Her studio background adds an extra dimension to her teaching and writing because she understands how crafts and art are made and includes that information in her classes and publications.

Carol worked with a weaving cooperative in Guatemala as a Peace Corps volunteer from 1976-80. She later wrote *Maya Hair Sashes Backstrap Woven in Jacaltenango/Cintas mayas tejidas con el telar de cintura en Jacaltenango*, Guatemala, a bilingual book based on her dissertation. Carol also authored three books about tapestry crochet, a craft she learned while in Guatemala.

Carol has interviewed and photographed craftspeople around the world – some of which are included in this book. More may be found on the web pages linked to her home page at <https://www.carolventura.com/>. She has presented papers at international conferences, including the 47th International Congress of Americanists, The 6th Annual Conference on Textiles, The Handweavers Guild of America International Conference, and the College Art Association.

Her numerous scholarly papers and articles have been included in both refereed journals and the popular press, including the *Berg Encyclopedia of World Dress and Fashion*, *Bloomsbury Encyclopedia of World Textiles*, *Testimony of Images: Pre-Columbian Art* books and *American Lutherie*, *Anvil's Ring*, *Ars Textrina*, *Ceramics Monthly*, *Ceramic Review*, *Crochet Traditions*, *FiberArts*, *Handwoven*, *Interweave Crochet*,

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Carol Ventura surrounded by first millennium Mochica portrait vessels at the Larco Museum in Lima, Peru, 2017.