

HISTORY AND MEANING OF SYMBOLIC RINGS
A CREATIVE PROJECT
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
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MASTER OF ARTS
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THESIS ABSTRACT

THESIS: History and Meaning of Symbolic Rings

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In this creative project I explored carving in wax and casting in the lost wax method to create rings with characteristics from ancient Egypt, Greece, Rome, medieval Europe, as well as contemporary designs. It was important to my work for me to understand the history and significance of symbolic rings, and how they have changed over time in design. After studying these time periods, I made numerous sketches of the rings. These designs were finalized, carved in wax, and then cast in metal. Measurements of the metal needed to cast each ring were taken and recorded. Experimenting with various tools I achieved a method that produced quality and satisfying results in the carving of the wax. Other traditional metal smith techniques were used, such as prong settings and post settings for stones in the completion of the rings.

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Statement of Problem

What is the history and the significance of the symbols used in the signet, ornamental, and ritual rings? How have the meanings of these symbols evolved from ancient Egypt, Greece and Rome through medieval Europe to contemporary times? What were the materials used to create these rings, and how do they compare to the materials used today?

When casting rings using the lost wax process, which carving tools achieved the best results? How can a clean, well-defined surface area be obtained in the finished carved ring? Which procedures can be utilized to create a lighter ring, which retains the integrity of the massive ring? What does the metal look like when melted to the optimum temperature without over heating? What causes surface pitting?

In my area of creative concentration, I attempt to answer these questions in the designing and producing of the symbolic rings in the lost wax method.

Ancient Times

Rings have a long history which varies from culture to culture. No specific dates have been discovered concerning the origins of the finger ring. According to George Frederick Kunz in his book *Ring for the Finger*, one origin of the ring is a kind of knot, which was made by twisting a cord or wire. Natural, organic materials were used to form it, and it was sometimes used as a charm in primitive times. Kunz further states that these charms were used as a spell to cripple and to mentally impair another person. A charm was believed to have powers to ward off evil spirits which were thought to cause disease or lameness. The charm was also believed to cure illness and affliction. The knot of the charm was viewed as binding the spell. The magic virtues attributed to the knot as a charm were given to rings since the ring was viewed as a simplified knot (Kuntz 2).

Although no definite time has been established for the origin of the finger ring, we do know many ways the ring has been used throughout history. From the early Egyptians to modern day, the ring has had a plethora of uses from symbols of royalty for the elite to ornamentation for the average man.

Vilimkova explains that, “The long development of ancient Egyptian jewellery (*sic*) started far back in prehistoric times, in small settlements and graves on the edge of the Nile valley, particularly in Upper Egypt.” Archaeologists determined the finds there belonged to the Neolithic and Chalcolithic periods. Findings included colored stones, ivory, bone, shell, and clay. The beads found there were often irregular, and the ivory

rings were sometimes decorated with a small boss, a raised area used as ornamentation (Vilimkova 9).

Pliny the Elder tells the Greek fable concerning the origin of the ring. Prometheus was accused of stealing fire, for the benefit of man, from the lightning of Zeus. Eventually, Prometheus was pardoned, and his punishment was reduced to wearing a link from the original chain on his finger to remind him of his offense (Pliny 209). The medium used for the ring, “belongs in the realm of pure conjecture, while the iron ring of Prometheus is mere legend. The latter does suggest, however, that the early tellers of tall tales thought in terms of iron when they projected their imaginations into the misty past” (McCarthy 59).

The ring is also believed to be a modification of the cylindrical seal which was first worn attached to the neck or the arm. By the time the seal was reduced in size to fit the finger, it was used as a signet ring in Egypt (Kuntz 1). An early reference in the Bible to the signet ring is recorded in Genesis 41:41-44. Pharaoh said to Joseph, “I hereby put you in charge of the entire land of Egypt.” Then Pharaoh removed his signet ring from his hand and placed it on Joseph’s finger. The ring indicated that Pharaoh put Joseph in charge of all of Egypt. Pharaoh said to him, “I am Pharaoh, but no one will lift a hand or foot in the entire land of Egypt without your approval” (Serendipity Bible for Groups).

The Bible indicated that the signet ring in early Egypt was used as a symbol of authority and for identification. In Egypt, wearing rings as identification became commonplace, followed by wearing rings for ornamentation purposes. It was the Greeks, Etruscans, and Romans that refined the art of making ornamental rings. These rings were made from gold, silver, ivory, amber, and iron (Kuntz 1). The Etruscans made rings that

were of great value because of their size and detailed engraving which often told historical stories (McCarthy 61).

The oldest ring bearing an inscription found in Cyprus is a gold hoop believed to belong to the late Mycenaean period. One ancient Greek ring has an extension squared off at the corners, making a long flat surface on the outside of the hoop with beads ornamenting the edges (Kuntz 7). In the fifth century B.C. as Greek prosperity increased, so did Greek craftsmanship. As rings became more common they also were more massive, and the engravings reached high levels of artistry (Ward 31). A dominant feature of first century B.C. Hellenistic work was its extraordinary variety, brought about by the availability of a wide range of gems and enhanced by novel forms and styles.

Early Greek symbols presented the deification of mythical characters. Later, concepts were symbolized, such as victory represented by a serpent and power by a knot. The resulting allegorical system uncovered the world of ideas (Lambert 41).

From 700 to 250 B.C. Roman jewelry for all practical purposes was Etruscan. “Between 250 and 27 B.C. Roman jewellery (*sic*), together with Etruscan, was now basically Hellenistic” (Higgins 173). “New elements were grafted on to the Hellenistic stock. In addition to uncut emerald crystals and pearls, harder stones such as the sapphire, aqua marine and topaz become increasingly popular. Even uncut diamonds were sometimes used” (Higgins 174-175).

In the two centuries following the Roman eviction of the Etruscans in 509 B.C., the Roman Empire emerged. The Roman looting of the conquered land allowed Rome to acquire large collections of works of art, but the Romans used them primarily to make

copies. The Romans were greatly influenced by Greek culture in general but especially by Greek artistic forms.

During the time of the Roman Empire the ring was in common use. According to Kunz, many rules and regulations governed the wearing of rings. During the Roman Republic (449-31 B.C.), the senator received a gold ring to wear only when sent on an embassy mission. All other senators wore iron, which was regarded as a mark of an individual's honor. Later senators of noble birth could wear a gold ring. These senators, upon occasion, would remove their gold rings and replace them with ones made of iron. These iron rings symbolized mourning or political disapproval of an announcement or a ruling that was made by those in charge (Kuntz 12).

In the third century B.C., the privilege of wearing a gold ring was extended to all senators and to the Roman soldier. Freedmen traditionally wore silver; whereas, the iron ring became the mark of slavery. Wearing a gold ring was of such high value in the eyes of the Romans that a freedman would wear a gold ring in his own home. If visited by others, the freedman would quickly take it off or would paint his gold ring black to make it look as if it were made of iron (Kuntz 13).

In the last years of the Republic, many classes of citizens were allowed to wear gold rings. This privilege was given to anyone with a reputable vocation. But regulations regarding wearing rings of precious metal did not apply to Roman women as it did to the men. The women were allowed to wear rings of all kinds for ornamentation or for use "in sealing the household goods entrusted to a wife's care" (Kuntz 13-14).

During most of the ancient times, few materials were used other than gold. When the date changed from B.C. to A.D., so did the designing of rings. The fashion of using mostly gold and accenting with gems, colored stones, glass and enamel evolved to using gold for the accent and the former accents became the featured materials (Ward 10).

When Constantine the Great, in 330, A.D., had transferred the center of imperial power to Constantinople, the jewelers of the Empire were brought into contact with the great wealth of material and opulence of Oriental ornament. They were strongly influenced by it. Greco-Roman jewelry now lost its classical character and comparative simplicity and took on gorgeous color and Oriental symbolism. From the combined influences of Europe and the Orient developed Byzantine jewelry, whose characteristics were destined to last through the greater part of the Middle Ages (Rogers 58).

Middle Ages

In the chapter, “Medieval Rings, 1100 – 1500,” from the book *Rings Through the Ages*, John Cherry states that rings were important indicators of status and wealth in the Middle Ages. Rings were worn “for adornment, for sealing documents and letters, as signs of religious devotion, love or betrothal, as amuletic protection and for mourning.” It was never used to distinguish a class of society as it was in the Roman period, nor was it a mark of military distinction. Bishops, abbots, and abbesses wore rings to indicate their office (Ward 53). Wealthy medieval merchants who were not important enough to have family crests, had special individual marks or symbols engraved on their signets, often in glass (McCarthy 100).

The seventh century A.D. was one of the darkest periods of history. Robbery and violence were rampant. Goldsmiths and lapidaries who had not found protection with a powerful nobleman gathered together for mutual protection. They devoted their lives to the preservation of various arts. Some became Christian monks (many of whom were goldsmiths) in monasteries that required the practice of an art or a handy craft. Rogers summarizes this use of monasteries: “Thus, in small havens of peace and safety, many knowledges of technique and art were preserved which otherwise would have been lost in the black chaos of the Dark Ages” (Rogers 60).

The principal materials used to make rings in the Middle Ages were gold, silver, and bronze. Gold was less common than silver in the twelfth and thirteenth centuries, but gold was more common in the later Middle Ages. Variations in the shape of both the

hoop and bezel (collar of metal), and the variety of stones available resulted in the decorated technique commonly used in the Middle Ages. A renewed interest in classical lapidaries in the twelfth century revived the interest of gem stones for the ring. During this period, stones were usually polished and faceting was rare. Popular stones were the ruby, sapphire, garnet, diamond, rock crystal, and amethyst. In the fourteenth century the art of intaglio gem-engraving was revived in Italy and flourished in France. Facets for diamonds were not made until the fifteenth century; however, the natural faces of the octahedral diamond crystal were polished. The bezel of the ring was shaped to accommodate the very irregular stones. These stones were secured either with claws or with a continuous flange of metal around the stone. (Ward 55- 56)

During the eleventh and the thirteenth centuries, Crusaders were going back and forth between Europe and the Holy Land. When they returned, they brought back “vast numbers of precious stones and engraved gems. Religion was militant with a vengeance and the Church benefited by the spoils of war. Gems, after being ‘rescued,’ found devotional uses in the churches” (Rogers 74). This bizarre mixture of pagan gem engravings and Christian symbols were immaterial to the clergy who were ignorant of such matters (Rogers 74-75).



*Oil on panel: The Goldsmith and the Young Couple
by Petrus Christus. Flemish. 1449.98 x 85 cm.
Oppenheim Collections, Lehmann Collections.
Metropolitan Museum of Art, New York.*

“The painting shows a goldsmith weighing a ring set with a ruby that he is selling to the young couple standing behind him to the left; the young nobleman wears the badge of the dukes of Guelders. The importance of the goldsmith is attested to by the richness of his varied stock, which is depicted with great realism. It includes brooches, pearls, and pieces of crystal, red coral, cups, a belt buckle and a small box of rings. In this box there are three tubes of parchment with six, four and three rings. One of the rings is evidently an armorial signet; there are three plain gold rings, and the rest are set with stones. This painting provides valuable evidence of the commercial sale of rings in the fifteenth century” (Ward 75).

Modern and Contemporary

The many sources used, had no clearly defined time frame for the *Renaissance* era. Indications of gradual change were evident in the mid-fourteenth century. A renewed interest in, and reassessment of, the arts and sciences were noticeable in the late fourteenth century. The only link between Classical and early Renaissance jewelry was the use of engraved gems. The early jewelry of the Renaissance was influenced more by new techniques in sculpture and painting than by its Classical origins. The workshop of the jewelers became known as the finest training ground for those wishing to master the major arts such as sculpting and painting (Black 144 -147).

About half-way through the 16th century there was a definite change towards 'mannerism' in major arts, a change which was reflected in jewelry about ten years later. Not that forms themselves changed radically, or materials, or techniques; it was a change of personality, a change of emphasis from classic simplicity to an elaborate showiness which was utterly contrary to the basic philosophy of the prime movers of the early Renaissance (Black 161).

In the late eighteenth and early nineteenth centuries, there emerged what is now known as *modern life*. Philosophical, scientific, and technical changes profoundly altered the ideas of artistic object, the status of artists, and the people who appreciated them (Lambert 93). A ring in gold and enamel, made between 1830 and 1840, exemplifies another trend of the time: flat, open-work metal hoop shows a glimpse of interlacing lines, plant shapes coiling and uncoiling.

The seal ring, a variety of a signet ring, is almost obsolete today, but the nature of the signet ring has not significantly changed. In the place of their old, elaborate designs are gold, platinum or silver rings imprinted with simpler designs. These rings are usually heavy and bear the initials or the family crest of the wearer. Precious stones such as diamonds and rubies are used, although the diamonds are typically used as accents because they are so hard nothing can be engraved on them (McCarthy 100).

One of the most interesting individual signet rings of recent times is a heavy gold circlet set with a bloodstone upon which is engraved the family crest of the Roosevelt family. It was the prized possession of the late President Franklin Delano Roosevelt and was worn on the left little finger (McCarthy 101).

Art Nouveau (1895-1914) showed a reaction to everything that had gone before. Art Nouveau, “representing both continuity and discontinuity, was directly influenced by English Arts and Crafts research and by the breakthrough of Japanese art on western soil. More a general artistic frame of mind than a style...” evolved (Lambert 99). A style of decorative leaves and flowers with continuous flowing lines exemplifies this style.

Rings created with generous, simplified forms incorporating very beautiful precious stones, focus on the concept of jewelry as an investment. From the early twentieth century, strong personalities of individual artists began to dominate the jewelry world with their distinctive styles. Designers and mass-produced rings came to the forefront of the fashion world by the mid-twentieth century (Lambert 123). Modern designers gave attention to technique, form, function, and meaning. Their knowledge of materials; and technical and technological expertise allowed the transformation of materials: using such procedures as “direct cutting, sculpture, moulding, melting electroforming, compression and assembling, as well as all stages in processing plastics such as extrusion, injection,

calendaring, rotary moulding, coating, heat forming, and transfer moulding and pressing” (Lambert 252, 253).

Precious Metal Clay (PMC) represents one of recent dramatic development in handling of precious metals. It “consists of microscopic particles of silver or gold, as well as some other metals, suspended in an organic binder to create a pliable material with a consistency similar to modeling clay. PMC can be worked with the fingers and with simple, inexpensive tools to create a vast range of forms, surfaces and textures that would be unattainable or laborious with traditional techniques” (McCreight 2).

Conclusion

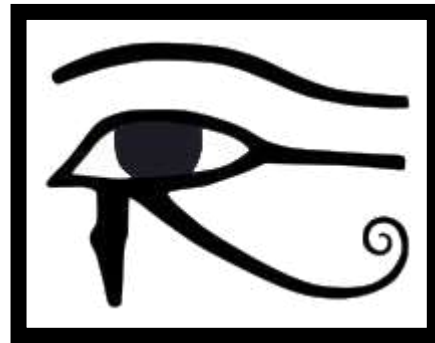
Rather than viewing the history of the finger ring as an embodiment of a series of styles, materials, or techniques, ring history can be better understood as the continuous intertwining of cultural, aesthetic, and artistic experiences and influences. The signet ring is an emblematic response to the human condition. The need of men and women for a small object of adornment is evident throughout history. Many basic techniques of ring making have not changed since ancient times, but some radical technical advancements appear to have emerged in the contemporary period. The desire for ornamentation and the need to capture symbolically a close relationship with people, groups, and metaphysical beliefs have existed among ancient peoples to present populations.

Creating Rings in the Lost-Wax Method

In the creative process of making these rings, several weeks were devoted to the designing of the rings. During the designing phase several symbols emerged. One symbol was an eye which has universal appeal.



The photograph on the left is an eye painted on an old marker in Holhenfeld, Germany. The eye below right, the Wedjat, later called The Eye of Horus from Ancient Egypt, brought into focus the universality of the symbol in both place and time.



The All-Seeing Eye



“God, say all religions, sees all. Sometimes, his eye is merciful, other times, less so. Nothing escapes him, except what he chooses to ignore. The eye of God is on the back of the American dollar bill, perhaps exhorting us to put the money to honest use.”

(I.J.Singh)

For the collection of rings in this creative project, the eye represents God watching over and protecting the individual. Another symbol is the small ball shape, which represents relationships in life now and in the future. The several thick lines within the designs represent paths that can be taken. Some lines have a fork, and these represent major choices in life. Examples can be seen on page 12.



Wax carving files

After creating the ring design, the next step was to file the wax to the pre-determined size. Carving the design into the wax presented problems. The traditional wax bur tools which were initially used removed too much wax at a time. For more control and detail, a finely pointed tool was needed so that the



Traditional wax tools

design could be laid out and the detail could be carved quickly. The tools that seemed to work best were the diamond bits, specifically the ones tapered to a point. (The diamond bit tool in the flex shaft would bend if the motor had not stopped prior to laying it down.)

After carving the design into the wax, a smooth finish was essential. The alcohol lamp was used for this procedure. The carved ring was passed quickly over the open flame, which caused the wax to melt just slightly, giving it a very smooth finish. If it was left too long on the flame, it caused the ring to melt too

much, and the design lost its definition. For better control of the flame on the ring, the use of a small, hand-held lighter was helpful. After the carving was completed, the ring was ready for the sprues, the channels in which the molten metal will eventually flow.



Assorted diamond burs



Diamond burs, dentist tools, alcohol lamp and lighter

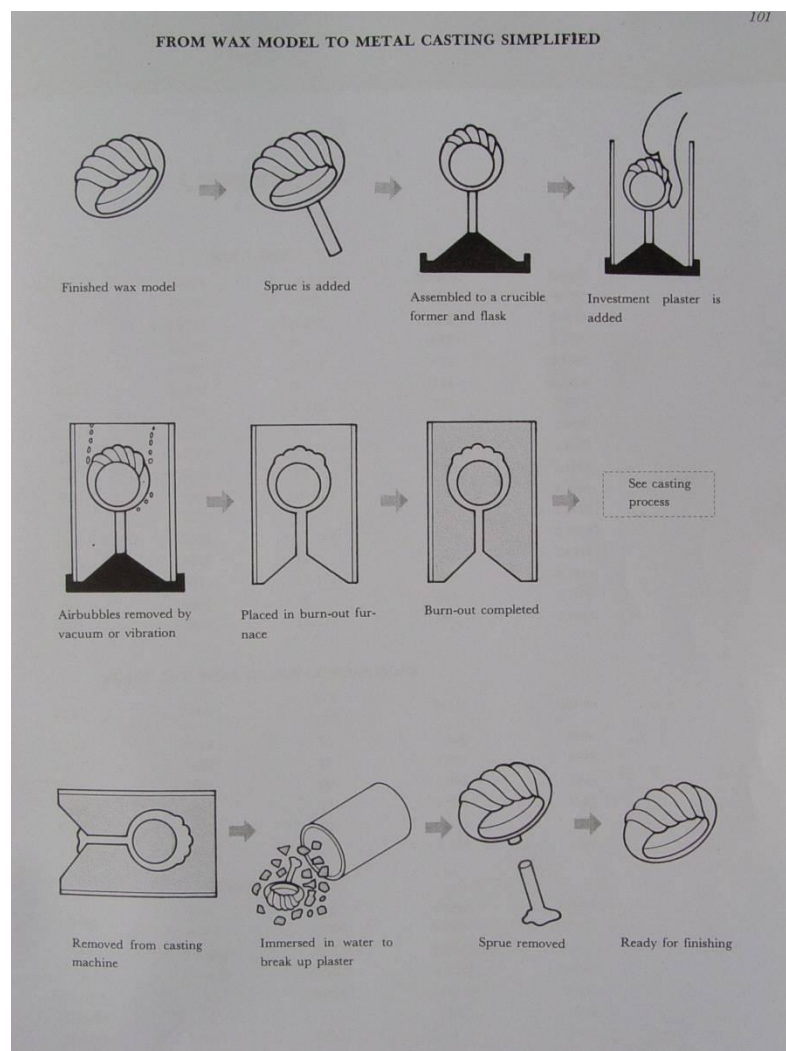
It is imperative to attach the sprues so that they create a path in which the metal can flow straight up and/or out. Metal cannot flow up and then down and around corners, so special care needs to be made to assure that the sprues are all in line to accommodate the flow of metal. Sprues need to attach to the thickest parts of the wax to be cast. A good example of this is pictured below.



Ancient Egyptian style signet ring with vertical sprues in red (above and right)



After the sprues were attached to the ancient Egyptian style signet ring, it was then ready for investment. The investment entailed making the mold of the ring. Plaster-like investment was weighed out, mixed with water, poured into a steel collar called a flask over the wax ring that had sprues attached. The sprues open to the bottom of the flask, thus allowing a channel for molten metal to flow into the mold. Air bubbles were removed by vacuum. Next, the investment filled flask was placed in a kiln to burn out the wax for at least 12 hours. At this point, the wax had melted out leaving a hollow space.



**The above is an excerpt from the book,
Basic Wax Modeling, by Hiroshi Tsuyuki. (Tsuyuki 101)**

The centrifugal casting method, as described by Tsuyuki, was used to produce these rings. Prior to the flask being placed in the casting machine it was necessary to rotate the balance arm two to three times clockwise and then to support it up by a release pin. The arm was balanced by a counter weight opposite the end to which the invested flask and crucible were placed adjacent to each other. Casting grains of metal were placed in the crucible. A torch was used to heat the metal. When the metal was at the desired state of liquefaction, the release pin was dropped, allowing the casting arm to rotate rapidly. The spinning action forced the hot metal to flow into the cavity left by the burned out wax in the flask (Tsuyuki 100).

Casting Outcomes

The first ring was cast and very little filing needed to finish the contemporary style ring. Because the wax had a good polish prior to casting, little work was needed after the casting. All new casting grains were used in the casting of the ring.



Contemporary style ring
cleaned and polished, (front view)



Contemporary style ring
cleaned and polished, (side view)

In the second casting, all new silver casting grains were used in the ancient Egyptian style signet ring.



Ancient Egyptian signet style ring
cast in silver and ready to be cleaned



Ancient Egyptian signet style ring
underneath side of cleaned ring

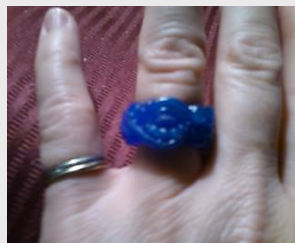


Ancient Egyptian signet style ring
cleaned and polished



Ancient Egyptian signet style ring
underneath side of cleaned ring

The third ring that was cast used the most quantity of sterling silver. Some concern was given to the final weight of the wax ring, but after the successful casting was completed, all reservations were replaced with satisfaction because the mass of the ring was well balanced on the finger, and quite comfortable.



Medieval wax ring carved and
ready for casting (front view)



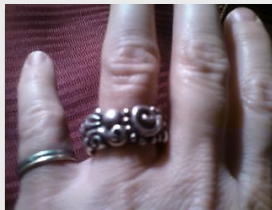
Medieval wax ring carved and
ready for casting (back view)



Medieval style ring
cast and ready to clean
(sketches of ring in background)



Medieval style ring
polished (front view)



Medieval style ring
polished (back view)



Medieval style ring
polished (front view)

When carving the fourth ring (a contemporary band), a concentrated effort was made to lessen the wax weight of the ring. The wax originally weighed 1.9 grams. After carefully reducing the wax by carving it with dentist tools, the final weight was 1.7

grams. The wax used for the fourth ring was considerably lighter than the 2.0 grams of wax used for the third ring. This is important because metal is approximately eleven times heavier than wax.

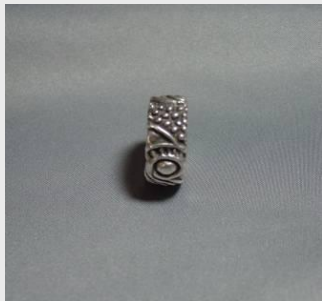
The contemporary band cast well with very few areas of pitting. A dentist type tool was effective in carving and scraping away excess or unwanted wax.



Contemporary band
(foreground)
cast and ready for polishing



Contemporary band
polished (front view)



Contemporary band
polished (back view)



Medieval style wax ring (gem)
carved and ready for casting



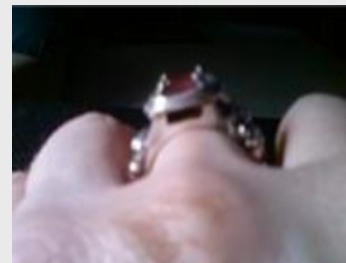
Medieval wax ring (gem)
carved and ready for casting



Medieval style ring (gem)
(foreground) cast



Medieval style gem ring
polished, prong set

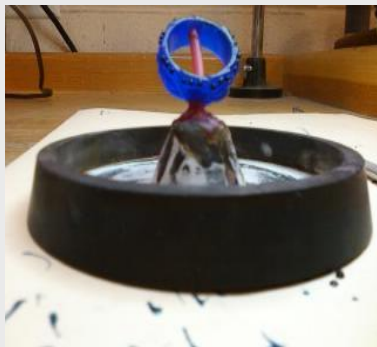


Medieval style gem ring
polished, prong set

The fifth ring was carved in wax leaving room for an *`a jour* style (open to light) setting for the medieval ring. Because the ruby gem was dark, an *`a jour* style setting

was necessary to help lighten the color of the gem as well as to create a ring with less metal weight. Carving the ring in wax was challenging because the design of the ring had small areas of detail on both sides of the ring. Issues of symmetry were addressed by re-verifying measurements and careful observation.

The sixth cast ring was a Greek style band that posed a different type of problem than had occurred before. Creating a repeating design that extended evenly around the entire band required very precise measurements. After measurements were taken, carving completed, the ring was cast. While casting the ring, the adjustment knobs on the torch were accidentally moved and the re-adjustment prolonged the melting time. After casting the ring some surface pitting occurred and hollow areas were found within its inner core. As a result the cleaning and finishing of the ring took longer than originally anticipated.



Greek style ring
with sprues, ready to cast



Greek style ring
cast



Greek style ring
(Finished and polished)



Greek style ring
(Finished and polished)

Conclusion of Casting

Through designing and casting the rings I have found several answers to questions that posed a problem for me. To receive the best results in carving, I found that the diamond bur tools were the most effective. When making larger rings, I was able to lessen the weight by hollowing out the excess wax from the inside with dentist tools. Although I used an alcohol burner to achieve a well-defined and smooth surface, I gained more control using a handheld lighter in tight areas. I have found that through practice, that I have learned what the metal looks like when it has melted at just the optimum temperature for casting and that pitting occurs when it is over heated.

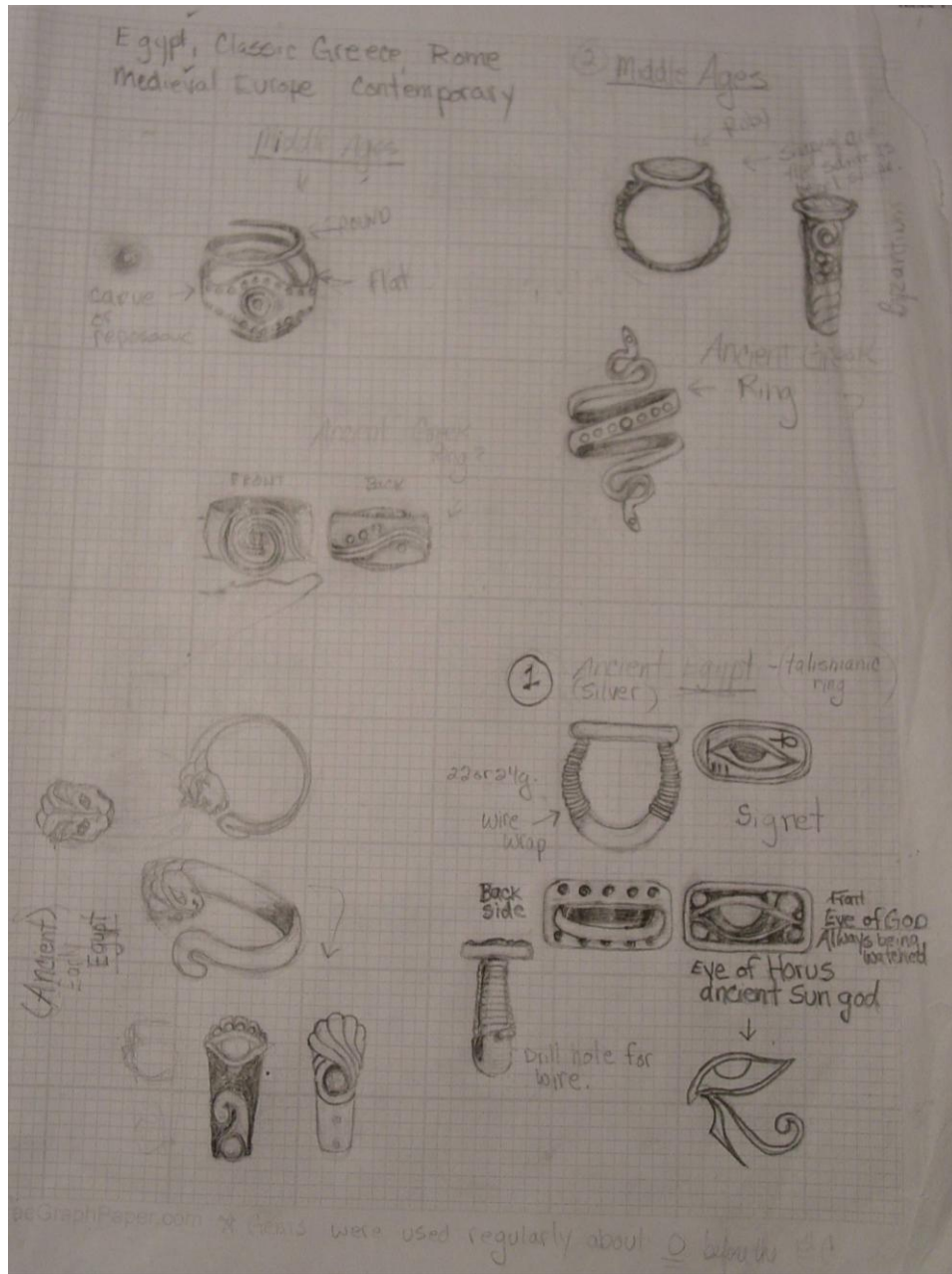
Throughout this challenging study, I have learned not only more about signet rings themselves but also about their impact on my personal life. While devoting much time toward this endeavor, I have developed new skills as well as a new love. Despite the long tedious hours, I never once wanted to stop as this project dared to push me beyond what I thought I could do. I fell in love with the symbolism and history behind the signet ring. This study has provided me with a gift that I am eager to share with those around me. I can create signet rings for each one of my children with each ring having its own special meaning. These rings and their unique stories can be passed on from generation to generation. I cannot think of a better way to pass on a little bit of me and keep my spirit alive. It is for these reasons that I want to continue this endeavor. I feel blessed to have completed this study and expect to continue creating for the rest of my life.

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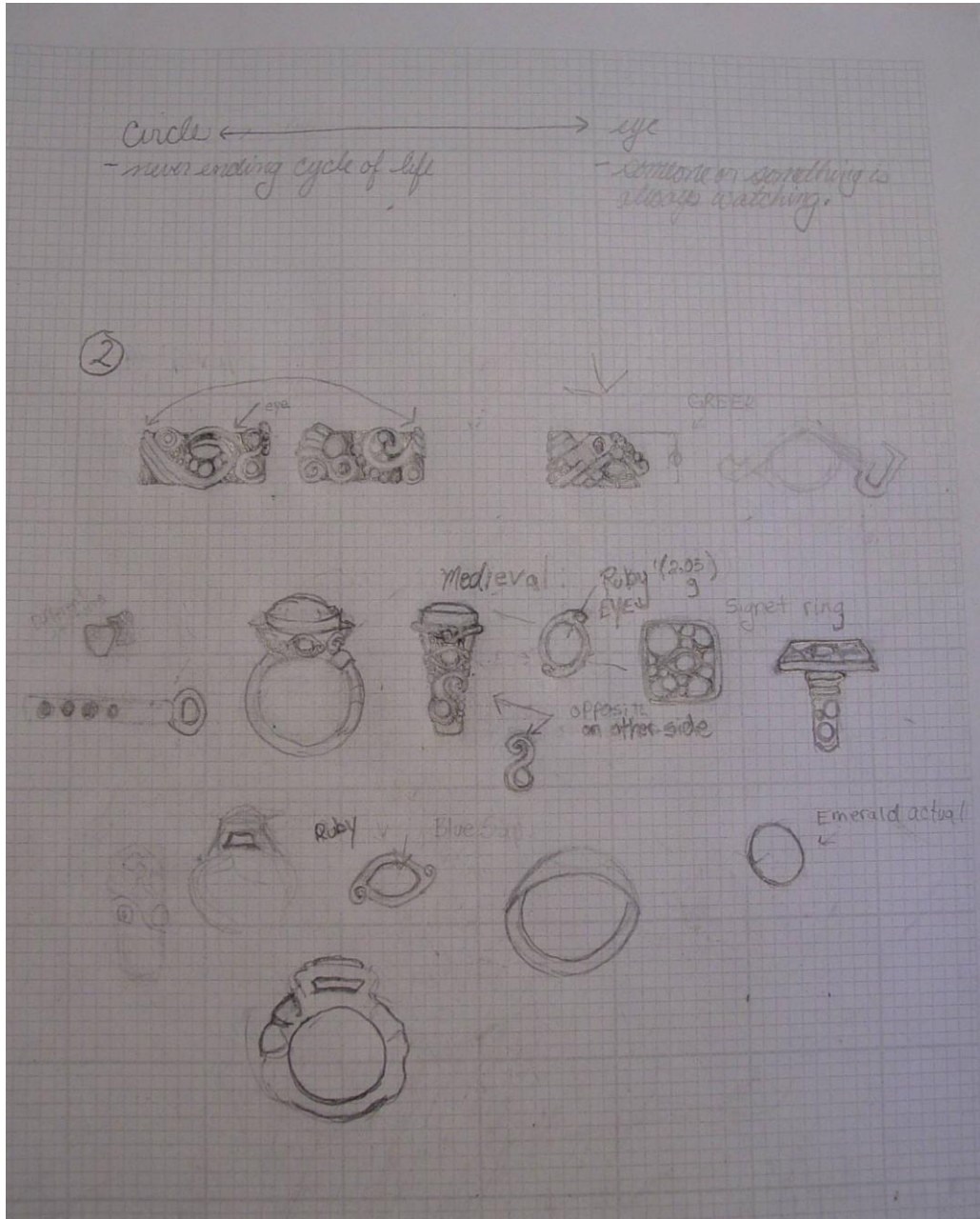
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Appendix A

Sketchbook Ring Designs



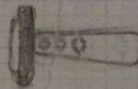
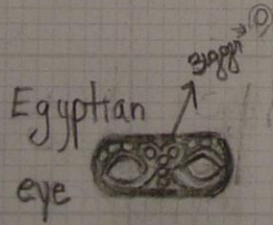
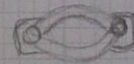
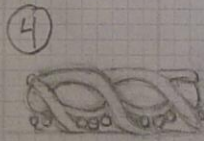


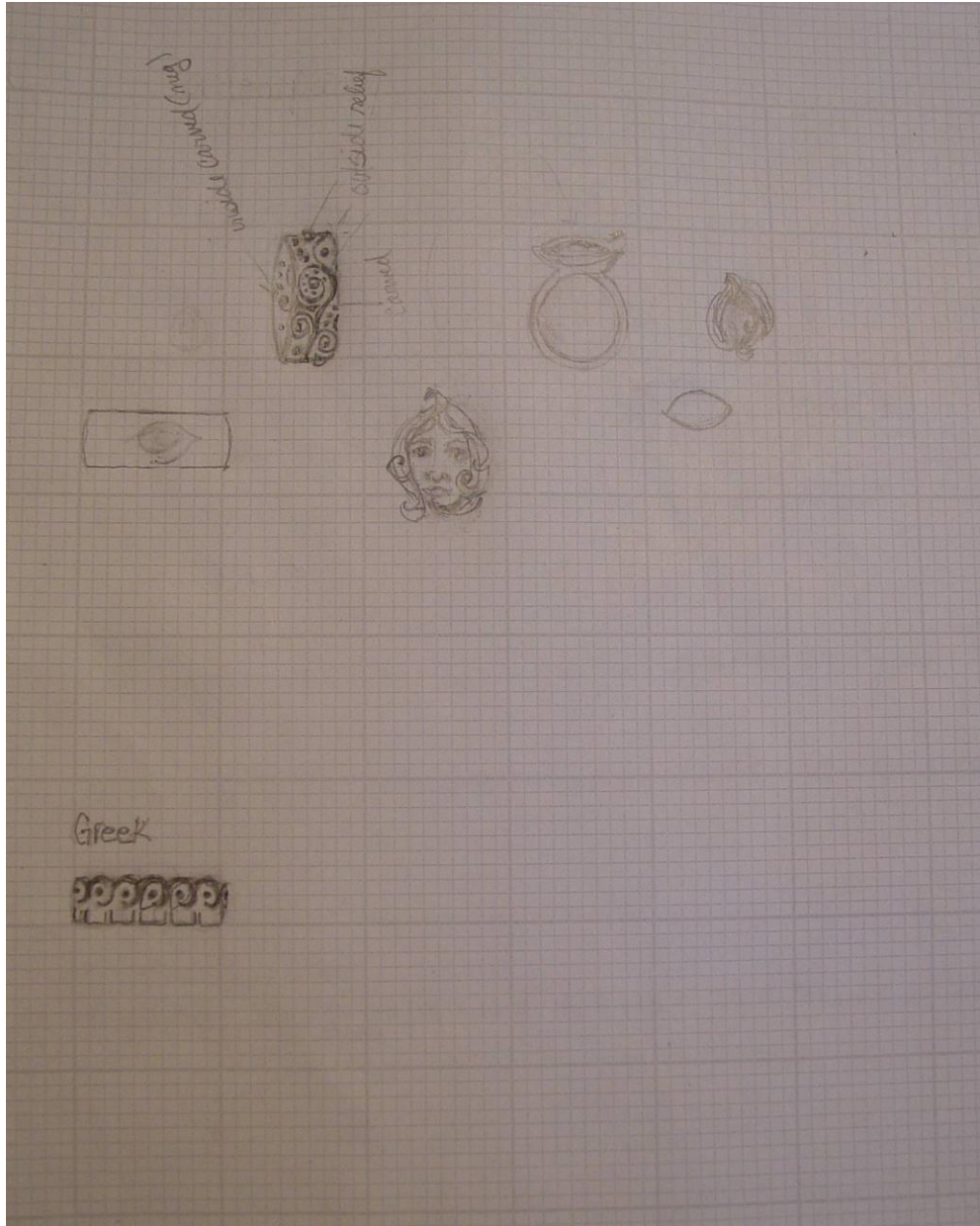


Roman



GREEK.





Elaborate Art. Soc.
Contour-shaped base
- uncorrupted beads
- smooth gold / 18K

Greek



filled



⑤

Contemporary



front



BACK



Appendix B

Casting Data

Casting 1: (Contemporary Band) wax weight 1.9 grams, metal ratio, centrifugally cast

Casting 2: (Ancient Egyptian) Wax weight 1.3 $\frac{3}{4}$ grams, metal ratio, centrifugally cast

Casting 3: (Medieval Band) 2.0 grams, wax weight, metal ratio, centrifugally cast

Casting 1

Centrifugal

Grams of sterling silver: 43.6 grams of silver

100/0 ratio of new silver to used silver

Wax: Wax sprues (8)

Investment burned out in kiln at 800-900 degrees.

Metal: silver melted in crucible

Outcome: Complete turnout

Casting 2

Centrifugal

Grams of sterling silver: 30.4 grams of silver

100/0 ratio of new silver to used silver

Wax: Wax sprues (8)

Investment burned out in kiln at 800-900 degrees.

Metal: silver melted in crucible

Outcome: Complete turnout

Casting 3

Centrifugal

Grams of sterling silver: 40.3 grams of silver

50/50 ration of new silver to used silver

Wax: Wax sprues (8)

Investment burned out in kiln at 800-900 degrees.

Metal: silver melted in crucible

Outcome: Complete turnout

Casting Data

Casting 4: (contemporary Band) 1.7 grams, wax weight, metal ratio, centrifugally cast

Casting 5: (Medieval Ruby Ring) 1.6 grams, wax weight, metal ratio, centrifugally cast

Casting 6: (Greek Band) 1.4 grams, wax weight, metal ratio, centrifugally cast

Casting 4

Centrifugal

Grams of sterling silver: 33.7 grams of silver

50/50 ration of new silver to used silver

Wax: Wax sprues (8)

Investment burned out in kiln at 800-900 degrees.

Metal: silver melted in crucible

Outcome: Complete turnout

Casting 5

Centrifugal

Grams of sterling silver: 32.6 grams of silver

50/50 ration of new silver to used silver

Wax: Wax sprues (8)

Investment burned out in kiln at 800-900 degrees.

Metal: silver melted in crucible

Outcome: Complete turnout

Casting 6

Centrifugal

Grams of sterling silver: 30.4 grams of silver

50/50 ration of new silver to used silver

Wax: Wax sprues (8)

Investment burned out in kiln at 800-900 degrees.

Metal: silver melted in crucible

Outcome: Pit marks caused by overheating