GREEK BRONZE SCULPTURE OF THE
TRANSITIONAL PERIOD 480-450 B.C.

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by

David Morton Elder, B.A.
The Ohio State University
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Approved by

[Signature]
Adviser
Department of Fine and
Applied Arts
PREFACE

The purpose of this paper is to develop a rather specific understanding of the Greek bronze sculpture during the Transitional period dating 480-450 B.C. The treatment of this research will be arranged four-fold.

First, the art form of the Greeks of this period will be discussed; this involves an understanding of the archaic background from which this sculpture emerges and some concept of their mental attitude toward the creative process.

Second, this paper will deal with the technical limitations and properties of bronze casting.

Third, this paper is concerned with the particular sculptors known to have been active during this period. The study of these men will entail: an approximate dating, discussion of their particular style or art form, and an investigation of their known works.

Fourth, and lastly, this paper will deal with the extant bronze works of this period. It is unfortunate that we have such a small number of works remaining, but they do show the characteristic style of the sculpture of the Transitional period in Greece.
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THE ART FORM OF THE GREEKS
The Greek artistic style is embodied with the essential expression of many forms and ideas that are still valid in the art of Western civilization today. Greek philosophy was an attempt to work out logical, purposeful principles of human existence. The belief that man is able to cope directly with the forces of nature and that, 'By man are all things measured.' was the spark that gave rise to the great Greek art as we know it. The sculptor took upon himself the function of creating man's image depicting his most glorious achievements in his life, such as monuments edifying both athletic and military heroes. The Greeks were constantly trying to alter nature to their own ends with the view that the Greek position in the universe was to be that of a harmonious unity of both philosophy and individualism. The reason for their great achievements was their quest for knowledge and their drive to succeed at any task by virtue of their own efforts.

It is necessary to know something about the laws which influenced the mind, the tastes, and the hand of the artists before judging their work. The Greek artist was subconsciously influenced by the traditions of his craft, customs of his school, the spirit of the public around him, and the impetus of national pride. The purpose in creating sculpture was connected with both a philosophy of humanism, which was the glorification of man, and a corporeal religion. Pagan
religious values could not be their guide, for the concept of man as the measure negated a religious-mystic point of view.

At the turn of the sixth century B.C., there was a period of immense importance in which great changes in the Greek art were to affect its future direction. The Transitional period stands between the archaic past and what is called the Golden Age of Greek art.

At this period man broke away from the mythical forms of collective thinking and began to awaken to a hitherto unknown fashion to consciousness of his own personality. It is a moment of universal significance when he discovered himself as an individual faced with responsible decisions in respect of the demands made by religion and state.²

When the descendents of the beneficent tyrants abused their power and were overthrown, a new and democratic form of government evolved. This very act fostered a sense of individualism and independence which was to become the essence of the Greek citizen and the Greek city-states. During the threat of the Persian invasion, few works of art were made by the Greeks until the latter part of the fifth century B.C. With the revival and rebuilding of the temples in Athens, a new art form emerged and this new spirit spread throughout the Greek world. The Greek artist acted as the interpreter of the mental, moral, and social atmosphere in which he lived. No longer bound by the representational problems of the human figure, Greek art now assumed a idealistic and spiritual character. The rise in monumental sculpture is directly
connected with the mental attitude of the citizens and the political position of their country. The Persian Wars indeed proved to be a blessing in disguise, for the sacking of the Acropolis in 480 B.C., with the destruction of buildings and statues, gave an extraordinary impetus to the Athenian people and impelled them to undertake with fresh enthusiasm the labor of rendering their city even more beautiful than before. During this rebirth not only were the individual city-states affected, but the impact was felt within the colonies of southern Italy and Sicily as well.

After the victory over the Persians, the Greeks, full of exaltation expressed their national pride in the form of sculpture and architecture. Each artist in this period has contributed, through the course of his own development, to the quality of greatness in Greek sculpture.

The glory of Greek art, truly humanistic and ideal, is to be found in the sculpture of the Transitional period rather than solely in the so-called Golden Age. The idealism is not the result of any one artist, but it is rather the culmination of all the Greek artists within their natural surroundings, their philosophy, their city-states, and their individual art schools, all of which contributed to the establishment of idealism. The meaning of humanism to the Greeks is found in their approach to their fellow man in their philosophy.
The spirit from which humanism takes its form is revealed in the realm of the true, the beautiful, and the good. The idea of the truth guides thought, and it constructs the world of science to illuminate the world, to make it subject to the mind and to give it shape. The idea of the good educates the will into self mastery and inner harmony; in the community it operates as the idea of the law, and it gives the community the order of a just state. And the idea of the beautiful guides contemplation and development and elevates art, which delineates an ideal world in which the forces of the invisible which are concealed in what is visible become clear and operate, as an educative factor towards moderation and harmony, on the mind that contemplates them.³

The characteristics of Greek sculpture are to be found in the qualities of direction, agility, and feeling for beauty. Through the use of directness an art form of simplification became evident. The artists turned his attention to the essentials both in his thinking and in his work. Greek writing and philosophy was that of sincerity and conciseness. Aristotle speaks of avoiding superfluities and defines them as the following: "That which makes no perceptible difference by its presence or its absence is no real part of the whole."⁴

By virtue of this attitude the sculptor concentrated upon the form and not upon the minute details. The rendering of the figure was simplified so that it was an organic whole which emerged as a life-like representation of the body. The quality of agility was shown by the challenging Greek mind and the love of delving into artistic problems. It was felt that art implied the use of acquired knowledge and that fine art implied the use of this knowledge for the creation of
beauty. The Greek artist was a sensitive observer of the
nature around him. His works of art were inspired by the
desire of the artist to express the dignity and divinity
of man. Greek sculpture of the human figure became a symbol,
an almost universal symbol, of a god in a human form. The
sense of beauty as a characteristic part of their art is
undeniable, for it was an integral part of their very lives.
This feeling for beauty as an aesthetic approach kept the
sculpture at an ideal level. The need for temperance,
harmony, and unity created the desired aesthetic ideal and
eventually gave rise to the complete harmony of form.
Aristotle speaks in a dialogue to the artist 'Parrhasias'
concerning his search for the quality of beauty.

But when you want to represent beautiful figures,
since it is not easy to find everything without
flaw in a single human being, do you not collect
from a number what is beautiful?\(^5\)

So then it was this perfection of form, an ideal
form, for which the Greeks strove. The Greek artist was quite
sensitive to symmetry, proportion, and rhythm. It was under-
stood that, "Symmetry is properly the proportion of one part
of the body measured against another."\(^6\) The symmetry in the
Greek sculpture may be regarded technically as the arrange-
ment of the forms to the best aesthetic advantage. The love
for proportion as found in their architecture now became
translated into their sculpture and is also found in the
canons of proportion of the human figure. These canons of
Proportion developed as standards of reference for the sculptor. Pythagoras, the Rhegion sculptor, felt that symmetre or metre was that "due proportion of the parts to one another and to the whole and is based upon strict mathematical principles."\(^7\)

Rhythm was felt to be the relationship of parts or forms to each other when in action. Rhythm implied the motion of a regular and balanced movement. This did not generally refer to a violent action, this was avoided during the archaic period of Greek sculpture. Rather, this action was a sheer simple movement of forms which created a more subtle rhythm.

The early Greek sculptors were directed in their observations and actions by the concept of 'ethos.' Ethos was considered to be that quality in man which is permanent and essential. The Greek ideal of manhood described an ideal state of health and an ideal moral state. The ideal Greek male was a full mature person occupying a position of middle age, structured between that of a youth and old age. The ideal male envisioned and encompassed the heights of man's potential; it denied his inadequacies. Greek art has lasting significance and beauty, because they embodied in their works of art this lasting quality of idealized greatness of the human form.

The physical perfection of man was exemplified in religious and athletic festivals, for it was understood that
the love for health and beauty were pleasing to the gods.

"In keeping the harmony of his body in tune, his constant aim is to preserve the symphony which resides in the soul." The subject matter of their sculpture began with rough representations of the human body which represented god or man. Thus the birth of the ideal human form was derived from their religious background, which was largely naturalistic and corporeal.

The act of creating sculpture, as well as any other art form, was conceived by the Greek mind to be the artist's fulfillment, the raison d'être of man. The creative act was:

The expression of the concrete thing under an image which answers to its true idea. . . . To seize the universal, and to reproduce it in simple and sensuous form, it is not to reflect a reality already familiar through the sense of perceptions; rather it is a rivalry of nature, a completion of her unfulfilled purposes, a correction of her failures.

The contributing factors that were present in the act of creating a work of art were convention, observation, selection, and harmony or unity of these elements. Their sculpture was directed to the natural objects around them, each sculptor was his own judge and observer of nature. From the past, the artist of the Transitional period drew upon the traditions of the Kouroi and Kourai figures and greatly profited from the past discoveries and developments of the human figure.

There are certain distinct psychological processes which are inherent in every act of creation. Wallas, in his
work entitled, *The Art of Thought*, classifies creativity into four stages of thought: "preparation, incubation, illumination, and verification."\(^{10}\) The Greek artist during the Transitional period was magnificently prepared for producing art. He was fully aware of the works of art of his predecessors. He had assimilated the craft to such a degree that he was capable of producing work of great artistic quality. He was most sensitive and receptive towards the thinking, i.e., philosophy, and the works of others and to his own receptivity he added his own perception and understanding. The second psychological condition, that of "incubation," involves the process of *over-learning*. Now that the Greek artist fully understood the anatomical functions of the body, he was freed to give his work life and to place it upon an ideal plane.

The artist sought to create a perfect and living organism to infuse his statues down to the finger-tips with the breath of life and to endow it with a natural relationship in space.\(^{11}\) The third condition embodies the act of creation. In creation there must be a complete awareness to sensory cues. The sculptor has to be especially aware of the tactile cues, and of the tridimensional quality of the sculptural form, as well as the space it occupies. The fourth condition is the final analysis of the finished work which is now divorced from the creator and becomes a part of the observer. It is the observer who gives to the work of art verification or validity.

The sculptor felt that in order to translate the human
body into a work of art he must harmonize the multiformity and restlessness of a man in nature, and out of this create a unity. The artist dealt with a concept of ideal unity, and when this was achieved his work was embodied with a quality of dignity and grandeur. The sculptural works were produced in close relationship to the communal and religious life and to the political activities of the citizen and city-state. Thus, a purposeful unity of form in their work emerged as a result of this harmony.

It is my belief that in order to create, man must involve himself in an activity which requires him to take one element; be he influenced by either an external source, i.e., an experience with nature, with one of its forms, objects or phenomena or an interior source, such as the mental abstraction of a past experience, a philosophical judgment or a concept of beauty, or a purely imaginative function of one's mind. He must take this element, or combinations of these elements, and allow all the influences of tradition, past experience, and acquired knowledge to pass through himself, forming a basis for creating. The act of passing all things through one's self in order for them to emerge as an entirely new element is an extremely important phase in the act of creating. This activity, for the most part, is done with little or no conscious control; rather it is a state of being which allows the creative act to emerge. This new form will
be known as the created form, object, or idea. However, within the act of taking one element and producing another, there are many unseen factors involved. One of these is purpose or need; that which stimulates the very act of creation. Before any action can ensue there must be a direction or a purpose for that action. There must be a need involved for this new element. Another factor which controls the creative act is man's action within the context of a unity. The artist is always trying to fulfill a unity or wholeness in all his actions. The aesthetic judgments placed upon a created work are largely based upon the criteria of fulfilling a unity. Therefore, in the final analysis, creation is caused by the creator having a personal need and a purpose; thus bringing the elements through himself and being tempered with a sense of wholeness or unity, is able to complete the act of creativity.

The concept of unity involved in the act of creation requires a further investigation. The aesthetic unity is that which fulfills the demands that are present within the person who creates it and also fulfills the need of the observer. This unity forms a bond or completes the link necessary for an all encompassing experience to become significant in our lives. In sculpture a unity is judged through the language of visual and tridimensional tactile forms. The unity in sculptural forms is that of the relationship of shapes and
forms of the work of art in space; the solids as well as the voids; all of which contribute to the wholeness of the work. Unity of a work of art is the result of the creator or artist being in tune with himself and structuring each part of his work to relate to every other part. In every experience and action man must seek out and try to establish himself, directly or indirectly, with a direct experience by placing it in terms of that which has unity. Now it can be seen that the act of creating is the very act of attempting to achieve unity.

The art of the Greeks was directed by this powerful sense of unity. In their development of sculpture, the work has been embodied with a direct sense of wholeness—there is never a sense of fragmentation or incompleteness. The forms of the work are complete and stand alone as individual creations. The Greek temperament, as well as their philosophy, was that of striving towards harmony, i.e., unity.

Their purpose was to create beauty in a human form, the concept of unity in all things was the basic nature of the Greek spirit and therefore permeated all their works.

Greek sculpture during the Transitional period developed dynamically because of a continuous effort to idealize and deify the human figure. The sculptors of the fifth century B.C. knew of the Kouroi figures with their stiffness, simplification, schema of the human body with their arms pressed closely to their sides, and sketchily rendered muscles, and
their strict adherence to the law of frontality. These characteristics refer to the well-known marble Kouroi figures, however, as recently as July 18, 1959, workmen in Piraeus, Greece discovered a "bronze Kouros figure of the sixth century B.C."\(^{12}\) with its arms detached from its sides. This new evidence tends to indicate that the material was a great factor in determining the extent of freedom of movement in the bronze figures.

Then one leg advanced--the left; next the arms detached themselves from the trunk and are flexed; the shape of the body and its musculature, at first ill rendered, become more and more life-like. The straight profile is broken, the weight of the body is now carried on one leg whilst the other is flexed, the attitudes and rhythms, hitherto unknown, become possible.\(^{13}\)

The development of the figure from the Archaic period of the seventh century B.C. to the Transitional period is marked by the following characteristics: a progression of the standing figure, a step by step analysis of the human forms, and a repeating of stylized and simplified shapes. The simplification can be found in the treatment of the abdomen, the kneecaps, and the lips portrayed in an archaic smile. The first monumental statues of nude youths produced around the mid-seventh century B.C. are most important to the development of the human figure in sculpture. They are the point of departure and the predetermining of style for the unique development of the nude male figure that reached its zenith in the Classical statues of the late fifth and fourth centuries
B.C. The Greek figure became in totality more corporeal and the forms were rounded and swelling as well as convincing to the eye. This was the attempt to embody a sense of flesh and blood in their work. The figures of the fifth century B.C. appeared more human: all the parts are linked together in a new organic relationship, for now the figure stands sure and confident as it penetrates the surrounding space. The sculptor placed the main stress and interest within the figure. The Greek sculptor was primarily interested in the internal anatomy as a part of the whole figure and thus the Greek figure approached a state of ideal unity by attempting to unify all the physical, mental, and psychological forces of the human body.

Finally, in the first part of the fifth century B.C. the affect of rigid symmetry is broken by an uneven distribution of the figure's weight, the actual shifting of the hip structure allows the figure to rest on one leg more than the other, thus giving rise to a variation in the abdomen structure. At last the figure is elastic; it is plastic, it moves! The figure has become natural; augmented by a variety of interplay of the planes; by turning the head, shoulders, hips, and knees. The sculpture now attains freedom and mobility. By challenging his mind and his love of knowledge to solve the problems of anatomy and the figure in space, the Greek artist gave himself the opportunity to sculpt the human body
in all manner of poses with its parts in proper relationship and perspective. Only then could the figure express emotion and action.

Now, with the problems of anatomy and construction dismissed, the sculpture might well have become more realistic; instead idealism and universality of form became the beacon. The Greek artist created a form universal. There were present in athletic contests vast amounts of material from which the sculptor could translate into his art form.

The gymnastically trained bodies of these slim boys and youths and vigorous men are evidence of the ennobling effects of athletics. Presented in complete nudity they are not faithful portraits from life, but motives or models from the pleistra transformed and exalted to the highest ideal of physical beauty and strength. They are the most splendid human beings that art of any period has created.¹⁴

The sculptor also dealt equally well in the understanding of the face and the head. The face during the early stage of the Transitional period is still rather archaic and flat but there is a greater understanding of the planes of the face. Although it is still treated, for the most part, in a stylized and decorative manner, the features have become convincing.

The eye is further sunk beneath the brow; and the form and position of the eyeball are better understood; the eyelids, though still heavy, are reduced more correctly with a good understanding of the canthus. The lids glide gradually into the cheeks.¹⁵

The characteristics that we commonly identify as typically Greek are seen when the head is in profile and the nose and
the forehead form an almost straight line; the eye is placed high up into the socket and closely approaches the eyebrow; the mouth is small with a curve of the lips accentuated; the chin and the ear are small; the form of the head is rather oval. The face still retains an almost impassive attitude, with little or no emotion expressed. Not until much later does the face become a vehicle for the expression of emotion.

It is, then, sense of structure, simplification of form and design, harmonious proportion, and rhythmic contour that stand out as the salient features of Greek sculpture. By them it acquires the grandeur which we feel in its presence. They give it its spiritual quality. And since art is the spiritualization of nature it is the spiritualizing quality which is fundamental, and without which representation is not art. And so Greek sculpture, throughout its development, has the distinguishing trait of great art.16
NOTES


5. Ibid.


16. Ibid., p. 28.
THE TECHNICAL PROCESS OF BRONZE CASTING
During the time of great Greek artistic achievement, the media of bronze was extensively used and highly revered. Unfortunately, due to its intrinsic value, most of the bronze works of that period have been lost to us; for much of it was melted down and forged into tools and implements of war. This very act speaks rather sorely for mankind's misplaced values. Although many bronze works were created, only a few remain. The proof of their existence is to be found in the meager literary evidence, in the Roman copies of Greek sculpture, and sometimes in the actual bases and attachments or holes left in the bases. Ancient literary sources as well as ancient coins and vase paintings provide the only and all too incomplete knowledge of the sculpture of the Transitional period. Inherent in the media of bronze was the added allurement of a wider scope of pure artistic achievement and experimentation in attitude and composition. The Greek artist found himself freed from the rigid solidity and shackles of the stone block from which the figure had previously had to emerge. Now in the form of bronze, his works could more readily penetrate the surrounding space. The figure could occupy space, move within it, yet not be confined by it. The love for rhythm and motion, found in the Greek style, and the love for invention and perfection of the human form led ultimately to the height in bronze works.

The earliest bronze work utilized the technique of
'Sphyrelation' the process of placing hammered sheets of bronze over a wooden core and either riveting or nailing them together upon a wooden framework. Metal work at its birth involved wood carving, for the core of the wood needed to be approximately the shape of the statue. The technique of riveting and nailing eventually led to the process of soldering. The solder was most probably an alloy of copper, lead, and tin in such quantities as to give it a low melting point. There was no longer a personal empathy between sculptor and material; rather, often times the modelling was done by one artist and the transformation of the work into bronze was done by a specially skilled craftsman. Hence the processes of bronze casting requires of the artist a craftsman-like approach. The technique of bronze casting gave the artist more freedom even though it was an indirect medium.

Bronze casting in its earliest stage was practiced by the Egyptians; however, there is no definite link which can be established that the Greeks were influenced by them. The invention of casting large scale bronzes must be attributed to the Greeks. Work in bronze seems to have begun during the seventh century B.C. as evidenced by wax models found in excavations in the second city of Troy. The casting process was developed to a high degree in Samos during the early sixth century B.C. or shortly thereafter. Figures created in the early sixth century B.C. appear as though they were cast
not from a modelled figure, but rather from wooden originals of which a solid cast was made; thus retaining the influence of the wood core used for the plated statues. Later the figure was modelled in wax and at this point bronze sculpture really began. The solid casting evolved by surrounding the modelled wax figure with a mixture of clay and sand to make up a mantle, when this was dry the entire mould was heated thus allowing the wax to melt and pour out of the mantle. The molten metal was then poured into the cavity previously occupied by the wax. After cooling, the mantle was broken off and the solid piece was removed and finished. From this rather crude method and extremely expensive operation of solid casting the bronze workers developed a much more advantageous and manageable technique, that of hollow casting. There were three Greek sculptors credited with the invention of hollow casting: Rhoikos, Telekles, and Theodoros from Samos. Although the denoting of these men may not be taken as completely reliable fact, it does serve to date the time in which hollow casting began to be used in sculpture. Pausanias writes, in his work VII 14.8: "The first to cast statues in molten bronze were Samians Rhoikos, the son of Phileas, and Theodoros, the son of Telekles." These men are dated about 546 B.C. for there is a record of Theodoros making a silver bowl for Croesus of that period. There is also an account by Pliny H.N. XXXIV 83:
Theodores, the builder of the labyrinth, cast his own portrait in bronze at Samos. This is famous, not only because of the marvelous likeness, but also because of the minuteness of the work.²

Upon the outset of the hollow casting process the modelling of the figure emerged much more plastic and flexible, for the modelling was now done in wax or clay. The modelling became more free and the artist was able to experiment with form and the position of the pose. A rather rough method of hollow casting was done by the use of the sand cast.

This sand cast could only be made into two pieces; this was made by placing the model into the sand to get a half-impression of each side. The model was then removed and a rough core was inserted and was supported by bars away from the sides of the hollow sand mould. In this manner the thickness between the mould and the inner core would be rather large and uneven showing that the core did not approximate the shape of the figure to be cast, but nevertheless, the figure was essentially hollow. From this stride in hollow casting the refined and more fully developed process now called the 'Cire-Perdue' or lost-wax method was introduced to the Greek bronze worker. The 'Cire-Perdue' process became the ultimate in bronze casting and is essentially used in the same form today in our contemporary works. The advantage of this process is the thinness of the cast figure, for rarely were the works over 3 mm. in thickness; thus giving considerable saving to the amount of metal used and to the total
weight of the sculpture piece. The technical process of 'Cire-Perdue' involves first: the modelling of the figure in clay or plaster but slightly smaller than desired. This was built upon an armature, an iron skeleton with a core of soft clay carefully beaten and mixed with pounded pottery. Over this clay model was applied a thin coating of wax in sufficient thickness to give perfect modelling of the final statue, the smaller details being touched up with tools of wood, ivory, or bone. At many points the thin layer of wax was pierced with thin rods of bronze. These rods were used to support the interior core once the wax had melted out.

Hollow tubes and vents of wax were attached to the outer layer of wax. The outer mantle or mould was of beaten pottery mixed with water to the consistency of thick cream and then was applied in several coats or 'slips' upon the moulded wax figure. The whole mould was bound by iron rings and placed into a furnace and heated. The wax melted out and the bronze rods held the inner core of clay in place. The moulten bronze was then poured in the place of the wax through the vents provided. The air vents allowed for reasonably uniform cooling of the metal and hot air and gasses passed through the escape vents. After cooling the outer mantle was removed and all the protruding rods and vents were sawed off. The inside clay mantle or core was removed as best as possible to make the bronze completely hollow and to reduce the weight. The bronze work was
then ready for the finishing process.

The casting pit found in the Athenian Agora was one of the oldest structural remains and dates back to the fourth century B.C. It has the characteristic flask shaped pit with an "maximum width of 1.70 m. and length of ca. 5 m., was sunk in the soft bed rock to a depth of 1.43 m. a narrow stairway led down to the bottom of the pit . . ."³ The mould stood upright in the pit and a fire was kindled around it and this melted out the wax. The mould was then packed firmly with sand and then the mould was ready for pouring.

No large bronze statue in antiquity, either Greek or Roman, was ever cast whole, rather it was composed of different pieces soldered together. The head, the arms, and the legs, for the most part cast and fitted together to make a whole statue.

In ancient bronzes there were several varieties of bronze metal used in the production of sculpture.

Cornith was supposed to have made three kinds, in one of which the preponderance of tin and silver gave a light color; and Myron was supposed to have preferred the alloy of Aegina, while Poly-cleitus, preferred that of Cornith.⁴

The materials used for bronze casting the Greeks found in large quantities; copper could easily be obtained from the island of Cyprus, and in smaller quantities in the island of Paros, and in certain districts of Greece: Mount Othrys, Euboea, and Boeotia. The copper was found to be not strong
enough or of great enough durability to allow work to be done on the piece after the casting. It was found that hardening could be achieved by permitting a proportion of copper oxide to be left in the copper during the last stages of smelting. Most of the smelting was done on the islands of Cyprus and Crete. "Ancient slag mounds found several places in Greek lands e.g. Chrysokamia, near Hierapetra (Crete)." The final smelting was usually done in stone moulds. The metal was poured into a hollow of the stone and was covered by a second stone. Moulds usually were brick-shaped with hollows on all faces of the stone, these hollows were shaped for different usages. The moulds must have been extremely valuable, for:

At Gournia, a town in Crete, where more than one house belonged to a metal-worker, a cracked mould had been most elaborately repaired by a strip of bronze being passed around it and tightened with wedges.6

The analysis of chemical composition gives insight into the metallurgical craftsmanship of the Greek artist.

Actually no quantitative chemical analysis has yet been made of bronze from a Greek statue or statuettes definitely to be of the sixth or fifth century. However, analysis of Greek objects of this period all show that the bronze then currently used was an alloy of copper with moderate to high proportion of tin with no other metals present except as accidental impurities in small proportion. The copper very probably came from Cyprus and the tin was brought in from Britain by Carthaginian traders.7

To this date there has been no chemical analysis given to the extant bronze works of the Transitional period as verified by the 'Louvre Museum, and the Museum of Delphi, and the National
Museum of Athens.'8 However, a great deal of information can be derived from the research that has been done up to this time.

The bronze works that were used in a specific analysis were found in 1936 in an abandoned well in the Agora in Athens. The two bronze statuettes and several coins found were deposited there approximately in the second century A.D. This date is substantiated by datable artifacts also found in the same location. The chemical analysis of these bronze works was done by Professor E. R. Culey of the Ohio State University. The two statuettes; one a female figure 10 cm. in length and the other an animal figure 6 cm. in length and 4.5 cm. in height were used for the analysis because both were badly corroded and unfit for restoration. Under microscopic viewing the surface of these bronzes showed numerous cavities and imperfections such as blow holes which were evidently formed in the metal at the time of casting. Through the analysis it was found that the amount of copper and tin were rather stable but the inclusion of lead holds for further study. The impurities that were found were tested and found to be small amounts of nickel, silver, gold, zinc, and iron. The results found that the female figure was of early Greek origin due to the lack of lead in the alloy and the animal statuette was of Roman period of a much later date due to a very large amount of lead in its composition.
The analysis shows that the metal of the female statue is an ordinary bronze of moderate tin content containing various impurities found in ancient bronzes. On the other hand, the metal from the animal statuette is an alloy of low tin content and extraordinary lead content.9

The chemical composition of the metal used in the casting of the bronze works has revealed that through the existing analysis, although information of this nature offers a field of greater research, there is a definite relationship of the percentages of the elements that were used in the bronze alloy and the date or the period in which the work was produced or cast. All of this evidence tends to indicate that works done in the Roman period have larger amounts of lead and are characteristic of Roman statuary bronzes, and also Pliny states that lead was used as an intentional component of the Roman bronze. Greek coins seem to have been made under the same direction and process as the bronze works of each period, for the coins tend to have a direct relation to the period in which they were made and the amount of lead in their composition. If we may assume that the bronze metal used in coinage is approximately the same as that which was used in the bronze sculpture, then there is quite a bit more substantial information to be derived and learned regarding these ancient works. Actually there is no evidence indicating that the metallurgy was any different for these two usages. In fact, Mr. Caley reports on an analysis of a fragment of disks used for coinage found in the Athenian Agora in 1953--
this analysis shows and substantiates the fact that the inclusion of lead indicates a metal of a later date than the fifth century B.C. Mr. Caley points out:

In the development of the Athenian bronze coinage through the Hellenistic and Imperial times the proportion of copper and of tin decline, while that of lead rises in a fairly consistent trend; . . . the presence of zinc indicates a late rather than an early date.\textsuperscript{10}

The chemical analysis of the bronze coin disks can be seen in Table 1. In Table 2, which was prepared by Mr. Caley, the proportions of chemical components of Greek statuary bronzes are most readily seen. In general, the early Greek bronzes which are grouped in this analysis are found to have an average of 88% copper, 10% tin, and the other 2% in impurities such as iron and nickle. Table 2 gives a general insight into the structure of the early Greek bronze composition. In preparing Table 3 the summation of all analyses are reduced to the mean taken from seventeen known Greek bronze analyses and is compared with seventeen known Roman bronze analyses; thereby giving a total percentage of all available analyses.

As was mentioned previously, in certain parts of Greece the bronze used was of different and varied composition.

The bronzes of Athens dating 307-283 B.C. contained on the average the following components: Cu 83.0 - 87.5, Sn 9.2 - 10.5, Pb 1.7 - 6.4, Fe 0.7 - 0.3, and NI 0.04 - 0.09. Whereas the bronze used in Corinth dating 400-146 B.C. contained: Cu 78.6 - 89.9, Sn 7.6 - 12.5, and Pb trace - 1.29.\textsuperscript{11}

It has been found that the works containing a rather
high content of tin tended to be more resistant to corrosion and thus have been preserved longer and have become handed down to us today. However, the bronzes of the Transitional period that we have today were, for the most part, sufficiently buried or lost at sea and have been preserved so that we now have these great sculpture pieces in their whole state.

After casting, the finish applied to the bronze was of utmost importance to the sculptor. The primary surface that is fresh from the cast after being received from the furnace is always more or less black and covered with ash accretions and stains, and its surface is rather uneven and marred by faults and bubble holes. The larger cracks or faults or bubble blisters were dealt with by patching. The process was done by clearing the defect area, usually to the depth of one millimeter, and welding a small plate of bronze over it. The craftsman carefully removed all traces of the mantel and attempted to extract as much of the inner core as possible and then prepared the bronze for the final surface. Most bronzes that we have today are covered with a patina that varies in color from cobalt-blue, or malachite-green, to a cuprous red. These variations are due to the chemical components to which they were exposed before discovery and are not to be considered as the color of the original work. The use of a patina is always an artificial process and it was questioned by Plutarch in De Pythiac Oraculis: in his
essay on the Pythian Oracle a discussion arises about the patina of a bronze group in the sanctuary. One of the observers states that the surface of the bronze is of a "Glistening blue colour," however, it was found that the figures were reported to have stood for 500 years, since the monument was erected to commemorate the battle of Aigospotamoi. In this expanse of time such a bronze exposed to the elements might easily acquire a completely blue finish which is smooth and of a dull polish. Generally, in Greek statuary there was a deliberate attempt not to apply an artificial patina. As seen in the "inscription from Chios which ordained that the άγορας νομοτείχοι shall see that a certain statue is kept free from corrosion and bright λαμπρός." This information would infer that the bronzes had to be polished and kept free from chemical changes in order to retain their original luster and color. Even the gold and ivory Zeus statue at Olympia had the descendents of Pheidias assigned to it who were named, "Burnishers of the Statue." Therefore, it is highly improbable that the Greek statues were allowed to grow green with age and neglect.

The most important process to which a bronze was submitted after coming out of the foundry was the detailed engraving of the facial features, the hair mass, and other body details. The artist who worked upon the cold metal used tools such as engravers and bruins which ploughed grooves and furrows into the bronze. The hair was treated in a main mass before
casting and then given the details afterwards. The details were rendered by gentle, continuous hammer strokes or steady hand pressure. The gouges or engravers cut the metal away, or rather pushed the metal out in one piece or shaving. Other features were added, such as the treatment of the eyes, nipples, and lips. Generally the sockets for the eyes were cut out and inserted with stone, glass, or enamel. The eyebrows and lips were often colored by applying a layer of silver upon them. The nipples were mostly fashioned and inlaid in copper, especially those works done during the fifth century B.C. The eye-lashes oft-times required special attention and were made of separate plates of bronze or copper and inserted into a slit provided for them. The entire statue at this stage of development had been thoroughly filed, scraped, smoothed, and polished and finally prepared for engraving.

The tools used by the bronze workers were of various purposes and may be identified by the following sources: The Berlin Foundry Kylix and the Ashmolean Kylix.\(^{16}\) From these vase paintings a pictorial account of the foundry tools used in the casting process are given to us. The tool that was widely used may be called a 'Strigil Rasp' and its use was to remove the unevenness on the surface, blemishes or the 'fireskin' and bubbles and accretions. It was made up of a curved blade rasp inserted into a wooden handle. Such rasps are to be seen on the Ashmolean Kylix and on the Berlin Foundry Kylix.
There was also a 'straight Rasp' or 'burnisher' and this was used for working the folds of drapery and getting into hard inaccessible places. The 'hammers' that were used were formed on the order of our modern day metal working hammers, with long slender handles and rounded heads. These were used for light tapping in removing the core and breaking up the outer mantle. 'Augers' or 'drills' were also seen on the Berlin Foundry Kylix, where the central handle is grooved for the placement of the hand grip and a loose but-plate to revolve with a string. The 'bow drill' was used for piercing holes for the eyes and parts that needed to be riveted together.

Two types of saws were used: the 'long saw,' seen again on the Berlin Foundry Kylix, is a saw with very large teeth and a handle at one end, with the blade curved. This might have been used to cut large portions of the statue or used in re-designing the armature. The 'small saw' is a small saw blade with narrow teeth with a bow handle used for sawing off small protrusions, air vents, and extraneous bronze that exists on the surface after the casting. 'Pinchers' or large 'tongs' were used in handling the hot metal and pouring it into a mould. 'Bruins' and 'chisels' were used primarily in engraving to push the metal out in grooves. A very fine set of 'punches' and 'chisels' were found in a jar near Cairo, Egypt at a place called Galjub^{17} apparently a community of bronze workers and craftsmen. Here was found a complete set
of tools. Some of them were new, for the tools showed no
signs of wear or use.

During the Transitional period the bronze work gave
to the artist an emancipation from the archaic stiffness of
the pose. For now the figure could be made to stand in almost
any position. The flexibility of the bronze and the handling
of this media carried over to the stone carving and can be
seen in the work in the beginning of the fifth century B.C.

Marble cutters clearly attempted to rival bronze
workers in the new freedom of attitude which
bronze allowed, though they could never hope to
attain to the freedom and extension of limbs of
statues like say, the Harmodios and Aristogeiton
and Artemision Zeus of the fifth century.18

At no time in the history of bronze sculpture has the attain-
ment been of such grandeur and possessed those lasting qualities
that are of great art as the work done during the Transitional
period by the Greek bronze sculptors.
NOTES


2. Ibid., p. 23.


6. Ibid., p. 5.

7. Taken from personal letter from Professor E. R. Caley, The Ohio State University, 1958, p. 1.

8. Taken from personal correspondence with the Museums in question.


13. Ibid., p. 150.


15. Ibid., Fig. 52 and 53, pp. 158-159.

16. Ibid., Fig. 73, p. 192.

17. Ibid., p. 233.

18. Ibid., p. 129.
THE SCULPTORS OF THE TRANSITIONAL PERIOD
During the Transitional era of sculpture in Greece dating 480-450 B.C., there were several well known sculptors who worked and created great masterpieces during that time. Their's was the glory of the Greek art, they were the artists who strode forth to give to Greece her Golden Age of art. To these known men and to those who are lost to us in the past, the greatness of Greece owes much.

Among the early sculptors who lived and worked within the boundaries of the Transitional period, the name of Kanachos is found in the ancient writings. Although little is known of this artist, the work that made him famous as a great bronze sculptor, was the *Apollo of Philesion*. The figure of Apollo was in bronze and stood in the temple at Didyma, near Miletus. Only the record of such work remains; no actual reproductions have survived, save for a vague idea provided by some bronze coins from Miletus. There is a bronze figure titled the *Apollo of Pombino* which is now in the Louvre Museum. This might well speak for the style of Kanachos' works, however, no attempt has been made to connect this artist with this bronze work, for there is not enough evidence available to warrant such an assumption. As a Sicyonian master sculptor, Kanachos may be nearly dated during the first quarter of the fifth century B.C. He is mentioned by the ancient writers, Quintilian and Cicero, in their writings as they discuss another sculptor named Kalamis and comparing him
to be: "... less stiff and rigid than those of Kallon, Hegesias, and Kanachos, but not so simple as those of Myron."\begin{footnote}{1}\end{footnote}

In most general terms it may be said of his style that he worked in an epoch of experimentation and undoubtedly his sculpture showed an interest in lively action and possessed a harmonious composition. It is safe to assume that his work still retained some of the archaic characteristics found in the marble sculpture of that period, but by the use of bronze, the work could be well modelled and the figure more plastic. It is not known whether his figures were cast in the 'Cire-Perdue' process or the sand cast method, but by this date it is doubtful that any large work would have been a solid bronze casting.

The next group of sculptors in Greek history are more famous and their works have been recorded in various sources. The sculptors, Kritios and Nesiotes, both Athenian sculptors, did much to elevate the use of bronze in sculpture. Kritios is dated by Pausamias (IV 3.5) as working around 460 B.C. or earlier. However, Pliny places Kritios at 488 B.C. in his chronological table of bronze sculptors.\begin{footnote}{2}\end{footnote} Therefore, Kritios and Nesiotes may be placed in the first quarter of the fifth century B.C. Their most famous work was a bronze group called the \textit{Tyrannicides} or \textit{Slayers of the Tyrant}. There are several reliable sources from which information about this sculptural group has been found: Two fragments of a statue
base with part of an epigram with the name of Harmodius inscribed on it were found in 1936 near Odeion.3 "An Athenian coin"4 depicts the two figures Harmodius and Aristogeiton and the group who had formed a conspiracy in 514 B.C. to rid Athens of her tyrants. The coin shows the figures:

... rushing forward straight to the attack. The first, the younger (Harmodius) and more eager to the two is naked, like an athlete, he brandishes a short sword above his head, and his left hand hanging down grasps a dagger. The second, calmer, (Aristogeiton) though quite as valiant, with his out stretched left arm, which is draped with a short mantle, holds the sheath of a sword.5

The Tyrannicides group is also pictured as a blazon on Athena's shield on a Panthenaic vase in the British Museum. There is also a relief of the group on a marble throne in Broom Hall, near Dunfermline, Scotland.6 There is also the remains of an extant Roman marble copy in the Naples Museum. The group was constructed extolling the death of Hipparchus, tyrant of Athens, and the act from which the republic and freedom grew in Athens.

It seems that the first group was originally done by a sculptor named Antenor, and it was carried away from Athens in 480 B.C. when Xerxes entered Athens during the Persian wars. Kritios and Nesiotes were commissioned to restore the monument and the second group was dedicated in 477 B.C. During the time of Alexander the Great both groups were displayed in Athens, for he returned the original from Persia and it stood beside the Kritios and Nesiotes group in the center of the Agora.
until the end of the second century A.D. The extant Roman copy in marble in Naples serves to give a comparable idea of the pose, but even this copy has been extensively restored. The bronze group was set up in the "Archonship of Acleimantos, i.e., Olympiad 75.4 = 477 B.C." The ancient writer Lucian writes a description of the sculpture on the Acropolis and surrounding area and he mentions the Tyrannicides group. The group was actually erected in the Agora. "Pass by the statues on the right, as you enter, amongst which stand the slayers of the tyrant, the handiwork of Kritios and Nesiothes." Pausanias writes of both groups when they were restored by Alexander the Great near the Temple of Ares: "Not far off are the statues of Harmodius and Aristogeiton, who slew Hipparchos. One pair are the work of Kritios, while the older ones are made by Antenor." The dynamic composition arranged the figures so that they appear to be converging upon their victim; Aristogeiton stretches out the drapery on his left arm to shield the body of young Harmodius, while Harmodius is in the act of striking with the sword.

The order of the limbs in the two figures is carefully contrasted; the left foot of one corresponds to the right of the other. Hereby a certain symmetry is attained when the statues are juxtaposed, giving a fine impression of vigorous and concerted action.

There is a strained sense in the muscles as they are arranged on a rather lean and powerful frame. The figures, although retaining rather archaic stiffness, have completely broken
the 'law of frontality'. Whereas in the past with the Kouroi figures an "imaginary line passes through the skull, nose, backbone, and navel, dividing the body into two symmetrical halves, is invariably straight, never bending to either side."\(^\text{11}\) In the figure of Aristogeiton, although the weight is evenly balanced, the shoulder is swung boldly forward and the other bends so that the arm and leg combine to emphasize the thrust. The younger Harmodius figure also pierces the surrounding space. His weight is shifted and placed correctly on the legs; both the flank and buttock of the supporting leg give rise to the conformity of the action. The modelling of the figures is not crude, but rather simple and quite massive—the marble copy shows the conventional treatment of the hair that was derived from the original bronze, that of composing the hair mass in the form of small, shell like curls. Lucian (Rhet. Praecept. 9):

Then he will bid you imitate those ancient orators, setting before you stale models of speeches hard to imitate, like the works of Archaic art, by Hegesias and the school of Kritios and Nesiotes closely knit and sinewy and stiff, and severe in outline.\(^\text{12}\)

The marble copied from the bronze retains touches of the archaic past. The outline is strictly held, the head of the Harmodius is done presumably in the style close to that of the earlier group by Antenor, the eyes are not sunk in, but the mouth is rather thick and the face is short and square at the chin. "The thorax is convincingly rendered in violent action for
the first time in Greek art."13

In the Tyrannicides group there is a sense of boldness in the composition which springs with the figure's movement, done with a great feeling of freedom. The work is an organized whole and the arranged group give a single dynamic impression. This sculpture group was more conceived in the round and was designed to be seen from any position. From this point Greek sculpture attains a completely free standing type of figure.

A sculptor active during and immediately after the Persian War was Pythagoras of Rhegion. He was Samian by birth, but after the fall of Samos in 496 B.C. he seems to have emigrated to Rhegion in southern Italy where he continued his fine work in bronze. In fact, all of his recorded works were done in bronze. Pythagoras is dated approximately 488-480 B.C. Both ancient writers, Pliny and Pausanias, refer to him and comment on his statues of athletes. He seems to have been a celebrated sculptor throughout Greece. Unfortunately there are no existing works that might be directly attributed to him; however, some sources speak highly about his style and his facility of handling the human figure. His work seems to have heightened the sculpture of that period with elements of naturalism and wholeness or unity of composition. His love for composition led to a canon of rhythm and proportion. His canon dealt with measures of the human figure observable in the human frame at rest. Secondly he dealt with a system of
changes producing constant harmony of the body when in motion. The knowledge of one is static, i.e., the hard fast canon of the inflexible figure, of the other is dynamic, for the movement of the figure in space gave a great deal of freedom to the sculpture. Of his athletic figures, Euthymos of Locri, the famed boxer, displayed his life-like style. According to Lucian, "... he was the first to represent sinews and veins, and to bestow attention on the treatment of the hair." His figures were still hard, but the musculature was now extremely well understood and the figure attained a living quality.

Pythagoras is recorded to have done a sculpture group of Europa and the Bull. "Europa, who, as Millius says, was carried away from Phoenicia by a bull; both were represented by Pythagoras in a magnificent bronze group at Tarentum." Through his naturalism of dealing with the figure, it gave rise to the opportunity of using his standard or canon and raising it to the level of that of an ideal human form. This, then, was the early beginning of the form universal. The sculptured figures by this period retained very little of the archaic style and now the figure was used for complete and full expression by the artist. Also, through the media of bronze, a better modelled figure could be attained, as well as the fine engraving heightened the figure's realism.

A younger contemporary of Pythagoras who worked in Athens was a sculptor called Calamis or Kalamis. His Attic
sculpture was produced soon after the time of the Persian Wars which were 490-480 B.C. and were the fore-runner of the great period of Greek sculpture. Kalamis is dated 475-450 B.C. and is recorded to have been active in his work during 467 B.C. Pausanias writes about Kalamis saying: "Kalamis was employed with Onatas on the offerings of Hieron dedicated by Deinomenes after 467 B.C. . . ." Before the temple is an image of Apollo who is called the Averter of Ill, bade by Kalamis. They say that this name was given to the god because he put an end to the plague which afflicted them at the time of the Peloponnesian war by means of an oracle from Delphi.  

Kalamis is also dated by his works of race horses and Olympic victory monuments of Hieron. His style drew the attention of the writers Quintilian and Cicero. His work "stands on the threshold of perfected style, combining some archaic characteristics, such as quaintness and severity, with grace and power of expression." Kalamis is crowned with the quality of grace. He is credited for his most beautiful production—that of the Aphrodite of Sosandra, a most beautiful and admired female statue which stood on the Acropolis. Lucian comments on her modesty, noble, and unconscious smile, and the arrangement and handling of her drapery:

Sosandra, and Kalamis will adorn her with modesty; for her smile shall borrow the fair and seemly folds of her drapery, save that the head will be covered.

This figure gave to Kalamis the label of 'nameless
grace' and delicate workmanship in his works. We find the first attempt to portray expression in the facial features of this renown figure; for Kalamis attempted to make the soul show forth through the face.

Although no original or assured copy exists of Kalamis' work, some of the historians and ancient writers have written glowing accounts of his sculptural ability, especially for his sculptured horse and chariot groups. Pliny writes:

There is also a statue which bears his kindness. For he placed a charioteer of his own on a four-horse chariot of Kalamis, lest the artist who excelled in representing horses should be thought to have failed in his treatment of the human figure.19

The horse of the Metropolitan Museum and the Poseidon found off the cape of Artemision may serve to give some illustration of what his style of beauty of his products in bronze might have been. None of these can be attributed to him, but they are very close to his work in grace, refinement, and originality of the pose.

Probably the most famous sculptor of the Transitional period was Myron of Eleuthreae in Boetia. This sculptor enjoyed a considerably wide-spread reputation throughout the Hellenic lands. He is considered to have been a pupil of an Argrive sculptor, Ageladas, and he is recognized as the leader of the Peloponnesian school of athletic sculpture. He is dated by the Olympic figures of 480-445 B.C. The athletic statuary was well established in the Argive school, where
the standing figure is put at ease by the bending of the median line into a graceful curve; by inclining the head to one side; by throwing the weight of the body on one leg, thus changing the plane of the hips and abdomen. Myron in his work had a tendency for more vigorous and violent action and the challenge of representing the figures in action interested him. Myron's principle of movement according to Pliny:

... that a statue or a sculptural group must be complete in itself, must possess a certain unity and concentration so as to attract and contain the interest of the spectator within the work itself, and not to direct it on extraneous objects, nor even allow it to wander away.20

Myron represented his figures in rhythmic action, full of life and vigor. There is little trace of the archaic stiffness; rather his figures are represented in violent action, graceful movement, and complete concentration. Myron worked exclusively in bronze, but the works that we have to date are all Roman copies. Of his style it might be said that he handled his figures with life-like naturalism and with some degree of idealism; he studied the proportions of his figures and tried to give his work a rhythm and movement in space.

The most widely known work by Myron is the Discobolos. The best copy of this work was found in 1781 in Rome at the palace of Lancellotti. Lucian describes the Discobolos in his Philopseudes, written in 160 A.D.:
Surely, said I, you do not speak of the quoit-thrower who stoops in the attitude of one who is making his cast turning around toward the hand that holds the quoit, and bending the other knee gently behind him, like one who will rise erect as he hurls the quoit? No, said he, for the quoit-thrower of whom you speak is one of the works of Myron.21

Although the marble copy and one modern bronze copy which is taken from a composite cast remain, they do not have all the grandeur of the original bronze, they do retain some of the beautifully modelled features of the figure and the unique pose. The position of the figure is that of an anticipated action, with every muscle strained for the moment before the unleashing of the quoit. This quality of capturing the figure in the moment of decision or action gave Myron's works a great feeling of unified composition as well as expressing motion. The athlete is in the act of throwing an "eight pound thin plate of bronze."22

The whole body, limbs, and the head followed a spiral course, only the right foot and lower leg remaining unmoved and forming a pivot of the whole movement.23

The treatment of the hair is done in close ringlets as we might expect of a bronze work. The composition of this figure is that of a complete unit and very much a dynamic wholeness is present to tie the figure together. "In the Discobolos, the self-containess of the action finds expression and counterpart on the line of the composition itself."24 Every part of the figure is in harmony with the whole, and the observer's
eye is carried around the figure by an easy and pleasing succession of outlines around the whole contour of the figure. Thus the figure attains an aesthetic unity which speaks of the greatness and flexibility of Myron as a master sculptor.

The second most famous sculptural work by Myron is the Athena and Marsyas group. This sculptural group must have enjoyed much popularity for there are several written accounts alluding to it. The satyr Marsyas is seen recoiling from the rebuke given to him by Athena for trying to pick up her flutes which she had cast aside. This pictorial account is seen on a red figure, Oinochoe, in the National Museum in Athens.  

Pausanias describes the group on the Acropolis of Athens; "Here Athena is represented in the act of striking the satyr Marsyas, because he took up the flutes when the goddess had wished them to be thrown aside." The figure of the satyr is seen recoiling from Athena's rebuke; the left leg resists the thrust of the muscles acting like a strong spring, thereby causing the figure to nearly lose its balance. Marsyas has a lean and sinewy figure, coarse hair and beard, with wrinkled forehead and flat broad nose, all this to give him an even more wild, bedeviled appearance. The composition of the group is one of the satyr's astonishment and Athena's passive removal from all the violent action. The satyr is shown at the moment of being seized with astonishment at the sight of the flutes.
It would be impossible to express better, by attitude or gesture, the astonishment and the amazed repulsion; and the choice of pose and gesture proved to be a rare faculty or observation.28

There was an unusual attempt at a facial expression; that of an upward curve of the eyebrows, corresponding grooves on the forehead, and the eyes set deep within their sockets; all of which helps confirm that Myron was one of the most original sculptors of his age.

Another work of Myron was that of the runner Ladas. Ladas, the runner, is pictured in a historic foot race, the momentary pose full of action and life expressed in every limb and breathless tension of the athlete whose supreme effort cost him his life. "Ladas is represented as grasping for the goal while his last breath appeared to flit from his half-opened lips."29 An ancient writer describes most beautifully the running figure of Ladas by saying:

As once thou wast, O Ladas, instinct wilt life, when thou didst fly from Thymos swift as the wind, on tip toe, with every muscle at full strain--even so did Myron fashion thee in bronze, and stamp on the whole frame eager yearning for the crown that Pisa gives. He is full of hope, and on his lips is seen the breath that comes from hollow flanks; anon the bronze will leap to seize the crown, and the base will hold it no longer; see how art is swifter than the wind!30

Petronus says of Myron: "Myron could almost catch the souls of men and beasts and enchain them in bronze, found no heir."31

Sculpture now attained the power of reproducing every attitude and gesture of the figure, the human anatomy had
been conquered, and a unified form was now at the sculptor's command. The face now becomes a soul, a mirror to reflect emotion.

Thus it can be seen that through the Transitional period, sculpture has been raised to a very high level of an art form and it possessed the qualities that hitherto were not present in sculpture. The vitality of this period comes about because the Greek sculptor, for the first time, becomes aware of himself as a truly creative artist and not a mere technician or craftsman. His sculpture holds its value for all times, because the sculptor embodied in his work the sense of complete harmony in his figures; thereby fulfilling the needs of the Greeks in the period for which it was made and for ourselves as well. Perhaps all great art is essentially a universal truth or a way of seeing for all men, endowed with a great sense of unity and completeness, as well as fulfilling the need of the observer that comes to it.
NOTES


2. Jones, Stuart, *Select Passages from Ancient Writers*, p. XXXV.


5. Ibid., p. 175.


9. Ibid., p. 50, Quote 64.


15. Ibid., p. 58, Varro, LLV 31, Quote 76.

16. Ibid., p. 59., Pausanias 3.4, Quote 78.


THE EXTANT BRONZE WORKS OF THE TRANSITIONAL PERIOD
The extant bronze sculpture of the Transitional period, unfortunately, is extremely limited. However, every new archaeological discovery adds to our knowledge of the greatness that was in Greek art. To date we have only four bronze works that can be substantially dated between the years 480-450 B.C., or within the Transitional period. The craftsmanship on these pieces has not been surpassed in any other period of fine art and these pieces reveal some of the character of the Greek genius and temperament. These four works have survived the ravages of time, by virtue of either being buried or lost at sea. Each of these bronze pieces has a characteristic excellence that is present in the works of the Transitional period; the modelling is finely done with a complete understanding of form; the composition of each piece displays the inner harmony and unity designed within the work; and finally, each piece has a dynamic quality—a spark of life that relates itself to the observer. Thus, they become a part of the world’s great art.

A bronze statue of the early fifth century B.C., dating about the time of the sculptor Kanachos, is the Apollo of Piombino. This fine figure was found in the sea of Piombino in Etruria opposite Elba. It was discovered in 1832; and in 1835 it was purchased by the Louvre. The statue was apparently being transported when the ship sank, but its origin was either Asia Minor or Southern Italy. There is an
inscription of silver inlaid on its left foot revealing that it was designed to be a votive statue for the goddess Athena. The inscription of three lines in the Doric script reads: ". . . os dedicated it to Athena as a tithe." 1 Perhaps this figure in full youthfulness represents the god Apollo; however, this is still a matter of conjecture. The figure does have the pose that is common to the statues of the god Apollo and may have held objects in his hand that were associated with the god. This again is supposition, for no such objects were found with the bronze figure. The stance is slightly archaic with one foot advanced. The parts of the body are not stiff or rigid as seen in the kouros figures; but rather the figure is quite flowing--there is a slight turn of the left leg and there is an inclining of the head to give the composition interest. This work is no archaic figure, for now the sculptor uses the human form to create an ideal form.

On long, thin legs rides a broad unathletic torso, lacking marked subdivisions, with broad square shoulders carrying a short, heavy neck topped by a gentle, almost boy's head with a fine pensive expression. 2

Within this figure there is a direct observable concept of composition and form. The head is approximately one-seventh the total height, thus showing the beginnings in the use of the canon of proportions. The bronze figure stands a total of three feet nine inches (1.15 m.) in height. The pose is
strictly frontal, but is not stiff. The back forms an "S" shaped curve with the muscles correctly rendered. The head is held high and is well modelled. The eyes are hollow but they originally contained some colored material. The eye-brown rise in a wide arc from the root of the small nose across the flattened forehead. The soft lips and nipples are inlaid in copper. The hair is long and is tied in the back, engraved with wavey lines radiating from the crown of the head. The neck is strong and thick enough to support the head. The torso is well modelled, the chest is full, and the back shows shallow depressions of the spinal furrows. The arms are detached from the main body, and the right arm is more advanced with the palm of the hand directed upwards positioned to hold, while the left is directed toward the body with the fist clenched. The symbols common to the god Apollo were a bowl and a bow and arrow. This figure may have held these objects, but they have been lost to us. The face is still rather impassive and lacks any real emotion, but the archaic smile is all but gone. The face is rather child-like with a great deal of youthful character. The ears and eyebrows are simply stylized, which gracefully lend to the design of the figure. One interesting aspect of the casting process in the Piombino figure is that there is a small patch of bronze 2.5 x 1.5 cm. in the area added to the flesh surface on the inside of the right leg just above
the ankle. The patch has since been lost but the casting process of this bronze reveals the excellent craftsmanship of this figure.

The sea of Artemision revealed a splendid bronze figure of the god Poseidon or Zeus. This massive bronze was found off the Cape of Artemision on the north coast of the island of Euobea in 1926 and 1928. It is now in the National Museum in Athens. It is of hollow cast, standing six feet ten inches (2.09 m.) high, with a span of the arms from fingertip to fingertip of six feet eleven inches (2.10 m.). This wonderfully modelled figure is that of a god with over-life size proportions and dimensions. The outstretched arms and the position of the fingers of the right hand show that it is probably the god Poseidon in the act of throwing a three-pronged spear or trident, or perhaps the god Zeus throwing a thunderbolt. The body is flexibly posed in the sweeping movement of the throw. The left foot is planted firmly upon the base, while the right foot is set back with only the toes touching. The athletic torso is magnificently modelled with great understanding of the human anatomy. The proud head of great dignity is in profile and the flowing beard frames the face; the eyes are wide and open and were originally set in colored metal or stone. The eyebrows are sharply defined and are inserted strips of silver. The fine engraving is shown in the treatment of the face and beard. There is a stern quality
about the eyes and mouth. The muscle structure is accurately rendered and there is a great impetus of movement within the powerful body before the act of the throw. The composition shows the body balanced in the action of throwing the trident or thunderbolt. The arms were cast separately, and upon the left shoulder can be seen the pin which holds the two parts together. This figure is dated before the middle of the fifth century B.C., but cannot be attributed to any particular artist of that time. This truly monumental figure is, to my mind, one of the finest bronze works done by man. It has a living, dynamic quality fused into the whole figure and still it retains a fresh sense of creativity that the later, more polished figures of the Golden Age do not possess. The pose exhibits the great experimental nature that is so typical of the Transitional sculpture, and yet this bronze work from Artemision gives the appearance of being able to stand for all eternity.

Another fine example of the great bronze sculpture found in the Transitional period is the Charioteer of Delphi. The Charioteer of Delphi was found by the French in 1896 in their excavations of the sanctuary of Apollo at Delphi. It was found buried north of the temple beneath a wall. This striking figure stands five feet eleven inches (1.80 m.) high and is now in the Museum at Delphi. The life size figure belonged to a quadriga that was erected near the
temple as a votive statue for a victory in a chariot race. Along with this figure "remains of the chariot, the shaft and yoke fragments of the horses' hind legs and a tail have been found." It is dated about 480-470 B.C. and was dedicated by Anaxilas, tyrant of Rhegion, who died in 470 B.C. The composition of the group was that of the chariot and rider at the moment before the beginning of the race. The figure is posed holding the reins of his team, anticipating the starting of the race. His body is firmly set and braced by his feet. He is clad in the long chiton of the charioteer. The bronze work was cast in six separate parts: the feet, the lower body up to the belt, the upper part of the body to the neck, the head and the two arms. The figure is hollow cast and was most probably produced through the 'Cire-Perdue' casting process. However, the bell-shaped skirt or lower portion of the figure has the markings of being cast from a wooden mould through the use of sand casting. Therefore, this figure may well exemplify the blending of several casting processes or the transformation from one method to a more improved one. The thick drapery of the bell-shaped skirt completely hides the body from the belt downwards, the heavy tublar folds give it a continuously severe, columnar appearance. "The long lower body under the belt has a quiet, deep not quite regular folds, which give the figure something of the slimness and grace of an Ionic column." The folds
above the waist are much more 'plastic'; that is to say they convey more rhythm and interest in the composition. The arm and hand are well modelled with the veins and muscular treatment done in a manner of naturalism and sure stylization. Only in the modelling of the head does any trace of the archaic art remain. The eyes, although accurately rendered, are slightly too prominent in relation to the whole head. The mouth, as in the past, remains expressionless. The hair lies in close locks and a broad band with a meander pattern is tied at the back, thereby giving the entire hair mass a more sculptural treatment. The neck is strong and the head is rather small and delicate.

By this period there is no trace of the archaic smile. The lips are well marked and lightly parted to show a line of teeth rendered in silver. The cheeks are narrow, but the bones are not prominent as in earlier works; the eyes are straight set; almost almond shaped, and the filling of white enamel and cymx is well preserved, eyelashes of inserted bronze spikes also remain.\textsuperscript{5}

The effect of the eyes is that there is a wonderful living quality about them. The cheeks arch in a wide gentle curve from the flat, broad eyebrow and gradually glide into the dominant shape of the head. The strong chin is also a prevalent feature of this period. The votive inscription on a rectangular block names the donor of the quadriga as the tyrant "Polyzalos of Gela"\textsuperscript{6} dating about 470 B.C. This piece of bronze is undoubtedly one of the finest examples
of Greek sculpture and is one of the finest works in simplicity and severity of style in the Transitional period.

The fourth and last extant work is that of a bronze horse from the quadriga found during the excavation of the temple in Olympia. This fine animal sculpture was found by the Germans in their excavations at Olympia in 1938. It is of solid bronze and was from a solid cast--it stands nine inches (22.8 cm.) in height. The horse apparently occupied a sculptural group for a votive offering for the Olympic races which date around 470 B.C. Only the two hind hooves and the tail are missing, otherwise, it has been preserved in all its rare perfection and beauty. The surface of the bronze had a dull, dark gleam. The left leg is forward with its head turned towards the left. The position of this animal would indicate that the horse's position was that of extreme left of a team of four. The foreleg is tensed as if in the act of moving off from the starting line. The head is done with excited dilated nostrils, great wide open eyes, which seem to be expectant for the reins to be released to mark the beginning of the race. The mane tapers in an arc from the top of the head to the back. The thick tuft of hair over the forehead balances the tail in the composition. The body is firm and cylindrical, with short thick neck and powerful head. All these elements create in this animal an effect of fiery beauty that is self-contained within the powerful frame.
Thus the Transitional period places the sculpture work at the very door of that which will become the Golden Age of Greek Art. The artist of this period finds himself in a peculiar position; that of struggling against the Archaic form of art, slowly emerging and forming a new direction in his art, and lastly, raising his art to its apex. Within the span of a century the sculptor frees himself of the shackles of the Archaic form of representation and thus, by his own creativity, create an attitude and an environment in which succeeding artists; great names such as Phidias and Polykleitos, produce what is known as the greatest period of art is sculpture. This change, however, is not a rapid one, but rather a slow transformation, within this context the monumental bronze sculpture of the Transitional period was produced.
NOTES


2. Lullies, Reinhard, Greek Sculpture, p. 49.

3. Lullies, Reinhard, Greek Sculpture, p. 50.


5. Lawarence, A.W., Classical Sculpture, p. 163.

TABLE 1

ANALYSIS OF GREEK BRONZE DISK
USED FOR COINAGE

Analysis reads as follows:

<table>
<thead>
<tr>
<th>Element</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>66.54</td>
</tr>
<tr>
<td>Tin</td>
<td>7.09</td>
</tr>
<tr>
<td>Lead</td>
<td>25.63</td>
</tr>
<tr>
<td>Iron</td>
<td>0.13</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.07</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Trace</td>
</tr>
<tr>
<td>Zinc</td>
<td>0.10</td>
</tr>
<tr>
<td>Silver</td>
<td>0.08</td>
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</tbody>
</table>

Total: 99.64 per cent

TABLE 2

ANALYSIS OF GREEK STATUARY BRONZES

Analysis reads as follows:

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<thead>
<tr>
<th>OBJECTS</th>
<th>Cu</th>
<th>Sn</th>
<th>Pb</th>
<th>Fe</th>
<th>Ni</th>
<th>Zn</th>
<th>Ag</th>
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<tbody>
<tr>
<td>A</td>
<td>88.74</td>
<td>14.29</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>B</td>
<td>88.54</td>
<td>11.46</td>
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<td>--</td>
<td>--</td>
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<td>--</td>
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<tr>
<td>C</td>
<td>88.51</td>
<td>10.13</td>
<td>None</td>
<td>1.02</td>
<td>0.34</td>
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<td>Trace</td>
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<tr>
<td>D</td>
<td>88.96</td>
<td>9.22</td>
<td>None</td>
<td>0.44</td>
<td>0.38</td>
<td>None</td>
<td>Trace</td>
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<tr>
<td>E</td>
<td>92.28</td>
<td>7.00</td>
<td>0.13</td>
<td>0.16</td>
<td>0.05</td>
<td>0.02</td>
<td>None</td>
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</tbody>
</table>

Average: 88.80

Average = 0.34
TABLE 3

**GREEK BRONZES**

Seventeen items dating from the fourth to the end of the third century B.C.

<table>
<thead>
<tr>
<th>Element</th>
<th>Average</th>
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</thead>
<tbody>
<tr>
<td>Cu</td>
<td>88.0676</td>
</tr>
<tr>
<td>Sn</td>
<td>10.1970</td>
</tr>
<tr>
<td>Pb</td>
<td>01.4082</td>
</tr>
</tbody>
</table>

**Roman Bronzes**

Seventeen items dating from the first to the third century A.D.

<table>
<thead>
<tr>
<th>Element</th>
<th>Average</th>
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</thead>
<tbody>
<tr>
<td>Cu</td>
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<tr>
<td>Sn</td>
<td>06.4076</td>
</tr>
<tr>
<td>Pb</td>
<td>18.7682</td>
</tr>
</tbody>
</table>

Impurities that were found to be common in both bronze groups:

<table>
<thead>
<tr>
<th>GREEK BRONZES</th>
<th>ROMAN BRONZES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe - 0.5400 - Three Items</td>
<td>Fe - 0.3950 - Eight Items</td>
</tr>
<tr>
<td>Ni - 0.2566 - Three Items</td>
<td>Ni - 0.1740 - Five Items</td>
</tr>
<tr>
<td>Zn - Trace       - Three Items</td>
<td>Zn - 1.5250 - Four Items</td>
</tr>
</tbody>
</table>


2. This table was extracted from a table prepared by E.R. Caley, "Chemical Investigation of Two Ancient Bronze Statuettes Found in Greece," *Ohio Journal of Science*, 1951, p. 11.
APPENDIX II

PHOTOGRAPHIC REPRODUCTIONS
OF
SCULPTURE
BY
DAVID MORTON ELDER
FEMALE TORSO

Sandstone
HEAD OF MOSES

Clay
HEAD OF A PROPHET

Cast Stone
MARTYR (Front View)

Plaster
MARTYR ( Back View)

Plaster
PHOENIX

Welded and Brazed Steel
BIBLIOGRAPHY

BOOKS


Chase, George Henery, Greek and Roman Sculpture in American Collections, Cambridge, Massachusetts: Harvard University Press, 1924.


**PERIODICALS**


