

The Geometry and Mystery of Flowers; The Art of Eudoxia Woodward

Paintings within a “Flame to Curiosity”, Bringing Art and Science Together

by Crystal Woodward

Eudoxia Woodward (1919–2008) is known for her artwork in which she brought together art and science, math and botany, in imaginative compositions including visual puns, time lapses, and historical references. For years she exhibited her paintings and gave lectures, with titles such as, “Flowers, Art or Science?”, “the Geometry of Flowers”, or, the “Mystery of Flowers”. In the last few years of her life, she created a “Digital Portfolio”, a presentation of her paintings, along with texts and details, by which she elucidated the mathematical and geometric laws, as well as botanical features, involved in each plants form and growth.

Part 1 in this book reproduces Eudoxias Portfolio. Part 2 follows with a compilation of the artists writings, with commentary, assembled and written by her daughter, Crystal Woodward. Eudoxias notes, sketches, exhibits, and family history, presented with numerous images, bring to light her creative thinking and whimsy and humor, in artworks including themes such as Platonic Solids and spherical pentagons, the Fibonacci Sequence, Symmetry, and, for her of primary importance, “Natures Perfect Packaging”. As she wrote, “A casual or haphazard observation sees only the botanical accuracy of the flowers I paint, but on closer study there is evidence of my interest in mythology, symbolism, geometric forms, numerical sequences, often with playful implications and trompe-loeil.” Her story also offers us a glimpse of the social and intellectual life of her time, in the area around Boston and Cambridge, Massachusetts, from her work at Polaroid in the 1940s, to her marriage to a Nobel Prize scientist, to her involvement with the Design Science “Philomorphs” at Harvard University.

The eleven pages following this one are excerpted from the book.

The last three pages are an excerpt from Chapter 9, “SketchesInterlude”, in Part 2.

To acquire a copy of this book, first printed in 2020, send an e-mail to the author Crystal Woodward at woodcrystl@aol.com.



Eudoxia Woodward, September 2007 ~ Photo, Crystal Woodward.

The Geometry and Mystery
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This book includes the reproduction of a “Digital Portfolio” of paintings by Eudoxia Woodward, first printed 2008, and a compilation and commentary by Crystal Woodward, 2019.

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“[...] presenting scientific information in a manner of the artist heightens the value of that scientific information; it emphasizes the universal timelessness (even the mystic nature) of man’s observations. It is a method of bridging that so-called fearful gap between the various disciplines.” (Notes, Arnold Arboretum Gallery Talk 1977)

“[...] I paint the geometric aspects of flowers because of a ‘sort of flame to curiosity’, to use Darwin’s phrase.” (Letter to R.G. King, Boston Museum of Science 1980)

Eudoxia Woodward

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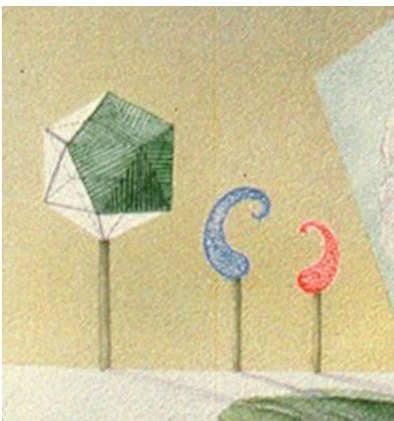
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Cauliflower Configuration

The study here of the cauliflower concentrates on its pentagonal structure and the inherent five and eight spiral clusters. Placing the head in a pentagon I have colored the path of clusters clockwise (in red) and counterclockwise (in blue). To the right is a broken off cluster with the spirals colored the same way.

To the left is an icosahedron to indicate the domed pentagonal form of the cauliflower, and likewise on the three spheres upper right. The cauliflower, marketed as a vegetable, is actually the plant in the bud stage of growth, with innumerable flower buds growing from the center to the perimeter. By breaking off clusters, with the oldest cluster being the largest, they diminish in size as shown in the sky. Of course within each cluster there are smaller clusters growing in spirals, always with the same two-spiral formation, five in one direction and eight in the other direction, thus creating the sense of infinity. With the pattern of the repeating two clockwise and counterclockwise spirals we can consider the cauliflower design a Mandelbrot set, a fractal.



Icosahedron



Pentagon



Clusters

CAULIFLOWER CONFIGURATION

1986

Brassicaceae Family • *Brassica oleracea botrytis*
Papier Moulin D'Arches 18" x24"; framed 25"x31"



An Aquabee sketchbook page (Image DSC_0138 Cornus Kousa Growth 5/23/98) merits our taking a close look: marked at the top, "Cornus Kousa", "5/23/98", the pencil sketch zeroes in on studies of the bracts and bud, as well as branches, stems and leaves, with notes as to the colors of these items – as preparation for painting them. In the lower left, we see, drawn large, a cluster of three drawn bracts with buds in center, among leaves, with a fourth standing on a tall stem above, a spatial arrangement which very much corresponds to the 1999 watercolor, upper left. Doxie also measured and recorded the angle of diverging branches and stems; she didn't subsequently include these numerical notes among the many branches in her painting, yet in her Digital Portfolio text she did comment, "...it is interesting to note that there is a consistency of angle among the large and small branches, an angle of about 36°."

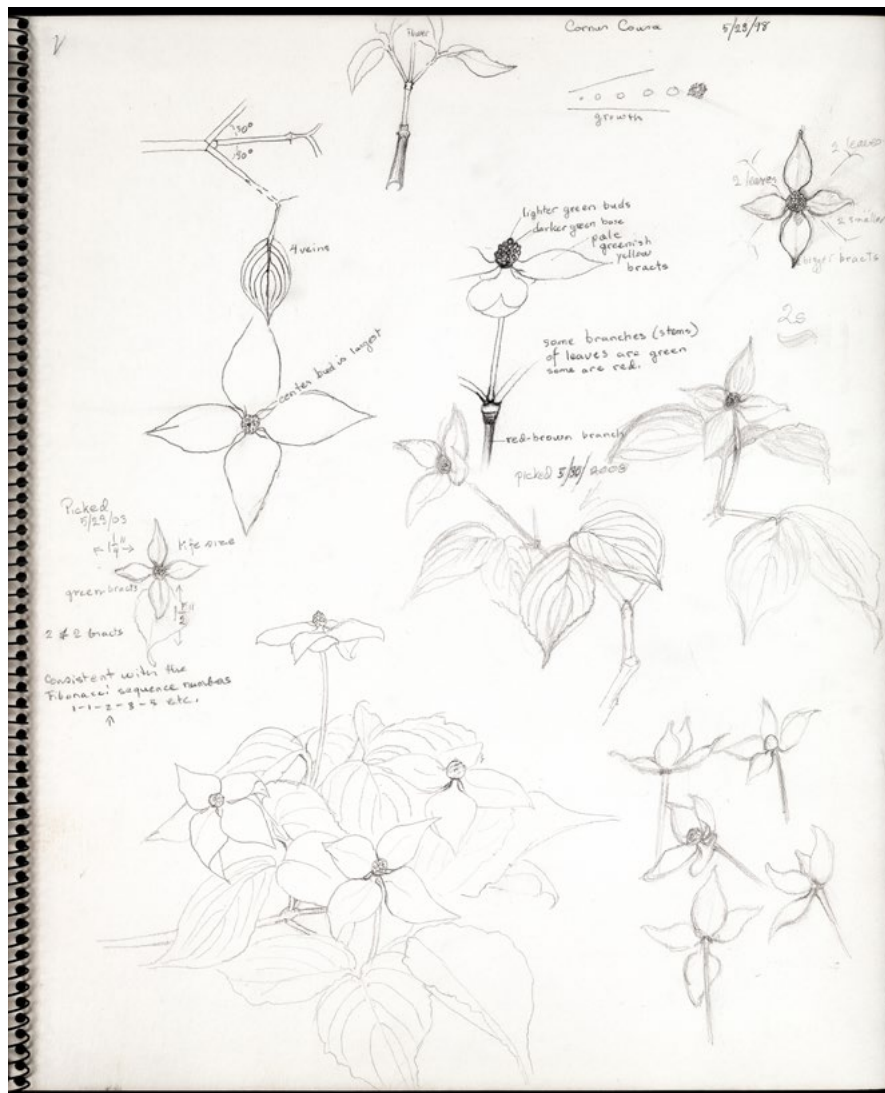


Image scan DSC_0138 Cornus Kousa Growth 5/23/98.

Eudoxia's sketchbooks show that she did many, *countless*, numerical jottings, such as, in this instance, the angles of the branches. This mathematical search was there in the backstage of her creative work, in her sense of order and beauty in the natural world. In the sketches we see this.

Looking further at the prolific "Cornus Kousa", "5/23/98" page, we find, apparently added later, two drawings of bract and bud marked, "picked 5/23/2003", and another, "picked 5/30/2003, life size", accompanied by measurements of the bracts' size, "1 ½ in." and "1 ¼ in."; below, the artist wrote, "Consistent with the Fibonacci sequence numbers, 1 - 1 - 2 - 3 - 5 etc." So, the page tells us, Doxie's appetite for understanding the Kousa's underlying mathematical "laws" did not stop at the completion of her 1999 watercolor; rather, the finished painting was yet a platform for a continuing inquiry, an unending inspiration.

On a small piece of paper among some of her file cards my mother noted down a quote: "'By answering one question we ask another.' James Burke." (Image P1140125 EW Flyer) James Burke, born 22 December, 1936, Northern Ireland, is known for his television documentaries on history of science and technology, such as "Connections" in 1979.

~ "Beautiful mathematics", and "project[ing] ourselves into the fourth dimension"

In a lecture Eudoxia gave at Brookhaven Retirement Community (Ref. Transcribed lecture, "The Mystery of Flowers", Brookhaven, Lexington, Ma., 1991), she shed light on her having become interested in the "laws of nature" and her penchant for seeking a mathematical understanding. Quoting some "important people", such as Leonard Bernstein, "Man likes order", and Bertrand Russell, "Mathematics possesses not only truth but supreme beauty", she continued:

[...] there are many of us who are annoyed at math because it means balancing a checkbook. But I think you'll find that nature has created some beautiful mathematics. [...] Kepler said, "Geometry existed before God but God, in his Almighty wisdom, used geometry to create the world." So there are many many people who have been involved in this kind of pursuit. I'm not alone in it.

She referred to the group she was involved in, with Arthur Loeb, which "meets once a month at Harvard, called the 'Philomorphs', 'fidel' meaning love, 'morph' meaning form. They're lovers of form. Cyril Stanley Smith, Steven Jay Gould, are with us; there are many scientists, mathematicians, and lay persons [...]" And artists, among whom my mother enjoyed her friendship with, for example, Holly Alderman, teaching assistant with Loeb, and artist of color and patterns; and Wasmaa Chorbachi, who documented through early manuscript evidence the meeting of science and art in Islamic civilization, and who is a specialist of Islamic geometrical patterns, co-author with Loeb on the subject, and creator of exquisite ceramic pieces herself.

I went with my mother to one of the "Philomorphs" meetings. They were held in a large studio room in Sever Hall, in Harvard Yard. We can get a sense of the spirit of the group, and of my mother's sense of

humor, as she continued in her Brookhaven lecture, “I heard a lecture the other night on the dimension beyond the third dimension. In other words, we would project ourselves into the fourth dimension. I’m not going to try to do that tonight, but if we could have the lights, we’ll go on and I’ll start the slides.”

It is wonderful that my mother had this group as context for sharing the interest in bridging art and science. After Loeb died in 2002, there were people trying to keep the Philomorphs going. In November 2007, a symposium was held in Providence, Rhode Island, “Synergetics and Morphology: Explorations into the Shapes of Nature”. This was organized by the Synergetics Collaborative with the Philomorphs and The Edna Lawrence Nature Lab at the Rhode Island School of Design (RISD). My mother’s cancer was advanced, yet she was eager to go, so I drove down with her. The organizers asked her to speak about Loeb and her memories of the Philomorphs, as she was one of the people present who had been involved the longest. (Image PB060340 Eudoxia at Synergetics and Morphology Symposium, Nov. 2007)



Image PB060340 Eudoxia (center), with Wasmaa Chorbachi (right), Caryn Johnson (left) and CJ Fearnley (standing) of the Synergetics Collaborative, Synergetics and Morphology Symposium, Nov. 2007 (Photo Crystal Woodward).

It is moving to realize that this was the last occasion at which my mother felt well enough to speak in public. We were shown around the Edna Lawrence Nature Lab, to which the Arthur Loeb Design Teaching Collection was accepted, in 2003. As explained on the RISD website, “This hands-on collection of hundreds of three-dimensional polygons and two-dimensional patterns inspires students and faculty to examine nature’s fundamental responses to design problems.”

I have wondered whether around the Loeb and Philomorphs Archives there might be a place for some of Eudoxia’s sketchbooks and related material.