



# Artist as Scientist in a Reflective Universe: A Process of Discovery

*Gilah Yelin Hirsch*

I was a questioner from earliest childhood. At age 6 I was writing and publishing essays with titles such as "Enigma" in the four languages of my childhood: Yiddish, Hebrew, English and French. These texts posed such issues as: "We are at the height of civilization, yet we are still dealing with problems of love, food and shelter." I was mystified by the fact that we are so smart yet so stupid. I attended a Jewish parochial elementary school in my birth city, Montreal, where I studied the Torah in Hebrew but discussed it in Yiddish, as the sacred language was not permitted for daily use. At age 8, I asked my male orthodox Torah teacher, "Although the names and pronouns of God are written both as male and female, singular and plural, why do we only talk about 'he'?" My teacher walked down the aisle, grabbed my hair and threw me out, and I was never allowed back into class.

The incongruity between what I was taught and my reality perplexed me. I was unable to reconcile the "revelation" of the Torah with the abysmal realities of my life. My father, a brilliant scholar, was an invalid from the time that I was 8. Over a period of 8 years, he lost control of his body and speech due to complications from a car accident. My mother, a teacher, poet and author, was renowned and admired in her community and yet was acutely physically and verbally abusive to my father and me as well as to anyone who grew close to her. Most of my relatives were very ill; there were always financial worries.

By the time I was 10 years old I had read that Albert Einstein was the world's greatest scientist, that he was Jewish and that he believed in the God of the Old Testament. Seeking to resolve my deep disturbance, I wrote a letter to Professor Einstein asking how he could reconcile his life as a scientist while believing in the God of the Old Testament, who not only allowed but created wrath, suffering and war. I received a reply within a week. On 24 February 1955, Albert Einstein typed:

Dear Gilah, Thank you for your letter. Try to form your opinions always according to your own judgment. You have shown in your letter that you are able to do so. With kind regards, Sincerely,  
Albert Einstein

It was signed "A. Einstein." He died less than two months later. This letter became the guide of my life; I learned to trust my intuition.

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**Article Frontispiece. *Dorland Pond #16*, oil on canvas, 37 × 30 in, 1982. (© Gilah Yelin Hirsch)**

My childhood career plans included becoming both a writer and a psychologist. Rather than pursuing a PhD in clinical psychology after attaining a BA, I accompanied my then-husband to the university of his choice in Los Angeles, where I earned an MFA (1970). Thus, I accidentally became an artist. By the second year of graduate school, I was exhibiting my paintings in the Los Angeles County Museum of Art. Upon graduation, I taught studio art and in 1973 began my tenure as a professor of art.

My interest in science continued, and I investigated the similarities and differences between artist and scientist. Art emerges from a synthesis between the skill of the artist and the properties of the medium. The scientist works in a similar fashion. As an artist, I understood that all phenomena are interconnected in a matrix of light and space; so does the scientist, who also may investigate qualities such as valence, chaos or quanta. The artist observes natural processes under various situations including the continuously shifting light of plein air and the controlled illumination of the studio; the scientist also works under stipulated conditions in nature or

## ABSTRACT

Combining years as an artist in solitary wilderness sojourns with biomedical and neuroscientific investigation concerning mind/body patterning, the author has blended art and science to reveal existing relationships between form in nature, form in human physiology and behavior, and the forms that are universally present in all alphabets. Her understanding that the artist brings abstraction into form, while the scientist brings form into abstraction, coupled with her experience in diverse world cultures, has prompted her to contemplate the hardwired wisdom of the body as the repository of intrinsic knowledge leading toward health and behavior benefiting the greater good.

**Fig. 1. *Red Square*, oil on canvas, 48 × 48 in, 1968. (© Gilah Yelin Hirsch)**

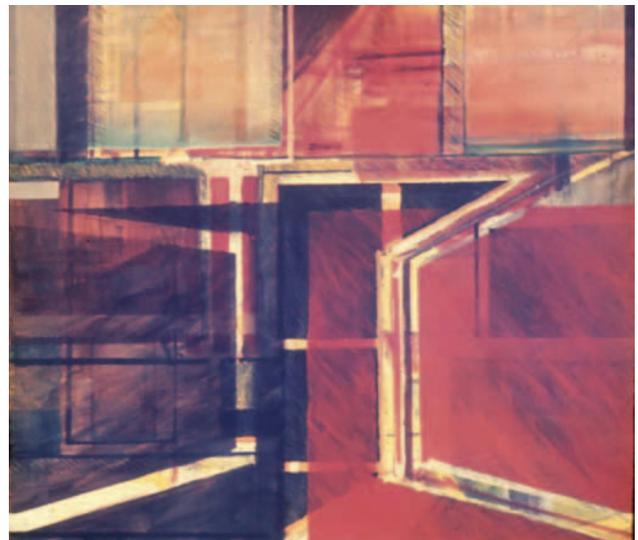




Fig. 2. (top) *House Arrest*, oil on canvas, 60 × 60 in, 1971. (bottom) *The Great Pumpkin*, oil on canvas, 60 × 60 in, 1969. (© Gilah Yelin Hirsch)

in a laboratory. As an artist I use frequencies of color to create illusions of reality; the physicist mathematically describes and calibrates the nature of frequency. The artist finds patterns in natural phenomena such as the occurrence of light and shadow. The scientist finds patterns in phenomena from protons to galaxies to the universe. The products of both artist and scientist are conceptualized by imagination and visualization and brought to perfection by meticulous execution. For the artist the criteria of success are coherence and beauty; for the scientist, coherence and elegance. The difference between the two is that the artist brings abstraction into form, while the scientist brings form into abstraction.

From the Middle Ages to the mid-19th century, when the practice of modern science as we know it began, the study of the physical world was called natural philosophy. A century earlier, the Industrial Revolution had begun to force specialization into ever-narrowing fields. As a result, Western scientists became technologically more adept but more generally ignorant, having lost the ability to appreciate holistic knowledge. During the first half of the 20th century, quantum physicists argued the question of locality. In the 1960s, as Eastern philosophy infiltrated the Western world, attention was paid to older, far-reaching knowledge that included the idea of the mind affecting visible as well as invisible phenomena. Quantum physics and mysticism were newly, but tentatively, united. With the isolation of the Higgs boson particle in 2012, an indisputable interdependence of space and matter was reified.

While artists use media to layer veils of light and shadow to *produce* illusions of form that have dimension, reflection, refraction and the presence of substance, physicists *explain* the presence of substance by measuring discrete units of frequency that create illusions of dimension, reflection, refraction. We complement and need each other.

I began painting seriously in 1968, layering light, form, time and space (Fig. 1, as shown in my *Windows* series, 1967–1968) [1].

By 1969, I was conjuring concrete form. In painting something as traditional and simple as “still life,” I realized that there is nothing still in life. Any “twoness” creates a relationship, immediately catalyzing *unstilledness*, tension and friction—necessary for life and creativity. In 1971 I became one of the founders of the Los Angeles Council of Women



Fig. 3. *Four Square Peeler*, oil on canvas, 48 × 48 in, 1972. (© Gilah Yelin Hirsch)

Artists, a seminal organization of women artists. I was painting over-scaled domestic food imagery as metaphors for women who were kept from their professional aspirations solely because of their gender. Working with scale and context, I rearranged foods such as eggs, fruit and vegetables to create new associations (Fig. 2). I also began to figuratively refract the space to show the distortion that might occur if a piece of glass were to be placed over a section of the image [2].

With growing ability as a realist painter, I confronted the nature of reality. I then began to reason: If I could visually superimpose multiple differing images of equal persuasiveness, then certainly I could mentally hold various and differing opinions concurrently, all having validity and truth. I could invoke, refute and reinvoke images that seemed to be peeling right off the edges of the picture plane in the same space/time. As I interpreted layers of imagery as years of acculturation, it became imperative that I reconsider all that I had held true. I began figuratively to peel off layers from the center outward. The canvas had become a vehicle for studying my own psychic history (Fig. 3).

My first solo expedition into wilderness, in 1970, was marked by a near-death

experience. I left Los Angeles on a warm, sunny day in early December. By the time I reached the High Sierras, I was caught in an unrelenting blizzard. My van broke down in a remote location in the mountains. After one night in that steel ice-box, I knew that unless I left I would freeze to death. With the blizzard still raging, I abandoned the van and trudged through the snow-carpeted forest for most of the day. Eventually I walked along a stream and then in it as the water still rushed.

My last memory was sinking into snow, exhausted, resigned to my fate. The blizzard buried me where I sat as deer circled and looked askance at the strange presence slowly disappearing before them. Two days later I was found by an excited dog who smelled something live under the snowbank where he was urinating. The dog's incessant barking brought his master, whose van was also stranded in the blizzard. More dead than alive, I was excavated from the snow mound and revived.

After that adventure I felt that I had to examine more deeply my spirit and psyche to understand the trajectory of my life. I knew intuitively that a round canvas would encourage more intimate content. The first painting of the subsequent se-

ries was catalyzed by a dream in which I pulled a yellow tapeworm from my left thumb palm. As I developed the image of the tapeworm through ensuing paintings, it was visually transformed into a serpent—the only creature that can swim in water, live underground, on the ground and in the air, and fly [3]. Mythically, the serpent is both terrifying and revelatory and is perennially searching for knowledge and truth. I understood these paintings to be metaphors for individuation.

It was at this time that I began to use Hebrew letters in my paintings. I re-evaluated the question “Who am I?” and represented myself as an orange egg in swaddling, inscribed with my name in Hebrew. In a later painting I worked with the Hebrew “mother letters” of Kabbalah: *Alef* (א), *Mem* (מ) and *Shin* (ש), the first letters of the words *avir* (air), *mayim* (water) and *srayfah* (fire), respectively (Fig. 4).

Next I painted my right eye looking into my brain. I wrote my names in Hebrew in painted pomegranate seeds—*Chassia*, meaning refuge, and *Gilah*, meaning cosmic joy, the first of the five words for joy in the Hebrew wedding ceremony: *gilah*, *rina* (joy of song), *ditza* (joy of giving), *hedva* (joy of community), *simcha* (joy of celebration). I searched further into the center of succeeding works, finding metaphors for DNA, while exploring Kabbalistic references with Hebrew inscriptions [4].

Deepening the exploration, I noticed that any crossing of DNA strands in their helical movement creates the image of the Hebrew letter Alef (Fig. 5). In Kabbalistic lore, Alef, the first letter of the Hebrew alphabet, is also interpreted as the origin of the universe. I then visualized the form of sound. The floral forms reminded me of Hebrew letters. I painted as if I could see through tissue and marrow to the moment of conception.

## READING THE LANDSCAPE

In 1981 I began making long solitary sojourns in wilderness. I spent the next 3 years at a large pond in Southern California, where I studied the reeds as they grew, broke and fell.

Geometric patterns of angles, triangles, arcs and crossed lines appeared regularly in daily, seasonal and annual cycles (Fig. 6). I was entranced by my scriptural perception of these calligraphic “messages” in the landscape [5].

As my vision deepened, I became hypnotized by the reflection in the pond



Fig. 4. *Reconciliation*, 1979, oil on canvas, 30-in round (interlocking *Alef, Mem, Shin*) (© Gilah Yelin Hirsch)

Fig. 5. *Reflections of Events in Time*, oil on canvas, 48-in round, 1978. (© Gilah Yelin Hirsch)



rather than that which was reflected (Article Frontispiece). The longer I spent in isolation, sans the mirroring of another human being, the more I felt like an untethered, isolated soul.

Again, I was concerned with illusion and reality. Which was real—that which was reflected, the reflection or that which sat on the surface of the pond? I was floating in limbo. The pond had become my teacher; it enticed me further as it perfectly reflected both heaven and earth. The surface of the water was discerned only by floating leaves, much as human behavior reifies the dynamic of relationships.

A 16-in area of land near the pond revealed the proximity of triangles, arcs and circles, straight lines and crossed sticks forming an X (Fig. 7). By this time, the seed of an idea had germinated: I decided to photograph my findings. As I wandered over the land, I found the geometry of angles and triangles in rocks, the branching of roots, reeds, trees and the random crossing of sticks as they fell over each other on the ground. I found groupings of similar shapes such as roof-shaped sticks next to roof-shaped rocks. I soon began to find wide-angled sticks with rocks or dots below them. It was as if I could read a Chinese-style ideogram for house: roof over person. Acutely angled sticks with stones in their centers reminded me of the English letter A. I was becoming profoundly affected by the forms that jumped at me from the complexity of the landscape [6].

It was not long before I was painting (adding) anthropomorphic images as expressions of human experience as I saw and documented them in natural occurrences in nature [7]. I was perceiving particular structural patterns in nature with increasing frequency. This led me to believe that there is no randomness in natural pattern, that a grand design exists and, within that, something within me prompted my recognition of particular events in nature.

I continued my documentation. By 1983, I was finding letters everywhere in nature: first English letters such as *A* and then letter forms that I recognized in several languages, such as *X* in English and *Alef* in Hebrew; *Y* in English and *Ayin* in Hebrew; *R* in English and *Taf* in Hebrew. I researched charts on early alphabets and discovered that northwest Semitic, the earliest version of Hebrew (14th century BC) antedated all other alphabets [8] and that the 22 letters had undergone 50 permutations over many centuries. I walked about the landscape

Fig. 6. (top)  
*Dorland Pond #19*,  
oil on canvas,  
1982, 24 × 52 in.,  
1982. (bottom)  
*Dorland Pond #34*,  
oil on canvas,  
45 × 22 in, 1983.  
(© Gilah Yelin  
Hirsch)

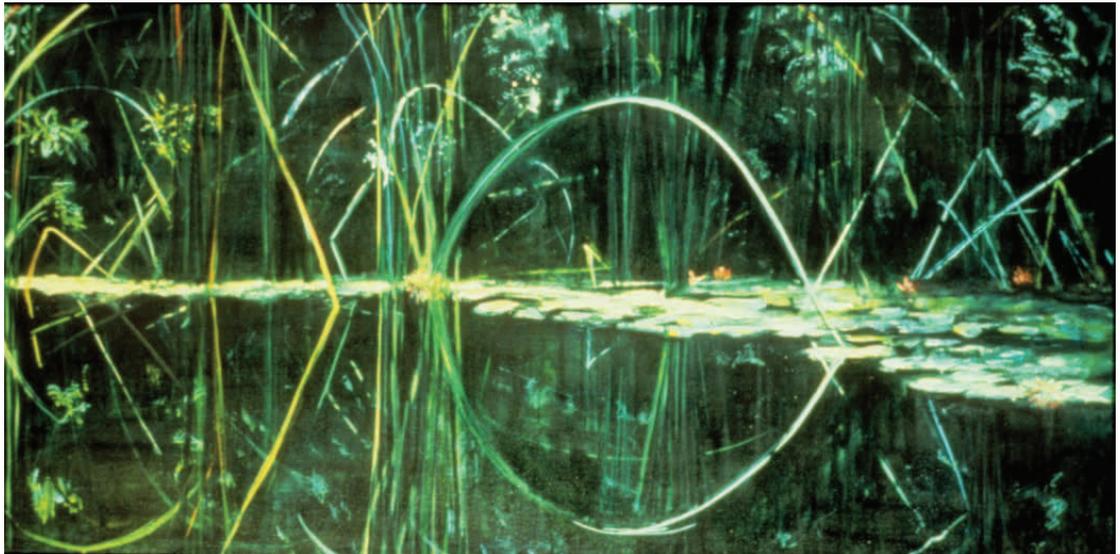


Fig. 7. *Beehive &  
Rock Vagina*, oil  
on canvas, 8 × 16  
in. (© Gilah Yelin  
Hirsch)





**Fig. 8. (top) Five Forms: Alphabetic morphology in various alphabets. The Hebrew word “OT” (letter) as found in roots. (bottom) From right, Alef and Taf, the first and last letters of the Hebrew alphabet. (Photos: Gilah Yelin Hirsch)**

with a Hebrew alphabet chart and systematically documented the entire alphabet with many of its transformations. The earliest forms are identical to those found in nature. Over the centuries they have become somewhat elaborated but still closely resemble their earliest structures [9].

Tracing my own artistic process, I had become convinced that as early man and woman walked their terrain, any terrain, their eyes peeled for food and foe, there were certain forms in nature that they, as I, noticed repeatedly. These forms affected them physiologically. Optical neural stimulation affected enzyme hor-

monal production, which changed the emotional state. I conjectured that the emotional affect associated with recognition of these forms was positive, since the act of noticing was repeated. With continuous repetition, these simple forms became imprinted archetypally. Consequently, when the time came for the formation of alphabets, these forms were chosen universally.

Form evokes feeling. Feeling conjures metaphor. Metaphor demands expression.

The first form of the last letter of the Hebrew alphabet, *Taf* (X) is identical to the last form of its first letter, *Aleph* (X).

The form is a crossing of two strands, a cyclical repetition, an extension of itself. Is this not the essence of genetic transference?

The Kabbalah states that visualization and meditation on the form of every letter of the Hebrew alphabet, alone or in combination, changes not only the psychophysiology of the practitioner but also the nature of the universe in the moment.

When I recognized that the forms in nature that constantly attracted my focus were the forms that were used in alphabets, I believed that I had isolated the five shapes that have been consistent throughout the evolution of alphabetic form (Fig. 8). I hypothesized that these forms were used universally because these shapes are found in physiological structures and processes and in nature: the line, as found in a stick, the horizon and the upright or prone human form; the angle, as found in the branching of trees and the shapes of mountains; the arc, as found in sections of the circle; the spiral, as found in the sun and moon, the circumference of a bloom, seashells and the half-moon; the meander, as found in roots, river patterns and the movements of snakes; and the random crossing of lines such as sticks, creating an X. California Institute of Technology theoretical neurobiologist Mark Chingizi, in a personal email corroborating my hypothesis, wrote, “Perhaps the culture has actually selected for visual signs and writing that tends to have the conglomerations of strokes that match the conglomerations of edges [or contours] occurring in nature” [10].

In 1986 and 1987 I traveled the world documenting ancient to modern alphabets and found that these five forms were used universally (Fig. 9). It was clear that, although cultures differ, the physiology of perception is pervasive; therefore the same forms were used.

Do we see because of what we think, or do we think because of what we see? Through the process of creating this series of paintings, I learned that nothing can exist in isolation, that the viability of any one thing is determined by the existence of another and that all things affect each other and are intrinsically interdependent at the smallest and largest levels. Why do we recognize form? I hypothesized that a mirroring process occurs between the physiological structure of the perceptual apparatus and that which is perceived. In other words, there exists an innate proclivity to recognize certain forms at a conscious or unconscious level (Fig. 10) [11].



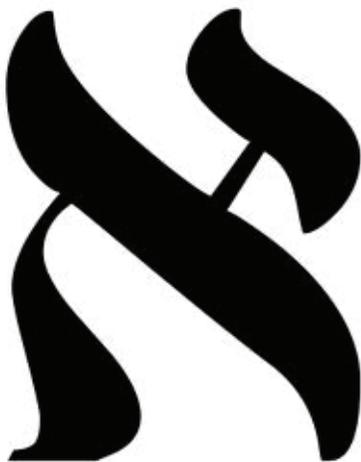
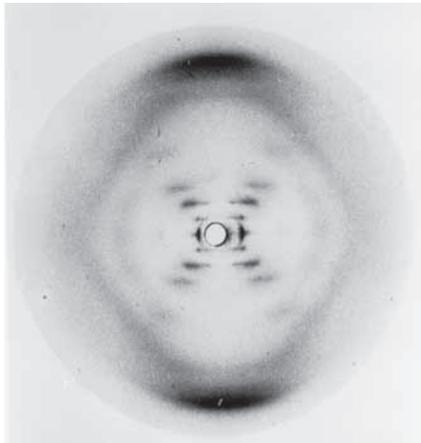
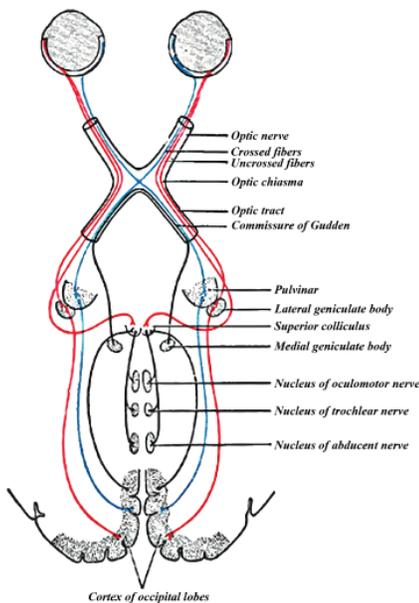


Fig. 11. (top) Optic chiasma (Gray's Anatomy plate, <<http://upload.wikimedia.org/wikipedia/commons/c/c0/Gray722.png>>). (middle) DNA. (Photo: Rosalind Franklin. © Kings College London.) (bottom) Alef. (Photo: Gilah Yelin Hirsch)

We discriminate in favor of that which fits comfortably in relation to the known, that which is inherent at the most basic level of being. The helical movement of DNA, the crossing of visual pathways of the optic chiasm in the actual process of vision, the shapes of neurons involved in seeing and cognition in the visual cortex of animals such as cats, monkeys and humans, as well as other physiological structural patterns, echo perceived external shapes (Fig. 11).

All forms catalyze direct psychophysiological affect in the viewer. Some, such as sexually explicit imagery, are more blatant than others. Yet all sensory experiences affect our bodies, which are delicately entangled with our perceptions. Every emotion precipitates biochemical reactions that change the physical state of each cell of our bodies [12].

Most early cultures worldwide use form as fundamental therapy for healing: e.g. Tibetan mandalas, Navajo sand paintings, Balinese dance, images of saints and holy persons, and sacred architecture. In the West we are only beginning to comprehend and utilize art and architecture as concentrated agents of healing; and since the early 1970s, visualization techniques have been used medically in psychoneuroimmunology and biofeedback.

From May 1988 to September 1990, I lived alone in the Tonto National Forest in Arizona. I learned to survive in sub-zero temperatures with no power, running water or heat. My companions were large animals such as bear, elk and deer who came to accept me as another creature. From these animals I learned that I, too, am a herd animal and that only within the herd can one be heard.

In March 1990 I received a letter from Dharamsala, India, inviting me to travel to the Himalayas, where the Dalai Lama would be giving formerly secret tantric teachings. I left my snow-covered mountaintop and arrived in Dharamsala, where I sat with 300 monks to receive the tantric teaching of *bodhicitta* (compassion)—a transformative practice for body, speech and mind. Accompanied by mudras (gestures) and mantras (sounds), the Dalai Lama guided our visualization of a white sphere of compassion sequentially nourishing every organ and system of the body, from the top of the head down the right side of the body, up the left side and expelled out the top of the head to provide compassion for all sentient beings in the universe.

During the weeks of practice, despite blizzards and uncomfortable positions

seated on cold ground, we felt physically robust, emotionally ecstatic and socially empathetic. I learned that “tantric mystic physiology of the subtle body is directly related to the somatic physiology of regular medicine, and the tantric practices of manipulating it bear directly on tantric healing” [13].

## FROM SACRED TO SECULAR

Having lived in many cultures, I concluded that, while joy is culturally determined (conditional upon, e.g., many wives, many husbands, various gods, etc.), grief is consistently experienced due to loss of contact, rejection and abandonment. I had already deduced that recognition is essentially proprioceptive, hardwired into physiological systems. If contact and communication are the glue between both animals and humans, valence attracts and stabilizes chemical combinations, and gravity tethers planets and galaxies, I was convinced that there must be a paradigmatic reflexive model submerged in our deeper recesses that allows us to perceive positively affective forms.

I began to study cellular behavior, as the cell seemed to be a discernible unit of life that lives in groups as do animals and humans. I learned from Ross W. Adey's research [14] that cells “whisper” together through their membranes, which vibrate in the electromagnetic field (soliton) created by the valence of various facilitating hormones, minerals and neurotransmitters [15]. If cells cannot communicate they begin to clone themselves, meaning that they become cancerous. Much like the cell, the entire human organism must have another who mirrors but is not a clone. We cannot mirror ourselves although we may try to as narcissists. If we are physically isolated we may begin to talk to ourselves. If we are emotionally isolated we may produce multiple personalities. From birth, our emotional system searches for resonating contact, not duplicating or identical sameness.

Reflection, interdependence and contact are hardwired into our physiological bodies. The focus of consciousness clearly points toward behavior benefiting the greater good, or as the Tibetans call it, “right action.”

## THE ACCIDENT

In June 1999, a faulty steering wheel in a rented car caused me to have a near-fatal accident on an abandoned road on an island of Haida Gwaii (the Queen Char-



Fig. 12. (top left) *Who Will Live & Who Will Die*, oil on canvas, 85 × 85 in, 1999. (top right) *Refuge*, 2000, oil on wood, 27 × 27 in, 2000. (bottom left) *Grace*, 2000, oil on canvas, 85 × 85 in, 2000. (© Gilah Yelin Hirsch)

lotte Islands), a remote archipelago in the Pacific Ocean. Many hours later, discovered as a crushed cadaver, I resumed consciousness and immediately began visualization toward healing.

After 5 days with no other treatment but morphine in the unequipped infirmary, I decided to return to Los Angeles. With morphine to go and focused volition, I boarded a ferry to another island, a puddle-jumper to Vancouver and a commercial jet to LAX.

My shocked doctor saw me as the walking dead: flat EKG; all ribs, three vertebrae, sternum, scapulae on both sides, femur and tibia broken; crushed heart, crushed head and 5 millimeters

of bone fragments lodged in my spinal cord. The prognosis was dire. Instead of surgery, I came home with a removable body corset made of plastic lace, stays and Velcro. Immobilized, I dedicated my time to visualizing the reconstruction of my body, cell by cell, system by system. Aided by medical texts, my visualizations were extremely detailed, toward the goal of achieving an optimal state for each cell and organ. Within 2 months I could walk upstairs to my studio. I chose to work on diamond-shaped canvases to better reflect the outstretched human body and painted the reconstruction of my body from the inside out. Drawing on the power of Hebrew letters, I once again

inscribed the images with Hebrew words, the first such work being *Mi Yamoot ve Mi Yechyeh?* (Who Will Live and Who Will Die? Fig. 12a). As I “rebuilt” the spinal cord, the ribs and the cells, white spheres appeared in my work, organized in a familiar pattern identical to that which I had been taught in the *bodhicitta* visualizations. I recognized that this pattern is congruent with acupuncture, moxibustion and meridian points.

I painted the opening of the heart so that I could “wrap” my first given name *Chassia* (refuge) around my visualized spinal column [16] (Fig. 12b).

I had come to a profound understanding of the seeming internal chaos held

together by forceful rays of volition radiating to and from the heart. All is simultaneously substantive, dimensional, transparent, illuminated by the entire spectrum, revealing a matrix of interpenetrating layers of life. As I grew stronger, I turned my vision outward to include the beauty of nature, once more attuned and connected to the healthy rhythms and vibrations of the universe.

I read later in *Tibetan Buddhist Medicine and Psychiatry: The Diamond Healing* that “the whole of conditioned existence consists of radiations of energy vibrations emitted as rays or as fields of force and at varying rates of speed and thus solidity, intersecting and interacting in accordance with the harmonics of karmic balance” [17].

I inscribed the Hebrew words *chessed* (grace—Fig. 12c), *hodaya* (gratitude), or (light, skin) and *ruach* (wind, spirit) into later Diamond paintings. With every breath, wind/spirit flows through us and reciprocally nourishes all atoms, molecules and worlds. We are perpetually, inextricably connected.

The Kabbalah says that Adam was created as the shadow of the reflection of the substance. The more clearly we understand the nature of reflection, the more profoundly we understand the nature of substance.

Whether the universe is explained through the Higgs boson, string theory, spheres of *bodhicitta* or meditation on

letter forms, we are all riding bareback on one another’s souls and share the responsibility for right action. Divinity is hardwired in humanity, and spirituality is in behavior. As we accept the gift of life with each breath we become the personae who animate the universe and both create the illusion and manifest the vision of a compassionate universe.

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