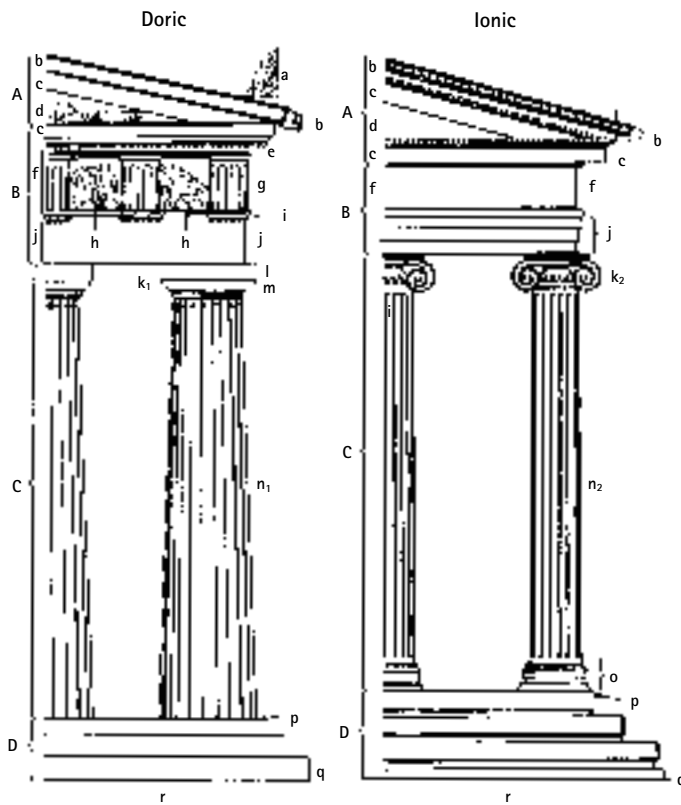


ARTISTS AND MATERIALS

ARCHITECTURE IN ANCIENT GREECE

Although the ancient Greeks erected buildings of many types, the Greek temple best exemplifies the aims and methods of Greek architecture. A temple's primary function was religious, its form and situation set to serve the cult of a divinity. The interior of the building usually contained a statue of the god or gods celebrated there and a treasury for the storage of precious offerings. Worshippers would have known these cult images by reputation, but need not have seen them often, for the rituals of Greek religion took place outdoors, at the altars where animal sacrifices were performed. The temple was one element of a sanctuary whose boundaries typically contained other structures, statues, objects dedicated to the gods as gifts, and often features of the landscape, such as sacred trees or springs. Many temples benefited from the awesomeness of their natural surroundings, which helped to express the character of the divinities worshipped within. For instance, the temple at Sounion dedicated to Poseidon, god of the sea, commands a spectacular view of the water on three sides, and the Parthenon on the rocky Athenian akropolis celebrates the indomitable might of the goddess Athena.

The form of a Greek temple was not a space inviting entry, but rather a sort of abstract sculpture marking a place in the world. The temple incorporated a stepped base of oblong plan, rectangular rooms for the main statue and offerings, and one or more rows of columns surrounding all four sides. The vertical structure of the temple conformed to an order, a fixed arrangement of forms unified by principles of symmetry and harmony. The two most important orders in Classical Greek architecture are the Doric and the Ionic, which were supposed to reflect the proportions of a man and a woman,



Greek Orders of Architecture

- | | | |
|-----------------------|---|---|
| A. Pediment | f. Frieze | n ₁ Shaft with flutes separated by sharp arrises |
| B. Entablature | g. Triglyphs | n ₂ Shaft with flutes separated by blunt fillets |
| C. Column | h. Metopes | o. Bases |
| D. Crepidoma | i. Regulae and Guttae | p. Stylobate |
| a. Acroterion | j. Architrave or Epistyle | q. Euthyteria |
| b. Sima | k ₁ Capital (Doric) | r. Stereobate |
| c. Geison or Cornice | k ₂ Capital (Ionic) with Volutes | |
| d. Tympanum | l. Abacus | |
| e. Mutules and Guttae | m. Echinus | |

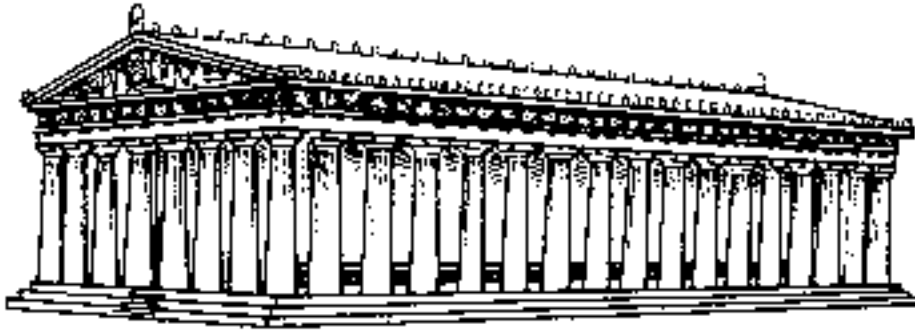


Corinthian

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respectively. The third order of Greek architecture, known as the Corinthian, first developed in the Late Classical period but was more commonly used in the Hellenistic and Roman periods. Corinthian column capitals are decorated with vegetal compositions, typically acanthus leaves. In a Greek temple, however, the order governed not only the column but the relationships among all the components. As a result, every piece of a Classical temple is integral to its overall structure; a scrap of molding often can be used to reconstruct an entire building.

The comparison between the body and the temple is one that ancient writers use, and it helps us tie architecture to the Greeks' other artistic endeavors. Temples and statues express many of the same concepts, for example, that numerical relationships underlie sound and beautiful proportions, that balance is a natural and dynamic principle, and that individual parts articulate an integrated whole. The Greek architect presented these abstract ideals in tangible form. In the Archaic and Classical periods, Greek builders favored limestone and marble construction. The quarrying and transport of such materials were costly and labor-intensive, and contingent upon substantial state budgets. For example, the wealth Athens accumulated after the Persian Wars enabled Perikles to embark on his extensive building program, which included the Parthenon and other monuments on the akropolis. Athens was able to engage skilled workmen from all parts of the Greek world, and constructed the temple, known as the Parthenon, between 447 and 432 B.C.



© John Kerschbaum

Model of the Parthenon. Scale 1:20. MMA, Purchase, Levi Hale Willard Bequest, 1890 (90.35.3) (Location: Uris Education Center)

Designed by architects Iktinos and Kallikrates, the Parthenon, which crowns the akropolis of Athens, was dedicated to the goddess Athena. It was constructed between 447 and 432 B.C., while Athens was at the height of her wealth and power under the leadership of the statesman Perikles. Built entirely of local Pentelic marble, it was one of the largest and most richly decorated of all Greek temples. The sculptural embellishment consisted of two triangular pediments filled with overlifefize figures; ninety-two plaques, or metopes, arranged under the eaves; and a frieze along the exterior top of the chamber of the temple, measuring a total of 525 feet. This ambitious sculptural program was overseen by the sculptor Pheidias, who also designed the gold and ivory cult statue of Athena, approximately forty feet high, that stood within the temple. The Parthenon itself is 110 feet 6 inches wide and 237 feet 2½ inches long. The model, of which you see a drawing here, was made in Paris by Adolphe Jolly in 1889, according to the reconstruction of the archaeologist and architect Charles Chipiez. While many details have proved to be inaccurate, the model gives an excellent sense of the architectural and sculptural features of the temple and their relative scale. (The windows in the front walls have been added to the model to reveal the interior of the temple.)

Although the Parthenon was an exceptional project, builders of Greek temples strove for the precision and excellence of workmanship that are hallmarks of Greek art in general. A civic or religious body engaged the architect, who participated in every aspect of construction: he usually chose the stone, oversaw its extraction, and supervised the craftsmen who roughly shaped each piece while it was still at the quarry. At the building site, expert carvers gave the blocks their final form, and workmen hoisted each one into place. The tight fit of the stones was enough to hold them together without mortar, and metal clamps, invisibly embedded within the layers of stone, reinforced the structure against earthquake.

Masters in many different arts collaborated in the raising of a temple. Wooden scaffolding was needed for construction, ceramic tiles for the roof, and metal fittings for the interior. Sculptors fashioned the friezes that ornament some temples, such as the Parthenon. They also made statues to fill the pediments, the triangular spaces enclosed by the gable, and akroteria, freestanding figures designed to crown the eaves. Painters enlivened sculptural and architectural details with paint, and metalworkers were hired to make any bronze decorative details on the surface of a sculpted frieze.

BRONZE STATUES OF ANCIENT GREECE AND THEIR ROMAN COPIES

Almost all the marble statues in the central area of the Mary and Michael Jaharis Gallery are copies made during the Roman period, from the first century B.C. through the third century A.D. They replicate statues of bronze created by Greek artists some five hundred years earlier during the fifth and fourth centuries B.C. All but a few ancient bronze statues have been lost or melted down to reuse the valuable metal, so that such copies provide our primary visual evidence of masterpieces by famous Greek sculptors.

During the third millennium B.C., in the early Minoan period in Crete, the use of bronze, an alloy usually in proportions of one part tin to nine of copper, became widespread. Even after the introduction of iron, bronze remained the preferred material for many utilitarian domestic objects and for sculpture until the end of antiquity. (Brass, a combination of copper and zinc, was created during Roman times.)

Copper came to mainland Greece principally from Chalkis on the island of Euboea to the north of Athens and from the island of Cyprus (whose very name derives from the Greek word for copper). Tin was mined in Asia Minor, but was also imported from as far away as Iran and Britain. In the Archaic period, artists often hammered utensils out of a blank of bronze or cast them; sculptors riveted together hammered plates or cast works hollow using the lost-wax method. The handles, rims, and feet of vessels and some statuettes were cast solid. To embellish objects, artists might hammer the bronze over forms in order to produce reliefs or incise designs using a technique called tracing.

In the Classical period, sculptors made freestanding bronze statues by hollow-casting their parts, then joining these components together by mechanical and metallurgical means. Cold chiseling then brought out details, especially in the hair, while blemishes and holes in the metal were patched. Although artists used different alloys of bronze for different effects, the metal was always left its original color in statues—a golden brown that resembled suntanned skin. With inset eyes of stone and other materials, silver teeth, copper lips, and colored borders on the drapery, these figures must have seemed astonishingly lifelike as they stood in the bright Mediterranean light.

Hollow Lost-Wax Casting: The Direct Method

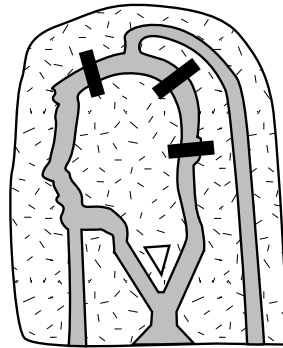
Drawing © Seán Hemingway



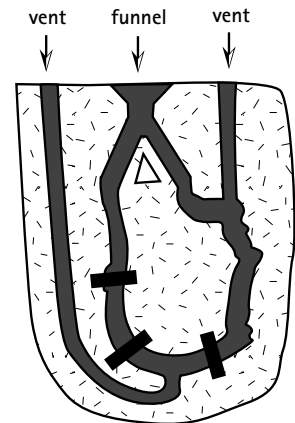
1. Roughly modeled core.



2. Wax model over core with protruding chaplets.



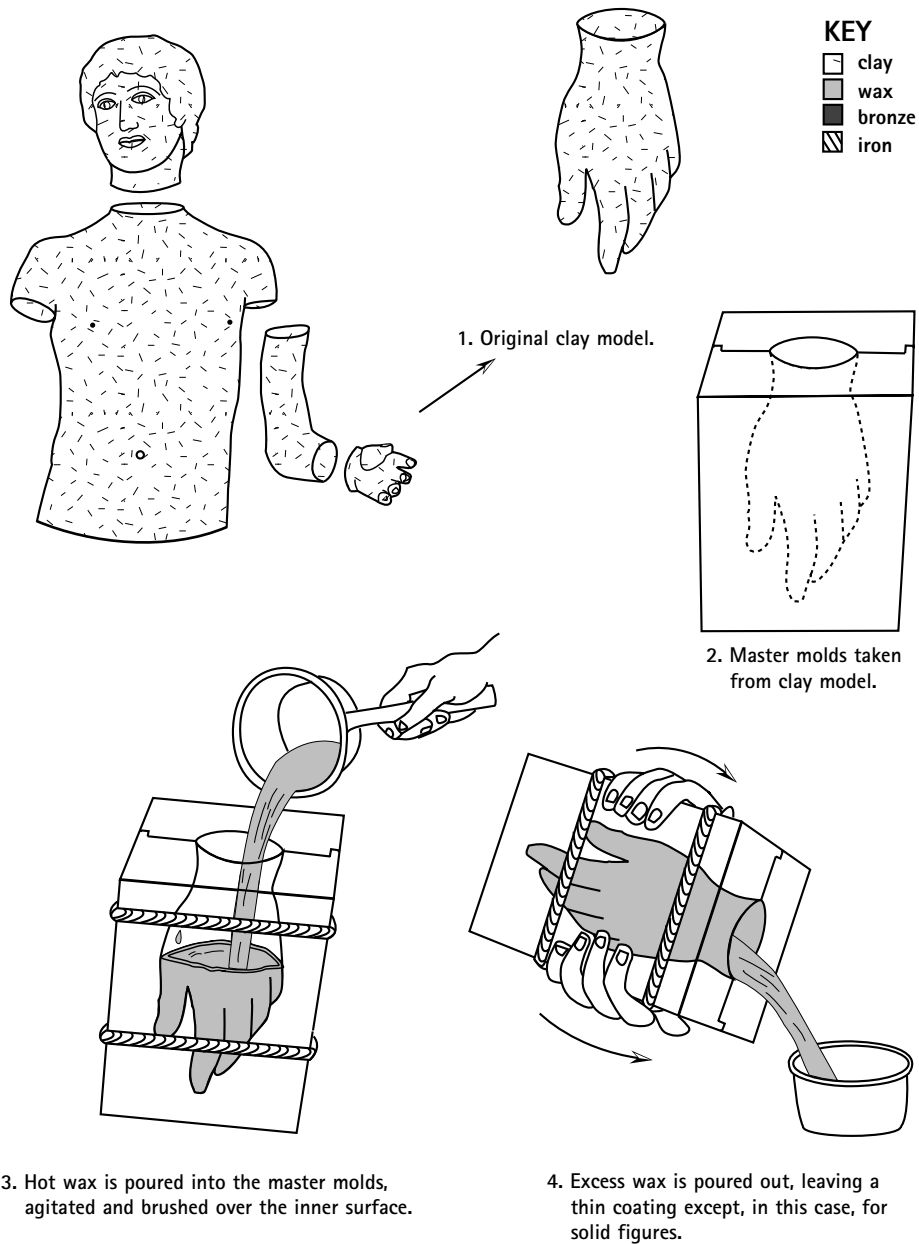
3. Clay mold built over model.

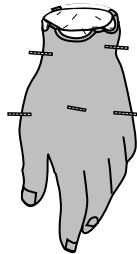


4. Wax melted out, bronze poured in.

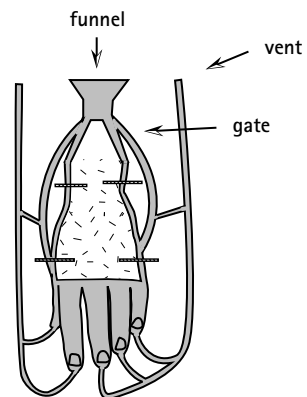
Hollow Lost-Wax Casting: The Indirect Method

Drawing © Seán Hemingway

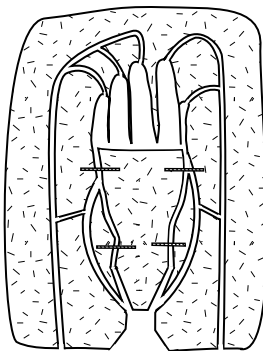




5. Finished wax working model with fingernails marked, clay core poured inside, and metal chaplets stuck through wax into core.



6. Cross section of wax working model with wax funnel, gates, and vents attached.



7. Cross section of investment mold inverted for baking, with hollow tubes where wax working model and gate system have been burned out.



8. Bronze has been poured, investment mold partially broken away.



9. Cast bronze hand with core, chaplets, and clipped gate systems.



10. Hand joined to arm by flow weld.

In the late fourth century B.C., the Romans initiated a policy of expansion that in three hundred years made them the masters of the Mediterranean world. Impressed by the wealth, culture, and beauty of the great Greek cities, victorious generals returned to Rome with booty that included works of art in all media. In addition, Greek teachers and artists were brought to Rome. Soon, educated or fashionable Romans wanted objects that evoked Greek culture, and images were produced in Greece and Italy that could impart the flavor of a classical gymnasium (athletic facility) or library to the villas of the nobility and the newly wealthy. To meet this demand, local artists, both Roman and Greek, made marble copies of famous bronze statues: molds taken from the original bronzes were used to make plaster casts that could be shipped to workshops anywhere in the Roman Empire and replicated in marble. These new statues ranged from carefully measured, exact copies to variants adapted to contemporary tastes. Because stone lacks the tensile strength of bronze, the Roman copies required supports, usually in the form of tree trunks or struts. By the second century A.D., the demand for copies was enormous—besides the domestic popularity of these statues, the numerous public gateways, theaters, and baths throughout the empire were decorated with niches filled with marble sculpture.

From the Renaissance onward, art patrons have prized these marble statues as decoration for their great houses in much the same way—and for largely the same reasons—that the Romans did. Until the mid-nineteenth century, excavated copies were heavily cleaned, and missing parts were carved to complete them. As the public began to appreciate the integrity and beauty of the original, fragmentary works, this type of restoration ceased, and in some cases the modern additions have been removed.

CERAMICS

Black- and Red-Figure Techniques of Athenian Vase Painting

Black- and red-figure techniques were used in Athens to decorate fine pottery between the beginning of the sixth and the end of the fourth centuries B.C., while simpler, undecorated wares fulfilled mundane household purposes. A tradition of fine pottery had existed in Greece since prehistoric times, so that the use of the potter's wheel, control over the firing process in a kiln, and principles of decoration were well established. Black-figure and red-figure are complementary processes that depend on the contrast between glossed areas, which turn black during firing, and the unglossed or reserved areas, which retain the orange color of the clay after firing.

First, the potter shaped a vase on a wheel, then set the vase out to dry until it became leather-hard. The surface was burnished and smoothed, and elements such as handles and feet were attached with slurry, a watery clay mixture. Independently of their decoration, Attic vases are distinguished by the quality of the potting, the absence of cracks, and the smoothness of the surface.

The painter who applied the decoration might or might not be the same person as the potter. In black-figure vase painting, the figural and ornamental motifs were applied using a refined clay, or gloss (commonly called "glaze" in the literature), nearly the same color as the clay of the vase. The forms were articulated by incising this gloss and adding red and white varieties of clay. The background was left the color of the clay of which the vase was made. In red-figure pottery, the outline of the forms was emphasized with a relief line and sometimes a broader gloss stripe. The figures were articulated with relief lines and, often, more or less dilute washes of gloss. Added red and white were used more sparingly in red-figure vase painting than in black-figure. The background was filled in with gloss, and the vase was then ready to be fired.

The firing process consisted of three stages. During the first, oxidizing stage, air was allowed into the kiln, turning the whole vase the color of the clay. In the subsequent reducing stage, green wood was introduced into the chamber and the oxygen supply was cut off, causing the object to turn black in the smoky environment. In the third stage, air was reintroduced into the kiln; the reserved portions turned back to orange while the glossed areas remained black. In characteristic Greek fashion, this firing process was extraordinarily efficient and required remarkable expertise.

Athenian Vases of the Sixth and Fifth Centuries B.C.: Styles, Subjects, and Some Artists

Painted vases were often made in specific shapes for specific daily uses—storage, fetching water, drinking, and so on—but also for special, often ritual occasions. Their pictorial decorations provide insights into many aspects of Athenian life, and complement the literary texts and inscriptions from the Archaic and, especially, Classical periods.

By the mid-sixth century B.C., craftsmen of the Athenian potters' quarter, known as the Kerameikos, had arrived at a fully developed style of black-figure vase painting. Attic black-figure vases were in great demand throughout the Greek-speaking world as well as among the wealthy Etruscans of Italy. Scenes of warfare were extremely popular at this time. Some, drawn from contemporary life, showed hoplites putting on their armor, bidding farewell to their loved ones before battle, or advancing in phalanx formation; but the majority represented mythological episodes or tales of the heroic past, from sources such as the *Iliad* of Homer. On these vases, gods and goddesses, famous heroes, and Amazons mingle with warriors in hoplite armor, thus raising warfare to an exalted level. Depicted with elegance and panache, these battle scenes must have afforded great pleasure to an aristocratic class that placed great emphasis on military valor and athletic competition.

One of the artists active in the Kerameikos from about 560 to 515 B.C. is known today as the Amasis Painter because he decorated a number of pots that were signed by a potter named Amasis. Some scholars conjecture that both potter and painter were the same person and that he came from Egypt, because Amasis is the Greek form of a common Egyptian name. The black-figure technique perfectly suited the sensibility of this artist. He sought extreme clarity in his compositions and had an exquisite sense of spacing, proportion, and balance. All of his images show extraordinary precision and care in execution, from tiny incisions that indicate toes to threadlike lines for spear shafts.

Exekias (ca. 550–530 B.C.), a contemporary of the Amasis Painter, was the consummate master of the black-figure technique (slide 5). Both potter and painter, he is credited with inventing several new vase shapes, including the eye-cup and the calyx-krater. He imbued any scene he created, even the most ordinary, with a sense of dignity and grandeur.

The years around 530 B.C. also witnessed a significant event: the invention of the red-figure technique in vase painting, attributed to the potter Andokides and the painter with whom he collaborated. This technique gradually replaced the earlier black-figure.

Euphronios (slide 9) and Euthymides are among the innovators who exploited the expressive possibilities of the red-figure technique at the end of the sixth and the beginning of the fifth centuries B.C. They recognized the possibilities that came from drawing forms freely, rather than laboriously delineating them with incisions. The ability to represent the human body in increasingly complex poses and their articulation of forms with dilute gloss helped to establish the primacy of this technique. Their successors tended to specialize in particular shapes, for example, artists such as the Brygos Painter, Douris, and Makron excelled in the embellishment of kylikes (drinking

cups), while the Kleophrades Painter, the Berlin Painter (slide 10), and others devoted themselves to larger pots. The Penthesilea Painter (slide 11) and his circle tended to favor more active, often mythological, subjects on small pots and cups. Another technique of vase painting, using a white clay ground, became popular during this period, and was especially applied to a type of oil flask known as a lekythos, which was the standard offering at graves. The white slip not only heightened the effect of the gloss drawing but also fostered the introduction of color for garments and other details. The works of the Achilles Painter and others who favored the white-ground technique preserve some of the rare surviving evidence for the ancient Greeks' use of color.

While black-figure painters of the sixth century B.C. reveled in the world of myth, early red-figure artists were interested in scenes of everyday life, which allowed them to show off their mastery of the new medium. Athletics, drinking, warfare, and other more down-to-earth themes thus took their place beside the exploits of Greek gods and heroes. Although significant exceptions exist, the vases primarily depicted an Athenian man's world. Around the middle of the fifth century B.C., the scenes of this world changed in emphasis, often showing the departure of a warrior, preparation or departure for battle, the offering of libations to the deceased (liquid offerings), and figures at a funerary monument. But even more conspicuous were the many vase shapes and subjects concerned with the daily life of women, the observances connected with marriage, and the various myths featuring women—from warrior Amazons to sea-nymph Nereids. This innovation concerned not only decorative preferences but also the uses to which the finest vases were put. It is also evident that the foremost artists—the Eretria Painter, the Meidias Painter, and their peers—worked in a delicate, controlled, and increasingly ornate style.

Although the subject matter of later fifth-century B.C. vases is familiar from earlier periods, there is a distinct change of tone. Warriors arming or fighting are now replaced by statuesque youths taking leave of their families. The music making that was associated with symposia earlier in the century is transformed into intimate, often introverted depictions of several figures listening to a performer. The domestic activities of women that had acquired prominence around the middle of the century become particularly focused on wedding preparations and celebrations of the bride.

Tanagra Figurines of the Fourth Century B.C.

Although the Greeks had been making terracotta statuettes since the eighth century B.C., it was not until the late fourth century B.C. that they began to produce brightly colored clay figurines, known as Tanagra figurines, still prized today for their naturalness, variety, and charm. These statuettes were first made in Athens and were soon being fabricated throughout the Mediterranean world. They take their name from Tanagra, an ancient city in Boeotia, the region to the north of Attica, where great numbers were discovered in tombs during the early 1870s.

The variety of gesture and detail that makes Tanagra figurines so appealing is due to their complex method of manufacture. Like most earlier terracotta statuettes, they were formed in concave terracotta molds. The original three-dimensional figure from which the mold was taken was usually freely modeled of wax or terracotta; sometimes existing figurines of terracotta, bronze, or wood were used. Tanagra figurines, however, were made in two-part molds—one for the front and one for the back. Often the heads and projecting arms were made in separate molds and attached to the statuette before firing. By varying the direction of the head and the position of the arms, a single type of figure could be given many slightly different poses. Wreaths, hats, or fans were handmade and attached.

Whereas almost all earlier terracotta figurines represented deities, the majority of Tanagra figurines are fashionable women or girls, elegantly wrapped in thin himatia (cloaks) and often wearing large sun hats and holding wreaths or fans (see fig. 25 in the **Greek Art** section). While most stand gracefully, some are seated or play games. Young boys are also represented, as are the deities Aphrodite and Eros.

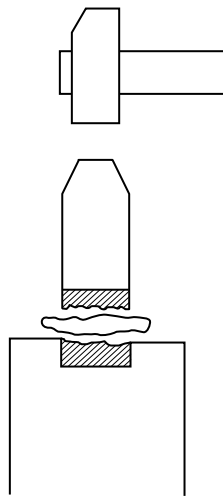
Some of these figurines have been found in private dwellings. Like other small-scale sculpture found in houses, they probably had some religious purpose and were placed in household shrines. They were also dedicated at public sanctuaries and placed in private tombs. At Tanagra, up to a dozen statuettes were found in some graves. Since fashionable ladies did not usually spend much time outdoors, religious festivals and funeral processions offered the best opportunities for displaying their finery. It is therefore possible that for all their secular appearance, the Tanagra figurines reminded the ancient viewer of solemn religious ceremonies.

The relaxed, curvaceous poses of these statuettes, their sweet faces, and the tightly wrapped drapery that forms a complex pattern of fine folds all derive from large-scale sculpture such as the statues of Praxiteles, the famous Athenian sculptor active in the mid-fourth century B.C. Their intimate, secular spirit also reflects contemporary comedies by Athenian playwrights, like Menander, who placed new emphasis on the foibles of people in everyday situations.

COINS OF ANCIENT GREECE

Origin and Technique

The concept of money as a means of exchange and as a way to store wealth and make payments can be traced at least as far back as the first written records, that is, to the third millennium B.C. in Mesopotamia and Egypt. Coinage started at the end of the seventh century B.C. in the kingdom of Lydia and in Ionia, both in Asia Minor. The innovation consisted of stamping pieces of metal of a standardized weight to guarantee their legal tender. In this way, coins could simply be counted, and it was no longer necessary to weigh money in order to determine its value.



Ancient coins were made by hand with two engraved dies: one—the obverse—was fixed in an anvil; the other—the reverse, or punch die—was placed on top of a metal blank, or flan, and the stack was struck with a hammer. The resulting images on the coin identified its geographical origin, type, and value. Since the dies themselves were engraved by hand, many of them can be compared to some of the great masterpieces of Greek sculpture and vase painting. It is interesting to compare how such subjects as Apollo or Dionysos and his followers are depicted on coins and in other media, such as vases.

The first coins were made of electrum, a naturally occurring alloy of gold and silver. Coinage spread to mainland Greece and the west in the second half of the sixth century B.C. The use of coins was quickly adopted by the Greek cities and so spread across the Mediterranean world. Since the Greeks had access to silver mines rather than sources of gold, the vast majority of their precious metal coinage was of silver in the Archaic and Classical periods.

Weight Standards and Denominations

The value of the silver coins was based on weight; it was not a token coinage. Obol (spit) and drachm (handful) were common names for coins (like the dime and dollar today), but each city had its own system of weights and denominations, making exchange between currencies difficult. Issues of a particular city were initially identified not by a legend, that is, written information, but by distinctive symbols. Within each monetary system, there were multiples and subdivisions of the obol and the drachm: the tetradrachm (four-drachm piece), the dekadrachm (ten-drachm piece; see fig. 18 in the **Greek Art** section), the hemiobol (half-obol piece), and so forth.

Images on Coins (Types)

As official state products, Greek coins are somewhat conservative in style; they are, however, original works of Greek sculpture. Since relatively few large statues in bronze or marble have survived, coins provide a tangible and contemporary sense of the Classical style.

Athenian coinage, like all city coinages, reflected local religion. However, the cult of Athena was widespread; for instance, Thurii, in southern Italy, the only Athenian colony in the west, chose the goddess as a coin type. The impact of the Parthenon sculptures reached as far as the Carian city of Aphrodisias in modern-day Turkey, where the colossal gold and ivory statue

of Athena by Pheidias appeared on a coin. Greek heroes, such as Herakles, and the great Olympian gods are often depicted on coins; however, owing to the small size of the flans (coin disks), the representations are mostly limited to the head of these figures. Mythological scenes are rare in this period but do occur, such as the abduction of the Palladion, or protective statue of Athena, on the coins of Argos. Other coins simply attest to agricultural or commercial wealth: the representation of an ear of wheat occurs on coins from Metapontum, a Greek colony in southern Italy, and an image of a tuna marks coins from the seaport of Kyzikos on the peninsula of Arktonnesos in the southern Propontis, in modern-day Turkey. Animals as attributes of the gods or as mythical creatures in their own right are also favorite coin types.

GEMS OF ANCIENT GREECE

Gem engraving, like the production of pottery and terracotta figurines, flourished in the Greek world from prehistoric times onward. One reason for the longevity of these three arts is that they produced objects that were functionally essential and easily portable. In the case of engraved gems, their purpose was to mark ownership in cultures in which writing was either unknown or restricted to very few people.

Greek gems of the Archaic and Classical periods reveal the same consummate creativity and execution familiar to us in larger scale media such as sculpture and vase painting. Moreover, the subject matter and the artistic challenges are often the same. During the early fifth century B.C., representations of young men and satyrs express artists' interest in depicting the male body in motion. During the later fifth and fourth centuries B.C., scenes of action become more intense. The depictions of ladies at home—so prominent on vases—are favored on finger rings, one class of objects closely related to gems. Another is coinage. The intaglio process used to engrave stones is related to the preparation of dies for minting coins.

The special qualities of gems reside not only in their small size but especially in their shapes and materials. An innovation of the Archaic period is the scarab, the carved beetle that had a long earlier history in Egypt. The scaraboid is a simplified variant with a smooth convex back. Its preferred stones are quartzes such as carnelian and jasper. These are favored for their durability, moderate hardness, and absence of grain. The hardest stones—emerald, aquamarine, and sapphire—were seldom engraved. (The diamond was probably unknown before the first century A.D.) The so-called Greco-Persian gems that represent the meshing of eastern Greek and Persian styles and tastes reveal a predilection for cones and complex faceted shapes; the stone of choice is chalcedony.

GLASS OF THE GREEK ARCHAIC AND CLASSICAL PERIODS

The practice of using core-formed glass vessels to hold such valuable commodities as perfume, scented oils, unguents, and cosmetics began in the later Bronze Age (around 1500 B.C.) in Mesopotamia and Egypt. In the middle of the next millennium, the technique of core-forming was revived, and core-formed vessels achieved their greatest popularity, as three successive industries manufactured relatively large quantities of them that circulated widely in the lands bordering the Mediterranean—from the Aegean, Black Sea, and the Levant in the east, to North Africa, Italy, and Spain in the west. In shapes derived from the forms of Greek ceramics and silverware, these glass vessels and their precious contents were employed in the home for cosmetic purposes, offered as votives in sanctuaries, and used to anoint the dead, after which the empty bottles were discarded in the burials.

MARBLE SCULPTURE OF ANCIENT GREECE

From the seventh century B.C. onward, the Greeks began to use marble extensively in their architecture and sculpture. Ancient marble sources included the Cycladic islands of Naxos and Paros; Thasos in the northern Aegean; Doliana in the Peloponnesos; and the mountains of Pentelikon and Hymettos near Athens. The earliest known quarries operated in Naxos, but Paros later was celebrated for its pure white marble. In Asia Minor, the city of Ephesos quarried marble from the sixth century B.C. onward, and quarries at Aphrodisias and Herakleia were opened in the Hellenistic period. Today, scientists are able to determine the provenance of most marble sculptures through isotopic analysis of their chemical compounds.

The Greeks first took measurements of the stone in the quarry. They removed the marble by chopping out a trench around the block with an iron pick, then they either levered it out or inserted wooden pegs around the edge of the block, doused them with water, and waited for the swollen pegs to split the marble away from the quarry surface. The sculptor roughed out the figure or relief using single-pointed picks, hammers, and chisels. From the sixth century B.C. onward, various types of drills, mostly powered by bows or straps, were used by sculptors for deep undercutting. In the fifth century B.C., a method of “pointing off” evolved that permitted the transfer of measurements from a model to the stone being carved, a system refined in later Greek and Roman times. This technique allowed a work to be replicated with considerable accuracy and in some quantity.

The surfaces of the marble were usually polished smooth with pumice or emery, and then painted with a mixture of natural pigments and wax, a technique known as encaustic. Even marble architectural details were treated with an organic wash that toned down the excessive whiteness of the raw stone.
