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Calliphysics

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CALLIPHYSICS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Fine Arts at Virginia Commonwealth University.

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ARTIST STATEMENT

My work focuses on the reality and life of mental objects. The unseen masquerade as the seen, not only in our mind's eye but as an immediate visual experience.

To realize this I apply volumetric form to models of thought and present them in a variety of environments. The forms are derived from the fields of science and mathematics, specifically geometry and topology. Topology or "rubber-sheet geometry," is the study of shapes whose essential attributes are unchanged by continuous deformation. The shapes are not defined by measurements of distance and angle, but by whether they can be transformed when bent, stretched, or shrunk. For these shapes I assemble environments which include architecture and devices from Italian Renaissance painting. In constructing the compositions I use an underlying geometric framework. The impetus for this device is that all things are hung on a structure of some sort, whether it be paint or metaphor. This device is also connected to Renaissance ideas of proving the divine through the employment of mathematics, or rather, using the tools of the exact sciences as a way of proving the unprovable. I see these arrangements as exemplifying a Metaphysics of Beauty in which the Platonic world of scientific and mathematical objects is filtered through aesthetics in what I have termed Calliphysics. *Kale*, from the Greek, meaning beautiful.

SUBJECT MATTER

"Painting has within it a divine power."- Leon Battista Alberti[1]

Alternative Realities and the Life of the Mind

One of the important influences on my painting is the work of Giorgio de Chirico (1888-1978). When he was 22 years old a significant event stands out in his life that greatly affected his artistic output and the output of many painters to come. He recalls that he was sitting in the Piazza Sante Croce in Florence where he had been many times before. On this occasion he was in a physically weakened condition due to a recent illness. He related that he felt particularly sensitive to his surroundings. Unexpectedly he perceived his environs as something more than the town square to which he was accustomed. He saw it as something extraordinary; as if he was looking at the Piazza for the first time. He visualized this image and its enigmatic ambiance in his mind's eye to later record it on the canvas known as *The Enigma of the Autumn Afternoon*.[2]

At this time De Chirico began assimilating into his thinking some core philosophical ideas that paralleled his extraordinary experiences in the piazza. One was Schopenhauer's idea that gave intuitive knowledge supremacy over the perception of eternal things. In other words there is a potential for a metaphysical reading of any given object or situation.[3]

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[1] Carlo Bertelli, *Piero della Francesca*, Edward Farrelly, trans. (New Haven and London: Yale University Press, 1992), frontispiece.
[2] Herschel B. Chipp, *Theories of Modern Art: A Source Book by Artists and Critics* (Berkeley: University of California Press, 1968), pp. 397-398.
[3] Ibid., p. 450.

Another was Nietzsche's view, stated in *The Birth of Tragedy*, that among philosophic thinkers there is a presentiment that another completely different reality exists beyond our immediate perceptions of reality.[4]

By 1917, De Chirico had formulated his ideas with Carlo Carra and together they founded the Metaphysical School. The Metaphysical painters wanted to show a different reality by way of dislocating ordinary objects. These objects would be presented in incongruous associations that would seem to depend on a new form of logic. Often a sense of the eternal as well as the enigmatic was evoked in scenes that encompassed elements of the past, present and future.

Like De Chirico, I am also interested in exploring ideas of unrecognized realities. However, my vocabulary differs from De Chirico's classical themes, mannequins, and interiors. The images I paint are taken from mathematical and scientific models. I want to give aesthetic form to objects from the realm of the mind or, rather, models of thought and present them in a variety of potentially logical environments. In other words I want to give a qualitative aesthetic feel to quantitative expressions. Another aspect of De Chirico's painting that has influenced me is his ability to create a certain stillness and calm. He described this aspect as the moment of waiting, as if you are holding your breath and everything is transfixed for a moment. For me it is that brief moment when you experience a sense of heightened awareness.

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[4] James Thrall Soby, *Giorgio de Chirico* (Arno Press, 1966), p. 28.

Another painter who has a major influence on my work was the younger brother of Giorgio de Chirico, Alberto Savinio (1891-1952). Many of his ideas paralleled his brother's, but it is his view of memory that inspires me. He stated that we are indebted to memory because when we "observe images we perceive not only what they have been, but what they will be as well..."[5] This idea is invaluable to me and suggests an approach to visualizing various incarnations of forms and their potential metamorphosis.

René Magritte's philosophy is also important to me. He was interested in the connection between images and thought. He felt that the power of painting relied on the mystery and the poetry of images. Like Magritte, I feel that an attempt to pinpoint definite meanings from my paintings reduces the power and the mystery of the image. To assign specific intentions to forms would discourage poetic interpretations.

Mental Objects

Visual thinking can be found in physiological functions such as memory, dreams, and hallucinations as well in the creative processes of scientists and artists. I find that my creative process is not unlike that in scientific discovery, especially in the fields of mathematics and physics. It is in the reliance on visual thinking and the use of models of thought that I draw parallels between my process and that of a scientist.

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[5] Maurizio Fagiolo dell-Arco, "Biographical Notes on a Metaphysical Argonaut: Alberto Savinio," *Artforum* (January 1983): p. 47.

An example of this is found in the event of Sir Isaac Newton's development of calculus, the branch of mathematics that deals with rates of change. His work on gravitation, motion, and calculus was published in *Principia* (1687) in which he worked out the mathematical proofs in calculus, yet checked them against complex geometric diagrams. Newton's method of developing his theories relied upon graphic representations of polyhedral models. Michael Faraday, the 19th-century physicist, contributed a massive amount of knowledge to the field of physics. However, he proposed his theories without the use of mathematical formulas. He knew only basic arithmetic yet through the use of models of thought and intuition he correctly postulated that light was electromagnetic radiation. In 1945, Jaçques Hadamard, author and mathematician, wrote *The Psychology of Invention in the Mathematical Field* in which he studied the way scientists think when they work. In this book Hadamard quotes Albert Einstein as saying, "...the words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought.... The physical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be 'voluntarily' reproduced and combined... The above mentioned elements are, in my case, of visual and some of muscular type. Conventional words or other signs have to be sought for laboriously only in a secondary stage..."[6] These are a few examples where I find the element of visual thinking used as a process for creativity and discovery in science. Often, the first thing I

[6] Philip J. Davis and Reuben Hersh, *The Mathematical Experience* (Boston: Houghton Mifflin Company, 1981), pp. 308-309.

do when explaining an idea is to draw a picture, thus indicating that verbal expression is not always sufficient for communication. I believe I work in this space between thought and language.

IMAGERY

"Among chosen combinations the most fertile will often be those formed of elements drawn from domains which are far apart." - Henri Poincaré [7]

Scientific and Mathematical Objects

When I discovered evidence of mental imaging as a tool in science, it seemed an obvious choice to use the models of thought of a mathematician in my work. Mathematics, for example, is the study of mental objects or symbols with reproducible qualities that exist outside of any one individual's mind. In other words, these forms are considered to be Platonic ideals. In choosing and narrowing my options for a visual vocabulary I decided to focus on topological shapes as sources of my images.

Topology or "rubber-sheet geometry," as it is often called, is the study of shapes whose essences are unchanged by bending, stretching, or shrinking. These geometric shapes are not defined by the characteristic method of measuring distance and angle. As long as two different shapes can be continuously deformed into one another they are considered to be the same or equivalent. A circle and square are considered equivalent because each one can be continuously deformed into the other. Therefore, two seemingly different shapes can have the same nature. This qualitative versus quantitative view of shapes appealed to me immediately. There seemed to be an infinite number of things I could say metaphorically and aesthetically with this concept and its set of shapes. With this pliant

vocabulary I would be able to compress, expand, stretch, bend, choreograph, and combine shapes. I could use the rules and propositions from mathematical and scientific literature as a catalyst for my painting ideas.

As I worked with the ideas intrinsic to topology, which state that no holes can be opened or closed in a shape, I painted a diptych which I named *Twins* (see Figure 1. Appendix, p. 21). It was my intention to paint a set of shapes that were counterparts (i.e. similarity/ difference, unity/discord, multiplicity/division...). The images I painted were of a cube and a torus gravitating above platforms. They were different but they belonged together. I felt that they were close enough in structure that they could have the same essences if viewed in a different way. In topology these shapes are considered different because one has a hole and one does not. Soon after I completed this diptypch I learned about a new branch of physics called quantum geometry. It is the practice of applying quantum physics to topology therefore allowing for holes to be opened and closed. Whereas before a cube (a polyhedra) and a torus (a 2-manifold) belonged to separate categories of shapes in quantum geometry they are considered equivalent. I had found a rationale for my referring to these shapes as twins. They were the same if viewed in another way. I could also expand my parameters of rules and laws and see where other combinations and deformations would lead. I believe that the reasoning and pseudo-scientific logic that I

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[7] Arthur Koestler, *The Act of Creation: A study of the conscious and unconscious in science and art* (New York: Dell Publishing Co., Inc., 1964), p. 164.

use to construct these images helps me to create an internal logic within a given work that will ultimately be recognized by the viewer.

Italian Renaissance Influences

It is in the era of the Italian Renaissance, with its advanced theories involving mathematics, that the systematic use of geometric substructures in painting is complex yet methodically traceable. The application of geometric substructures as a device for the placement of elements in a work of art was replete with mathematical, symbolic, and aesthetic substance. A defining idea of Renaissance artists was to attempt to join mathematics with religion in an effort to prove the Divine. The geometric and perspectival systems were considered to be esoteric knowledge. These ideas and their formulae were passed from one intellectual or artist to another. It is this method of constructing a compositional arrangement that I follow in my own work. And, it is the systematic nature of building a painting that has influenced the way in which I work.

Found in the mathematical treatises of Leon Battista Alberti, Piero della Francesca, and Fra Luca Pacioli are mathematical theories that can be directly applied to the arrangement of elements in Quattrocento paintings. These particular thinkers grounded their ideas and research in the works of Plato, Pythagoras, and Euclid but further developed ideas and formulae involving perspective, porportions, ratios, and geometric computations.

In relation to my work, I am particularly inspired by the Renaissance painter Piero della Francesca (1416?-1492). *De Prospectiva Pingendi*, is Piero's treatise on perspective for the painter. In this work he cites Alberti's idea that design, measure and color are what make up painting. Piero was particularly fond of using schemes of dividing the picture plane laid out by Alberti. He often employed the ratio of 2/3/4 - also known as the division of small numbers. This is a prime example of an association made between a mathematical treatise and painting. Owing to a large quantity of supporting evidence and documentation these structures cannot be viewed as wholly random applications of geometric designs.[8]

Therefore we can assume that Piero used a geometric substructure in *The Baptism of Christ* (see Figure 2. Appendix p. 22). Piero was a Euclidean scholar and it is possible that the composition was based on Euclid's Proposition 16. This Euclidean formula is used in constructing a 15-sided figure by superimposing a pentagon on an equilateral triangle and circumscribing the points with a circle. The triangle could be symbolic for the Trinity and the pentagon symbolic for the five wounds of Christ. Fifteen chords comprise the circle's arc in which each spans 24°. The chord length determines the overall proportions of the painting. Twenty-four degrees, the span of chord, is also significant. The medieval church believed that Christ was baptized on the winter solstice when the sun lies 24° south of the equator. Piero's painting mathematically linked Christ with the sun

[8] Charles Bouleau, *The Painter's Secret Geometry: A Study of Compositions in Art* (New York: Harcourt, Brace & World, 1992).

and subsequently with Divine Illumination.[9] If Piero used Alberti's division of small numbers (2/3/4), the work is equally full of symbolism. It is Piero's method of constructing a composition that interests me. In his merging of geometry with art he proposed the integration of the corporeal with the ethereal, the physical with the metaphysical, and reason with passion. This is a single but quintessential example of the use of underlying geometric and symbolic elements in Italian Renaissance painting. It is also an example of a method of working that I have adapted to my painting process in which I divide the picture plane into geometric configurations as groundwork for the placement of formal elements.

The power of a painting often relies on the strength of its compositional construction and its intrinsic power. At a fundamental level, dealing with the surface area of a painting involves decisions about the divisions of space. Our knowledge of space has been systematized in geometry. The foundation for the relationship between geometry and space was laid out by the mathematicians and artists of the Quattrocento. This reliance on geometry for the structures of paintings may permit interpretive variations on symbolic content, but the internal logic of Renaissance compositions cannot be denied. In general these artists used geometric divisions as formal boundaries. To create order and harmony within certain parameters using mathematical ratios and divisions was a standard practice of the day. It was not a limiting factor but a format for an infinite number of possibilities.

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[9] Marilyn Aronberg Lavin, "Piero the painter blended geometry with religious art," *Smithsonian* December, 1992): p. 126.

The divisional ratios echoed the shape and the boundaries of the edge or frame. The geometric divisions drawn on the surface acted as guides to maintaining the integrity of a particular piece in relation to its shape, size, and scale. This attempt to find order in the universe by searching for and applying a unified system of belief is a continuous human activity.

While I am inspired by Piero's underlying structures and ideas, the visual elements of Giovanni Bellini's (1430?-1516) paintings are of interest to me. In his work there is strength of compositional design but a reliance on color in describing form. Architectural elements such as window ledges, drapery, platforms, parapets, and crypts are used to simultaneously create a sense of deep and shallow space. Bellini used the landscape to escalate and heighten the mood of a painting and employed shallow space to create a sense of intimacy. Much like other artists who interest me, there is a certain thoughtful and quiet air to Bellini's work.

FORMAL DEVICES

"Ask any molecule what it thinks of the second law of thermodynamics and it will laugh at the question." -John Wheeler [10]

"The supreme misfortune is when theory outstrips performance." - Leonardo da Vinci [11]

Method of Working

The use of intuition and imagination as tools of discovery are common to both science and art. Intuition may be thought of as the third method to knowledge beyond induction (data gathering) and deduction (pure reasoning). Henri Poincaré, the 19th-century French mathematician, was frequently guided by intuition. He discovered an important set of mathematical functions, called Fuchsian functions, after an altered state of consciousness (sleep deprivation). For several weeks he had tried unsuccessfully to prove a theory. One evening he drank black coffee, which was not his habit, and was unable to sleep. He states that "Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination."[12] The next morning he wrote out his discovery in a few short hours. He continued to refine his theory of Fuchsian functions detailing several other instances of intuition and revelation. Poincaré detailed his experiences and the subsequent revelations at his celebrated lecture on Fuchsian functions. He not only heeded his intuitions but proposed an attitude of openness towards the use of intuition as a tool. His experience was not unlike the type of revelation that was felt by Giorgio de Chirico when he

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[10] Richard Morris, *Time's Arrow: Scientific Attitudes Towards Time* (New York: Simon & Schuster, Inc., 1985), p. 123.
[11] Kimon Nicolaïdes, *The Natural Way to Draw* (Boston: Houghton Mifflin Company, 1941), p. v.

developed his *Enigma* pictures. Both these individuals, skilled in their fields, acted upon their intuitions with positive outcomes after having had revelations. Although intuitions and revelations may well be based on the whole of our conscious or unconscious knowledge, it does not make them less viable methods of discovery. This intuitive type of discovery plays a part in my creative process. It is a process that I assimilate into my reasoning and aesthetic decision making while I am working. Although much of my process is highly structured and planned I rely on intuition to push my intellectual and aesthetic ideas to fruition.

This aspect of my process is important when working with mental objects and models of thought. I need to envision how shapes will be manifested under particular conditions, in particular environments, and exhibiting particular attributes. I depend on dreams and musings on shapes to work out formal and philosophic problems in the studio. My introspective ideations have more impact than everyday experience.

In conjunction with formulating ideas for paintings I typically generate a series of paintings by first sketching ideas in pen & ink, watercolor, or soft pastel. This is when I let my imagination flow freely by drawing whatever crosses my mind yet always using my chosen vocabulary of images (topological shapes). I begin a painting when I decide that I have enough drawings to drive my ideas and I feel the need to paint. I prime my canvases with several sanded layers of tinted gesso. I geometrically partition the surface of the

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[12] Koestler, p. 115.

unpainted canvas using straight edges, string, and charcoal pencils. I sometimes employ the exact substructures used by Renaissance artists or I may develop my own. The geometric division of the picture plane suggests to me the actual placement and movement of shapes. It can even suggest the bulk, scale, and type of a shape. I also use the geometric division of the canvas as a device to add overall strength and balance to a painting. My original reason for using this device is to show that all things are hung on a structure of some sort, whether it be paint or metaphor.

After geometric division of the surface is complete I paint areas of light and shade with a single color, usually burnt sienna. I always paint in oil color with linseed oil as a medium. Next, I lay down a layer of paint indicating color ideas. The third layer of paint usually consists of high key colors complementary to the second level of paint. The fourth level of paint brings the overall color and tone of the painting into focus. Often a canvas is a mixture of layers. I layer the paint in a way that I believe is necessary and sufficient for a complete and cohesive surface.

Features of Work

I frequently paint thin layers of color in alternating complementary colors to achieve a layered luminous quality. Areas of soft-hued and understated color placed next to high key pure color accentuate the vibrancy and energy of forms. My paint handling is controlled to permit precise expression and specificity.

When developing the scale of my shapes I think in terms of the size of the canvas and what the lifesize of the shape would be. The geometric substructure also aids in determining scale. If it is a small canvas then the objects are appropriately scaled down. In my large canvas *The Madonna, the Student, and the Obvious* (72"x96") (see Figure 3. Appendix p. 23). I perceived the shapes as being lifesize. I wanted them to have a physical presence in relation to a human scale. I refer to the smaller square images, *Weak and Strong* (see Figure 4. Appendix p. 24) and *Proof of the Obvious* (both 42"x42") (see Figure 5. Appendix p. 25) as snapshots of smaller views and arrangements.

I depict the scientific and topological forms in a surreal yet plausible environment relying on the techniques associated with realism, but continuing to maintain the view of my shapes as painted forms in a metaphysical realm. The acute rendering of forms implies the veracity of the image.

Like Italian Renaissance painters I work within a specific framework of subject matter, imagery, and formal devices. However, within that framework an inexhaustible number of possibilities exists for exploration.

CONCLUSION

"Beauty is that which pleases in mere contemplation." - Thomas Aquinas [13]

I believe that beauty resides in objects and is waiting to be recognized. In keeping with ideas of mathematical and scientific aesthetics I equate beauty with the interior logic of objects, which can be discovered through the elements of surprise, curiosity, and wonder. In describing the path to an experience of the beautiful I begin with the element of surprise. When I am surprised I am confronted with an unfamiliar situation or idea which is contrary to my expectations. Next I experience curiosity and I question the nature of my surprise and subsequently I desire to know more. Finally I am steeped in the wonder of a new world of possibilities previously unknown to me. It is through the combination of these three elements that I explore the logic of a given object or situation and have the potential to find beauty.

My paintings are a synthesis of themes and images in which I find analogies between science and art. I see them as exemplifying what I call a Metaphysics of Beauty; an idea beyond objectified pleasures. I attempt to make the inherent beauty of mental objects more apparent by giving them a qualitative nature in which ideas come to have an aesthetic feel. I strive to maintain interior logic within my arrangements in keeping with

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[13] H.E. Huntley, *The Divine Proportion: A Study in Mathematical Beauty* (New York: Dover Publications, Inc., 1970), p. 59.

the analytic qualities of mathematical and scientific forms. I have coined a name for my synthesized world of art and science, *Calliphysics* - Kale, from the Greek meaning beautiful.

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APPENDIX

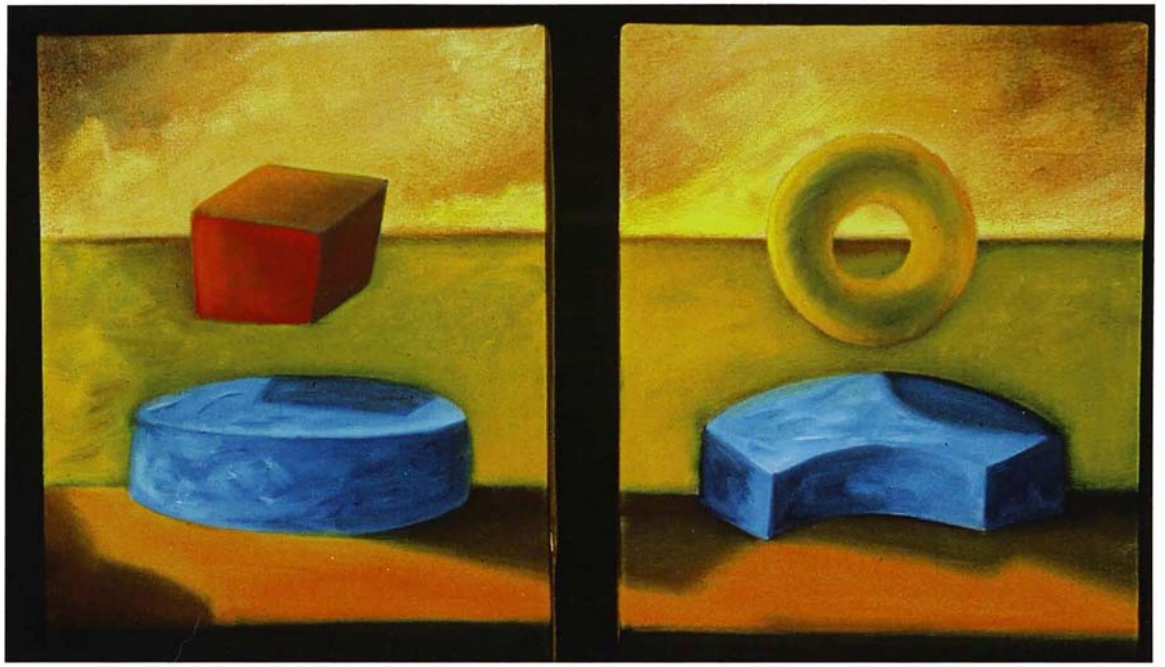

Figure 1.

Twins, Oil on canvas, each canvas 10" x 8", 1995.

Figure 2.

The Baptism of Christ. Piero della Francesca. Tempera on panel, 167cm x 116cm, c. 1451?, Reproduced from Marilyn Aronberg Lavin, "Piero the painter blended geometry with religious art," *Smithsonian* December, 1992, p. 126.

Figure 3.

The Madonna, The Student, and The Obvious. Oil on canvas, 72" x 96", 1995.

Figure 4.

Weak and Strong. Oil on canvas, 42" x 42", 1995.

Figure 5.

Proof of the Obvious. Oil on canvas, 42" x 42", 1995.

Slide Sheet

#1	*The Madonna, the Student and the Obvious*	Oil on canvas	1995	72"x96"
#2	*Echo of the Similar*	Oil on canvas	1996	52"x64"
#3	*The 3rd Triumvirate*	Oil on canvas	1996	24"x15-1/2"
#4	*Birth of Venus*	Oil on wood	1996	24" tondo
#5	*One Fixed Point*	Oil on wood	1996	2-5/8"x2-5/8"
#6	*The Red Curtain*	Oil on canvas	1995	12"x16"
#7	*Twins*	Oil on canvas	1995	10"x16"
#8	*Offering*	Oil on canvas	1995	~18"x24"
#9	*Dunces*	Oil on canvas	1995	12"X9"
#10	*The Visitation*	Oil on canvas	1995	14"x11"
#11	*The Master and the Student*	Oil on canvas	1995	22"x22"
#12	*Weak and Strong*	Oil on canvas	1995	42"x42"
#13	*Proof of the Obvious*	Oil on canvas	1995	42"x42"
#14	*Principle of Divine Constancy*	Oil on canvas	1995	42"x42"
#15	*Orifizio Mundi: Not to Scale*	Oil on canvas	1994	48"x48"
#16	*The Student*	Pastel	1996	29-1/4"x22-1/4"
#17	*Waiting for the Stigmata*	Pastel	1996	22-1/4"x29-1/4"
#18	*The Strangled Torus*	Pastel	1995	22-1/4"x29-1/4"
#19	*Muse*	Pastel	1995	29-1/4"x22-1/4"
#20	*Inside Out*	Pastel	1995	29-1/4"x22-1/4"

CURRICULUM VITAE

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