



***A Visual Survey of***  
***Craft History***

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

***Volume II: Continental Asia  
China & India***

***Carol Ventura***

# **A Visual Survey of Craft History:**

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

**Volume II: Continental Asia**

**China and India**

**Carol Ventura**

**Edited by Linda Pastyrk**

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<https://www.metmuseum.org/art/collection/search/75909>

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## 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, Luke Anderson, Noreen Grisolano, and the many other

friends and craftspeople who made this free eBook possible.

# Chapter 5: China and India

## China



Shang Dynasty, ca. 1100 BCE (map by Simeon Netchev).

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

China's technological achievements changed the world with its development of **ceramic glazes**, **stoneware** (Figure 5.9), **porcelain** (Figures 5.16, 5.17, and 5.18), and **silk** (5.22). Europe's demand for these products inspired land and sea trade routes that led to the discovery and conquest of the Americas. The monumental **bronze ding** in Figure 5.1 is a testament to China's advanced metalworking techniques. With these technologies, China demonstrated to the known world what was possible with clay, metalworking, and **fiber**.

Legendary Emperor Yu the Great began China's dynastic rule when he established the Xia Dynasty (ca. 2070-1600 BCE). His innovative dams

and irrigation canals helped eliminate floods and improved agricultural production. Unfortunately, the nine bronze dings he sent to the provinces did not survive, but the enormous example in Figure 5.1 and others like it, cast during the Shang Dynasty (ca.1700-1050 BCE), managed to escape being melted down and recast, the fate of most ancient bronzes.



Figure 5.1 *Houmuwu Square Cauldron (ding)*, cast bronze, 52 3/8 x 44 x 3 5/8 in /133 x 112 x 9.2 cm, 1,826 lbs / 832.84 kg, China, Late Shang Dynasty, ca. 1300–1046 BCE (© National Museum of China).

[https://en.chnmuseum.cn/collections\\_577/collection\\_highlights\\_608/artifacts\\_handed\\_down\\_from\\_ancient\\_times\\_612/201911/t20191121\\_172579.html#:~:text=The%20Hou%20Mu%20Wu%20bronze,title%20of%20Shang%20king's%20mother.](https://en.chnmuseum.cn/collections_577/collection_highlights_608/artifacts_handed_down_from_ancient_times_612/201911/t20191121_172579.html#:~:text=The%20Hou%20Mu%20Wu%20bronze,title%20of%20Shang%20king's%20mother.)

The cast bronze Shang *Ritual Ewer* in Figure 5.2 was used to hold liquids such as water and wine during ritual banquets that honored the ancestors. The form and surface decoration of this covered vessel, called a gong, combines tiger and bird imagery. The lid has a tiger on one end and an owl on the other. The handle is shaped like a bird's head, and the vessel

looks like a water bird when the lid is removed; the bird's tail doubles as the neck and chest of the tiger.



Figure 5.2 *Ritual Ewer (gong)* combining a tiger, owl, and water bird, cast bronze, Henan province, China, Anyang Period, Late Shang Dynasty, ca. 1300-1200 BCE (Purchase - Charles Lang Freer Endowment, Image courtesy of the Smithsonian National Museum of Asian Art).

[https://www.si.edu/object/ritual-wine-ewer-gong-form-tiger-owl-and-water-bird:fsg\\_F1938.5a-b](https://www.si.edu/object/ritual-wine-ewer-gong-form-tiger-owl-and-water-bird:fsg_F1938.5a-b)

Many early Chinese bronzes were produced by pouring molten metal into clay **molds**. Molds could be incised with imagery before **casting**, or a solid clay model of the desired object could be sculpted. The model was placed face down on a clay pad and allowed to dry. Fresh clay was then added around the model to create the outside of the mold. Once dry, the outer mold was carefully removed, then a thin layer of the original clay model (the inner part of the mold) was scraped off to create a space for the molten bronze (Figure 5.3b). After casting, the mold was broken away to reveal the cast object. Imperfections were filed off, then the casting was polished. Green **patina** covers older bronzes as they age in moist environments. When new, the surface of the bronze would have been reflective and golden brown in color.



Figure 5.3a Clay model next to finished cast bronze vessel (photograph by Carol Ventura, Shanghai Museum, 2013).



Figure 5.3b Closed and open three-piece clay mold used to cast a bronze vessel (photograph by Carol Ventura, Shanghai Museum, 2013).

Although cast parts could be attached with mechanical joints, welded, or **soldered** in place, around 1000 BCE the Chinese began to integrate them during the casting process by placing the appendages into the proper locations in the molds before the molten metal was poured.

The Chinese were among the first to produce **earthenware** and the very first to make **stoneware** and **porcelain**. Over four thousand years ago in the village of Yangshao, they **coil built** with earthenware clay, painted it with mineral **pigments**, **burnished** it, then fired the pieces to produce vessels like the jar in Figure 5.4.



Figure 5.4 *Jar with Spiral Decoration*, coiled red earthenware with painted mineral pigments, 14 9/16 in x 20 7/8 in / 37 x 53 cm, Majiayao, Banshan phase, Yangshao, Henan, China, ca. 2600–2300 BCE (Image courtesy of the Princeton University Art Museum).

<https://artmuseum.princeton.edu/collections/objects/32574>



China (original map from <https://www.geo4u.net/china201802.html>).

Qin Shihuangdi (Shi, indicating “the first” emperor; Huang meaning “august”; di meaning “divine ruler”) unified China and established the Qin Dynasty (ca. 221-206 BCE). His burial mound has not yet been excavated, but the life-sized **terracotta** army of over 6,000 sculpted men and 2,000 horses that were placed in an underground palace-like structure near his tomb are being unearthed (Figure 5.5a). Traces of color on some of the pieces show that at one time they were realistically painted (Figure 5.5b), but most of the color has deteriorated because it was applied after **firing** the clay.



Figure 5.5a *Army of the First Emperor*, terracotta, life-size, Xian, China, Qin Dynasty, China, ca. 210 BCE (photograph by Carol Ventura 2013).



Figure 5.5b *Army of the First Emperor*, terracotta and paint, life-size, Xian, China, Qin Dynasty, China, ca. 210 BCE (© Shaanxi Cultural Heritage Promotion Center and Emperor Qin Shihuangdi's Mausoleum Site Museum). <https://news.wttw.com/2016/03/01/unpacking-one-terra-cotta-warrior-field-museum>

Emperor Qin Shihuangdi's sculptors used several techniques to create the terracotta warriors, including coil building and **press molding**. Molds helped form identical large or small pieces quickly and efficiently. Soft clay was pressed into fired clay molds (Figure 5.6a) to fashion the hands, heads, and parts of the torsos. Similar techniques are still used today to create reproductions with plaster molds (Figures 5.6b, 5.6c, and 5.6d).



Figure 5.6a Partial mold of a lion, fired clay, Tang Dynasty, ca. 618-907 CE, Yaozhou, China (Xian Museum collection photograph by Carol Ventura, 2013).



Figure 5.6b Terracotta is pressed into a two-piece plaster mold at the Art Ceramics and Lacquer Factory, Xian, China (photograph by Carol Ventura, 2013).



Figure 5.6c The mold is put together, then opened when the clay has dried enough to keep its form at the Art Ceramics and Lacquer Factory, Xian, China (photograph by Carol Ventura, 2013).



Figure 5.6d Leather-hard pieces are removed from molds and overhanging parts are supported as they dry at the Art Ceramics and Lacquer Factory, Xian, China (photograph by Carol Ventura, 2013).

Weapons buried with the terracotta army were made of **alloys** of up to 15 metals, including **iron**, **copper**, tin, lead, aluminum, titanium, vanadium, and cobalt. The Chinese were the first to cast iron with efficient bellows that forced enough air into the fire to produce the high temperatures required to melt the ore. The effectiveness of this bellows' technology, with its continuous flow of air into the **furnace**, was crucial in developing superior iron weaponry. Crossbows with iron trigger releases were used in China 600 years earlier than in the West. Many iron triggers were excavated from Emperor Qin Shihuangdi's tomb.

The Han Dynasty (ca. 206 BCE-220 CE) is known for establishing a centralized bureaucracy and for opening the Silk Road in 114 BCE, an expansive network of trade routes between China and the Greek and Roman Empires. This cross-cultural exchange spread innovations and opened the empires to foreign influences.

Advancements in **kiln** construction, firing techniques, clay refinement, and the development of lead-based glazes also occurred

during the Han Dynasty. Throughout history and around the world, metalwork has influenced ceramic styles. For instance, the hu in Figure 5.7 mimics similar but more expensive bronze vessels. The shape, relief, and glossy glaze are especially convincing.



Figure 5.7 *Ewer (hu)*, earthenware with lead glaze, 12 x 9 15/16 in / 30.5 x 25.3 cm, China, Han Dynasty, ca.100 BCE – 100 CE (Brooklyn Museum, The William E. Hutchins Collection, Bequest of Augustus S. Hutchins, 52.49.25. Creative Commons-BY).

<https://www.brooklynmuseum.org/opencollection/objects/65914>

The high iron content of earthenware allows it to become hard (although still porous) when heated to 2100°F / 1150°C, but stoneware has a lower iron content, so it can be fired up to 2372°F / 1300°C, temperatures that **vitrify** clay. So, stoneware is nonabsorbent and has a stone-like ring when struck. It fires tan, gray, brown, or brownish black, depending on the composition of the clay and the atmospheric conditions of the kiln during firing.



Figure 5.8a Walking backwards as he works, this **potter coil builds** a large stoneware pot that will be fired in the dragon kiln behind his workshop (Figure 5.8d) in Tianbao, China (photograph by Carol Ventura, 2004).



Figure 5.8b He textures the sides of the piece with a wooden paddle in Tianbao, China (photograph by Carol Ventura, 2004).



Figure 5.8c He then smooths the rim with a wet cloth in Tianbao, China (photograph by Carol Ventura, 2004).

The Chinese developed the cross-draft dragon kiln (Figures 5.8d, 5.8f, and 5.8g) that could be fired to the high temperatures needed to mature stoneware around 500 BCE, during the Zhou Dynasty (ca. 1046-256 BCE). The long, barrel-vaulted dragon kiln is partially buried in the side of a hill; the slope helps the draft and the ground acts as insulation. To slowly raise the temperature, the firing lasts many days - beginning at the lowest level - where wood is fed into the “mouth” until that part reaches the desired temperature. The rest of the kiln slowly heats up as the flames find their way to the chimney at the top of the incline. Fuel is then inserted through holes in the arched roof over the next section until that part is brought up to temperature – on and on until the entire kiln has been fired. The kiln is then left to cool for several days before opening the ports and doors. Both stoneware and earthenware can be fired at the same time by loading them in different places. Appropriately named, with its belching flames and long body, this kiln evokes a dragon: China’s favored symbol for protection, strength, wealth, health, and prosperity.



Figure 5.8d Pots dry in front of the **pottery** workshop. A tile roof protects the 160 ft / 48.77 m long wood-fired dragon kiln that runs up the hill behind the workshop in Tianbao, China (photograph by Patty Haag, 2004).



Figure 5.8e These stoneware vessels will be stacked base-to-base and rim-to-rim in the kiln just as they are stacked in a workshop storage room in

Tianbao, China (photograph by Carol Ventura, 2004).



Figure 5.8f This dragon kiln has side entrances for loading firewood and port holes (plugged in the photo) on the roof for stoking. Most of the kiln is underground (to conserve heat); only the arched roof is left uncovered in Tianbao, China (photograph by Carol Ventura, 2004).



Figure 5.8g The sloped floor inside the kiln is stepped so that pieces can be stacked on a stable, horizontal surface. It takes six months to fill with work, so this dragon only fires up twice a year in Tianbao, China (photograph by Carol Ventura, 2004).

Ash from the burning wood that fuels the flames during firing forms a glossy greenish glaze wherever it settles at the high temperatures required to mature stoneware. Potters probably combined wood ash with finely ground China stone or granite rock to produce the thin olive-green colored glaze on the top half of the Han jar in Figure 5.9. The three glazed bands (separated by raised ridges) feature incised birds, fish, mythological animals, and geometric designs inspired by similar decorative patterns on contemporary Chinese lacquerware (Figure 5.23). The strap handles on the shoulder are similar to those found on bronze vessels.



Figure 5.9 *Storage Jar*, stoneware with natural ash glaze, 13 ¼ x 15 3/8 in / 33.7 x 39.1 cm, China, Han Dynasty, ca. 206 BCE - 220 CE (Brooklyn Museum, Gift of Dr. and Mrs. George J. Fan, 1996.26.1. Creative Commons-BY). <https://www.brooklynmuseum.org/opencollection/objects/4290>

During the Tang Dynasty (ca. 618-906 CE) sculptures and vessels were made with buff-colored earthenware and covered with clear lead-silicate glazes that were tinted amber and brown with iron oxide, green with copper oxide, and blue with imported cobalt oxide. Tang **ceramists** favored white, green, and amber tones, known as sancai (“three-colored”), with occasional accents of cobalt blue and brown.

Tang tombs of the elite were filled with ceramic statuettes that featured sancai guardians, court officials, merchants, musicians, horses, and camels. The female figures are especially detailed, revealing a variety

of fashions, ethnic types, and the cosmopolitan nature and personal wealth of the Tang period. Instead of sitting on the floor, the court lady in Figure 5.10 is sitting in the Western style on an imported stool. While dressed in the courtly fashion of the time, a dog plays with her slipper!



Figure 5.10 *Seated Court Lady*, earthenware glazed with sancai (three-color glaze), 14 3/4 in / 37.5 cm high, China, Tang Dynasty, 8<sup>th</sup> century (The Metropolitan Museum of Art, New York, Purchase, The Vincent Astor Foundation Gift, 2010, CC0).

<https://www.metmuseum.org/perspectives/videos/2013/10/seated-court-lady-art-explained>

and

<https://www.metmuseum.org/art/collection/search/75765>

Most scholars think Tang Dynasty ceramists were the first to successfully work **porcelain**, which is less malleable than earthenware and stoneware. Porcelain fires to a higher temperature (up to 2552°F / 1400°C) than stoneware and is smoother, more resonant, and translucent after firing.

**Kaolin**, the main porcelain ingredient, was named for the place it was first mined, Mt. Kaolin near Jingdezhen, China. China stone, the other basic ingredient, was mined there, too. Some of the finest porcelain was produced in Jingdezhen: classic **underglaze** cobalt blue, copper red, and **overglazed** polychrome ware.

China stone, a porcelain and glaze ingredient, has been processed by hand since ca. 960 CE in Yaoli. Higher production techniques are utilized in nearby Jingdezhen, China. <https://www.carolventura.com/Yaoli.htm>



5.11a China stone is quarried nearby, broken into pieces, then ground into a fine powder with water-powered trip-hammers in Yaoli, China (photograph by Carol Ventura, 2004).



5.11b A water wheel drives the long, wooden axle. Wooden pegs (center back) trip the stone-tipped stamper as the axle rotates, Yaoli, China (photograph by Carol Ventura, 2004).



Figure 5.11c The fine powder is washed, most of the water is evaporated from the slurry in settling tanks seen here, then the China stone is formed into blocks in a wooden mold, dried, and sold, Yaoli, China (photograph by Carol Ventura, 2004).

Ceramics have been produced for over 1800 years in Jingdezhen, China. Emperor Zhenzong decreed that it should produce all the porcelain used by the Imperial Court during the Jingde Period (ca. 1004-1007). The industry

continued to develop during the Song, Yuan, Ming, and Qing Dynasties. Before reaching the kiln, a piece passed through many hands; clay preparation, **throwing**, modeling, finishing, and decoration were all done by specialists. Modern production is still based on this model. Today Jingdezhen is a recognized center of porcelain production. Although electric wheels and electric and gas kilns have replaced ancient production techniques, traditional ways of working are demonstrated at the Jingdezhen Ceramic History Museum (Figures 5.12a, 5.12b, 5.12c, and 5.12d).



Figure 5.12a The **potter's wheel** is spun counter-clockwise with a stick at the Jingdezhen Ceramic History Museum, China (photograph by Carol Ventura, 2004).



Figure 5.12b The leather-hard bowl is forced onto a smooth mold to standardize the bowl's size at the Jingdezhen Ceramic History Museum, China. Had it been placed on a decorative mold (as seen in Figure 5.12e), a pattern would have been transferred to the interior of the bowl (photograph by Carol Ventura, 2004).



Figure 5.12c The walls of the piece are then trimmed to make them thinner at the Jingdezhen Ceramic History Museum, China (photograph by Carol Ventura, 2004).



Figure 5.12d The unfired piece is glazed by dipping and pouring a thin glaze over it at the Jingdezhen Ceramic History Museum, China (photograph by Carol Ventura, 2004).

The mold (Figure 5.12e) and bowl (Figure 5.12f) are decorated with floral motifs. Nature is an honored source of wisdom and inspiration in Chinese philosophy, so plants and animals are often featured. Each month is signified by a flower, and the time of month can be shown by the development of the flower, from bud to full bloom.



Figure 5.12e *Mold with Decorative Relief*, Yaozhou ware, **bisque**-fired stoneware, 2 5/8 x 4 9/16 / 6.6 cm x 11.6 cm, 1100-1199, China, Jin Dynasty (Art Institute of Chicago, Gift of The Orientals, CC0).

<https://www.artic.edu/artworks/21887/mold>

The uniquely glazed stoneware and porcelain, known as **celadon**, were produced in Jingdezhen. The iron in celadon glaze turns green during **reduction** firing. The intensity of the color changes with the thickness, so celadon is often used to glaze pieces with molded or **carved** reliefs where it can pool (Figure 5.12f).



Figure 5.12f *Conical Bowl with Peony Scroll*, Yaozhou ware; molded and celadon glazed stoneware, 1 5/8 x 4 in / 4.2 cm x 10.1 cm, China, Northern Song (ca. 960–1279) or Jin dynasty (ca. 1115–1234), 12th century (Art Institute of Chicago, Bequest of Russell Tyson, CC0).

<https://www.artic.edu/artworks/21508/conical-bowl-with-peony-scroll>



Figure 5.12g To make large vessels, sections are thrown, dried, and trimmed at the Imitated Antique Porcelain Factory Hutianjingdezhen (IAPFH) in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.12h Sections then joined together to build large vessels at the Imitated Antique Porcelain Factory IAPFH in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.12i A pot is trimmed in the foreground, clay is prepared for throwing in the middle ground, and clay is centered in the background at IAPFH in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.12j A dry vessel on a slowly rotating wheel is sanded at IAPFH in Jingdezhen, China (photograph by Carol Ventura, 2004).

To efficiently produce repeated forms, clay may be slip-cast in plaster **molds**. To do this, **slip** is poured into a plaster mold (Figure 5.13a). After a clay skin has formed (where water was absorbed by the plaster), the slip is poured out (Figure 5.13b). The mold (with the hollow clay form still inside) is left to dry for a while (Figure 5.13c), then part of the mold is removed. After drying in the mold a little while longer, the slip-cast piece is removed and allowed to dry some more. The leather-hard piece can then be placed on a dry clay chuck and trimmed on an electric wheel (Figure 5.13d). Handles and other parts are usually cast separately, then luted (joined) together with slip (Figure 5.13e).



Figure 5.13a Filling plaster molds with porcelain slip in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.13b Pouring out porcelain slip to make a hollow form in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.13c Slipware and plaster molds drying outside in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.13d Trimming cast porcelain in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.13e Applying cast handles with porcelain slip in Jingdezhen, China (photograph by Carol Ventura, 2004).

Cobalt blue can withstand the high temperature needed to mature porcelain, so it is applied to **greenware** (Figure 5.14b) covered with clear glaze (Figures 5.14c and 5.14d), then **high fired** to produce blue and white porcelain. Many other colors cannot take high heat, though, so overglazes are painted onto vessels that have been glazed and high fired (Figure 5.14e), then the pieces are refired at lower temperatures to bond the overglazes to the surfaces.



Figure 5.14a A stencil is used to transfer the pattern onto greenware at the Jiayang Ceramics Company in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.14b Cobalt underglaze is painted over the stenciled lines, which will burn off during firing at the Jiayang Ceramics Company in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.14c This bronze statue demonstrates the old method of blowing clear glaze through a tube onto a painted vessel in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.14d A compressor and spray booth are used today to cover cobalt-painted greenware with clear glaze in Jingdezhen, China (photograph by Carol Ventura, 2004).

Damp stencils are used to transfer drawings onto the glossy surfaces of glaze fired ware (Figure 5.14e) to help guide overglaze painters. Overglaze can also be painted onto vessels that were previously painted with underglaze cobalt and fired (Figure 5.14f). These pieces are then refired to **fuse** the overglazes to the porcelain.



Figure 5.14e Stenciling design onto glaze-fired vessel in Jingdezhen, China (photograph by Carol Ventura, 2004).



Figure 5.14f Painting overglaze on blue-and-white fired porcelain in Jingdezhen, China (photograph by Carol Ventura, 2004).

Kilns changed over the years and so did firing techniques. The egg-shaped kiln in Figure 5.15 that, developed from the gourd-shaped kilns of the late Yuan and early Ming periods, became very popular during the Ming period. To keep wood ash from settling on and fusing to the porcelain, it was fired in reusable, stackable **stoneware saggars** (Figures 5.15a and 5.15b). <https://www.carolventura.com/Jingdezhen.htm>



5.15a Saggars line the interior walls of the egg-shaped kiln in Jingdezhen, China (photograph by Carol Ventura, 2004).



5.15b Saggars with celadon-glazed porcelain bowls in the Shanghai Museum, China (photograph by Carol Ventura, 2004).

The production of blue and white porcelain began during the Yuan Dynasty (ca.1279-1368) and increased in during the Ming Dynasty (ca.1368-1644) when porcelain became whiter, thinner, smoother, more translucent, and elaborately glazed. Mongol domination during the Ming

dynasty established a highly centralized state with a powerful Emperor and a complex administration. Extensive repairs and additions to the Great Wall were undertaken at this time; new crops were introduced, and more land was brought into cultivation.

A less pure type of cobalt was found at this time in China, but the manganese it contained produced a gray-blue color instead of a pure blue color, so three parts cobalt imported from Persia was mixed with two parts Chinese cobalt to produce the soft blue.

Figurative themes from the Yuan Dynasty continued to be popular during the Ming Dynasty. Some of the imagery was inspired by contemporary ink paintings on paper. The Ming vase in Figure 5.16 features the Daoist Immortal Zhongli Quan, identified by the leaf he holds and the gourd suspended from his belt. The faint horizontal ridge around the middle of the vase is where the upper and lower thrown parts of the vessel were joined together as seen in Figures 5.12h.



Figure 5.16 *Vase in Meiping Shape with Daoist Immortal Zhongli Quan*, porcelain with cobalt blue under transparent glaze, 13 5/8 x 7 7/8 in / 34.6

cm x 20 cm, Jingdezhen, China, Ming Dynasty, ca.1450 (The Metropolitan Museum of Art, New York, Purchase, Friends of Asian Art Gifts, 2010, CC0).

<https://www.metmuseum.org/art/collection/search/75938>

The wucan (five color) porcelain jar in Figure 5.17 features under-glaze blue with over-glaze green, iron red, light brown, and yellow on a white ground. The neck and base are decorated with repeat motifs. As with many other porcelain pieces, this jar was thrown in multiple sections and joined (as seen in Figures 5.12g, 5.12h, 5.12i, and 5.12j). A slight lump formed at one of the joins can be seen running horizontally through the fish.



Figure 5.17 *Jar with Carp in Lotus Pond*, wucan on porcelain, 9 1/8 in / 23.2 cm, Jiajing Reign, Jingdezhen, China, Ming Dynasty, ca. 1522-1566 (The Metropolitan Museum, New York, Rogers Fund, 1917, CC0).

<https://www.metmuseum.org/art/collection/search/42549>

Sea trade between China and Europe began in 1517, when the first Portuguese ships reached China and began importing blue and white porcelain. In fact, the very word “porcelain” is European in origin and indicates this East/West interaction. Some sources associate the Italian

word porcellana with the cowrie shell, which has a similar glossy surface as well as a monetary value. Control of this sea trade eventually passed to the Dutch East India Company in the early 1600s.

Shipping costs of the blue-and-white table wares and vases were very high. For centuries Europeans tried to figure out how “white gold,” as they called it, was made. Stoneware and porcelain technology traveled from China to Korea, then to Japan, and eventually to Europe.

Blue-and-white and polychrome wares continued to be popular during the Qing Dynasty (ca.1644-1911), but colors became more delicate and translucent. Porcelain was produced with profusions of colorful plants, birds, and butterflies for the European market at this time. The vase in Figure 5.18, with its application of gold, yellow, orange, pink, red, greens, blues, and purple on a white ground, demonstrates the skillful range of these imperial workshops. References to the four seasons continue to be widespread in Chinese literature and the visual arts, where specific plants indicate special virtues.



Figure 5.18 *Vase with Flowers of the Four Seasons*, porcelain with underglaze and overglaze **enamels**, 11 3/8 in / 28.9 cm high, China, Qing Dynasty, ca. 1736-1760 (The Walters Art Museum, CC0).

<https://art.thewalters.org/detail/20572/vase-with-flowers-of-the-four-seasons/>

Yixing stoneware is not glazed but painstakingly burnished to achieve a glossy surface (Figure 5.19b). It developed during the Song Dynasty (ca. 960-1279 CE) and then large-scale production of teapots, vases, flowerpots, and sculptures began during the Ming Dynasty (ca. 1368-1644 CE).

The fine-grained clay was originally available in three colors: purplish-brown, buff-colored, and deep cinnabar orange red. By mixing them, adding minerals, and varying the firing temperature and amount of reduction in the kiln, Yixing potters are now able to produce more shades,

from beige to light brown, cinnabar red to dark brown with a hint of purple, and dark green to black. They developed the last two colors in the early 20<sup>th</sup> century by adding cobalt oxide and manganese dioxide to the clay. Unfinished pieces must be covered to keep the clay damp between working sessions (Figure 5.19c).



Figure 5.19a Burnished teapot next to plaster molds in Yixing, China (photograph by Carol Ventura, 2013).



Figure 5.19b Burnishing a damp stoneware teapot in Yixing, China (photograph by Carol Ventura, 2013).



Figure 5.19c Damp clay and unfinished stoneware teapots in a plastic container (with lid temporarily removed) in Yixing, China (photograph by Carol Ventura, 2013).



Figure 5.19d Painting a green clay flower onto damp clay in Yixing, China (photograph by Carol Ventura, 2013).

European demand for teapots arose when tea became popular in England. Potters working in Yixing are credited with inventing the teapot, perhaps inspired by Chinese wine ewers. Shi Dabin crafted the teapot in Figure 5.20 in the shape of a plum blossom.



Figure 5.20 Shi Dabin, *Teapot in the Shape of a Plum Blossom*, burnished stoneware, 3 3/4 in / 9.5 cm high with lid, Qing Dynasty, Yixing, China, early 17<sup>th</sup> century (The Metropolitan Museum, New York, Purchase, Ann Eden Woodward Foundation Gift, 1982, CC0).

<https://www.metmuseum.org/art/collection/search/42323>

Silk moth cocoons were collected from trees as early as 3000 BCE in China to make silk, the strongest natural fiber. For centuries, only Chinese nobility could wear silk clothes, and they were able to keep silk production a secret, but eventually sericulture (production of raw silk from silkworms), mulberry seeds, and silk moth eggs were smuggled out of China.

Silk **fabric** found its way to the Greek and Roman worlds in 114 CE over the network of trade routes collectively called the Silk Road. Byzantine silk was produced as early as the 4<sup>th</sup> century in Constantinople (Istanbul, Turkey) and dominated the market until the 12<sup>th</sup> century, when Italy became the silk capital of the West. At the end of the 17<sup>th</sup> century the French were important silk producers.

The life span of the silk moth is around six weeks. After hatching, silk moth caterpillars (aka silkworms) are fed mulberry leaves six times a day. They grow from less than 1/8 in / .32 cm to over 2 in / 5 cm long the first month then spin a 1 mile / 1.6 km long filament in two days with head spinnerets that extrude liquid silk coated with sticky sericin to form a cocoon.

Some moths are allowed to mature for two weeks in their cocoon to reproduce. They mate immediately upon emerging and then each female lays three to four hundred eggs. Silk with a deep, creamy finish is made from the pierced cocoons.

Lustrous filament silk can only be wound off an undamaged cocoon, so the cocoon is immersed in hot water to kill the moth before it breaks through. The hot water also dissolves the sericin (the natural gum which holds the filaments together). Silk filaments from several cocoons are wound and twisted together to form single thread. Silk can be **dyed** after the sericin has been boiled off.



Figure 5.21a Silk moth caterpillars eating mulberry leaves in Suzhou, China (photograph by Carol Ventura, 2013).



Figure 5.21b Two types of silk cocoons are commercially produced. The more commonly cultivated silk moth, the *Bombyx mori*, produces white cocoons. The less common beige cocoons on the lower right were made by the semi-domestic *Muga-Antheraea Assama*, who eat outdoors but are moved inside to make their cocoons, emerge, mate, and lay eggs (Carol Ventura Collection, photograph by Carol Ventura, 2014).

The invention of the **spinning** wheel during the Zhou Dynasty (ca.1046-256 BCE) allowed the Chinese to spin **bast** and silk fibers rapidly and efficiently. Chinese weavers used many techniques to produce fine silk fabrics, including **warp** patterning, **weft** patterning, **tapestry weaving**, **embroidery**, knotting, and braiding.

The Qing robe in Figure 5.22 was made for a temple statue of Guan Di, the Taoist (or Daoist) God who became associated with wealth and war. It is a highly advanced example of Chinese **brocade** and **damask** woven with silk and **gold** thread. Damask is a reversible patterned fabric with glossy imagery on a mat background. This technique combines **warp faced** and **weft faced satin** weaves on a complex **loom** that allows individual pattern warps to be lifted as the fabric is woven. Although probably developed in China, damasks were named for the city of Damascus in Syria,

a weaving center during the Middle Ages. Damasks are monochromatic when woven with the same color warp and weft. Two-color damasks are woven with warp of one color and a contrasting-colored weft. Additional (**supplementary**) brocade wefts (Figure 5.38m) can add even more color.

The sleeves and front of the Qing robe include blue, yellow, green, brown, orange, pink and red brocade. Four-clawed dragons decorate the front, sleeves, back and collar. Guan Di may have derived from a real individual, Guan Yu, known for his military skills and heroism; after his death, he was honored as a God. So, this robe was woven with many auspicious symbols—symbols which were also associated with emperors, including the symmetrical *fu* symbol (good fortune in life) in the center of the robe, as well as millet, flames, mountains, axes, and pheasants, cloud forms, and the wave border on the bottom.



Figure 5.22 *Temple Robe*, brocaded silk damask with metallic thread, 63 ½ x 77 in / 161.5 x 195.6 cm, China, Qing Dynasty ca. 1790 (Victoria and Albert Museum, Bequeathed by W. Llewellyn Jones).

<https://collections.vam.ac.uk/item/O12661/robe-unknown/>

In addition to their woven silk, the Chinese were also known for their use of lacquer. Organic lacquer is extracted from certain plants and insects. The most common source is the poisonous sap of the Asian lacquer tree (*Toxicodendron vernicifluum*). Other ingredients are added to make it more

colorful (Figure 5.25c). Lacquer was used at first to make clay vessels watertight, but it is now mostly applied to wood and metal.

The folding chair in Figure 5.23 is an exceptional example of carved lacquer that is colored red with cinnabar / mercuric sulfide. Many thin coats were applied, allowing each to harden for a day or more, before the lacquer was thick enough to carve. Some Chinese carved lacquer pieces dating to ca. 500-1700 CE are composed of as many as 200-300 layers. Workshop records from those early periods document large pieces that took years to prepare and carve.

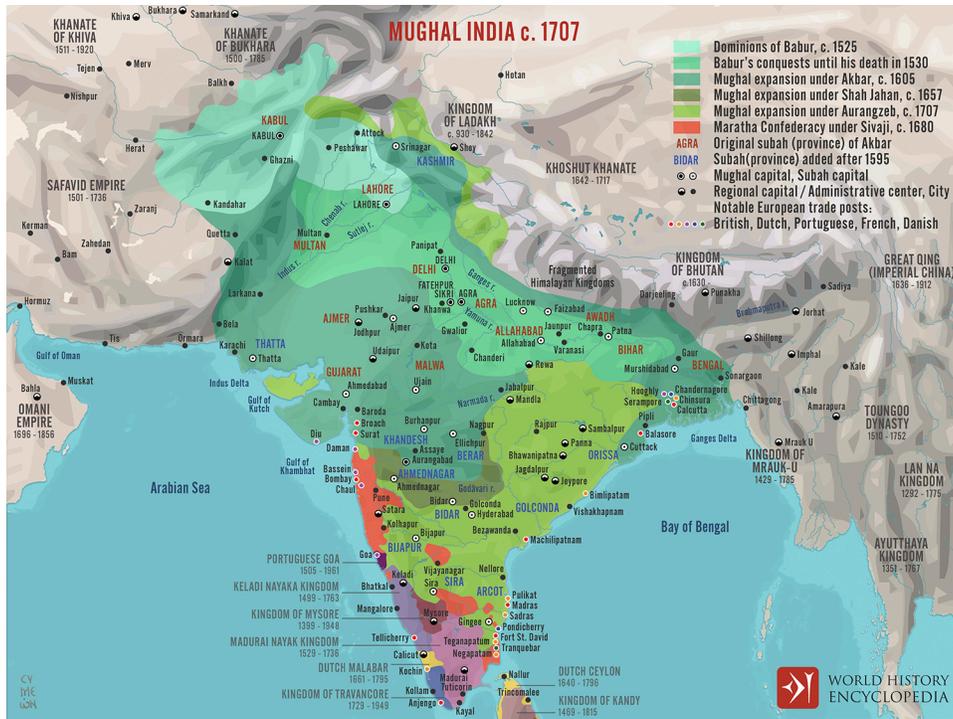
This armchair probably accompanied a Ming emperor during his travels and, at times, could have functioned as a portable throne. The five-clawed dragons, carved into the chair's back splat, as well as the red color of the lacquer, symbolically surround the emperor with power and prosperity. The emperor's feet would rest on images of the lotus, carved into the lacquered hinged footstool. The lotus associated him with rebirth, new life, and purity. The excellence of the craftsmanship here, such as positioning the footstool on the stretcher between the front legs and the flexible woven seat, with its diamond pattern, indicate the skillful, creative approaches in the emperor's workshops.



Figure 5.23 *Chair*, red lacquer on wood with woven mat seat, 45 in / 114.5 cm high, China, Ming Dynasty, ca.1500-1560 (Victoria and Albert Museum, Given by Sir Harry Garner and Lady Garner).

<https://collections.vam.ac.uk/item/O73594/chair-unknown/>

## India



India, ca. 1707 (map by Simeon Natchev).

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

Civilization arose in the Indus Valley about the same time it was developing in Mesopotamia and Egypt. Unfortunately, very little remains from those early days, but the copper *Harpoon* in Figure 5.24 attests to the high quality and design of metalwork produced more than 4000 years ago in India.



Figure 5.24 *Harpoon*, copper, 13 ½ x 2 ½ in / 34.3 x 6.35 cm, Uttar Pradesh, India, ca.2000-1000 BCE (Gift of Marjorie Bissinger Seller, Asian Art Museum of San Francisco).

<https://searchcollection.asianart.org/objects/11426/harpoon?ctx=dc8727c52ef5ee374298073bec13689c41b8c944&idx=0>

**Woodturning** with a bow **lathe** requires practice and patience (Figures 5.25a and 5.25b). The rope on the bow is wrapped around the piece being

turned. The bow is moved back and forth with one hand while the other holds the end of the wooden handle of the sharp metal tool. Cutting is done as the bow moves the wood towards the turner.



Figure 5.25a Bhachaya moves a bow back and forth with his right hand while operating a cutting tool with his feet to turn wood on a bow lathe in Nirona, Kutch, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.25b Bhachaya's right foot holds the cutting tool, and his left foot steadies the tool and the lathe in Nirona, Kutch, Gujarat, India (photograph

by Carol Ventura, 2016).

Lacquer is made in India from resin secreted by the female lac bug (*Laccifer lacca*). These insects are farmed by tying sticks covered with lac eggs to trees so that newly hatched insects will colonize the branches, grow, and then secrete resin and red dye. The infested trees are pruned, the insects are scraped off the twigs, crushed, and sieved to remove debris. The “seed lac,” as it is called, is then washed, heated, strained, and sometimes mixed with pigments (Figure 5.25c).

In Nirona, India, colorful lac sticks are pressed against wood rotating on a bow lathe (Figures 5.25d and 5.25e). In the process, they transfer bands and layers of colors that are selectively cut to produce decorative patterns (Figure 5.25f).



Figure 5.25c From left to right: stick lac (a lac encrusted twig); a ball of lac with its original color; and pigmented black, orange and yellow lacquer sticks used to decorate wood in Nirona, Kutch, Gujarat, India (Carol Ventura Collection, photograph by Carol Ventura, 2016).



Figure 5.25d Applying lacquer to wood rotating on a bow lathe in Nirona, Kutch, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.25e Applying lacquer to wood rotating on a bow lathe in Nirona, Kutch, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.25f Lacquer decorated spatulas are made in Nirona, Kutch, Gujarat, India (photograph by Carol Ventura, 2016).

Ceramic **spindle whorls**, fabric impressions on pottery, and a few cloth fragments show that **cotton** has been spun and woven in India for over 4,500 years. Silk and wool have been spun and woven there for over 3,500 years. The Indian subcontinent possessed sufficient water, a skilled labor force, and many natural dyes and **mordants**, so it is not surprising that affordable and luxury fabrics have been produced in India and exported for thousands of years. Babylonians, Greeks, Romans, and more imported Indian cotton fabrics.



Figure 5.26 Spinning **wool** on a charkha in Bhujodi, India (photograph by Carol Ventura, 2016).

Hand-painted Indian **chintzes** were very popular in Europe during the 17<sup>th</sup> and 18<sup>th</sup> centuries. In India, chintzes were treasured as ceremonial items and sacred heirlooms, but wealthy Europeans used these decorative fabrics for furnishings and clothing. When utilized as bed covers, wall hangings, and drapery, they were known as palampores (Figure 5.27). The success of imported Indian chintz in Europe reduced the home market for European **textile** manufacturers. In response, France and England enacted legal measures to ban the import of Indian chintz. This ban was eventually lifted after Europeans began producing their own colorful chintzes.

A serpentine tree of life emerging from a hill was one of the most popular painted designs on chintz palampore export textiles during the 18<sup>th</sup> to 19<sup>th</sup> centuries. Europeans prized them as wall hangings and bed or table covering.



Figure 5.27 *Chintz Palampore*, mordant, **resist**, and natural dyes painted on cotton, 44 9/16 x 72 in / 113.2 x 182.9 cm, Coromandel Coast, India,

first quarter of 18<sup>th</sup> century (The Metropolitan Museum of Art, Purchase, Fernando Family Trust Gift, in honor of Dr. Quintus and Mrs. Wimala Fernando, 2010, CC0).

<https://www.metmuseum.org/art/collection/search/75909>

Natural dyes are hand painted onto mordanted cotton cloth to produce Mata-Ni-Pachedi votive textiles in Ahmedabad. The mordant is necessary to assure the dyes will not wash away when the cloth is washed. Synthetic dyes are less popular now because artisans are turning back to natural dyes that are less toxic, more sustainable, and more readily available. Locally grown indigo (Figure 5.29 and 7.15) and a variety of flowers and seeds are combined with alum, iron, and /or sugars to produce shades of blue, red, black, brown, and brownish violet.



Figure 5.28a Mordants and dye ingredients, Ahmedabad, India (photograph by Carol Ventura, 2016).



Figure 5.28b Vishalbhai Chitara paints black lines with a pointed stick onto mordanted cotton cloth in Ahmedabad, India (photograph by Carol Ventura, 2016).



Figure 5.28c Vishalbhai Chitara paints black lines with a pointed stick onto mordanted, painted cotton cloth in Ahmedabad, India (photograph by Carol Ventura, 2016)

The cloth is soaked, painted with dye, boiled, washed, and sundried multiple times to complete the process. The three original Mata-Ni-Pachedi colors are significant: black repels evil, white is the color of purity, and blood red represents the life force (Figure 5.28d). Today the range of colors has increased (Figure 5.28e) to meet the demand of fashion and furnishing designers.



Figure 5.28d Jayantibhai Chitara, *Mata-Ni-Pachedi Cloth*, hand painted cotton, Ahmedabad, India (photograph by Carol Ventura, 2016).



Figure 5.28e Jayantibhai Chitara, detail of Mata-Ni-Pachedi cloth, hand-painted cotton, Ahmedabad, India (photograph by Carol Ventura, 2016).

Blue dye is derived from indigo, which can color cotton, wool, and silk many shades of blue without a mordant. The word “indigo” is derived from the Greek *indikon* meaning “from India,” but the leaves of many different species of indigo plants were also processed into blue dye in Asia, Europe, and Pre-Columbian America. Both natural and synthetic indigo need to be fermented in a vat of warm water mixed with lime to raise the pH (lower the acid level) and regularly fed fructose to keep it active. Indigo vats are often partially buried in the ground to help them maintain a constant temperature.



Figure 5.29a Shamji Vankar rotates a wool skein into a partially buried ceramic indigo vat. The yarn emerges green but turns blue as it absorbs oxygen in Bhujodi, India (photograph by Carol Ventura, 2016).



Figure 5.29b Shamji Vankar wrings the wool that was dipped into the indigo vat in Bhujodi, India (photograph by Carol Ventura, 2016).



Figure 5.29c Dipping the wool into the dye and pulling it out several times produces dark blue in Bhujodi, India (photograph by Carol Ventura, 2016).



Figure 5.29d Shamji Vankar hangs an indigo dyed wool skein to dry in Bhujodi, India (photograph by Carol Ventura, 2016).



Figure 5.29e The indigo vat is fed fructose to keep the dye active in Bhujodi, India (photographs by Carol Ventura, 2016).

Patterned bandhani turbans and sarees often identified the wearer's community. Red and black headscarves were traditionally associated with bridal costumes of the Muslim Khatri community. Muslim designs avoid animal and human figures. White, undyed dots form boteh and vine leaf patterns on the *Headscarf* in Figure 5.30 Gold, brocade stripes define the edges. Today's cotton bandanas are printed versions of the large, silk bandhani handkerchiefs exported in the 1700s.



Figure 5.30 *Headscarf*, bandhani tie-dyed silk, 27 x 25 in / 69 x 64 cm, Kutch, Gujarat, India, early 20<sup>th</sup> century (Victoria and Albert Museum).

<https://collections.vam.ac.uk/item/O70650/rumal-unknown/>

Bandhani is a resist-dyeing process that produces small undyed spots on silk, wool, and cotton fabric. Called plangi in Indonesia (Figure 6.5) and shibori in Japan (Figure 6.20), this tie-dyeing process was also popular in Pre-Columbian Peru (Figures 7.21 and 7.22c). This technique has a long history in India. In 6<sup>th</sup> century India, frescoes were painted in the Ajanta caves that depict women wearing resist-dyed clothing. The 7<sup>th</sup> century

court poet, Banabhatta, describes the luxurious bandhani of the king's sister.

To begin the process, taut muddy string is snapped onto cloth to mark tie locations. Wooden blocks were used to print the locations for tying, but now blueing is transferred through a stencil (Figure 5.31a and 5.31b). The cloth is grabbed where marked, then wrapped and tied to restrict dye penetration. A variety of patterns are possible, depending on how it is tied and dyed.

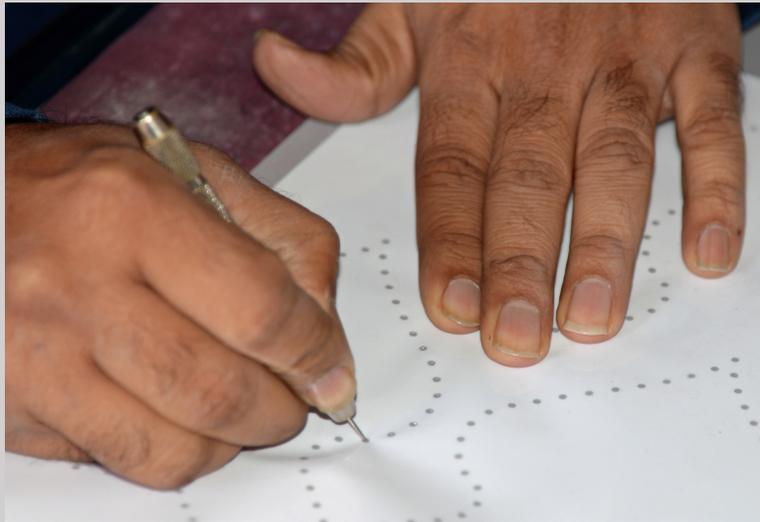


Figure 5.31a Abdul Jabbar Khatri punches holes into a plastic pattern at Sidr Craft in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.31b Abdul Jabbar Khatri rubs blueing across the pattern to transfer a design onto silk at Sidr Craft in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).

The fabric is often folded one or more times before being tied (Figures 5.31c and 5.31d) to produce a mirrored motif. The bound cloth is submerged in dye (Figure 5.31e), then hung to dry (Figure 5.31f). Tying and dyeing may be done several times to produce multiple colors. Stretching the cloth pops off the ties, revealing a textured cloth with numerous undyed spots (Figure 5.31g). The crimp is part of the aesthetic but disappears when the fabric is washed.



Figure 5.31c Abdul Jabbar Khatri pinches a dot to wrap it with thread (inserted in an orange tube) at Sidr Craft in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.31d Printed silk with ten wrapped dots, threaded tube, and ball of thread at Sidr Craft in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.31e The wrapped cloth is dipped in and out of hot dye, then hung to dry at Sidr Craft in Bjuh, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.31f A tie was removed to reveal the color protected by the wrapped thread at Sidr Craft in Bjuh, Gujarat, India (photograph by Carol Ventura, 2016).

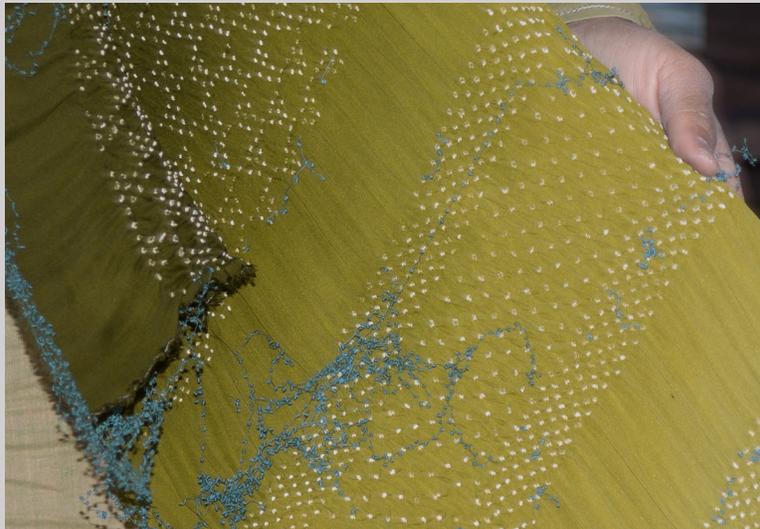


Figure 5.31g Dry, dyed cloth is stretched to pop off the ties at Sidr Craft in Bjuh, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.31h The crimp (folds) formed by the ties and hot dye is an important part of the contemporary style of silk bandhani scarves produced by Sidr Craft in Bjuh, Gujarat, India (photograph by Carol Ventura, 2016).

Block printing is less time consuming than hand painting and tie-dyeing. Ajrakh printing blocks are made from East Indian rosewood or teak by specialists, who paint the cross-grain face with a mixture of powdered lime and PVC glue, then transfer a paper pattern or create one on the white surface (Figure 5.32a). The negative space of the design is removed with chisels, and a **bow drill** that rotates a sharp metal bit (Figure 5.32c). Multicolored patterns are printed with perfectly registered sets of blocks: an outline block, fill blocks, and background blocks.



Figure 5.32a Pattern and wooden printing blocks at the Anokhi Museum of Hand Printing, Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.32b Marking a block to be cut at the Anokhi Museum of Hand Printing, Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.32c Using a bow drill and sharp metal bit to make holes in a block at the Anokhi Museum of Hand Printing, Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.32d A sharp metal bit cuts holes as it is rotated in a block of wood at the Anokhi Museum of Hand Printing, Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.32e Carved wood blocks used to print cloth at the Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).

Cloth is stretched and pinned to long, padded tables; then, the borders are laid out with a chalk-line. Carved blocks that compose the design are dipped into resist, mordants, or pigment to print the cloth before it is submerged into one or more dyes.



Figure 5.32f Printing a border on cotton cloth at the Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.32g Skillfully printing the second color on cotton cloth at the Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.32h A dye-loaded wooden block ready to print at Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.32i Perfectly placed printing block at Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.32j Printing the border of a cloth at the Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.32k Block printing yellow on stretched cotton at the Dr. Ismail Mohmed Khatri Workshop in Bagru, Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.32l Paper protects the border as yellow is printed on stretched cotton at the Dr. Ismail Mohmed Khatri Workshop in Bagru, Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.32m Dye is spread onto block printed cotton cloth to color the background at the Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.32n After being rinsed in water, block printed cloth dries in the sun at the Dr. Ismail Mohmed Khatri Workshop in Bhuj, Gujarat, India (photograph by Carol Ventura, 2016).

Block printed textiles (Figures 5.32 and 5.33) greatly diminished the demand for hand-painted chintzes in the 19<sup>th</sup> century, and now

competition from screened (Figure 5.34) and industrially printed fabrics threaten the market for hand-painted and block printed cloth. Climate change and dams that decrease river water pose other challenges because printers require a lot of water for washing fabrics at various stages of the printing process.

The dry climate of Fustat, Egypt, preserved the cotton cloth fragment in Figure 5.33 that was woven and block printed in Gujarat, India. Egypt and India have a long history of trade, dating back to at least the tenth century. Figure 5.32I demonstrates how paper is used today to avoid overlapping the central image with the border.



Figure 5.33 *Textile Fragment*, handspun cotton, block printed, mordant dyed, 11  $\frac{3}{4}$  x 9  $\frac{3}{4}$  in / 29.8 x 24.8 cm, Gujarat, India, 13<sup>th</sup>-14<sup>th</sup> century (The Metropolitan Museum, Purchase, V. Everit Macy Gift, 1930, CC0).

<https://www.metmuseum.org/art/collection/search/448526>

Since screen printing onto cloth through a stencil is more efficient than hand painting and block printing, it poses stiff competition.



Figure 5.34a This screen is ready to print in Ahmedabad, India (photograph by Carol Ventura, 2016).



Figure 5.34b The screen is attached to a rail on one side to help with registration as it is moved across the cotton cloth during printing in Ahmedabad, India (photograph by Carol Ventura, 2016).



Figure 5.34c Screen printed cotton cloth in Ahmedabad, India (photograph by Carol Ventura, 2016).



Figure 5.34d Washing the screen after printing in Ahmedabad, India (photograph by Carol Ventura, 2016).

The sari is a traditional wrap-around garment worn by Indian women, dating back 3000 years. Colors are often symbolic; white is worn by widows during mourning while red is worn by a bride. Fabric colors and patterns can also identify the wearer's home region.

A patolu sari is worn by a bride during her wedding in India. The exquisite example in Figure 5.35 depicts a parade of elephants carrying crowned dignitaries and their attendants. Click on the link below the caption to better see the standard-bearers, soldiers with lances, and soldiers on horses and camels that surround the elephants.

Silk patolu was an important trade item because it was the most prized cloth traded to Indonesia, where it was believed to have magical powers. Indonesian weavers and printers eventually created their own versions of the imported cloth (Figures 6.5f, 6.5g, and 6.6).



Figure 5.35 *Patolu with Elephant Design*, silk double ikat (resist dyed), 43 x 182 in / 109.2 x 462.3 cm, late 18<sup>th</sup> century (The Metropolitan Museum of Art, Purchase, Friends of Asian Art Gifts, 2012, CC0).

<https://www.metmuseum.org/art/collection/search/77871>

**ikat** is produced with specially tie-dyed warp and/or weft threads to produce a reversible patterned cloth. Patolu (Figure 5.35) is a double woven ikat fabric woven with tie-dyed silk warp and weft that precisely match up to form an image while the fabric is being woven. The plural form of patolu is patola.

To begin the process, a design is drawn onto graph paper. Each square representing a group of warp and weft threads (Figure 5.36a). The threads are measured to length, stretched on a frame (Figure 5.36b), separated into groups, and marked with a grid. Following a graphed pattern, they are wrapped with cotton thread (Figures 5.36c) to block the dye from that section, then colored with natural dye, and dried. This procedure is repeated several times to produce the multicolored warp and weft threads.



Figure 5.36a Graph with bundles of bound and dyed silk thread at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36b Frame with stretched weft at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36c Bundles of threads were marked then the parts that are to remain white are tightly wrapped to stop dye from penetrating at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).

The binding threads are removed after all the colors have been applied (Figures 5.36d, 5.36e and 5.36f).



Figure 5.36d Savanbhai Salvi unwraps a bundle of dyed threads at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).

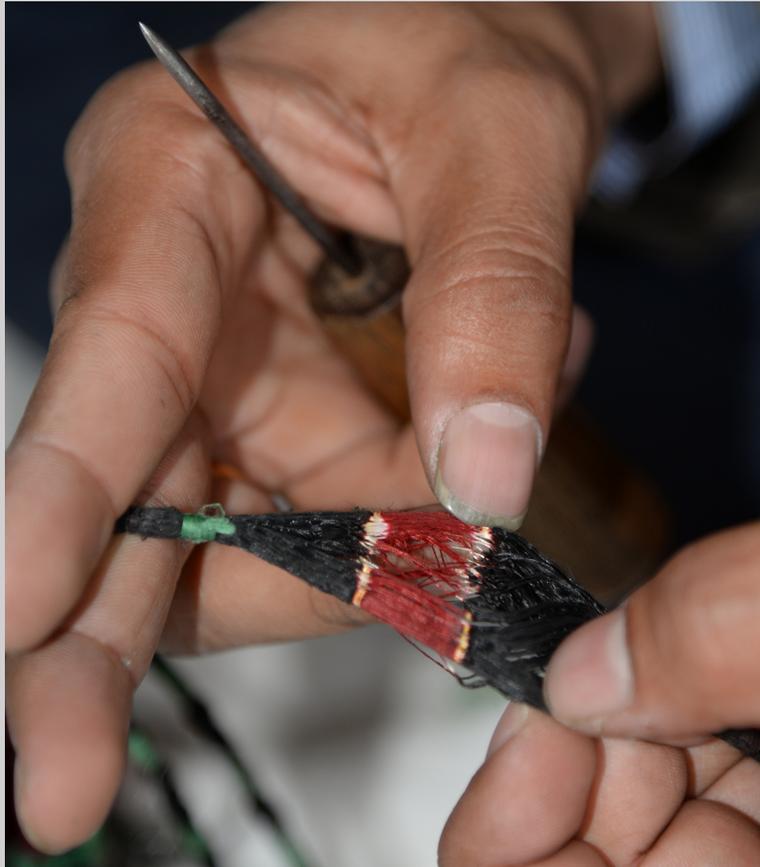


Figure 5.36e Unwrapped dyed warp at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).

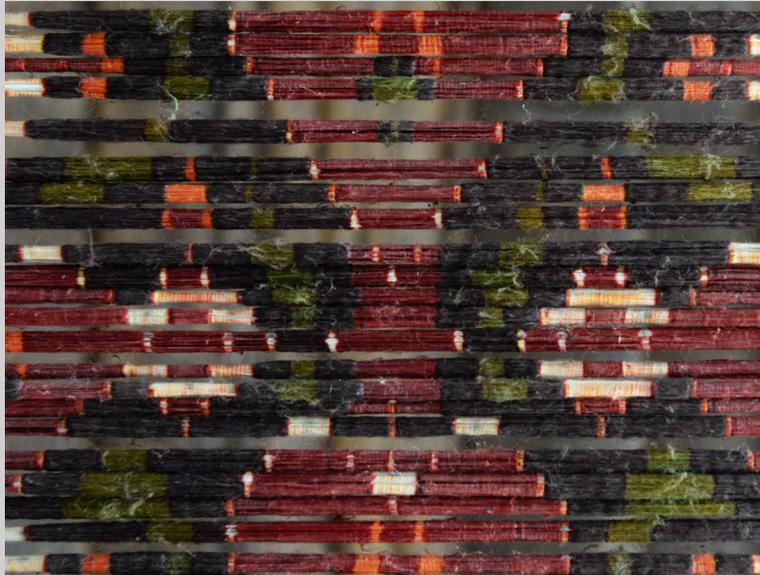


Figure 5.36f Bundles of unwrapped dyed warp at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).

A grooved warp spreader keeps the patterned warps evenly spaced (Figure 5.36g). The dyed warp is mounted on a loom (Figure 5.36h) placed on an angle so that light reflects on it.



Figure 5.36g A grooved warp spreader keeps the patterned warps evenly spaced while weaving on the loom at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36h Winding the cloth beam of the suspended loom at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).

The patterned weft (Figures 5.36i and 5.36j) is inserted, then adjusted with a large needle (Figure 5.36k) to line up the patterned warp and weft threads.



Figure 5.36i Shuttle with bobbin of dyed weft at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36j Inserting a shuttle of weft with the left hand while adjusting the placement of the threads with the right at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36k Bharatbhai Salvi adjusts the warp and weft with a large needle to line up the pattern at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).

A stretcher bar is attached to the right and left selvedges to maintain the width of the woven cloth (Figure 5.36l). Rice water sizing is occasionally spread onto the unwoven warp to keep the fragile threads from breaking (Figures 5.36m and 5.36n).



Figure 5.36l A bowed stretcher on the bottom of the cloth is attached to the left and right **selvedges** to help maintain the width of the woven cloth at Patan Patola Heritage, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36m Rahulbhai Salvi applies rice water sizing to the unwoven tie-dyed silk warp with his hand in Patan, Gujarat, India (photograph by Carol Ventura, 2016).



Figure 5.36n Rahulbhai Salvi spreads the sizing with a brush to strengthen the delicate tie-dyed silk threads in Patan, Gujarat, India (photograph by

Carol Ventura, 2016).

Pit **treadle foot loom** weavers sit slightly above floor level with their feet below floor level resting on treadles that control the **harnesses / shafts** closest to the weaver. The pit treadle **drawloom** in Figures 5.37a and 5.37b is operated by two people. A “draw boy,” seated above the loom, is guided by sequentially knotted cords that indicate which harnesses need to be lifted to create the next **shed** to produce the pattern (Figure 5.37c). A specialist follows a graphed pattern to prepare the *jaala* (Figure 5.37d) that will guide the “draw boy.” The weaver inserts the **shuttle** into the shed to produce a loom-controlled patterned fabric.



Figure 5.37a A knotted cord shows the “draw boy” which harnesses / shafts need to be raised to produce the next pattern shed in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.37b A “draw boy” uses a lifting fork to raise the appropriate drawcords to lift the harnesses in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.37c White strings knotted around specific drawcords show the “draw boy” the harnesses that need to be raised in Cholapur, India (photograph by Carol Ventura, 2016).

A pattern graph informs the specialist who prepares the “jaala” drawloom pattern cord guide (Figure 5.37d) for the “draw boy” (Figure 5.37a).



Figure 5.37d Naseem prepares a pattern cord storage guide that will be used for a *jaala* drawloom in Varanasi, India (photographs by Carol Ventura, 2016).

**Velvet** is a **pile** weave that requires two sets of warps: supplementary pile warps and ground warps. The supplementary pile warps are wound onto individual bobbins (Figure 5.38e) because their lengths change as the pile is woven. To create the pile, a shaped metal wire is inserted into a supplementary warp shed, then a ground weft is inserted into the next few sheds and beat into place between each pass to secure the pile warp. Several wires are woven into the cloth before the first wire is cut free with a razor (Figure 5.38h).

Cloth that combines areas with and without velvet is called voided velvet. To produce voided velvet (Figure 5.38j), pattern cords are raised by the “draw boy” (Figures 5.38b and 5.38c) to produce a shed for the weaver to pass through the weft. Foot treadles tied to the harnesses closest to the weaver control the ground cloth sheds.



Figure 5.38a “Draw boy” Belal Ansari and his older brother, master weaver Rijvana Ansari, and their 21-harness pit treadle drawloom anchored to stone uprights buried in the floor in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38b While Belal selects drawcords for the next pattern shed, Rijvana Ansari inserts an angle hook that helps separate the cords, and her husband, Shamin, weaves the silk ground **twill** with foot treadles on their drawloom in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38c Belal raises drawcords with the lifting fork, then Shamin inserts silk pattern weft to produce voided velvet on their pit treadle drawloom in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38d Barbara Setsu Pickett, Eva Basile, and Michael Pickett observe the Ansari family weaving on the drawloom with individually weighted supplementary warp threads in Cholapur, India (photograph by Carol Ventura, 2016).

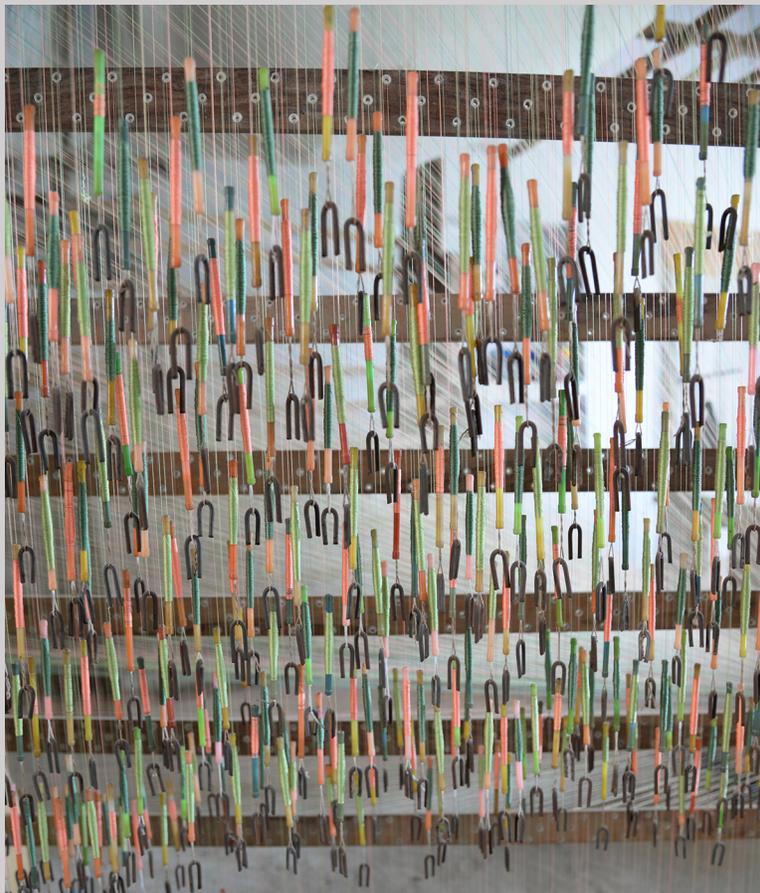


Figure 5.38e View of the individually weighted supplementary silk pile warp threads in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38f A white cloth protects the woven voided velvet as Shamin beats the wefts into place in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38g A view of raised harnesses, warp, and Shamin at the drawloom in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38h Shamin cuts the supplementary warp over a wire to create the pile and to remove the wire in Cholapur, India (photographs by Carol Ventura, 2016).



Figure 5.38i Paper graph for the voided velvet fabric on the drawloom in Cholapur, India (photograph by Carol Ventura, 2016).



Figure 5.38j Woven voided velvet silk fabric on the drawloom in Cholapur, India (photograph by Carol Ventura, 2016).

Many drawlooms have been converted into **jacquard looms**, which use punched cards instead of a “draw boy” to lift the harnesses (Figures 5.38k, 5.38l, 5.38m, and 12.14).



Figure 5.38k Inserting ground weft on a jacquard loom that was converted from a drawloom in Varanasi, India (photograph by Carol Ventura, 2016).



Figure 5.38l Beating wefts into place on a jacquard loom that was converted from a drawloom in Varanasi, India (photograph by Carol Ventura, 2016).



Figure 5.38m Inserting supplementary weft on a jacquard loom that was converted from a drawloom in Varanasi, India (photograph by Carol Ventura, 2016).



Figure 5.38n Strung together punched cards (on the left) control the sheds in place of the cut cords on this jacquard loom that was converted from a drawloom. Each hole in the cards represents a specific warp thread. Varanasi, India (photograph by Carol Ventura, 2016).

India was the first country to mine diamonds – as early as 300 BCE. They were traded to the west, along with emeralds, sapphires, rubies, topaz, coral, and pearls. Precious and semiprecious stones were skillfully cut and set into gold and **silver** bracelets, anklets, finger rings, toe rings, nose rings, pins, turban ornaments, necklaces (Figure 5.40) and earrings that were cast, **chased**, or decorated with pearls or enamel. Colorful stones were also set into the walls of monumental architecture, the most famous being the 17<sup>th</sup> century Taj Mahal (Figures 5.39a and 5.39b).



Figure 5.39a Stone inlaid into the marble walls of the Taj Mahal, Agra, India (photograph by Carol Ventura, 2016).



Figure 5.39b Detail of semi-precious stone inlaid into the marble walls of the Taj Mahal, Agra, India (photograph by Carol Ventura, 2016).

Some **lapidaries** in India still shape and polish precious and semiprecious stones with pre-industrial tools (Figures 5.39c through 5.39h).



Figure 5.39c Carving a stone matrix for inlay in Agra, India (photograph by Carol Ventura, 2016).



Figure 5.39d Shaping stone inlay piece against a rotating abrasive wheel turned with a bow in Agra, India (photograph by Carol Ventura, 2016).



Figure 5.39e Attaching warm dopping wax to stones in Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.39f Shaping a dopped stone against a bow controlled abrasive wheel in Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.39g Stones dopped (attached with wax) to a handle for easier control while cutting the stone into a **cabochon** shape in Jaipur, India (photograph by Carol Ventura, 2016).



Figure 5.39h Cutting a dopped stone against a bow-controlled abrasive wheel, Jaipur, India (photograph by Carol Ventura, 2016).

The *Necklace* in Figure 5.40 provides a glimpse at the excellent design, techniques, and craftsmanship of Indian jewelry.



Figure 5.40 *Necklace front and back, gold, diamonds, colorless sapphires, rubies, imitation emeralds (colorless rock crystal over green foil), and pearls, 11 13/16 x 5 7/8 x 13/16 in / 30 x 15 x 2 cm, Punjab or Rajasthan, India, 18<sup>th</sup> – 19<sup>th</sup> century (The Metropolitan Museum of Art, John Stewart Kennedy Fund, 1915, CC0).*

<https://www.metmuseum.org/art/collection/search/446767>

## **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 17<sup>th</sup> century French Louis XIV Rococo style furniture.

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

**Boule Work** – Sixteenth, seventeenth, and eighteenth-century marquetry technique using metal (often brass or pewter), wood veneer, and/or tortoise shell; perfected by André-Charles Boule (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 16<sup>th</sup> 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 5<sup>th</sup> 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 11<sup>th</sup> 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 form 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.

Saggar – 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 8<sup>th</sup> century BCE through the 3<sup>rd</sup> 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.

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# Author

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 47<sup>th</sup> International Congress of Americanists, The 6<sup>th</sup> 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*,

*Ornament, Piecework, Shuttle Spindle and Dyepot, Vogue Knitting Crochet, Whispering Wind, and Woodcarving magazines.*



Carol Ventura surrounded by first millennium Mochica portrait vessels at the Larco Museum in Lima, Peru, 2017.