PORTAL TO A NEW EARTH IS AN ESSENTIAL TEXT for any readership looking for a combination of inspirational values that offer antidotes to the painful political, sociological and immunological problems of the past few years; but, even more significantly, over the last few decades. This book provides both paths of redemption and spiritual/ecological/behavioral choices that, if pursued by ever greater numbers of participants, has a chance of affecting genuine improvement.
—James Wines, SITE Projects, author *De-Architecture* and *Green Architecture*

PORTAL TO THE NEW EARTH IS A JOURNEY ON MANY LEVELS. From Harlan's personal path of design discovery and worldly travel, to the manifesting of his Portal structures installed at sacred sites and festivals experienced by thousands of people, to the universal principles of Fuller's Synergetics and Soleri's Arcology, ultimately synthesizing into a clear vision of Earth as the great portal of humanity's conscious evolution. There is a breadth of knowledge and depth of underÅ standing shared with ease throughout the book that will inform, inspire and delight your outer senses and inner imagination.
—Marshall Lefferts, author *Cosmometry*

HARLAN GRUBER IS A UNIQUE AND VISIONARY TINKERER of systems, sounds, and structures. Encountering his Portals at Burning Man over many years, I deeply appreciate his art of dimenÅ sional transformation. Rich with sacred geometry and personal vision, Portal to the New Earth is mind expanding passageway to another liminal zone.
—Erik Davis, author *Techgnosis* and *High Weirdness*

I HAVE HAD MANY PROFOUND EXPERIENCES in Harlan's wonderful Portal sculptures. He is a master of sacred geometry and a student of humanity's evolutionary potential with a deep underÅ standing of ancient civilizations. This book is of value to anyone seeking how they can contribute to the creation of the New Earth we are all dreaming of.
—Daniel Pinchbeck, author *2012 the Return of Quetzalcoatl* and *Breaking Open the Head*

INSPIRED BY BUCKMINSTER FULLER'S WORK, Harlan Emil Gruber's Portal to the New Earth explores his lifelong exploration of how humanity can transform the Earth to benefit 100% of life. It presents an impressive overview of Buckminster Fuller's work, along with other inspiring visionary works. I love Harlan's unique comprehensive synthesis that results in a vision of creating a future of beauty for all.
—Amanda Ravenhill, Director of Buckminster Fuller Institute

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PORTAL TO THE NEW EARTH

Harlan Emil Gruber

PORTAL TO THE NEW EARTH

SOUND, SACRED GEOMETRY & GRID ENERGIES FOR PERSONAL & PLANETARY TRANSFORMATION

Harlan Emil Gruber



I created this small paper maquette based on my studies of the golden ratio in 1984 while attending Parsons School of Design in NYC. Flash forward twenty years to 2004, my fifth year attending Burning Man, where I decided to build it as an interactive installation titled it the 11:11 Diamond Portal. It was placed in the deep playa at 11:11 on the Burning Man city layout with the intention of it being a key to shifting the Earth into the next vibrational dimension. Standing 16 feet tall with an elevated cylindrical opening for participants to perch in, it vibrated subtly with the random low frequencies of the Quasar Wave Transducer sound sculpture's purring emanations. And so began the journey of creating the Portal installations.

This book is a comprehensive overview of my lifelong interest in how the universe operates and how to utilize this information to catalyze an evolution of human consciousness to choose to live in sacred and divine harmony with all of life and the Earth. This is a journey in two parts: the first part shows how the Portals utilize sound, sacred geometry and an understanding of Earth grid energies to facilitate an evolution of consciousness. I have come to think of them as multi-dimensional energy body alignment tools. Part two covers the inspiration and ultimate reason that I build the Portal installations: to awaken people to the sacredness of all things so as to choose to inhabit the earth in the most harmonious and beautiful way. Inspired by the work of Buckminster Fuller and Paolo Soleri, I have gone on to study a wide range of visionary projects spanning the past century that I have synthesized into a future urban eco-structure concept: the 12 Spiral City. The book culminates with the principle of TerrAquaforming: consciously integrating water and earth in the most life enhancing way for not only the benefit of future human habitations, but all life and the Earth itself.





Harlan Emil Gruber (b. Jan. 14, 1959, NY) has combined his interest in science and art to shape a respected design career. A student of Physics at Emory University and of Electrical Engineering at University of Miami and Georgia Tech, Harlan Emil subsequently received a degree in the field of Environmental Design from Parsons School of Design, New York (1985). Mr. Gruber worked for the design firm SITE Projects of New York before launching his independent career in 1987. He has exhibited at galleries in New York, Chicago, Taos, and Santa Fe, NM. Harlan Emil was the founder of Pluto Dog, Inc. (1988-1993), which produced his sculptural furniture as well as a partner in Pluto Dog on the Earth, an avant garde boutique in the lower east side of NYC 1989-94. He designed the first three retail stores for the clothing company 555 Soul (1991-1996) and the bar Openair (2001), all in NYC.

In 1996 Harlan Emil moved part time to Taos, New Mexico, while still living part time in New York. He relocated to California in 2010, living in Oakland, Grass Valley and now Joshua Tree while keeping a place in Taos.

He has been attending the Burning Man festival in Nevada since 1999, creating large scale sculptures for it starting in 2003. He sees Burning Man as a global crossroads where the transformation of our current world paradigm is taking place, and he works to bring this transformation to as many people as possible. He has exhibited his installations at numerous events and festivals around the world.



He is now focusing on his interest in conceiving regenerative eco-villages and cities based on his lifelong studies of Buckminster Fuller, Paolo Soleri and other visionary architects and thinkers.

PORTAL

TO THE

NEW EARTH

SOUND, SACRED GEOMETRY AND GRID ENERGIES FOR PERSONAL & PLANETARY TRANSFORMATION

HARLAN EMIL GRUBER

ILLUSTRATED BY CASEY HOUSE

DEDICATION



I dedicate this book to my parents, Dr. Joseph L. Gruber & Rita Emil Gruber, for the unconditional love & support they have given me to pursue creative endeavors my entire life. This book is a result of their incredible generosity allowing me to study, create and share this work for the benefit of all.

ACKNOWLEDGEMENT

I would not have been able to write this book without the persistent coaching and collaborative writing of Jonathan Grant Phillips, of which I'm extremely appreciative. A really big thank you to Casey House for creating all the illustrations of the 3D geometries and the Portals for this book, a back and forth process that took us over a year to complete. I was fortunate to find the incredible designer Nikola Stojnic through Fiverr.com to create the elegant design of the book. Thanks to my graphic designer friend Julie Peasley for finalizing all the design details of the book and designing the dust jacket cover, and thanks to Rey Shaun Madolora for the fantastic photo of the 11:11 Diamond Portal at Burning Man 2004 used on the cover. I'm grateful for the introduction to Midas Printing by Renny Russell of Taos, NM, and thanks to Midas Printing for printing the book.

And most importantly, I'm extremely grateful for the incredibly generous support of my father Dr. Joseph L. Gruber that has made not only this book possible, but most everything I have done my entire life. I have the deepest and sincerest gratitude for his unwavering unconditional love and substantial financial patronage, even when he didn't wholly understand or agree with what I do.

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FOREWORD

"Geometry will draw the soul toward truth and create the spirit of philosophy" – Plato

Portal to the New Earth is an essential text for any readership looking for a combination of inspirational values that offer antidotes to the painful political, sociological and public health problems of the past few years; but, even more significantly, over the last few decades. This book provides both paths of redemption and spiritual, ecological, and behavioral choices that, if pursued by ever greater numbers of participants, has a chance of affecting genuine improvement of the world at large.

While the planet undergoes extreme challenges, Gruber's messages of how to apply earth-centric responsibility and spiritual connectivity to the built environment have all gained new levels of significance. It is generally agreed in scientific circles that novel new viruses, inflated political strife and diminishing resources are, in themselves, evidence of the earth's rebellion against irresponsible human behavior . . . basically, an ever-expanding form of 'nature's revenge.'

Describing aspirations for many utopian ideals and a future of ecologically responsible cities; the book's primary message offers immediately attainable goals that can be realized without excessive expenditures or destruction of the ecosystem. In this regard, the applicability of his vision is one of its most humanitarian contributions. Where you see this the most is in his Portal installations which are keys to this transformation taking place. He provides installations for people to assemble for experiential interactions and dialogues, individual interpretations of transcendence and the desire to participate with each other in a unified atmosphere.

His primary venue for these evolutionary installations is the annual 'Burning Man' festival in Black Rock City, Nevada. This recurring event is dedicated to many of Harlan Emil's essential beliefs – for example: people's self-reliance, self-expression, radical inclusion,

decommodification, civil responsibility and total participation. Still, the ritualized and ceremonial characteristics of Burning Man are confined to one week per year, whereas the Portals accommodate new activities in different locations on a continuing basis. Whether in the public art sphere, international festival circuit, or the privately commissioned domain, this flexibility is the Portals most rewarding and catalytic accomplishment.

Contrary to the divisiveness in politics of today - which are primarily characterized by confrontational agendas and an absence of civility – Harlan Emil's structures encourage new levels of harmony, experienced within the sanctuary of geometric containment. Another important aspect are the Portals association with geometry as the principal design matrix for hosting a spiritually oriented assembly of participants. This relationship goes back to ancient Greece where, in point, Plato declared "It is through geometry that one purifies the eye of the soul.' Needless-to-say, there is little observance of such Classical ideals in today's world; so his recognition of the value of human scale and intimacy found in these forms is a rare embodiment of this ancient knowledge. At the same time, within this geometric framework, Gruber also supports the idea of evolutionary change and an analytical process that can embrace human thought and natural phenomena in their various states of 'indeterminacy.'

Unfortunately, at the polar opposite of 'indeterminacy' and 'chance' as sources of inspiration, mainstream architecture today has been consumed with the design of massive, highly specific and environmentally damaging commercial structures. These examples are mostly manifested in convoluted (and often obscenely expensive) sculptural shapes, rather than serving as biomimetic and ecologically integrated means of enclosure. Too many recent buildings celebrate the client's wealth, architect's ego and stylistic conceits, as opposed to reflecting the need for sustainability and enrichment of the individuals personal cultural experience.

In addition to meeting the world's need for philosophical, integrative and practical agendas for healing our relationship with the environment, this book provides a rich educational background on

the underlying principles of how the universe manifests through sound and geometry and the application of these principles in conceiving future environments. His references include a wide range of concepts that provide important precedents for his visions and concepts of a spiritually-driven imperative to transform the Earth. Included are examples of ancient megalithic structures found all over the world that brings to light humanity's past interaction and connection with the metaphysical aspects of the earth. He credits 20th century designers Buckminster Fuller and Paolo Soleri for their integrative designs and use of construction technologies in accord with ecological principles. He additionally offers cautionary warnings on the dangers of an over-dependence on digital technology as the exclusive tool for design development. He observes that the results can dangerously reduce all of the personalized and idiosyncratic characteristics that bring sustainable human merits to architecture. Gruber wisely advocates a fusion of digital technology, environmental sensitivity and hands-on building processes as the essential ingredients to create the New Earth where all of life thrives.

In view of Harlan Emil Gruber's primary message, it seems appropriate to conclude this foreword with two perceptive quotes:

"The greatest danger to our future is apathy" – Jane Goodall

"Never doubt that a small group of thoughtful, committed citizens can change the world: indeed, it is the only thing that ever has." – Margaret Mead

– James Wines, June 21, 2021

Chair of the Environmental Design Department at Parsons School of Design (1984-1990), professor of architecture at Penn State University (1999-present), author of Green Architecture and De-Architecture, and founder and president of the New York City architectural and environmental design firm SITE.



Fig. 1 - 1:11 Sapphire Portal at dusk - Burning Man - 2007

PREFACE

MONDAY
NIGHT
August 27, 2007
AT BURNING MAN

Around a hundred people have found their way out to the very edge of the Playa, well over a mile away from the Man, to the 1:11 Sapphire Portal to experience the total lunar eclipse taking place that night. My campmates and I had just finished building it a few hours earlier, completing the very last touch of attaching blue LED lights around the top of the wall at sunset. They were not much brighter than the stars in the sky, creating a serene and dimly lit space to experience this celestial event.

This was my ninth year attending the Burning Man festival, as I started going in 1999 and attended every year since then. In 2004, after five years of experiencing all the fantastic interactive large art installations there, I was inspired to start building structures of my own. I started with the 11:11 Diamond Portal, a 16 foot high plywood structure that accommodated people within it and was vibrating with low frequency feedback. My next project was the 12:12 Emerald Portals in 2006; one built of plywood and one of steel tubing. For Burning Man 2007 I created the third and by far the most ambitious of these Portal art installations, the 1:11 Sapphire Portal. It was a 60 foot diameter, 10 foot high sky blue walled and carpeted space that could accommodate hundreds of people inside. At the center of the space were three nested geometries based on the evolution of the Earth's geometric form. The Quasar Wave Transducer low frequency feedback device that had been concealed inside of the previous Portals was also filling this space with its subtly changing purring bass vibrations. I was inspired to build and share these Portal installations to provide

an environment that awakens the consciousness of participants to live in sacred harmony with the Earth by aligning their multi-dimensional energy body to the Earth's evolving energy body.

By 2007 Burning Man had grown to a city of nearly 50,000 people and was attracting a diverse population from around the world. As people gathered in the 1:11 Sapphire Portal that Monday night, watching the moon cast its shadow upon us, I had an epiphany: I came to understand that this Portal not only allowed the higher dimensional consciousness of the Earth's evolving energy body to be downloaded through interacting with the geometries, but also provided a conduit for people already holding this evolved consciousness within them to upload it into the Earth's geometric grid. I saw that it was a two-way interface for interacting with the evolving consciousness of the planet.

As dawn approached on the Playa the following morning, a 30 foot section of the sky blue wall was opened to allow the few hardy souls that were still there to see the glowing orb of the sun crest the horizon. It shone directly into the Sapphire Portal's central geometries, illuminating them with its deep orange hues. As it rose higher into the sky, the wall section was closed again, creating the contained space for this activation of a new sacred understanding of our place on planet Earth. And even though the 1:11 Sapphire Portal was located on the very edge of Black Rock City, where only the intrepid few people might wander out to experience it, the subtle effects of what transpired there has rippled out to affect the whole world and are still reverberating.



FIG. 2 - SUNRISE IN THE 1:11 SAPPHIRE PORTAL - BURNING MAN - 2007

INTRODUCTION

This book encompasses my lifelong interests and studies of the underlying design principles of the universe, culminating with visions of conceiving sacred and beautiful environments for all humanity to live abundantly in accord with nature. Although the majority of the information in the book is scientifically based, I have also included a number of metaphysical concepts for their spiritual value, as these help to complete a bigger picture. My intention is to inspire the reader to actively participate in the momentous evolution of humanity that is currently underway.

Part 1 starts off with the subject of sound as the essence of all creation. We explore everything from the role of sound in creating the entire universe, to its effect on matter and human consciousness. Next we provide a thorough explanation of three-dimensional geometry, starting with the most important aspect of form: the Golden Ratio. The Platonic solids and intermediary shapes, including the 64-tetrahedron grid "Structure of the Vacuum", are shown to be the underlying organizing principle of all matter and energy in the universe. This leads to an overview of ancient megalithic sites around the world and how our ancestors may have built these utilizing the knowledge of the Earth's geometric energy grid. The geometry of this energy grid has only recently been rediscovered in western culture and some researchers say that it is evolving to a new form at this time. This evolution of the geometry of the Earth's energy body corresponds to, holds, allows or even creates the new consciousness that is awakening in humanity.

With the information from these three chapters I show how and why I have created the Portal installations for Burning Man since 2004. The Portals integrate sound, color, and the geometric relationship of the Earth's and humans' energy bodies to create an interactive environment intended to facilitate an evolution of consciousness.

Part 2 expands upon "Future Environments," my 1985 undergraduate thesis on architectural visions that embody this evolved

consciousness. It begins with one of my life's biggest influences, the geodesic dome inventor and comprehensive design scientist R. Buckminster Fuller. It then covers the work of Paolo Soleri, notably his 1969 book *Arcology: City in the Image of Man,* which inspired me in 1981 to pursue conceiving ways to design and build cities in harmony with nature. Soleri coined the term "Arcology", by combining architecture with ecology, to describe his designs of huge three-dimensional ecologically integrated cities that are akin to a living organism. With Fuller's and Soleri's influences as inspiration, I enrolled in Parsons School of Design's Environmental Design program to further these studies. I dove deep into this with an independent senior thesis where I discovered many other designers with similar visions. Most notable was the German Expressionist Bruno Taut, who created in 1919 an illustrated monograph titled *Alpine Architecture* depicting humanity building beautiful crystalline cities integrated into nature for the benefit of all life. I present an overview of his work and a number of other visionary architects' ecologically integrated design projects of the last century. I incorporate these concepts, synthesized with my studies of ancient monuments and sacred geometry, into a design for an Arcology called the Twelve Spiral City.

I am now combining all of my research and understandings of natural design processes in a technique that I call "TerrAquaforming": integrating land and water into human-built environments in a regenerative and life-enhancing way. This technique is still in its very beginning stages of development and is based on the ground breaking work of Viktor Schauberger's studies of water flow from the mid 20th century. I invite anyone interested and inspired by this book to collaborate on further development and implementation of this method. TerrAquaforming integrates all knowledge from the scientific to the spiritual nature of reality to create a world of divine harmony and sacred beauty to benefit not only humanity, but all life on the planet.

PART 1

SACRED GEOMETRY AND THE NATURE OF REALITY

CHAPTER 1

SOUND:
THE CORNERSTONE OF CREATION

THE VIBRATIONAL ORDER OF CREATION

According to modern science, 13.8 billion years ago, the universe sprang into being with the Big Bang, an enormous and instantaneous explosion of energy that would bring forth all matter into existence. This ultimate sound of Creation is referenced in the *Bible* at the opening of John 1:1: "In the Beginning was the Word, and the Word was with God and the Word was God... Through Him all things were made."[1] The Word, translated from the Greek term *Logos* signifies "speech, a principle of divine thought or creative order," where vibration becomes the organizing pattern of the entire cosmos. From the scientific to the spiritual, sound is regarded as the primary source of all that is.

The ancient Hindu texts of the Vedas and Upanishads revere the sound "Aum" (Om) as the original source through which the unmanifested state of the Almighty Brahman transformed into the countless variations of the material world we see today. As one of the most sacred symbols in Hinduism, Aum represents the initial sound of the universe, the essence of ultimate reality, and consciousness itself. For the Sikh religion, nothing but "utter darkness" existed until God created everything with one single sound, a sound from which millions of rivers flowed, and all the lands of the world appeared. The Australian Aborigine's "Song Lines" also tells of creator beings using sounds in the primordial Dreamtime to create the reality around us.

Around the world, we find diverse traditions and mystical cultures describing sound as the preeminent force that manifests the universe. That's because the vibrational energy of sound has a surprising and unique power to structure matter into coherent patterns. The first sense to develop in human embryos is hearing, and while we generally take being able to hear sound for granted, it's through speech, singing, music, and other audio vibrations that we come to know a large part of our world. In fact, it's through spoken languages that we communicate most of our ideas, knowledge, emotions, stories, and basic needs, but throughout our daily activities, this fundamental significance of sound goes largely unnoticed.

WHAT SOUND IS

Sound is produced when an object vibrates, creating pressure waves that travel through a medium, such as air, water, wood, or metal. Solids have the most tightly packed molecules of these mediums, then liquids, followed by gases. Sound transmits much quicker in a solid than in a gas. It travels about thirteen times faster in wood than air, and four times faster (and farther) in water than in air, which explains how whales can communicate with each other over vast distances in the oceans. Even in what is considered the vacuum of outer space, we still find rarified particles that vibrate with sound. The Voyager spacecraft relayed interplanetary sounds it detected while moving through the solar system back to Earth.

Of course, not all creatures hear the world around them the same as we do. Humans have a hearing range of between 20 hz to 20,000 hz, though we hear sounds best from 1,000hz to 5,000 hz, where human speech is centered. While this range can be impressive, we pale in comparison to many of the great listeners on our planet. With the unique design of their ears and ear canals, elephants hear infrasound waves as low as 14 hz. These great beasts are sensitive enough to hear the call of another elephant nearly six miles away, or the subtle gathering of rain clouds so they know where to head for potential water sources.

On the other end of the spectrum, cats' ears are designed to funnel in high-frequency ultrasound waves ranging up to 64,000 hz, and bats can pick up frequencies soaring as high as 200,000 hz. Much like bats, dolphins utilize a high-frequency echolocation system to sonically navigate and hunt their next meal. They direct sonic pulses from their forehead towards their target — a nearby shark, ship, or shoal of fish. When these ultrasound frequencies reflect back to them, the dolphin's jaw receives the sound vibrations, delivering this information to the brain.

Every day across our planet, sound vibrates our world into being and is fundamental to all life. Choruses of birds serenade each

dawn, bees buzz at just the right frequency to release pollen from flowering plants, corn seedling's roots purr at a consistent 220 hertz, and millions of male crickets rub their forewings calling in the night for new mates. Evidence shows even the flowers and trees sing with dynamic vibrating energy. Nature thrives on a symphony of sound, which the flora and fauna on our planet bring forth to balance, stabilize, and sustain our diverse ecosystems and the fabric of our living reality. It happens on the savannas of Africa, in the lush and dense Amazon, across the American prairie, and even the snowy peaks of the Himalayas. Whether we notice it or not, the creative power of sound is constantly, consistently, vibrating our world into divine harmony.

It's even thought that whales help hold life on Earth in balance by singing their songs and swimming along certain pathways in the ocean, as elucidated by Familial Integrity author and mystic Beverly Bright Star: "As the whales started to seed our oceans, singing and sounding their songs, it helped our oceans to stabilize and balance the life force, and it helped create a better, more life-sustaining ocean environment for all life in the oceans of Earth at that time."[2]

CYMATICS: SOUND AND FORM

Renaissance minds like Galileo Galilei and Leonardo Da Vinci had a strong interest in understanding the effects of sound resonance, but this study didn't come to full fruition until the late 18th century with the experiments of German physicist and musician Ernst Chladni. In his groundbreaking book, "Discoveries on the Theory of Sound" (1787), Chladni described how he would draw a musical bow over metal plates covered in sand or a fine powder. The plate was vibrated until it reached certain resonances, where the sound vibrations caused the sand/powder to transform into harmonious two-dimensional geometrical patterns, known as "Chladni Figures." Chladni had once and for all shown that sound had the power to shape and transform physical matter, birthing an entirely new field of acoustic scientific study.

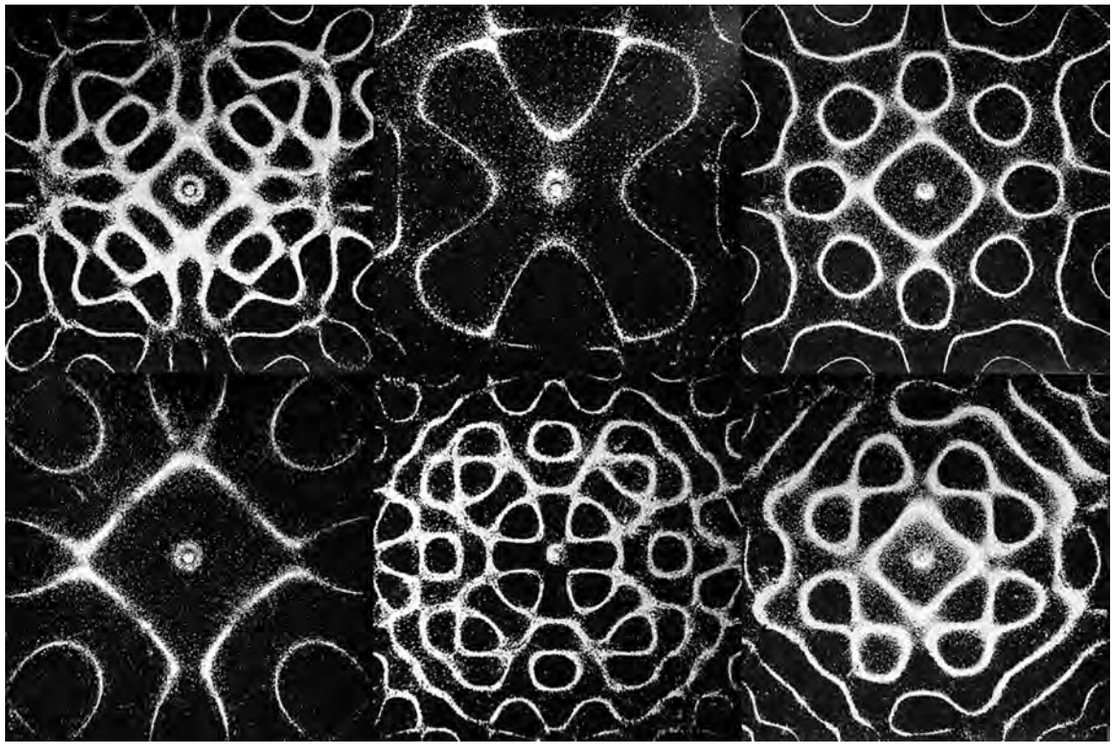


FIG. 1 - CHLADNI PLATE PATTERNS

In the 1960's, Swiss medical doctor Hans Jenny coined the term Cymatics. In his spare time, Jenny investigated the power of vibrations to organize matter. Using sophisticated modern equipment, he measured and photographed the geometrical order of sound vibrations on diverse mediums, such as metal plates, fluids, powders, and liquid paste. He discovered that if he increased the frequency, the level of geometric complexity would also increase. As a vibration rose, there would be a moment of chaos and disharmony while the patterns realigned, reaching a new level of resonance which resulted in even more complicated, mandala-like geometric patterning.

Today's Cymatic scientists, like the UK's Evan Grant, feed metal sheets connected to sound drivers with vibrations from an advanced frequency generator. Through this work, Grant claims that "Cymatics is an almost magical tool. It's like a looking glass into a hidden world. From the numerous ways that we can apply Cymatics, we can actually start to unveil the substance of things not seen."

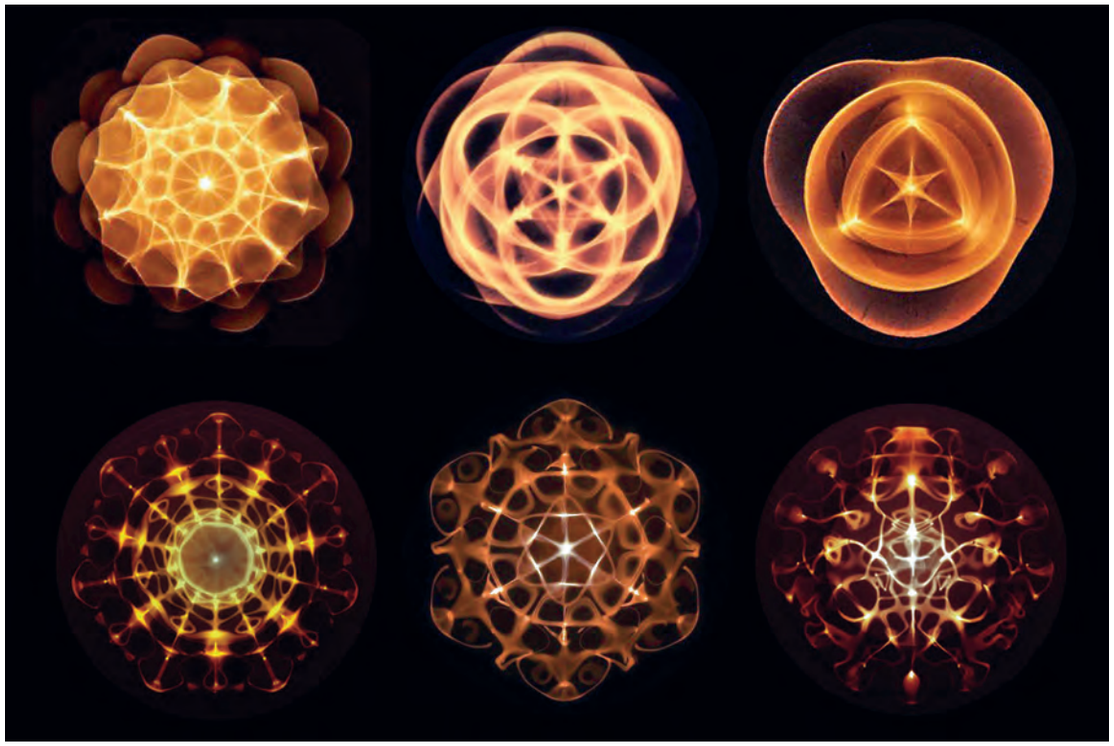


FIG. 2 - HANS JENNY CYMATIC PATTERNS

He cites how oceanographers are currently using Cymatics to decipher the complex and elegant three-dimensional holographic patterns created by dolphins' sonar beams. According to Grant, Cymatics reveal the underlying archetypal patterns of nature, such as the sacred geometry of a starfish or the intricate beauty of a snowflake; and it holds an untapped potential to heal and transform human evolution through the incredible creative power of sound.

"Sound has form and we've seen that it can affect matter and cause form within matter. If we take a leap and think about the universe forming and the immense sound of the universe forming...If we ponder on that, then perhaps Cymatics had an influence on the formation of the universe itself," says Grant.[3]

The brilliant Romanian artist and scientist Gabriel Keleman takes this one step further, with what he calls the "Universal Sphere-Vortex Principium." In the following excerpt, the Nasui Collection and Gallery of Bucharest describes his life's work:

"For over 30 years Kelemen has studied the phenomenon of how stationary waves arise in liquids as they are stimulated by audible sound frequencies. Gabriel's experiments are performed with the rigor and discipline of a physicist, while his artistic sensitivity brings a playfulness and an inventiveness that often yield surprising results— for instance, his startling 3-dimensional Cymatic "sculptures" that mimic complex natural structures, such as flowers, biological organisms, and even the human face."

"The influence of acoustic waves fields on liquids reveals striking morpho-dynamic conformations as a response of the fluid permeated by sound waves that induce and maintain standing waves, invisibly shaping the carefully selected liquid corpus. "The metamorphoses of the liquid matter traversed by vibrant energy reveals as dynamic patterns symmetries generated by interferential overlaps of loops and nodes of standing waves periodically stabilized in the fluid mass. Thus, visualized sound results from the confluence of sound-recipient-fluid interactions. The dynamics of standing waves occurred in the undulatory pulses of liquid circular surfaces establishes unifying

bridges equivalent to the laws of musical harmony with polyhedral geometry."[4]

His numerous artistic renderings show explicitly the 3-dimensional details of his "Universal Sphere-Vortex Principium"

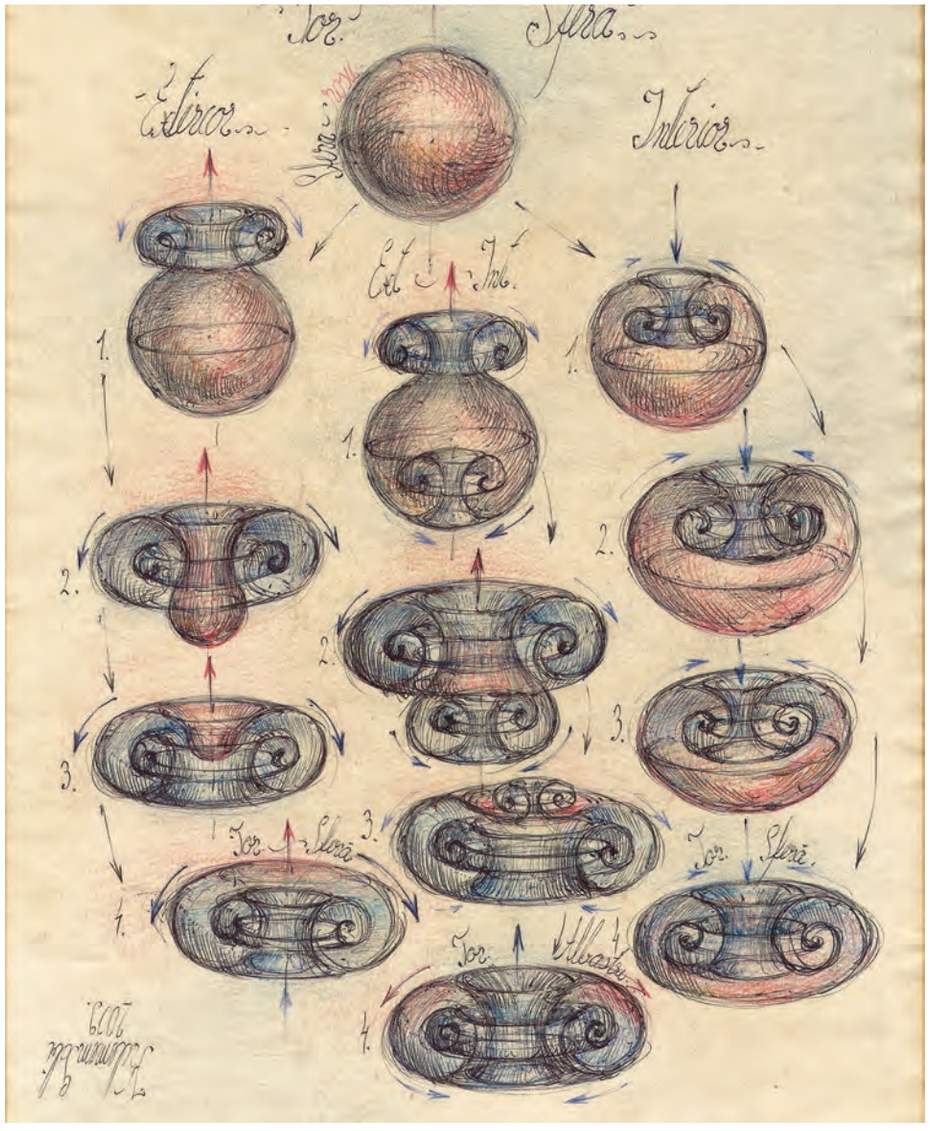


FIG. 3 - UNIVERSAL SPHERE-VORTEX PRINCIPIUM - GABRIEL KELEMAN

New York artist Mikey Bergman creates 3-dimensional shapes based on the phi spiral to be used in structures called “Phiral Sound Temples.” Although they are very similar in appearance, Bergman developed these without knowledge of Keleman’s work, indicating that these forms have an intrinsically natural origin. The intention of these Phiral Sound Temples is to use vocal toning and shamanic instruments to explore sound resonance where all the sound waves reverberate in a golden ratio proportioned environment. It is his hope that these modern day temples will bring us back a lost knowledge of sound which the ancients knew about and to provide sacred spaces where sound can be used to heal and rejuvenate one’s being. In his own words: “Making the designs all curves also allows for the spherical nature of sound to flow more freely without getting trapped in any dead corners. All of my focus is now being dedicated towards bringing forth my dream of Phiral Sound Temples into manifestation.”[5]

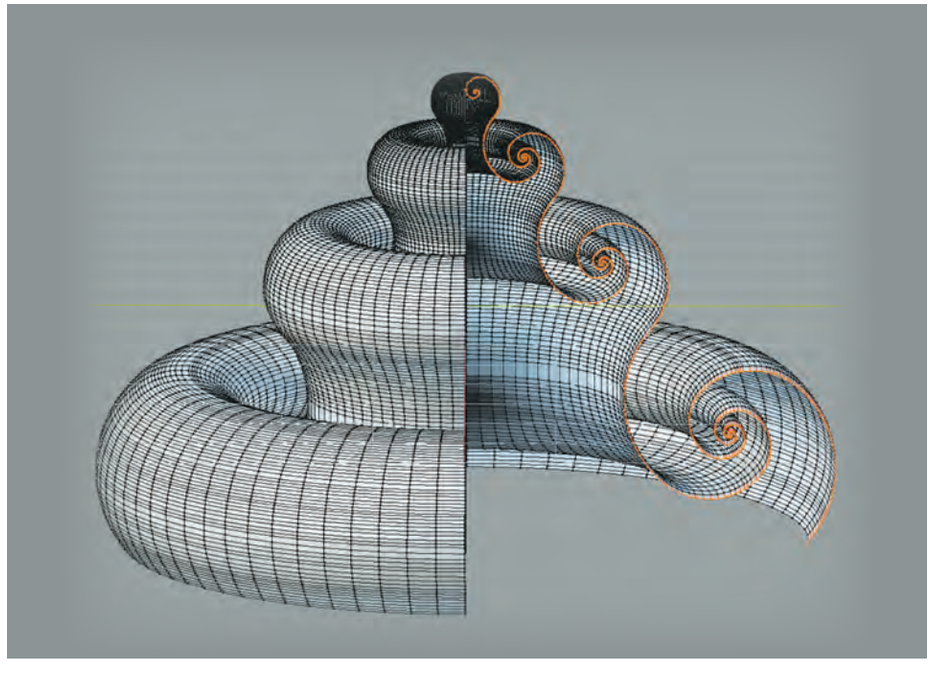


FIG. 4 - PHIRAL SOUND TEMPLE - MICKEY BERGMAN

SPIRITUAL AND RELIGIOUS USE OF SOUND

Sound has played a key role in all spiritual and religious practices since the dawn of human civilization. Primitive and ancient cultures from every corner of the planet have used drums and rattles in their ceremonies, along with voice, as the key elements of shamanic rituals. Ancient Hindu teachings from India employ Sanskrit mantras – sacred utterances and numinous sound syllables – thought to convey the power to protect, transform, and enlighten seekers by vibrating the body and mind through repetition. Buddhist monks chant an extensive litany of sutras and mantras to alter human consciousness. According to Rigzin Tromge, Vajrayana Buddhist, musician, and creator of *The Sacred Trilogy* album series, “Mantra is an ancient spiritual technology. Awakened mind-manifesting directly through sound vibration. When we hear or recite a mantra, it resonates with that essence within ourselves, our inherent awakened true nature, bringing that to the forefront of our consciousness.”[6]

Prayers and hymns are cornerstones in Judaic, Christian and Islamic worship. From the Christian practice of Gregorian chants, Jewish Cantors singing Hebrew hymns, to the Muslim’s daily calls to prayer, sound is a vital aspect of their religious services. Native American cultures all utilize song, chanting, and prayer for healing and religious ceremonies. In recently popularized South American ayahuasca ceremonies, shamans and curanderos chant sacred songs called *icaros* for healing, guidance, and visionary insight. The Shipibo people of the Amazon depict the colorful and elaborate geometric patterns of *icaros* in their world-famous tapestry designs, mimicking a similar divinity, complexity, and harmony we witness in the Cymatic sciences.

LIGHT AND STAR LANGUAGES

A fascinating trend in the evolution of vocalization has been the recent development of star or light languages, also known as glossolalia, "galactic tongues" or in traditional religious circles, "speaking in tongues". People are able to create complex and unusual sounds automatically by tapping into cosmic energies and allowing these sounds to come through them. Thought to be channeled from galactic beings, "star civilizations," or simply one's own multidimensional higher self, these sound utterances can transmit healing energies and expand human consciousness, catalyzing personal transformation for our awakening world. The sounds that are utilized cover the entire spectrum of vocalizations humans are capable of, and even though the languages are completely indecipherable, they seem to have positive effects on a deeper intuitive level by many of the people that hear them.

As scientist, inventor, and self-proclaimed "starseed" Zacariah Heim explains: "Light language is a mechanism to move inter-dimensional and emotional energies through the *nadi* or *chi* energy system. All beings have a "morphogenic field" and these electromagnetic, electrostatic flows of energy throughout our multiple energy bodies can be guided and shared with others through intent. The pronunciation of the phonetics allows our brains to make an association with the energy that we are experiencing. A way to "tune in" to the energies that are wishing to express, light languages enable people to release trapped and stuck emotions and they are a key to allowing humanity to be more in touch with the nuances of prana and emotional energies."[7]

ACOUSTIC LEVITATION

Ancient legends across the planet share fantastical tales of levitating objects with sound. Levitation techniques, such as singing, chanting, and musical instrumentation, have been attributed to the building of a number of monuments, even entire cities. "There are many examples. A Mayan legend – about the pyramid of Uxmal in Yucatán – claims that builders whistled special tones and heavy blocks moved into place. Chaldean priests lifted great stones at Baalbeck with melodious chants. At Tiahuanaco in Bolivia, stories describe ancient builders using trumpets as key building tools. Legends portray the walls of Thebes being built by Amphion's lyre. Other stories depict Stonehenge builders using drums, songs, and symbols for construction means. Translations of Babylonian tablets reveal records of the widespread use of sound to lift heavy objects."[8]

In the modern era, travelers to the East claim to have seen Indian gurus levitating themselves through meditative states achieved by chanting, as well as Tibetan monks moving large boulders with singing, drums, and horns. "We know from the priests of the Far East that they lifted heavy boulders on high mountains with the help of various groups of sound... the knowledge of the various vibrations in the audio range demonstrates to physicists that a vibrating and condensed sound field can nullify the power of gravitation."[9] There is the story of a Swiss scientist Dr. Jarl that was studying at Oxford University and made a trip to Tibet in 1939 under the auspices of the English Scientific Society. He witnessed and even filmed large stones being levitated 250 meters up a cliff by a group of monks playing instruments and drums. The large stones were place in a concave stone set on the valley floor and the instruments were arranged in a semi-circle at a precise distance from the stone to be levitated. All the monks played in unison for several minutes before the stones started to levitate and then travel all the way up the cliff to where the monks were constructing a rock wall at the entrance of a cave. He witnessed this repeatedly with up to five stones being levitated in an hour. The films Dr. Jarl made of this event were confiscated and classified by

the English Scientific Society, so only his anecdote of his experience remains of this event.

Science is now proving that sound has the capacity to levitate small objects. Acoustic levitation takes advantage of the properties of sound to cause solids, liquids, and heavy gasses to float. But rather than a chanting priest or initiated musician, all physicists require are a transducer and a receiver. Mechanical engineer Dimos Poulikakos of the Swiss Federal Institute of Technology has recently built acoustic transducers from piezoelectric crystals. The transducer platforms produce sound waves that move upward until they reach a reflective surface above, which bounces the vibrations back again. When the downward-moving reflected waves meet the upward-moving source wave, both frequencies cancel out in the middle, at what are called "node points." Objects placed at these nodes hover in the air because of the pressure waves coming from both directions. By adjusting the position of the nodes, Poulikakos' team is able to tow the objects between platforms; thus, not only levitating the object but also moving its location. So far this research has been limited to small items like coffee granules, water droplets, fragments of polystyrene and toothpicks, but with advances in technology, acoustic levitators may one day move large objects, perhaps even assist in the building of monuments and cities, like the ancient megalithic structures our ancestors have mysteriously created.

MUSIC OF THE UNIVERSE

Our whole cosmos works in musical harmony, an enormous symphony of oscillating energy – from spiraling galaxies and spinning planets to vibrating subatomic particles – forming the entire physical universe. Ancient Greek philosophers understood the important dynamic that sound holds for maintaining universal order. Pythagoras used sound and music extensively in his philosophical teachings, developing his table of whole number ratios for musical harmony, which he translated to the order seen in all forms of creation:

"According to the Pythagoreans, what provided order in the realm of nature was not just any mathematical pattern but patterns based on harmony or, more precisely, on musical harmony. The Pythagorean table, rediscovered by Albert von Thimus in the nineteenth century, relates the ratio of small whole numbers to musical tones, and the Pythagoreans claimed that various natural beings from minerals to animals to the stars were constructed and moved to order that was, musically speaking, harmonious. This was also true of sacred works of art and architecture that emulated the cosmic order. It is this truth that those who have spoken over the ages of the music of the spheres had in mind as did Goethe when he referred to traditional architecture as frozen music."[10]

The Pythagorean system of creating scales using whole number ratios for each interval is called Just intonation, with each note of the scale in perfect musical harmony. But Just intonation only works in one key and if its notes are used to play in a different key, they will be out-of-tune, creating "wolf" tones that are noticeably disharmonious. Equal temperament was developed both in China and Europe in the late 16th century to avoid this problem. It divides an octave into twelve equal semitones instead of relying on the whole number ratios of Just intonation, resulting in all notes being mostly in-tune for every key. Equal temperament is the method that all modern instruments are tuned to today. Although this compromises the perfect harmony of an ideal musical scale, it has the advantage of making notes that would otherwise be noticeably out-of-tune sound pleasing to the ear.

432 HZ VS 440 HZ

Music is a global phenomenon that touches nearly everyone on the planet – from Beethoven to the Beatles, folk to jazz, Indian ragas to Mongolian throat chanting. The reason music is so universal is because it resonates with our emotions. Its visceral energy shapes our moods, our memories, even entire epochs of our history. Music provides the soundtrack of our daily lives and is a significant part of all cultures throughout the history of the entire world.

When it comes to the frontlines of harmony in music today, perhaps nothing is as controversial and hotly debated as to whether instruments should be tuned to A 432 Hz or A 440 Hz. Up until the mid-20th century tuning varied greatly across Europe, with the A note ranging from as low as 400 Hz to over 470 Hz, causing confusion and musical discordance across the orchestras of the Western world. The standardized "concert pitch" of 440 Hz was set by an international conference in London in 1939 and adopted by the International Organization for Standardization (ISO) in 1955. Many of today's sound healers, musicians, and electronic DJs argue that using A 440 Hz results in music that is not harmonious with the natural order of the universe.

Instead, they believe that using A 432 Hz results in music being in balance with natural order and number ratios that align in mathematical harmony. It is true that the harmonics created by A 432 Hz are numerically elegant, and there are some examples showing the Cymatics of 432 Hz to produce more orderly patterns than 440 Hz, but the evidence is inconclusive that there is any significant difference between the tunings. There exists a metaphysical understanding that thoughts and intentions can influence reality; therefore, perhaps it's the intentions of the musicians that use 432 Hz that creates a beneficial effect?

The polymath Robert Edward Grant has done extensive explorations of mathematics and numbers. This excerpt from his paper

"Unified Mathematics of Geometry and Music" shows an intricate relationship of why 432 hz is of such importance:

"Hertz is the standard measurement of frequency in sound, calculated by the number of times a sound's waveform or vibration pattern repeats in a single second. Although the modern tuning standard for the note A is 440hz, 'true' Pythagorean tuning originally set the note A to 432hz. To see the direct connections between geometry and sound, Pythagoras' original chromatic tuning scale must be used."

"Notes will repeat with a uniform ratio called 'octaves,' calculated by doubling or halving any hertz value. There are a total of 12 notes, so the 13th note in a scale will be a repeat or up-octave of the first. For example, A4 = 216hz, A5= 432hz, and A6 = 864hz, where each number following the letter denotes the octave range the frequency belongs to. The note C4 is commonly referred to as 'middle C' due to the range best fitted for human hearing. Pythagoras first discovered this pattern by noticing that plucking a string sustained a vibration or note and that plucking a string half as long sustains the same note at a higher pitch. He used the same division to identify the frequencies of all other notes on the scale. Today, these ratios have been further honed and 'equally tempered' to a greater degree of accuracy, meaning the frequencies shown are more symbolic references to the notes themselves."

"The following table will show the harmonic relationships between notes in the chromatic scale, their degree references, and their resulting polygonal geometries. For example, a B5 note following an A5 is 1.0833 x 432hz = 468hz, which lands at 300° (0.8333 of 360°) on a circle. The arc length is calculated by measuring the distance around the circle from the starting point (note A5 – B5 or 360°-300°)... The pattern continues through the audible spectrum of sound and is calculated for one full octave scale in the table below."[11]

Arc Length	Degrees	Decimal (÷360)	NOTE	Length (unit)	Decimal (÷432)	Sum of Angles	HERTZ	GEOMETRY
0°	360°	1.00	A_5	12	1.00	0°	432hz	
30°	330°	.9166	$A\#_5$	11/12	1.0416	30°	450hz	2
60°	300°	.8333	B_5	10/12	1.0833	180°	468hz	3
90°	270°	.7500	C_5	9/12	1.1666	360°	504hz	4
			GAP I			GAP: 540°		
60°	240°	.6666	$C\#_5$	8/12	1.2500	720°	540hz	6
45°	225°	.5833	D_5	7/12	1.3333	1080°	576hz	8
30°	210°	.5620	$D\#_5$	6.75/12	1.4166	1800°	612hz	12
15°	195°	.5406	E_5	6.48/12	1.5000	3960°	648hz	24
7.5°	187.5°	.5208	F_5	6.24/12	1.5833	8280°	684 hz	48
6.32°	186.32°	.5175	$F\#_5$	6.18/12	1.6666	9900°	720hz	57
4.76°	184.76°	.5104	G_5	6.124/12	1.7500	13140°	756hz	75-sides
2.4°	182.4°	.5052	$G\#_5$	6.0624/12	1.8333	26640°	792hz	150-sides
1.2°	181.2°	.5033	GAP II	6.0399/12	1.9166	53640°	828 hz	300-sides
NEXT OCTAVE	180°	.50	A_6	6/12	2.00	0	864hz	1

FIG. 5 - 432 HZ HARMONIC RELATIONSHIP

This discussion wouldn't be complete without mentioning that other tunings are also employed, such as A 417 Hz (from the Solfeggio Frequencies that many healing tuning forks are based on), and A 444 Hz, which some musicians and orchestras use. The debate is still open to conjecture, and the best answer may be to follow what intuitively resonates the most with you.

SOUND HEALING

Sound healing directly uses vibration for the purpose of transforming ourselves mentally, physically, and spiritually. Since all of consciousness consists of vibration, our molecules, bodily systems, and energy can go from a state of disharmony and "dis-ease" to wellness and balance through a process of *entrainment*. Entrainment occurs when closely related rhythmic cycles synchronize with each other, resulting in a conservation of energy. This was first discovered by Dutch scientist Christian Huygens in 1665. Huygens would set up a room full of pendulums and start each one at a different time. When he came back a day later, he discovered that every pendulum in the room had synchronized together in harmony. Entrainment also occurs with mechanical clocks in close proximity, even women and their moon cycles. It explains how our body's complex systems and circadian rhythms come into multi-layered harmony. When these systems fall out of balance, that's when we experience disease.

If we are out-of-tune in our bodily systems (from our nervous, circulatory, to energetic), our innate health and harmony suffer. Through sound healing, we can entrain out-of-balance chakras, organs, and brain frequencies into a symphony of vibrational wellness. Jonathan Goldman, author of *Healing Sounds: The Power of Harmonics* and one of the forerunners in this field, explains: "When an organ or another part of the body is in a state of health, it will be creating a natural resonant frequency that is harmonious with the rest of the body. However, when disease sets in, a different sound pattern is established in that part of the body which is not vibrating in harmony. Therefore, it is possible through the use of externally created sound that is projected into the diseased area, to reintroduce the correct harmonic pattern into that part of the body which is afflicted and effect a curative reaction. Through the principle of resonance, sound can be used to change disharmonious frequencies of the body back to their normal, healthful vibrations."[12]

Another trailblazer in the sound healing field is Tom Kenyon. He originally came from a purely scientific background, creating Acoustic Brain Research to produce sound healing recordings based on scientific studies into how the mind operates. He then went on to experience a mystical transformation, leading him to devote his life to creating healing sounds through his voice. His work incorporates diverse elements taken from such cultures as Tibetan Buddhism and ancient Egypt to whale sounds and channeling higher dimensional beings.

There is a documentary on Tom Kenyon titled “Song of the New Earth” released in 2014. It covers his entire life starting with enigmatic stories in his childhood, a profound life changing experience as a young adult where he had a spontaneous samadhi experience, to the development of his company Acoustic Brain Research in 1983 compiling scientific studies on the effect of sound on the brain. It culminates with his channeling of the Hathors, a higher dimensional race that is assisting humanity in the evolution of consciousness that he explained in detail in his 1996 book “The Hathor Material: Messages From an Ascended Civilization”. I have shown this film at the sound healing event I hosted in Joshua Tree 2014 to 2019 called “Portal to the New Earth”. His website tomkenyon.com has an archive section on his Hathor channelings which have greatly influenced my work. He both channels messages with specific instructions as well as using his voice to sing ethereal channeled tones to be used in meditations. I conducted one of these Hathor meditations titled “The Bridge Between Worlds” at Burning Man 2015 at the 11:55 Reformation Portal in conjunction with a globally synchronized event he organized. It was one of the most powerful and significant sound healings I have facilitated. Summing up the transformative force of sound healing, Kenyon claims, “I’ve seen miracles happen with sound.”[13]

BINAURAL BEATS

Over the past few decades, sound healing has kept pace with the advances in modern technology. A global movement of “consciousness hacking” is emerging to the forefront of the sound healing sciences. This includes inventions from Bioharmonic Technologies, developed by regenerative medicine doctor Steven Schwartz, to heal chronic illness and enhance wellness through the use of sound, light frequency, and vibration. Eileen Day McKusick is revolutionizing the field with the scientific application of tuning forks to harmonize the complex energy field surrounding the human body in a technique she has created called Biofield Tuning.

Binaural beats is one of the most popular of these technologies, applying rhythmic soundwave therapy directly to the human brain. The process involves sending different frequencies to the left and right ears through headphones. Upon hearing the two different frequencies, the brain responds by interpreting them as a consistent, rhythmic beating. For example, if frequencies of 190 Hz and 200 Hz are used, the binaural beat heard will be the difference between the two tones – 10 Hz. Researchers have discovered that binaural beats in theta patterns (between 4 Hz and 8 Hz) deepen meditation and enhance creativity, while beta patterns (12 Hz to 30 Hz) promote concentration and alertness. The Monroe Institute has done extensive research and development into binaural beats over the years. The findings show this technology to positively affect the vigilance, performance, and mood of test subjects, as well as reduce cardiovascular stress in military service members suffering from post-deployment stress.[14]

THE QUASAR WAVE TRANSDUCER

My interest in the creative power of sound came about through playing the electric bass guitar. Growing up on Long Island, NY in the ‘60’s and ‘70’s listening to rock music, I started playing the bass at the age of thirteen, learning songs by Jimi Hendrix, The Rolling Stones, Led Zeppelin, etc. In 1976 I furthered my interest in sound by studying physics at Emory University with an emphasis on acoustics. I continued this education with electrical engineering at Georgia Tech and the University of Miami before dropping out to form a New Wave rock band with my high school friends back on Long Island in 1980.

We had a rehearsal space, but I kept a small practice amplifier at home, where late one night I experimented with getting my bass to feedback at the lowest notes it could possibly make. I leaned the bass against the speaker cabinet and tuned the two lowest strings lower and lower until they were almost completely slack. This created random and chaotic rumbling sounds that would build up and die down in a pattern somewhat like ocean waves. At times it even sounded like it was talking! The strings are tuned to subsonic notes as low as 4 Hz and not higher than around 15 Hz (I’ve never measured the exact frequencies). These *fundamental notes* are inaudible (and the amp and speaker are unable to even reproduce them) but they produce extraordinary audible harmonics that can be heard and felt. They vibrate within the spectrum of human brain waves, and in the range of the 7.83 Hz Schumann frequency, which is the Earth’s global electromagnetic resonance.

I came to call this device the Quasar Wave Transducer (QWT), based on the conceptual idea that it tunes into the subtle emanations of Quasars (the most distant and powerful astronomical objects in the sky). I featured it as a sound installation in a number of underground venues in the East Village of NYC in the early 1980’s. In 1996, I debuted an all-in-one version with three 15” speakers and three strings, one down each edge with its own built-in amplifier at a New York electronic music and art event called Substation.



FIG. 6 - QUASAR WAVE TRANSDUCER

The Quasar Wave Transducer came into its full significance when I built my first large-scale sacred geometric portal structure for Burning Man in 2004. I created a 16-foot tall interactive art installation called the “11:11 Diamond Portal” (it was placed at 11:11 on Burning Man’s clock layout) with geometry based on the golden ratio. It featured a large horizontal cylindrical space that could comfortably fit seven people climbing up inside it. I concealed the Quasar Wave Transducer inside this structure. Using the original 15” speaker cabinet, I mounted two bass guitar strings directly onto it with a bass pickup that fed into a 12v car audio amplifier. Since it was powered by deep cycle 12v batteries recharged by a solar panel on top and had to play for the entire week of the festival, I put it on a timer to turn it off for eleven minutes, eleven times per day to give the amp and speaker a rest and bring the 11:11 into a temporal dimension. As the frequencies were subtle, people thought it was created from amplified vibrations of the Earth or the wind. When it would stop suddenly, they would be quite surprised. After eleven minutes of silence, the amp would turn back on and the vibrations would gradually build again by themselves.

Since 2004, the Quasar Wave Transducer has been featured at the center of all my Portal installations. Around the world, from the

many west coast festivals, to Boom Festival in Portugal, the Rainbow Serpent gathering in Australia, to the fourteen years in a row they were brought to Burning Man, it has become an intrinsic part of the TransPortals. The QWT's purpose is multifaceted. Its sound is random and chaotic and changes by itself. It seems to respond to the coming and goings of different people, and I have been told that the sound seems to be affected through meditation. It's hard to say if there is truth to this, as the sound can change at any point on its own. But the Quasar Wave Transducer uses the same chaotic, nonlinear feedback which science now sees in all systems as the underlying pattern to organize and evolve – from physical matter to biological life to the development of civilizations. When I showed it to the groundbreaking physicist and founder of the Resonance Academy Nassim Haramein in 2009, he commented that this is the same type of non linear feedback he observes through his research into how the physical universe comes into form.

The Quasar Wave Transducer serves as the humming motor that activates the Portal experience. By vibrating the structure, it dynamically expresses how the shapes and geometries of the installations are actually vibrational energy patterns, similar to what we see in Cymatics. This is one of the major aspects of sound – the ability to encode three-dimensional geometric patterns in its vibrations. The device creates a soothing, "cat-purring" sound to bring visitors into a meditative state by vibrating their body with calming tones. It has the effect of aligning participants' brainwaves: although you can't hear the subsonic *fundamental frequencies*, they are present in the sonic structure of what you can hear and they can entrain the mind into zen-like meditative states. Since the frequencies are in the range of the Earth's Shuman resonance, it can have a grounding effect on those inside. Over the years, we've hosted many sound activations in the Portals – Tibetan singing bowls, didgeridoos, shamanic drumming, "galactivation toning" that are played or sung along with the low rumblings of the QWT, providing an experience for deep transformation.

A FREQUENCY SHIFT FOR THE PLANET

From ancient shamans, Druid priestesses, and gnostic initiates to today's spiritual gurus, sound healers, and modern scientists, humans have harnessed the immense creative power of sound to shape reality and transform consciousness. Today, a sound revolution is catching fire across the planet. Millions of practitioners in the Western World chant chakra-activating vowel sounds and Vedic mantras daily on their yoga mats; electronic DJs transmit thumping harmonies tuned to 432 Hz to overflowing dance floors from Burning Man to Bali; an army of sound healers are utilizing crystal bowls, didgeridoos, gongs, tuning forks and binaural beats, forging the next tier of evolution in the acoustic sciences and vibrational healing for our world.

This sound revolution is indicative of a larger global awakening taking place. We are witnessing a profound transition and ascension process as humans learn to harmonize on a higher level with the universe. The planet is an enormous Portal of dynamic energy that activates living creation day by day. We are watching an old tune reach fragmented dissonance. Caught in a frequency shift, we experience the disconnected cacophony of industrialized pollution, fossil fuel consumption, global warming, species extinction, and social discord, as the new frequencies arise.

If you listen closely, you can sense a higher global vibration coming into form. We experience this in the in the growing number of regenerative eco-villages stewarding the land; in the scores of lightworkers, transformational scientists, and conscious entrepreneurs sharing their gifts and genius with humanity; and the awakening to a deeper understanding of our place in the universe. By comprehending the limitless power of sound, we unlock the ability to create a new world.

CHAPTER 2

THE THREE-DIMENSIONAL ORDER OF SPACE

THE GOLDEN RATIO

My journey of creating the Portal installations can be traced back to when I was studying Environmental Design at Parson's School of Design in New York City from 1983 to 1985. As part of the curriculum, we learned about a fundamental principle underlying natural designs and utilized to create monuments and artworks throughout ancient cultures around the world – the golden ratio. From plants and animals to spiral galaxies, Greek temples to Renaissance art, this ubiquitous "golden proportion" can be found everywhere one looks. Symbolized by the twenty-first letter in the Greek alphabet, *Phi*, it's an irrational number that goes on forever after the decimal and never repeats, although it is usually rounded off to 1.618 as a very close approximation for practical purposes.

Dividing any length at a point where the shorter section is in proportion to the longer section as the longer section is to the whole length, the golden ratio can be expressed as A/B = (A+B)/A. In this equation, A is the longer section and B is the shorter section. When "A" is equal to 1, "B" is .618, making A+B 1.618, therefore, .618 is to 1 as 1 is to 1.618. As both .618 and 1.618 are in this ratio to unity, the lesser value is denoted by lower case phi and the greater by upper case Phi. Over the centuries it has been discovered and rediscovered by philosophers, physicists, and artists alike, inspiring different names, such as the divine proportion, golden section, golden proportion, or golden mean.

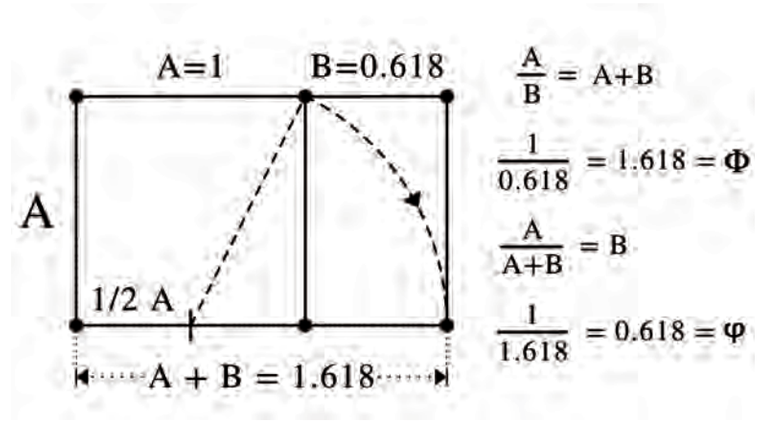


Fig. 1 - Golden Ratio Rectangle

The golden ratio proves to be the most efficient and coherent way for energy and matter to propagate and organize. It is found throughout the human body. For instance, The bellybutton divides the height of a human at the golden ratio; each segment of each finger is in divine proportion to the next, and even the hand is in this ratio to the forearm. Scientific studies reveal that facial features that adhere more closely to the geometry of *Phi* have a tendency to be considered more attractive and beautiful across cultures. On the microscopic level, our DNA molecules follow this divine pattern, measuring 34 angstroms long by 21 angstroms wide (a 1.618 ratio) for each full cycle of the double helix spiral. Medical doctor Jasper Veguts at the University Hospital of Leuven, Belgium recently discovered the golden ratio's relationship with the fertility of women. Using ultrasound machines, he found that the length and width of the uterus for women in their fertile years was at a ratio of 1.61, but this steadily declined over time, reaching around 1.46 on average during old age. Perhaps our capacity to give birth and propagate the species corresponds with this one divine principle.

Ancient Egyptian, Mayan, Greek, and Roman Temples all employ golden proportions. In *Pre-Columbian Architecture in Mexico,* published in 1956, investigative archaeologist Manuel Amabilis uncovered examples of the Mayans utilizing the golden ratio in the monuments of the Chichen Itza temple complex. According to his studies, *Phi* proportions helped create a series of polygons, circles, and pentagrams throughout the site. The Greek sculptor and mathematician Phidias is known to have applied the golden mean to the design of sculptures for the Parthenon, and the height and width of the Parthenon itself closely conform to *phi*. Around 300 BC, the Greek mathematician and "father of geometry" Euclid announced the golden ratio into the historical record in his published work *Elements*: "A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater sum, so is the greater to the less."[1] He then linked the divine proportion directly to the construction of a pentagram.

Leonardo Fibonacci was a medieval Italian mathematician from the Republic of Pisa. Born in 1170, he spent much of his time in

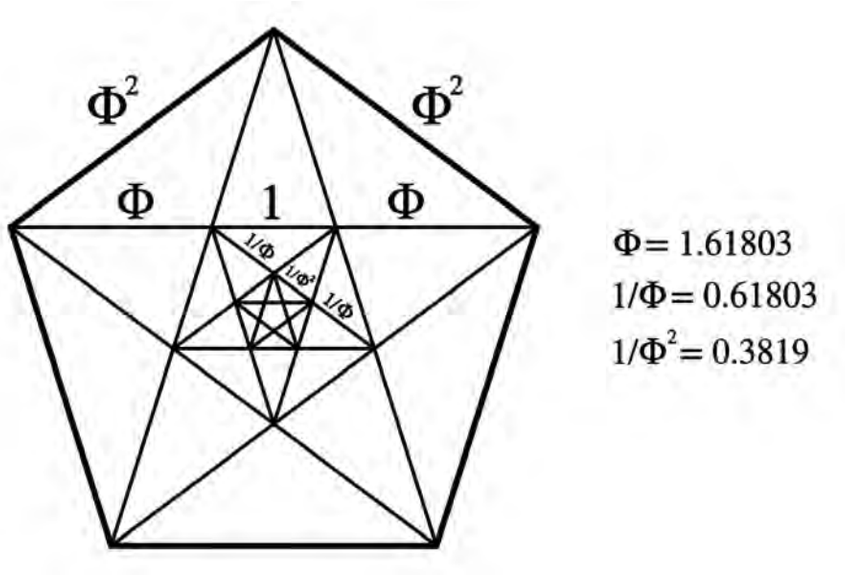


FIG. 2 - PHI IN THE PENTAGRAM

Bulgia, Algeria, where his father Guglielmo ran a merchant trading post. In Bulgia, he learned about the Hindu-Arabic numeral system. Through his experiences traveling around the Mediterranean with his father, meeting with many merchants and their systems of arithmetic, Fibonacci came to understand the significant advantages of the Hindu-Arabic system. It's place-value-system allowed for much easier calculations than that of the Roman numeral model used in the West.

In his published work, *Liber Abaci* (*Book of Calculations*), Fibonacci popularized the use of the Hindu-Arabic system across Europe. Also discussed in this composition was an important number sequence, known to Indian mathematicians since the sixth century AD, that he was responsible for introducing to western culture. Starting with 0 and 1, each successive number in "the Fibonacci sequence" is generated by adding the two previous numbers: 0+1=1,1+1= 2, 2+1= 3, and so on, creating the sequence 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610 and so on infinitely. By dividing any two consecutive numbers in this sequence, it approximates *phi*, and the larger the value, the closer it gets to exactly the golden ratio. For example, the ratio of 3 to 5 is 1.6667, 55 to 34 is 1.6176 and 233 to 144 is 1.61805.

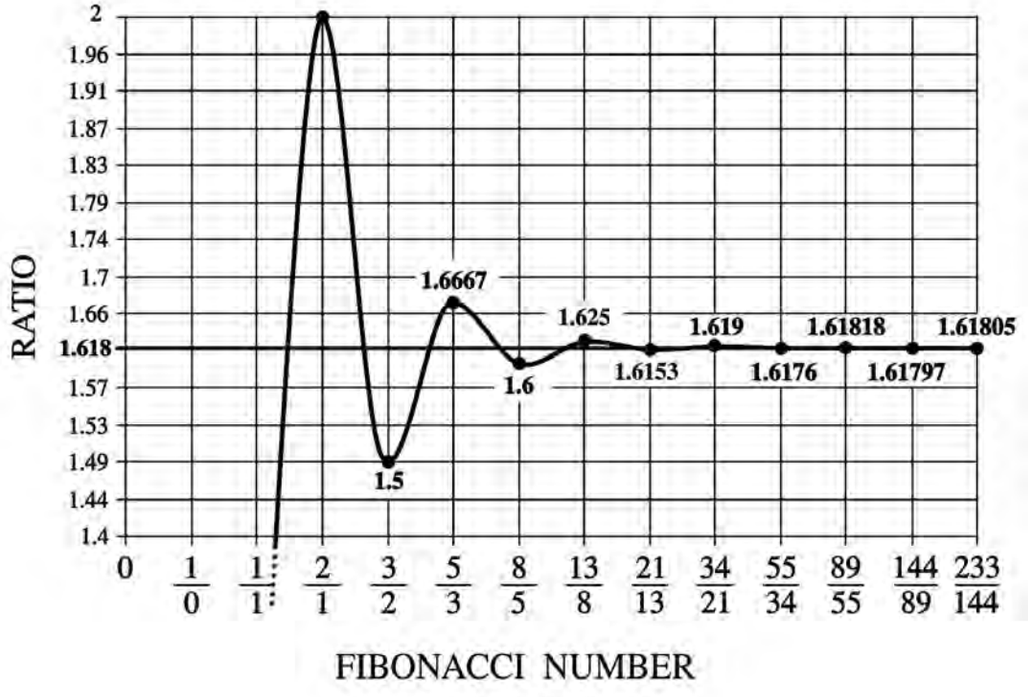


FIG. 3 - FIBONACCI SEQUENCE

One of the most common ways the golden ratio is represented and visualized is in the diagram known as the golden rectangle. It is a rectangle in which the lengths of the sides are in golden proportion. It is then divided into a square and a smaller golden rectangle with each successive smaller golden rectangle divided into smaller squares and golden rectangles. An arc is then inscribed into each of the squares creating a golden spiral. This can be done infinitely but for practical purposes, after eight times it becomes too small to be noticeable.

In 1509, Italian mathematician and Franciscan friar Luca Pacioli revolutionized the use of *phi* and golden rectangle throughout the Renaissance world when he published *De Davina Proportione* (*The Divine Proportion*) in Venice. The book's subject matter was mathematical and artistic proportion, especially the calculations of *phi* and golden rectangle in architecture. Leonardo da Vinci drew the illustrations for the book while he lived with and took math lessons directly from Pacioli. Da Vinci designed all the proportions in his

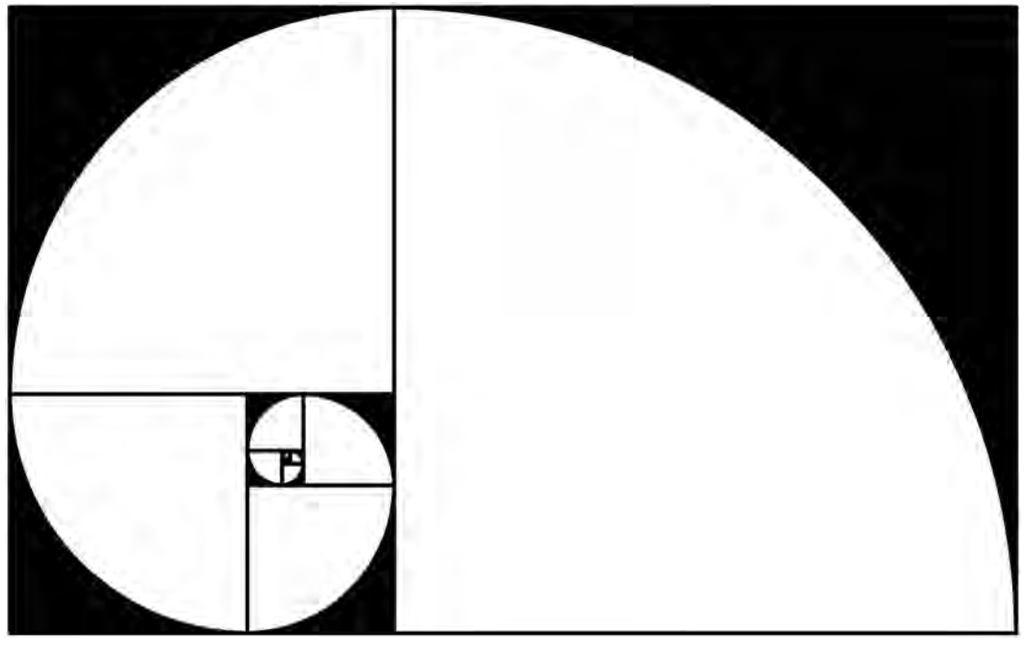


FIG. 4 - PHI SPIRAL IN THE GOLDEN RECTANGLE

"Last Supper" – the table, the walls, even the backgrounds with the golden mean. He features *phi* in his sketch of the Vitruvian Man, the courtyard of "The Annunciation," and in the face of the most famous portrait in all of history – "The Mona Lisa."

Renaissance artists from across the spectrum used the golden ratio to instill balance, harmony, and beauty in the paintings, sculptures, and buildings they were designing. Raphael's "School of Athens" is filled with the application of *phi* in its composition, where a small golden rectangle sits front and center of the painting, signaling the artist's intent in this principle. On the ceiling of the Sistine Chapel, God touches the finger of Adam precisely at the golden ratio point in Michaelangelo's "Creation of Adam." Here, like in nature itself, the conception of "mankind" required both the touch of God and His divine proportion. In his book *Ad Quatratum* (1919), Norwegian historian Frederik Macody Lund traced the design of the golden rectangle and divine proportions of the many Gothic cathedrals of the Middle

Ages, including the Cathedral of Chartres, Notre-Dame of Laon, and Notre-Dame of Paris.

The golden ratio is intrinsic in all forms of nature – from the orbits of the planets in the solar system to the proportions within all living animals. Plants and flowers grow in a Fibonacci pattern that enables the best possible exposure to sunlight. In pinecones, pineapples, and sunflowers, the ratio between the number of spirals in their geometries correspond to Fibonacci numbers. Elegant golden spirals can be seen in the living example of nautilus shells, goats' horns, the cochlea of the inner ear, and in the flowing form of a hurricane. Across our galaxy, from the microscopic to the macroscopic, and throughout diverse cultures in history the golden ratio is found to be the underlying design principle.

Another significant aspect of the golden ratio is found in waveforms. Based on the work of physicist Dan Winter, who shows that *phi* is the fundamental proportion of all coherent waveforms that are in phase conjugation, allowing non-destructive interference and compression from the smallest subatomic frequencies to the astronomical scale. The Heartmath Institute has applied Winter's discovery that shows when human heart rhythms are in golden ratio, the heart enters into a state of coherence, creating an experience of bliss. The Institute has developed biofeedback technologies to help participants achieve this harmonious state of being. With their assistance, more and more people are becoming entrained to this golden heart frequency, bringing greater coherence into the collective energy of humanity.

THE 11:11 DIAMOND PORTAL

In 1984, while learning about the golden ratio at Parson School of Design, and without any specific instruction or assignment, I made a small paper sculpture that utilized the golden mean within a three-dimensional geometric object. Using paper and foamcore for material, I created a small maquette that was diamond (rhombus) shaped in plan and tapered upward to a diamond that was the golden ratio smaller than the base, the height is the same as the length of the bottom. A golden-ratio diameter cylindrical opening, centered at the golden mean of the shape's height, cut horizontally through its width. I stored this model away with a number of other design projects in a box for safekeeping, but I never imagined twenty years later that this small experiment would ignite my life's work and the arc of my artistic career. *(see next page - fig.5)*

I started attending the Burning Man Festival in Nevada in 1999. The week-long gathering features large-scale interactive art installations. I particularly enjoyed the work of sculpture artist Michael Christian, who over the years had created enormous metal installations that towered over the festival-goers. As Christian states, he builds "large fun and playful interactive sculptures." His steel monolithic installations had become a legend at Burning Man – the array of twisting and curving ladders sprouting from the ground for "Klimax" (2003), an amorphous blob-shaped structure of climbable steel tubing that formed "Celestial Body (2004), and a similar organic shape atop a tall tower with a tunnel to access it called "Hypha" (2005). Unlike the tamed, roped-off sections of museums and art galleries; here the work was alive, interactive, and if I'm totally honest, not entirely safe! You could walk across elevated bridges, climb on huge stone monoliths suspended in the air, crawl through mazes and scale geometric lattices, and I remember one giant "surfacing" submarine art piece that you could actually ride your bike onto the bow jutting up at an angle from the desert floor. This was wild, untamed art, not found in the confines of galleries and museums, that catalyzed me to take action to create.

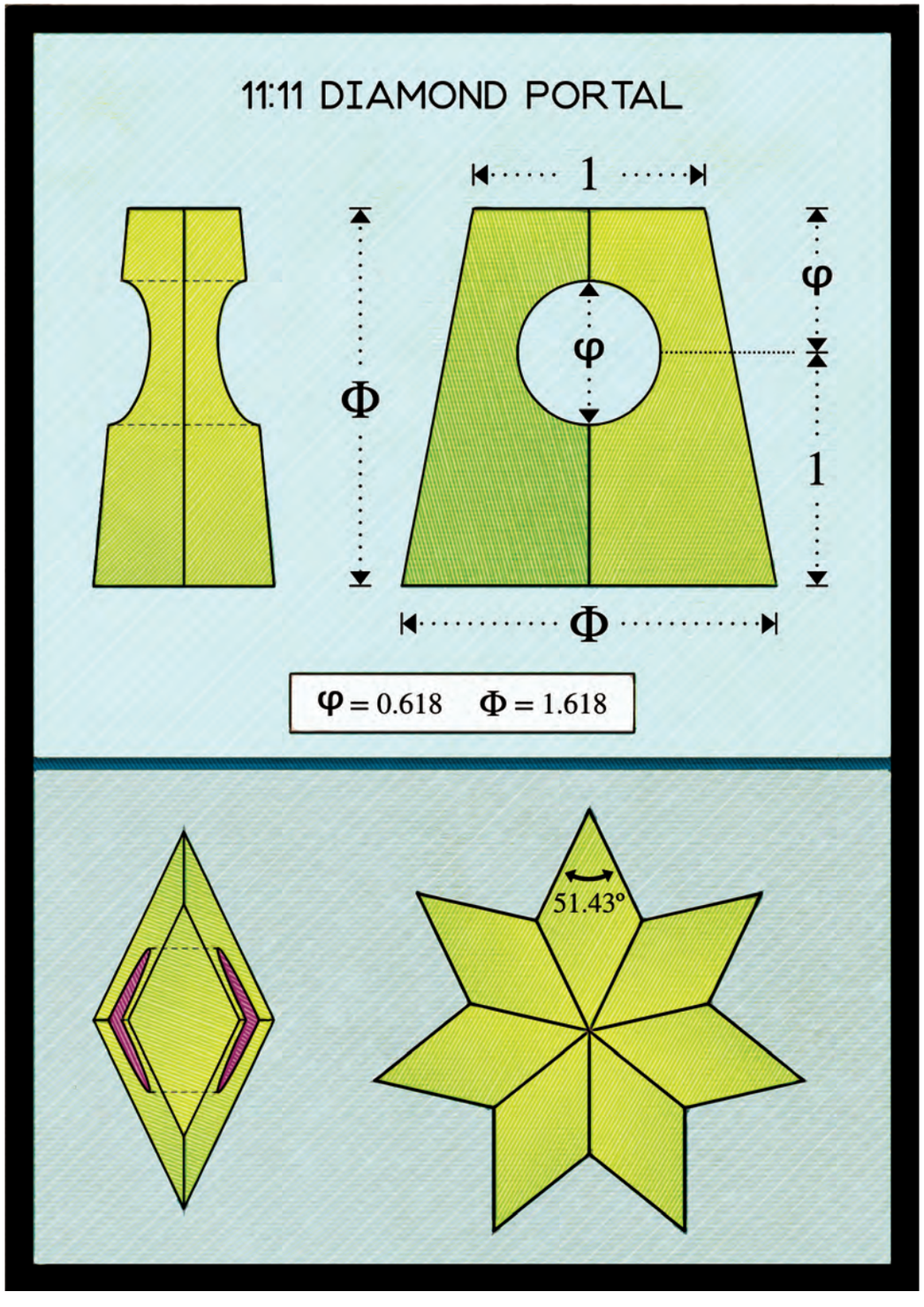


FIG. 5 - 11:11 DIAMOND PORTAL

I was inspired to build a large interactive installation to bring to Burning Man in 2004, and I thought back to that golden-ratio-based model that I had nestled away in a box of design projects from my years studying at Parsons School of Design two decades earlier. I had moved to Taos, New Mexico in 1996 (while still keeping my apartment in New York and spending time living in both places). Taos had been a hotbed of the back-to-earth commune movement in the late 60s, which interested me greatly, and although these communes were all but gone by the time I moved there, the southwestern artistic community resonated with my visionary intentions. Having heard of Burning Man in 1995, I eventually went in 1999 with a group of friends from Taos and have continued to go every year, only missing 2018.

I chose to build the first installation as large as practically possible, making it 16 feet tall by using 8-foot sheets of plywood – a size that could be transported using my van. As the central cylinder was the second golden ratio of the height, this turned out to make it a little over six feet in diameter while fitting six to seven people comfortably reclining inside. While developing this project I named the shape the “Diamond Portal,” based on the rhombic or diamond shape of it in the plan, and the cylindrical “portal” that pierces it in elevation. My intention was for it to be a “Key” to shifting the Earth into the next dimension, akin to the New Age concept of human awakening and ascension, making it a “Portal” to this evolution of consciousness growing around the globe.

My studio wasn’t big enough to build it inside so I had to construct the project outside in my backyard. Luckily the weather in Taos in the summer was cooperative. I intuitively painted the inside of the cylinder deep maroon and the outside of the structure a chartreuse green, that only later I came to understand related it to the color of the heart chakra, the energetic power center on the human body that integrates opposites of the masculine and feminine, serves as the gateway between heaven and earth, and the center of healing for ourselves and the world. Only upon completion of building the full-size structure did it become apparent that the cylinder formed a perfect heart shape when viewed from certain angles. Between



FIG. 6 - 11:11 DIAMOND PORTAL - BURNING MAN - 2004

this heart-shaped opening, the green color and the golden ratio form relating to the golden ratio of the heart when it is in coherence, the entire Portal became a powerful heart chakra based installation. Upon completion, I transported the larger panels on the roof of my van and the central cylinder via a trailer that my Taos Burning Man camp used to transport all the camp infrastructure. The Burning Man Festival is laid out in a radial plan based on a clock, and I had chosen to place the installation at 11:11, a synchronistic activation code popular among transformational seekers. Inside of the Portal was a solar-powered version of the Quasar Wave Transducer, vibrating soothing sounds with low-frequency pulsations that resonated with the Earth, the Portal and the people in and around it. *(fig. 6)*

My Taos camp mates helped me build the Portal installation at its 11:11 location. Almost immediately upon completion, a young man climbed up and in saying, "This is so cool, I'm not leaving." When I checked back eight hours later at the end of the day, he was still perched up there, meditating while catching the sunset. During the course of the week, numerous people ventured out to it. Although it only fit seven comfortably inside the central cylinder leaving other people to lean against its vibrating outer skin, occasionally more people could crowd themselves in with a record number of 16 at one point. Immediately after the event, I started receiving emails from people about their profound experiences with it and the other people they met out there. The piece was brought back to Taos New Mexico where it was set up at an outdoor sculpture park where several events were held, one most notably on 11/11. It wintered the snowy weather but was no match for the spring winds and was blown over and damaged. I rebuilt it like new to be brought back to Burning Man in 2005.

Following up on the 11:11 Diamond Portal's success, I built a golden ratio smaller "outline" climbing version. It was made of round steel tubing that was 10 feet high, making it very ergonomic for people to climb on and do 3D yoga and acrobatics. This was fully interactive art. It was placed on the same 11:11 axis at the golden ratio between the full-size Diamond Portal (which returned from the year before) and the effigy of the Man, bringing *phi* into the city layout. I also created

11:11 Diamond Portal pendants cast in pewter to give out as festival gifts – gifting is a central part of the culture of Burning Man. The pendants were exactly the eleventh golden ratio smaller than the full-size Portal, making them just under an inch in height. From 16 feet to ten feet to under an inch in height, the 11:11 Diamond Portal could be sat in, climbed on, or carried around the neck. My friends who helped me bring it there insisted that I burn it so they didn't have to help bring it back. As burning it in place was not an easy option, I made wheels to be put on so it could be rolled into the flaming remains of the Temple fire. On the last day of Burning Man 2005 the 11:11 Diamond Portal came to a fiery end.

THE 5 PLATONIC SOLIDS

The study of sacred geometry is vast, and usually begins in two dimensions, starting with a compass and drawing a circle. The exploration greatly deepens with the addition of the third dimension, however, most people visualize 3-D geometry simply as a cube with its three axes of length, width and height. To fully enter into the study of three-dimensional space we need to start with the five shapes, or polyhedra, known as the Platonic solids. The Greek philosopher Plato introduced and categorized these fundamental forms to western culture. His Platonic solids are 3-D faceted shapes, or polyhedra, that satisfy two key rules: (1) they have all the same shaped faces with equal edge length (triangle, square or pentagon) and (2) they have the same number of these faces around each vertex. There are only five possible shapes that satisfy these two criteria: the tetrahedron with four triangular faces, the cube (or hexahedron) with six square faces, the octahedron with eight triangular faces, the dodecahedron with twelve pentagonal faces, and the icosahedron with twenty triangular faces. These five polyhedra and the set of closely related secondary shapes have an extraordinary pattern of interrelationships that are the very essence of three-dimensional geometry and the underpinnings of how the universe operates.

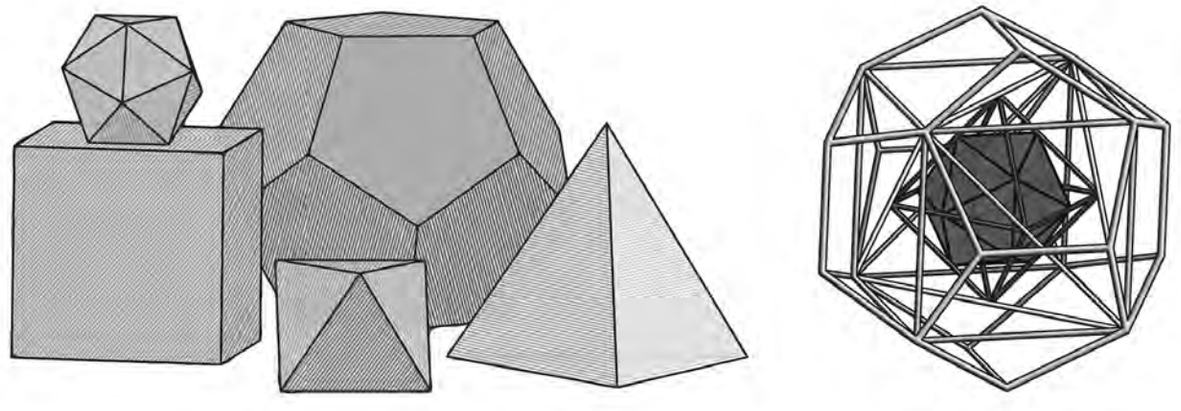


FIG. 7- PLATONIC POLYHEDRA

Plato associated each of the solids with one of the elements. According to the classic philosopher: "We must proceed to distribute the figures [the solids] we have just described between fire, earth, water, and air... Let us assign the cube to earth, for it is the most immobile of the four bodies and most retentive of shape; the least mobile of the remaining figures (icosahedron) to water; the most mobile (tetrahedron) to fire; the intermediate (octahedron) to air... There still remained a fifth construction (dodecahedron), which the god used for embroidering the constellations on the whole heaven."[2] As Aristotle would later point out, the dodecahedron embodied the element aether, the element of the heavens, with its twelve faces representing the twelve constellations in the sky.

The tetrahedron Platonic solid has four triangular faces, three around each of the four vertices and six edges. Connecting the midpoint of each edge creates an octahedron inside of it, surrounded by three half-size tetrahedrons.

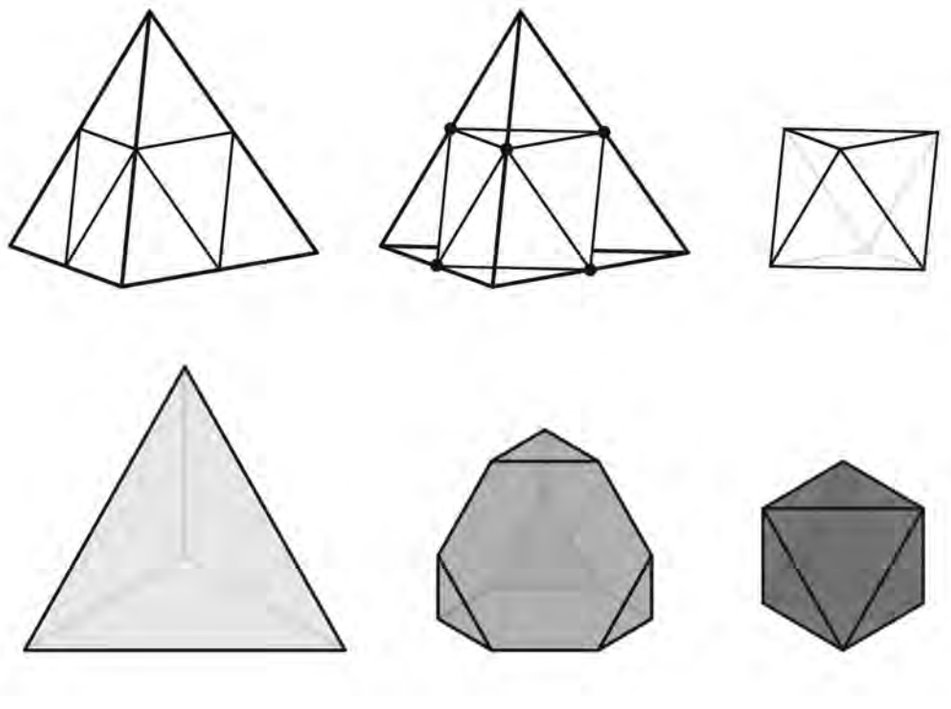


FIG. 8 - TRUNCATED TETRAHEDRON

The cube has six square faces, three around each of the eight vertices and 12 edges. Connecting the center of all it's six square faces creates the octahedron which has eight triangular faces, four around each of the six vertices and twelve edges. As the cube and octahedron are duals of each other, the converse is also true: connecting the center of each triangle face of the octahedron makes a cube. Another way of looking at this is to see a cube inside of an octahedron where each corner (or vertex) of the cube touches the middle of each triangle face of the octahedron, and conversely an octahedron inside of a cube where each vertex touches the center of each square face of the cube.

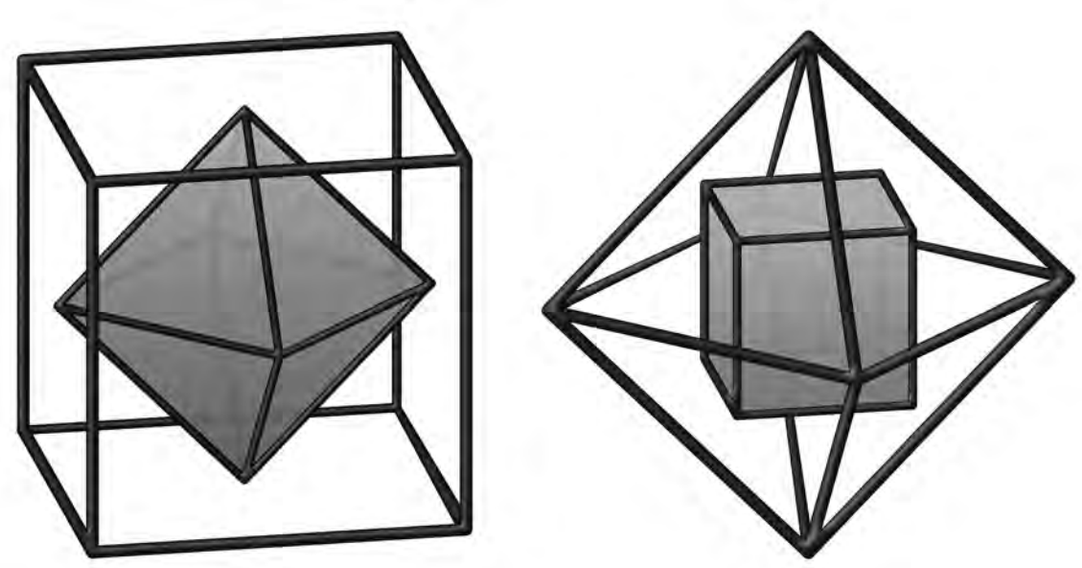


FIG. 9 - CUBE & OCTAHEDRON DUALS

An important note to make here is that by truncating the corners off of either the octahedron or cube at the midpoint of each edge creates the cuboctahedron, a shape that has both six square and eight triangle faces.

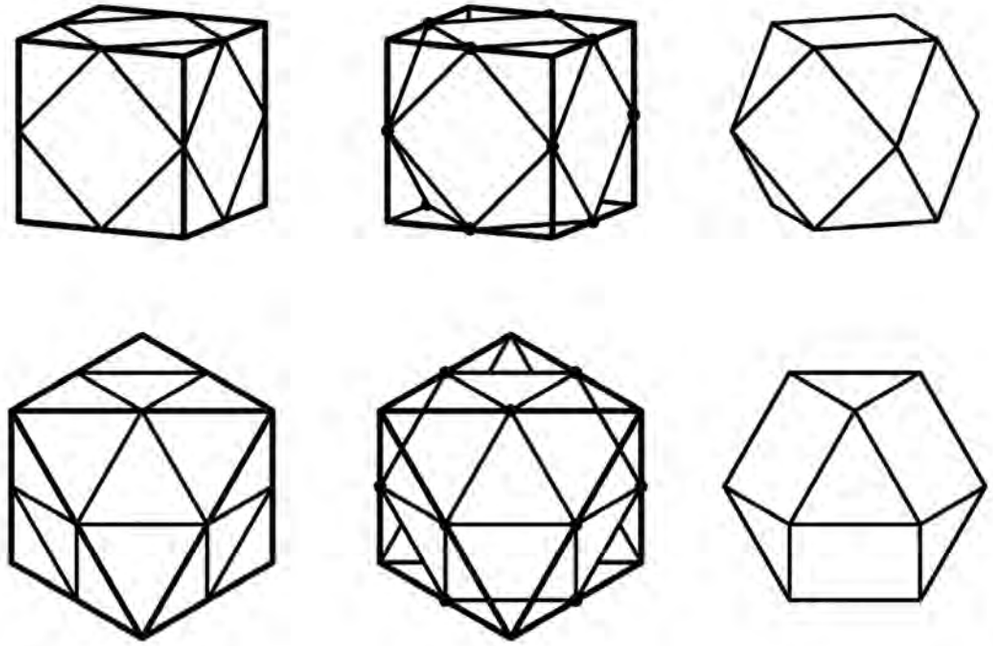


Fig. 10 - Cube & Octahedron Truncate to Cuboctahedron

This is a very significant shape when you connect all the outer vertices to the center point to create eight inward-pointing tetrahedra. The great twentieth-century thinker R. Buckminster Fuller named this shape the vector equilibrium because it represents a state of perfect energetic equilibrium. The twelve vectors emanating from the center, representing the energy that wants to expand outward, are perfectly countered by the twenty-four surrounding vectors wanting to collapse inward. Fuller also demonstrated another way of understanding this shape by showing how it's created by "the closest packing" of uniform spheres. Starting with one sphere, six more can "closest pack" around it in a plane. Three more can "closest pack" below it and three more above it, making twelve spheres "closest packed" around a central

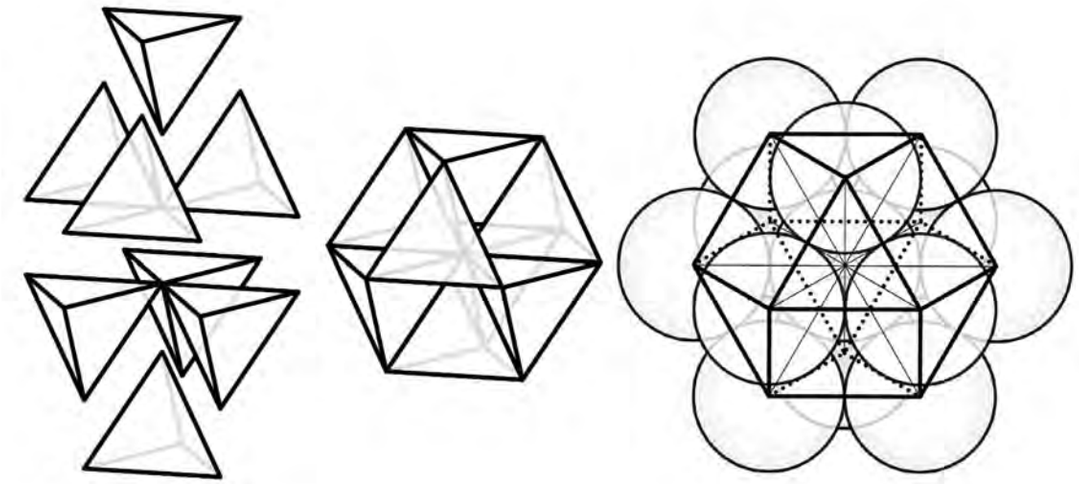


Fig. 11 - Eight Tetrahedra in Cuboctahedron Connecting Centers of 13 Closest Packed Spheres makes the Vector Equilibrium

sphere. Connecting the centers of all of these spheres creates the vector equilibrium.

With all the vectors having the exact same length and angular relationships, the Vector Equilibrium represents the ultimate condition wherein the energy reaches a state of equilibrium, all forces perfectly canceling each other out and thus, absolute stillness and nothingness. As Fuller states: "The vector equilibrium is the true zero reference of the energetic mathematics. Zero pulsation in the vector equilibrium is the nearest approach we will ever know to the eternity of god: the zero phase of conceptual integrity inherent in the positive and negative asymmetry that propagate the differentials of consciousness."[3]

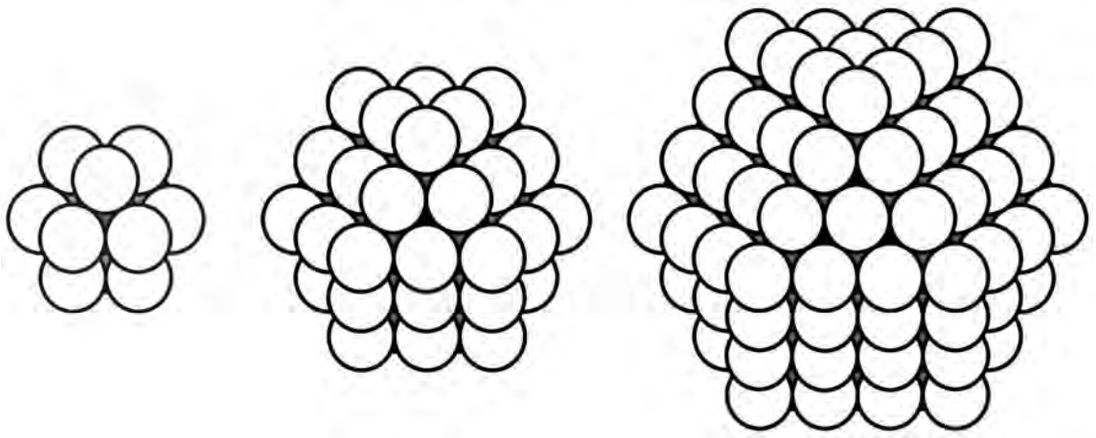


Fig. 12 - Closest Packing of Spheres Creates Larger Cuboctahedra

Continually packing spheres around this shape creates layers of larger or “higher frequency” cuboctahedra/vector equilibriums and ultimately what Buckminster Fuller called the “Isotropic Vector Matrix”, meaning that the vectors that connect the centers of these closest packed spheres are the same in all directions infinitely. The “Isotropic Vector Matrix” is a grid of four axes at 60^0 to each other that creates tetrahedrons and octahedrons that will fill all space. This is different than the usual way of visualizing space mapped out along three axes at 90^0 to each other that makes a grid of cubes, which does not satisfy the vectors all being the same, as the vectors between diagonals are greater than the vectors between adjacent points. The Isotropic Vector Matrix is an accurate way of describing the energetic principle of three-dimensional space where all the vectors of energy are in equilibrium.

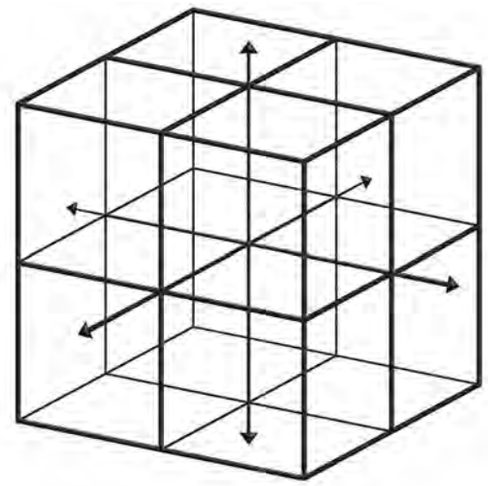


Fig. 13 - 90˚ Cubic Vector Matrix

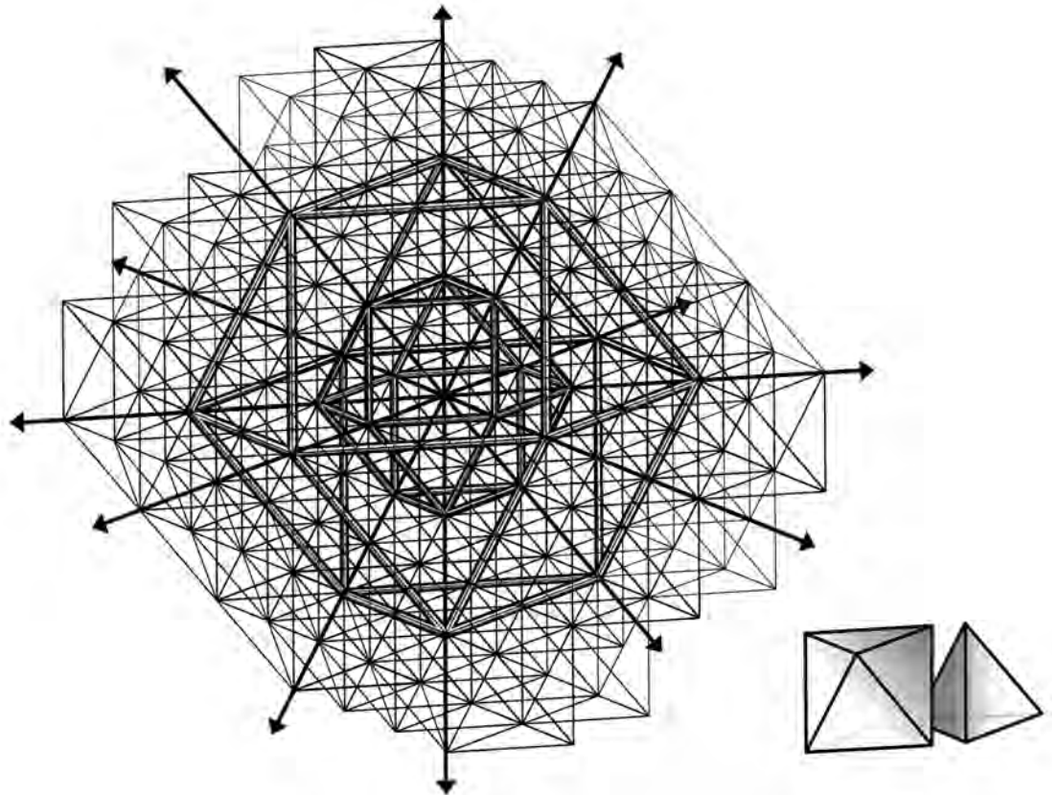


Fig.14 - 60˚ Isotropic Vector Matrix

By connecting the center points of the square and triangle faces of the cuboctahedron makes its dual, the rhombic dodecahedron, which has twelve rhombic shaped faces. This means that each of the six axes through the corners of the cuboctahedron is perpendicular to the twelve faces of the rhombic dodecahedron. The rhombic dodecahedron can also be made by crossing the diagonals of opposite corners of a cube through the center point making six inward-pointing pyramids that are then inverted onto the faces of the cube. The long diagonals of the rhombic triacontahedron form an octahedron and the short diagonals form a cube.

Crossing the diagonals of all six square faces on a cube creates two tetrahedrons, or what is known as the star tetrahedron: intersecting upward and downward pointing tetrahedrons. The star tetrahedron is also a stellated octahedron (stellation refers to creating points on the faces of any polyhedral, making the shape star-like, thus "stellating"). Another way of seeing this is as eight smaller tetrahedra pointing outward surrounding a central octahedron, making it a direct

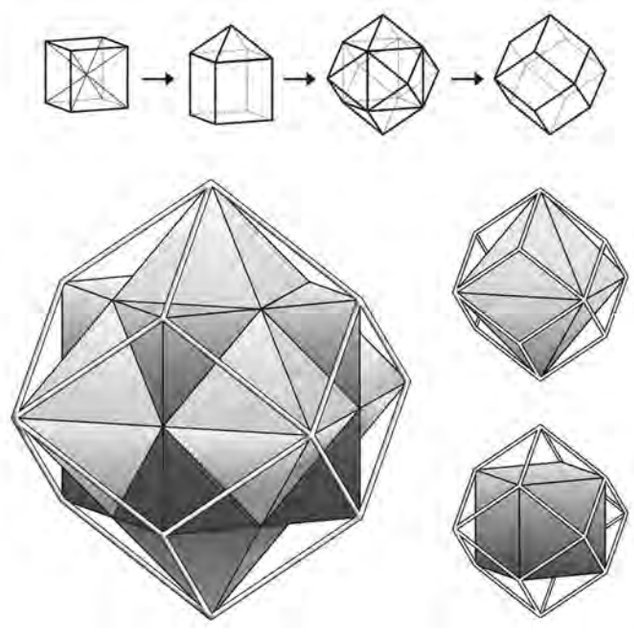


FIG.15 - RHOMBIC DODECAHEDRON WITH CUBE AND OCTAHEDRON FORMED BY DIAGONALS

compliment to the vector equilibrium with its eight inward-pointing tetrahedra. In many esoteric traditions, the star tetrahedron is the geometric shape at the center of the body's energy system, the fourth (or heart) chakra, representing the reconciliation of opposites – spirit and matter, male and female, earth and heaven, and good and evil – through the vibration of love. The star of David is a two-dimensional depiction of the star tetrahedron, also known as the Merkaba, a universal symbol found in cultures across the world. Merkaba is a Hebrew word which means "chariot", when broken down phonetically means "light, body, spirit" from an ancient Egyptian translation. The prophet Ezekiel had a vision of an ancient airborne craft that whisked him up into the sky, "an immense cloud with flashing lightning and surrounded by brilliant light. The center of the fire looked like glowing metal."[4] (Ezekiel 1:4). Ancient alien proponents and UFO-ologists suggest the Merkaba of *The Old Testament* describes a scenario similar to that of UFO abductions reported today. However, many cabalists and mystics argue the Merkaba of the human energy field –

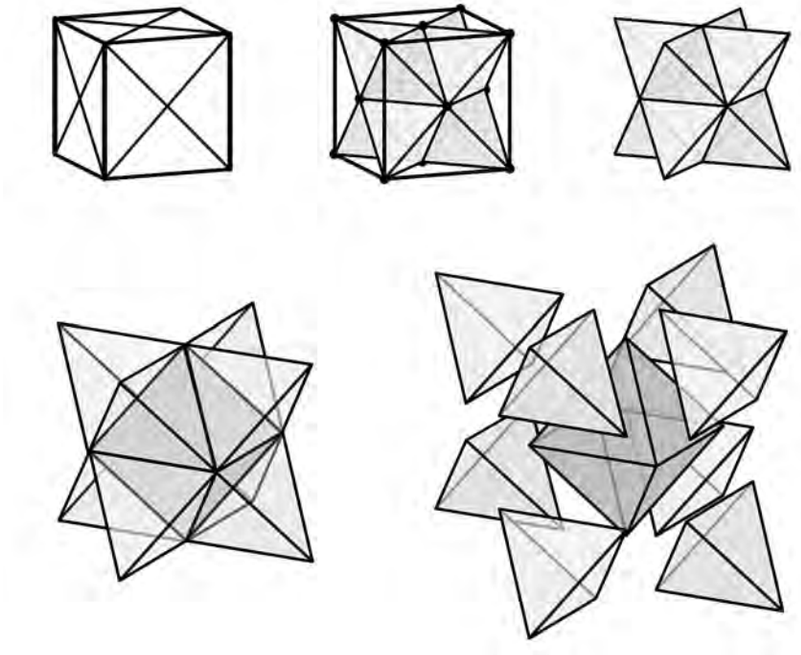


FIG. 16 - FACE DIAGONALS OF CUBE FORM STAR TETRAHEDRON EIGHT TETRAHEDRA SURROUNDING CENTRAL OCTAHEDRON IN STAR TETRAHEDRON

the star tetrahedron of the heart –, serves as its own “flying saucer,” a light-body activation portal where one can travel through multiple dimensions, and reach higher levels of consciousness. American new age writer and teacher Drunvalo Melchizedek is perhaps best known for his “Merkaba Meditation,” instructing to visualize rotating the tetrahedrons around the body in opposite directions to help seekers to activate its potential.

In the fall of 2006 I was invited to create the infrastructure for a three-day gathering, called “Habitats”, that some friends were producing in Brooklyn, NY. I choose to use the star tetrahedron, or Merkaba, as the starting point for this project. They wanted to create an interactive space to be utilized by the diverse performers, musicians, artists, and attendees to all mingle within and use to set up their equipment. It was to take place at the Brooklyn Lyceum, a huge space originally built as a bathhouse at the turn of the 20th century with the largest indoor pool in the country, repurposed as a gymnasium in the depression era and ultimately became an unconventional performance arts and cultural center. Employing the metaphysical property of the Merkaba, and it’s potential for personal and collective activation, as well as the elegance of its geometric shape, I designed the project by visualizing a forty eight-foot star tetrahedron in the center of the space and deconstructing it. A table-height slice out of the downward-pointing tetrahedron was built out of plywood and fabric with three openings on each side to allow access to the center so the performers could place their props and equipment on it to use throughout the show. The three corners of the upper pointing tetrahedron were made of twelve-foot 2x4’s and covered in see-through scrim, allowing video projections to be cast on and through them without blocking the view of the musicians, dancers, speakers, and sound artists. If the corner tetrahedron’s and central table’s edges were to be visualized continuing outward, they would connect to create the full 48 -foot star tetrahedron or Merkaba, thus inspiring the name I chose for it “The Abridged Merkaba”. It functioned both practically and metaphysically, as New York crowds unknowingly meandered through this sacred geometry of the light body vehicle.

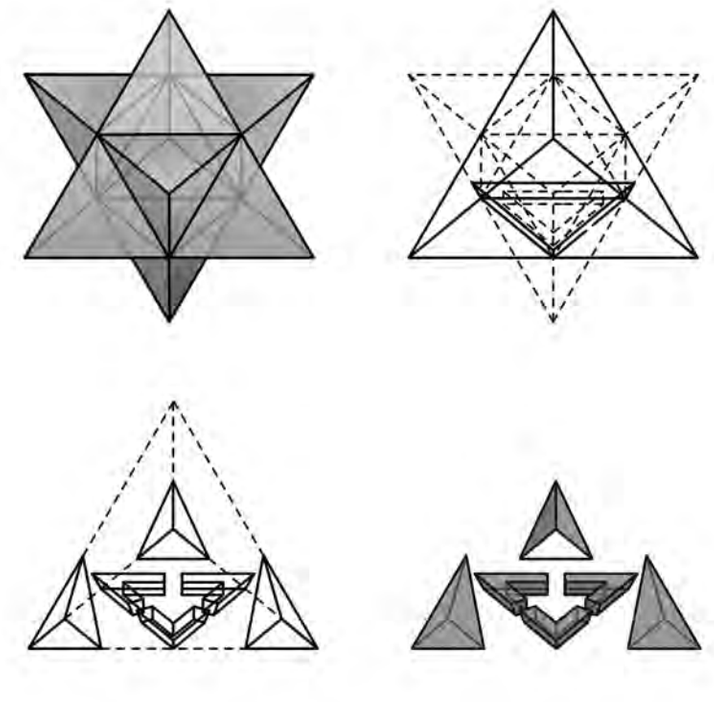


FIG. 17 - ABRIDGED MERKABA

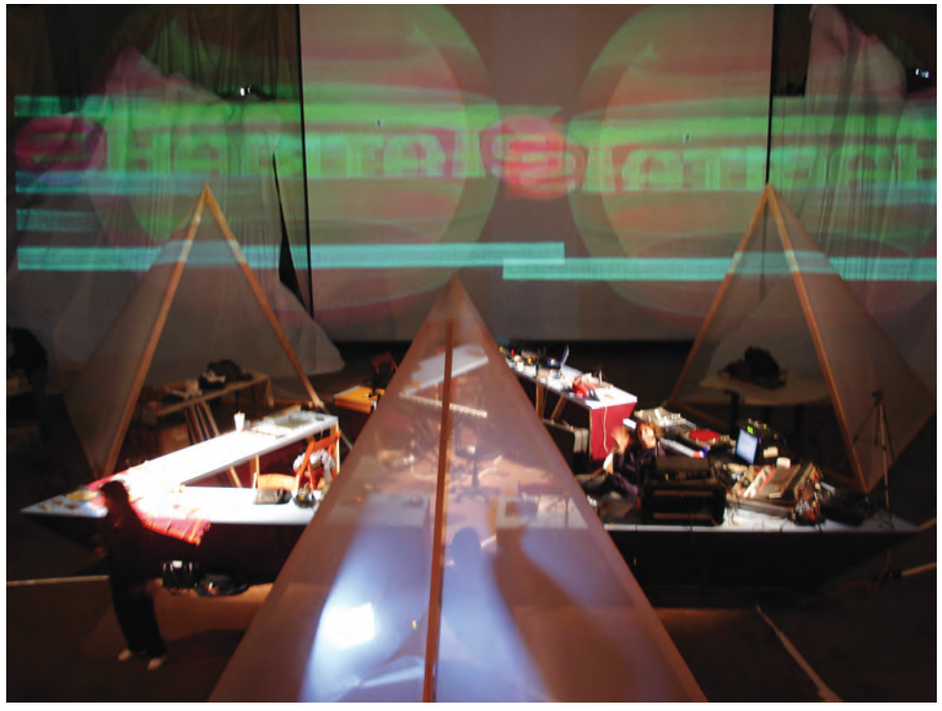


FIG. 18 - ABRIDGED MERKABA - HABITATS - BROOKLYN LYCEUM - 2006

THE FRACTAL HOLOGRAPHIC UNIVERSE

The cuboctahedron, or Vector Equilibrium, and the star tetrahedron are the two keys to understanding the 64 tetrahedron "Structure of the Vacuum" discovered by the modern-day physicist and founder of the Resonance Project Nassim Haramein. The shape is the fundamental relationship of energy in perfect fractal equilibrium, the very essence of space or the vacuum. Modern science sees empty space as having a nearly infinite amount of energy that is completely undetectable – called the vacuum energy density. This is because the energy fluctuates in perfect equilibrium at a scale trillions of times smaller than that of atoms, the Planck's length (the smallest length possible in the physical universe, measuring 1.6×10^{-35} which is 100 million trillion times smaller than the proton). This 64 tetrahedron geometry shows how the vacuum energy density is in equilibrium.

One way to visualize the Structure of the Vacuum is to recall the star tetrahedron, created by crossing all the diagonals in a cube, which then forms eight tetrahedrons around a central octahedron.

Now visualize a cube of twice that size so that it's made of eight of the original cubes and replace those eight cubes with the enclosed star tetrahedrons. These eight star tetrahedrons all touch in the center and along their edges. This makes a 64 tetrahedron grid that is a double-size star tetrahedron combined with a surrounding cuboctahedron. At the center of this shape there is a half-size cuboctahedron, so it can be seen as both concentrically-nested cuboctahedrons and radially-connected star tetrahedrons. The structure of the vacuum is a geometric grid exhibiting a balance of both the converging aspect of the eight inward-pointing tetrahedra of the cuboctahedron and the radiating aspect of the eight outward pointing tetrahedron of the star tetrahedrons. If all of the edges of this 64 tetrahedron shape are either doubled or halved, the exact same shape is created either twice or half as big, revealing how the shape is fractal in nature. Halving or doubling can go on infinitely smaller or bigger and the shape always

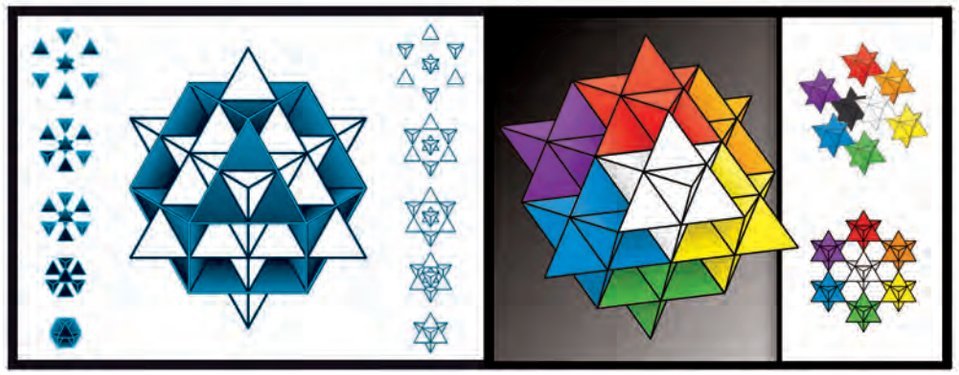


FIG. 19 - 64 TETRAHEDRON "STRUCTURE OF THE VACUUM"

stays the same. Another interesting aspect of this shape is that it has 144 triangular faces.

Author Andreas Bjerve of the web-magazine *Fractal Holographic Universe* explains the significance of Haramein's work: "He presents a new solution to Einstein's field equations and the mechanics of universal forces. The theory is based on both *holographic* and *fractal* principles and has accordingly been named the 'Holofractographic Universe', or simply 'Fractal Holographic Universe'. Haramein's model seems to achieve what no previous model has, namely the unification of physics across the micro and macrocosmic scale. Throughout the history of physics this has been a holy grail; to integrate the universal force of Gravitation with the complex mechanisms of the quantum world. Whereas earlier attempts have fell [sic] short, producing overly complex patchworks of mathematics, Haramein's model seems to master the task in a simple stroke; with a few crucial modifications to conventional

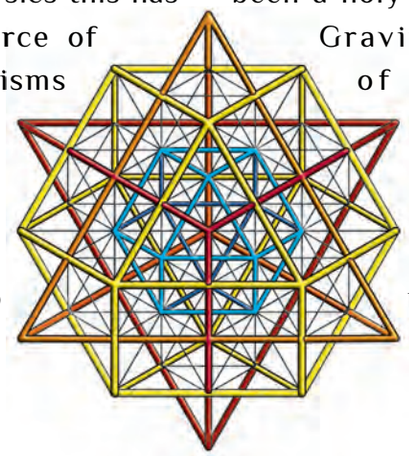


FIG. 20 - 64 TETRAHEDRON "STRUCTURE OF THE VACUUM" SHOWING NESTED CUBOCTAHEDRON

models, a simplified, elegant understanding of the fundamental mathematics of the universe is achieved... a True Unified Field Theory."[5]

There are many significant aspects of the Structure of the Vacuum. For example, the Chinese divination tool of the *I Ching* is made of 64 hexagrams created by all the combinations of the eight trigrams of three either whole or broken lines. Tetrahedrons are made of six edges, so there is a one-to-one correlation of the *I Ching's* hexagram to the tetrahedrons in the grid. When an animal's egg is fertilized, the zygote cell divides undifferentiated, doubling each time to 64 cells before the cells start to differentiate into diverse organs. There are 64 possible combinations of the four nucleotide proteins that make up the coding in DNA. In Tibetan Buddhism, the well-known Heart Sutra states: "Form is Emptiness, Emptiness is Form" where "Form" is synonymous with "Structure" and "Emptiness" with "Vacuum." I believe the sutra is attempting to convey this underlying property of the way the universe comes into being. A two-dimensional projection of the Structure of the Vacuum from corner-to-corner creates a grid where the intersections align perfectly with the center of every circle of a Flower of Life diagram, the cornerstone of two-dimensional sacred geometry.

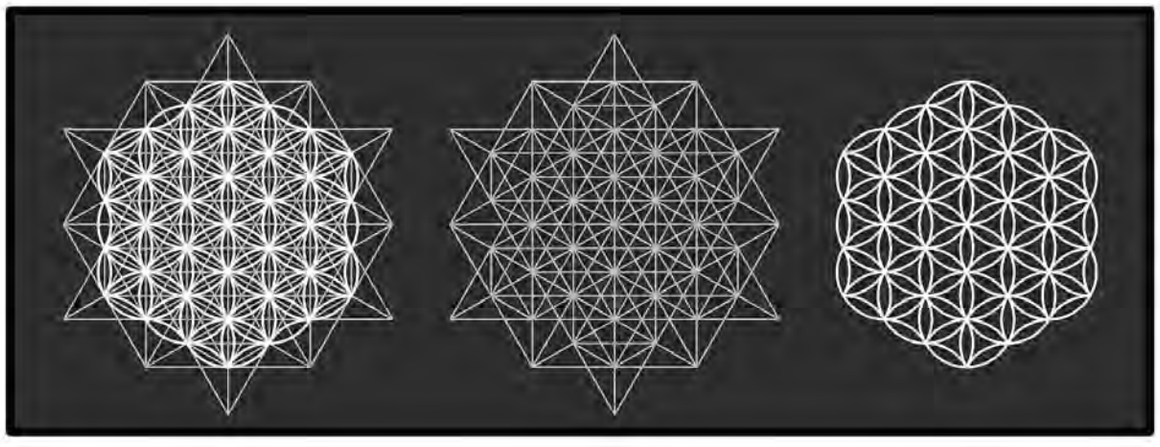


FIG. 21 - 2-DIMENSIONAL PROJECTION OF STRUCTURE OF THE VACUUM ALIGNS WITH FLOWER OF LIFE

THE RHOMBICTRIACONTAHEDRON & BIRTH OF A NEW HUMANITY

Having explored in-depth the first three platonic solids, the tetrahedron, cube and octahedron, and their various relationships to each other, we move on to the last two shapes, the dodecahedron and icosahedron. The dodecahedron has twelve pentagonal faces, three around each of the twenty vertices, and thirty edges. The icosahedron has twenty triangular faces, five around each of the twelve vertices and also thirty edges. Just like the cube and octahedron, they are duals to each other, meaning that connecting the center points of the faces of either creates the other one: all the vertices (or corners) of a dodecahedron touch the center points of all twenty faces of an icosahedron, as will the twelve vertices of an icosahedron touch the center points of all the faces of a dodecahedron.

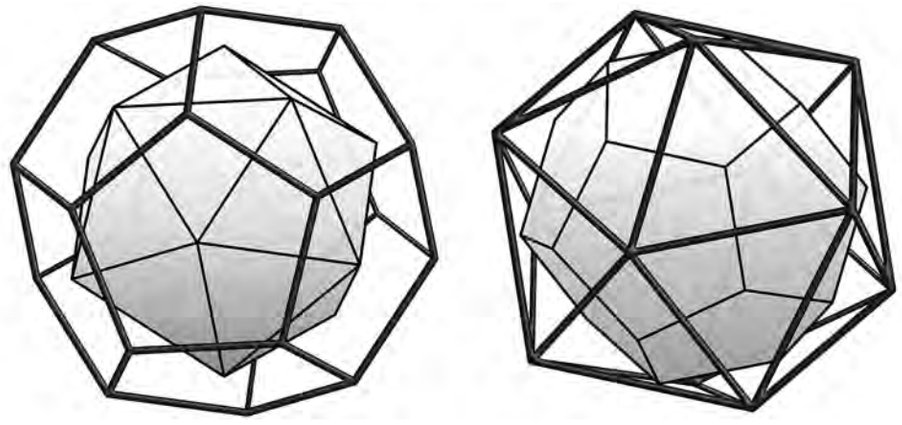


FIG. 22 - DODECAHEDRON & ICOSAHEDRON DUALS

Crossing all of the diagonals of the twelve pentagonal faces of a dodecahedron creates the edges of five cubes inside of it. This can also be seen as inscribing five-pointed stars or pentacles on each face. Conversely, truncating the edges of a cube can create a dodecahedron.



FIG. 23 - CUBE INSIDE OF DODECAHEDRON

A stellated dodecahedron is created by adding pentagonal pyramids to each face of a dodecahedron where the angle of the pyramids are such that they align to form twelve intersecting five-pointed stars or pentacles. Connecting these twelve vertices produces an icosahedron.

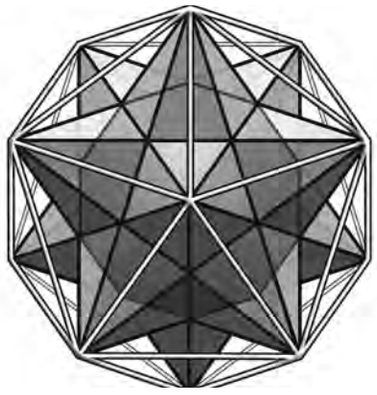


FIG. 24 - STELLATED DODECAHEDRON INSIDE OF ICOSAHEDRON

Truncating the vertices of both the dodecahedron and the icosahedron to the midpoint of their edges creates the same shape, a twenty triangle and twelve pentagon polyhedra called the icosidodecahedron.

And just as the rhombic dodecahedron is the dual of the cuboctahedron, connecting the centers of all the faces of the

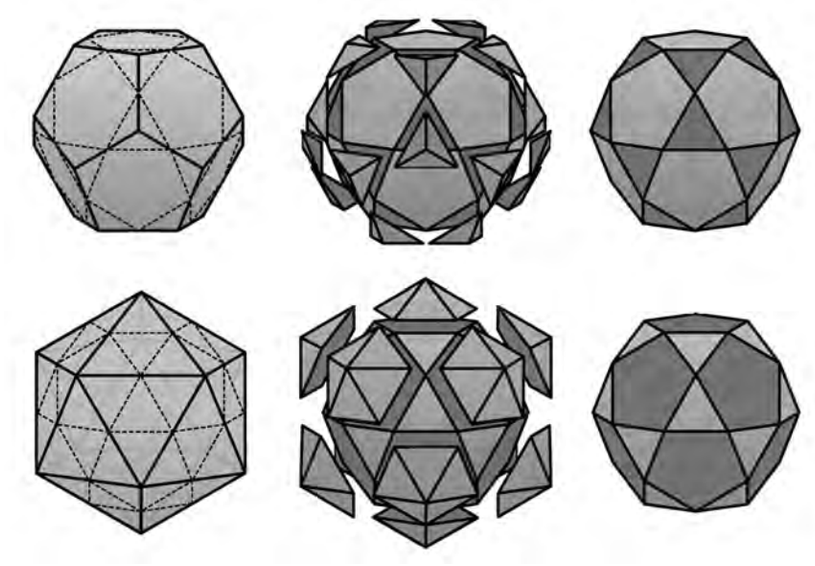


FIG. 25 - DODECAHEDRON & ICOSAHEDRON TRUNCATE TO MAKE ICOSIDODECAHEDRON

icosidodecahedron creates its dual, the rhombic triacontahedron, a thirty-sided polyhedra with rhombic faces.

Crossing the longer diagonal of all thirty faces creates an icosahedron and crossing all the shorter diagonals makes a dodecahedron. It is quite interesting to note that these diagonals are in perfect golden ratio. These diagonals cross at the center of the thirty rhombic faces, so that connecting these center points creates its dual, the icosidodecahedron.

Plato himself proposed that the basic geometry of the Earth's energy matrix was composed of a dodecahedron, a concept we will cover in greater depth within the next chapter. He believed that the global energy grid was in the shape of a dodecahedron, but that as a product of evolutionary forces, the planet would eventually transform into the more elaborate twenty-faced polyhedron of the icosahedron. Drunvalo Melchizedek, author of *The Ancient Secret of the Flower of Life* (and architect of the "Merkaba Meditation" cited earlier in this chapter) believes that the Earth has gone through three major geometrical shifts in its energy matrix. In his documentary, *The Birth of Humanity*, he argues that Aboriginal People lived in a consciousness

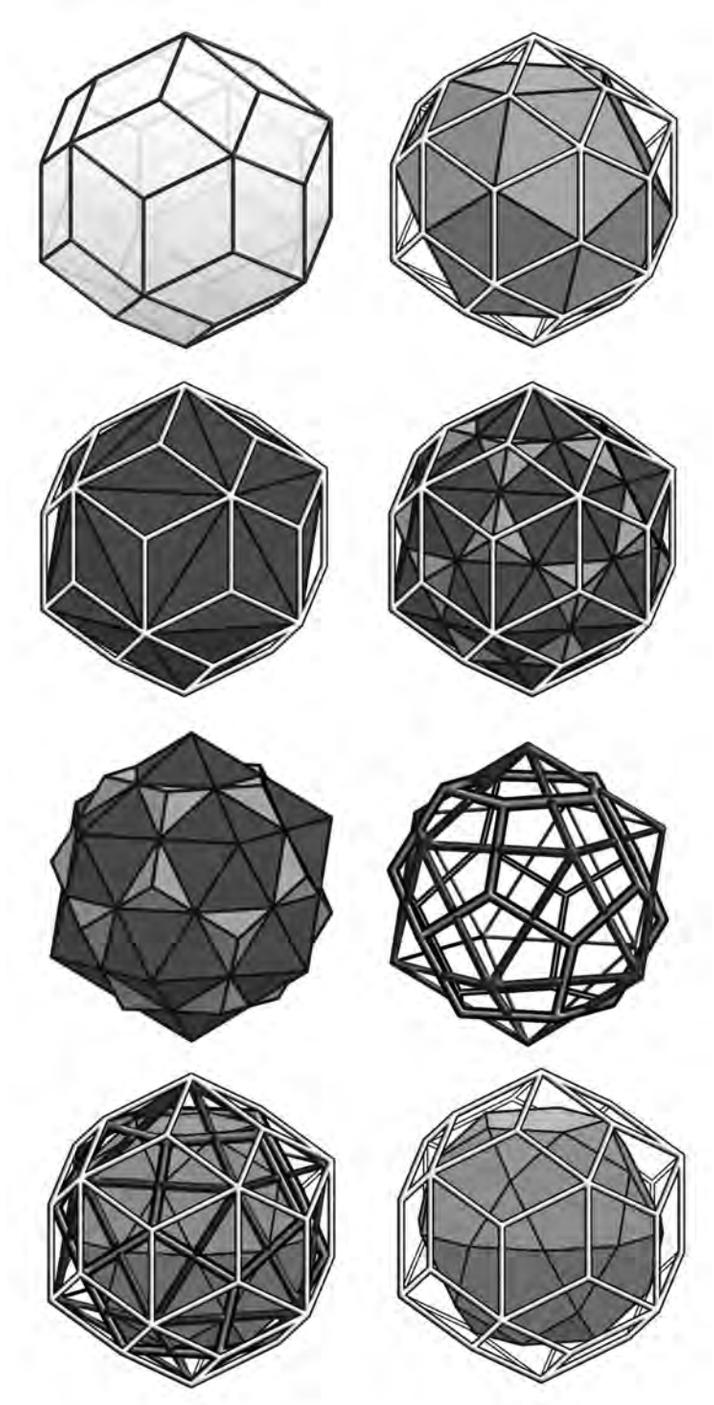


FIG. 26 - RHOMBIC TRIACONTAHEDRON DIAGONALS FORM DODECAHEDRON & ICOSAHEDRON. CONNECTING INTERSECTIONS OF DODECAHEDRON & ICOSAHEDRON FORM ICOSIDODECAHEDRON

grid that was much closer to the golden mean than the one the civilized world has existed in over the last 13,000 years. The second evolution in the planet's energy matrix came to being with the rise of agriculture and western civilization, spanning up until the modern era. According to Drunvalo, its geometric structure is flawed, "not even close to the golden mean, so we are not in tune with nature" and that this is what is causing the current state of species extinction on the planet. Melchizedek goes on to note that most of the military bases around the globe are located on the nodal points of this conscious grid and that governments may be using those positions to control and dominate the Earth's populace.[6]

Melchizedek then explains that there is now a third matrix arising on the planet. It is that of a rhombic triacontahedron, perfect in shape, where the diagonals are exactly in golden ratio to each other. Connecting the centers of each face (the point where the diagonals cross) forms an icosidodecahedron. It seems we may be moving out of a destructive, "egoically oriented" matrix based on "polarity consciousness, seeing the world as black and white" to one of divine connection and universal harmony, where "if we can just make it to that place, then we can solve all of our problems." Melchizedek believes that ascended masters have been working with humanity over the centuries, creating sacred sites like "pyramids, temples, buildings, and structures" to shift global consciousness, rapidly advancing an evolutionary process that normally takes tens of thousands of years.

As Melchidezek states: "Every time they build a new structure, it changes the shape a little bit and they keep getting it closer and closer and closer to a grid that is an icosahedron and dodecahedron blended perfectly. Without this new grid that is being formed right now, there would be no ascension. Nobody would be able to move from where we are now and no-one would be able to go into a higher level of consciousness until that grid is completed and finished. Before that, on an individual level, you could be an ascended master, but we could not move there as an entire race, or as an entire planet until that is completed."[7] According to Melchizedek, it is sacred three-dimensional geometry that serves as our Portal to a New Earth.

FROM GEOMETRY TO COSMOMETRY

In his recently published book *Cosmometry,* the multi-talented producer, musician, designer and author Marshall Lefferts shows how geometry expands from an earth based "geo" principle to a "cosmic" order of measure. This comprehensive exploration of the "holofractal nature of the cosmos" covers all aspects of the patterns observed in the universe. "Cosmometry is the study of this underlying order, wherein cosmic geometry, unified physics and the harmonic system of music are seen as three lenses through which to view one phenomenon

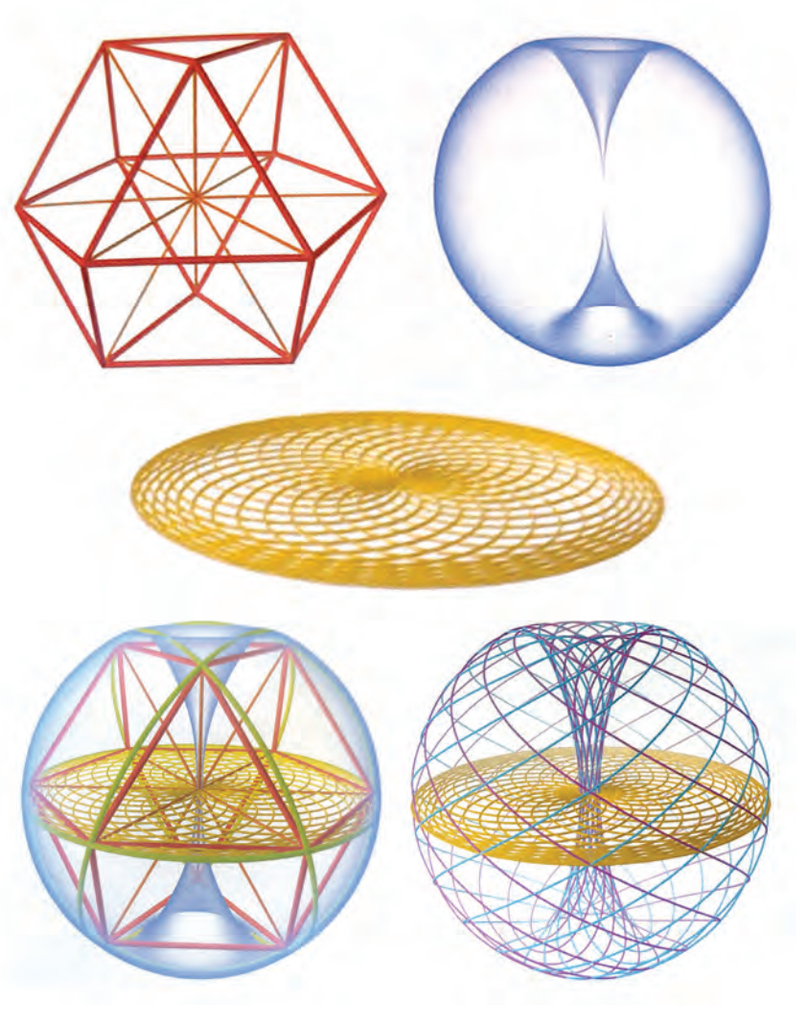


FIG. 27 - UNIFIED MODEL OF COSMOMETRY

— universal dynamics of energy and matter manifesting in physical form and flow."[8]

It is an exceedingly complex subject of which the "Unified Model of Cosmometry" is one of the most essential concepts presented in the book. This model combines the geometry of the Vector Equilibrium with the flowing patterns of the Torus and the Phi Spiral:

"In its simplest form, the Unified Model of Cosmometry depicts three basic cosmometric attributes: the Vector Equilibrium, the Torus and the Phi Double Spiral. These three components share two things in common: a "one point" center, and a spherical circumference.

As illustrated, the double spiral is a cross-section slice of the overall toroidal field pattern.

It is important to remember that the Unified Model is depicting one thing -- equilibrium -- in both zero phase reference (Vector Equilibrium) and dynamic manifestation (Torus and Double Spiral). Of the three components, it is the Double Spiral that is most readily seen in nature. The Vector Equilibrium is, by definition, non-visible. The Torus is most often an implied form (an implicit order, we might say), and the double spiral (or single vortex) is easy to find in the patterns of nature (an explicate order)."[9]

From plants and animals to spiral galaxies, this model shows how 3D geometries are expressed in the naturally occurring forms found throughout the universe.

CHAPTER 3

THE EARTH'S MULTIDIMENSIONAL BODY

THE ANCIENT MEGALITHIC LANDSCAPE

The Saxon village of Avebury in southwest England features an ancient circular earthen ditch, or henge, surrounding the dozen or so cottages and shops on High Street. Enormous granite stones, weighing upwards of forty tons and standing over ten-feet tall, lay scattered in the open space and along the edge of a thirty-foot deep trench dug into the site's hard chalk ground. In medieval times, Christians methodically destroyed most of the original 154 granite stones, leaving only thirty-six remaining today, but fortunately, a wealthy businessman purchased the site in the nineteenth century for preservation and it now belongs to the English Historical Society. Among Avebury's ruins, four paths aligned to the cardinal directions provide access to the area within the henge, which extends over 1,000 feet in diameter.



Fig. 1 - Avebury Stone Circle

By far the largest stone circle still in existence, estimated to be around 4,500 years old, it is part of a complex of Neolithic structures that covers the British landscape. This network of archaeological structures includes the chambered underground tombs of West Kennet Long Barrow, the heavy standing stones lining the ancient avenues and causeways of Windmill Hill, and the largest prehistoric mound constructed in all of Europe at Silbury Hill. These monuments cover the landscape south down to Stonehenge seventeen miles away, and stretch out across the entire British countryside, up to Scotland, west to Wales, and over to the Irish isles as well as on the European continent.

Modern archaeologists have not been able to decipher how and why these Neolithic monuments were built using their limited scientific perspectives-. It is only through a more broad-minded and metaphysical approach that we can begin to comprehend Avebury's true purpose, as well as the countless other ancient megalithic sites found all over the planet. A breakthrough in understanding the nature of these structures came in 1921. Alfred Watkins, a British photographer and amateur archaeologist was looking for features of interest on a map of the Herefordshire countryside when he suddenly experienced "a flood of ancestral memory," realizing that many of the tracks and footpaths seemed to connect one hilltop to another in a straight line. He saw that numerous prehistoric sites, such as standing stones, earthen burial mounds, and Neolithic causeways fell into these lines, stretching out for miles. Watkins referred to these paths as "ley" lines, because they passed through places whose names held the syllable "ley." He would publish his findings in his most important work, *The Old Straight Track* (1925), a book that galvanized groups across England, who conducted field research delving into the mysteries of England's rich Neolithic archaeological past.

In his book, *The New View Over Atlantis: The Essential Guide to Megalithic Science, Earth Mysteries, and Sacred Geometry*, author John Michell articulates Watkins sublime vision, which birthed a whole study of tracking, mapping, and understanding ley lines across the five continents: "Watkins saw straight through the surface of the landscape

to a layer deposited in some remote prehistoric age. The barrier of time melted and, spread across the country, he saw a web of lines linking the holy places and sites of antiquity. Mounds, old stones, crosses and old crossroads, churches placed on pre-Christian sites, legendary trees, moats and holy wells stood in exact alignments that ran over beacon hills to cairns and mountain peaks. In one moment of transcendental perception Watkins entered a magic world of prehistoric Britain, a world whose very existence had been forgotten."[1]

While Watkins conceived of ley lines as physical trading routes and roadways to Neolithic villages and ceremonial sites, he also opened the way for a new esoteric science to take form, one that would bring forth knowledge hidden from us for centuries. Could ancient civilizations have once known of the earth's electromagnetic body, mapping and working to channel its flowing energy with the countless numbers of sacred megalithic monuments scattered across the globe?

Feng-shui, the ancient Chinese art of landscape divination, has been practiced in China for thousands of years and is being studied now in Western culture as a way to understand the subtle energies of the Earth. It is a branch of the ancient Taoist philosophy that seeks to harmonize oneself with the environment. The Chinese have applied feng shui to locate the best positions to place temples, domiciles, even agricultural projects, since these energies transmit fertility and abundance. As *New View Over Atlantis* author John Michell summarizes: "In China until recently, as long ago in Britain, every building, every stone, and wood, was placed in the landscape in accordance with a magic system by which the laws of mathematics and music were expressed in the geometry of the earth's surface. The striking beauty and harmony of every part of China, which all travelers have remarked, was not produced by chance. Every part was contrived."[2]

According to feng-shui, two main forces (called dragon currents) crisscross the planet – one being the yin (female) energy force, and the other a yang (masculine) force – working much like acupuncture meridians in the human body, but on a larger scale. The equivalent study in western culture is called geomancy, which includes dowsing

for not only water, but other subtle forces flowing across the planet. Geomancy recognizes that ancient sacred monuments were located on top of these energy currents and that many later-day churches were constructed on top of those sites.

The Earth's energy grid is a matrix of subtle forces forming an interconnected pattern that circles the globe. This extensive system is thought to be magnetic in nature, forming the same "lines" that birds, mammals, insects, even bacteria use to migrate across distances. We find some of the world's most renowned monuments sitting at points where ley lines are claimed to meet and many surmise that ancient cultures built their megalithic stone structures along these energy channels, especially at the intersecting nodal points where they could harness more power. Across the world, we find great monuments along this grid – the Egyptian pyramids, Native American mounds covering North America, the towering Incan citadel of Machu Picchu, and the giant Moai statues of Easter Island, to name just a few.

Many Earth-mystery students have been mapping the countless number of "dolmens" – large standing stones holding up a flat-table capstone roof – sprawling across the planet. We find dolmens dispersed everywhere – across Europe, the Middle East, Africa, and the Americas. Over 100 dolmens have been located in India's Krishnagiri district, Russia's Northwestern Caucasus region hosts more than 3,000 dolmens, and estimates say the Korean Peninsula features around 35,000 of them, comprising the largest concentration on the planet. It's believed these structures directed and channeled the planet's chi force for ceremonial practices during energetically potent events like full and new moons, spring and autumn equinoxes, solstices, and eclipses, although their true use has never been fully understood.

Julie Ryder, the recent discoverer of the Montana Megaliths, marveled how the structures seemed to be located on two different energy grid corridors that when traced, connected megalithic sites circling around the world, including Pakistan's ancient city of Mohenjjo-daro (built in 2500 BC), the Hindu temples in Khajuraho, and the Angor Wat religious complex in Cambodia. Considering how subtle energy



FIG. 2 - DOLMENS

might be flowing from one sacred monument to the next, one can wonder if the whole world of antiquity had been connected through a vast planetary energetic grid system.

Some mystical investigators believe that the Great Pyramid of Egypt may have served as a type of "power plant" distributing energy harnessed through the earth's geometric grid. Set along the flowing waters of the Nile, and what's been cited as one of the most potent nodes of ley lines on the planet, the Pyramid's underground passageways are lined with granite containing high amounts of quartz crystal that can produce piezoelectricity. Christopher Dunn, author of *The Giza Power Plant: Technologies of Ancient Egypt* argues that for Egyptians, "The source of energy is the Earth itself, in the form of seismic energy. The ancient Egyptians saw tremendous value in this form of energy and expended a considerable amount of effort to tap into it. The benefits they received may have been twofold: energy to fuel their civilization, and the ability to stabilize the Earth's crust by drawing off seismic energy over a period of time rather than allowing it to build up to destructive levels."[3]

While most mainstream archaeologists believe the monument to be merely a tomb of the fourth dynasty pharaoh Khufu, what perplexes "power plant" proponents is the total lack of the ornate wall

art or hieroglyphs typically featured in the tombs of ancient Egypt. Also, the granite sarcophagi is unusually larger than the coffins of that time (much too big for a human) and may have instead served as a central energy conductor for the pyramidal structure to collect and transmit power. As *Giza Power Plant's* Christopher Dunn claims: "It is a widely held popular belief that the Egyptian pyramids contained mummies, and that these mummies were actually discovered inside the pyramids. This simply is not true. These beliefs are only inferences that are reinforced by inaccurate documentaries that link the pyramids with the Valley of the Kings where there are no pyramids, but where the mummies actually were found. In reality, the Giza Plateau and the Valley of the Kings are vastly different sites, separated by hundreds of miles of desert. It is now becoming widely recognized by the people who research the pyramid issue that of all the pyramids excavated in Egypt, there was not one that contained an original burial. Considering that more than eighty pyramids have been discovered in Egypt, this fact alone practically negates the tomb theory."[4]

In a similar fashion to the Great Pyramids, Avebury's sacred stone henges may have served as an energy conductor for the Druids of England. Its circular megalithic architecture is thought to have been an amplifier and harmonic echo chamber that channeled energy through that location. In their essay, "Ley Lines and the Meaning of Adam," published in David Hatcher Childress' 1987 anthology *Anti-Gravity and the World Grid,* authors Richard Leviton and Robert Coons. "There is a specific site on Earth where the Michael/solar and Oroboros/Lunar Lines actually touch down, beginning and ending their planetary circuit... This place is Avebury Circle, in central Wiltshire, England. Avebury, according to this model, is the planetary umbilicus. Avebury is Earth's primary cosmic/electrical socket. It's where the Earth plugs into the cosmos. Avebury is Grid Central, the planetary geomantic switchboard... Moreover, Avebury is, to borrow another term from esoteric yoga, the planetary sutratma. The sutratma is the channel through which the direct stream of life from the Spirit flows through the lower spiritual bodies and Soul to the personality and physical body; it is anchored in the etheric heart chakra. The life stream controls the circulation of the human blood and planetary ch'i."[5]

In the late 19th century Serbian-American inventor Nikola Tesla developed the alternating current (AC) generating system that would prove to be the only practical way to distribute power through an electrical grid, rather than his competitor Thomas Edison's direct current (DC). Tesla's AC's voltage could be "stepped up and down" using transformers made of coils of wires. Through induction, low voltage in one coil could be transformed into higher voltage, which



FIG. 3 - TESLA'S WARDENCLYFFE TOWER

traveled through wires more efficiently before being "stepped down" again for household use. The Chicago Columbia Exposition of 1893-94 marked Tesla's ultimate triumph over Edison in what's been called the "War of the Currents." Amazed spectators watched thousands of bright lamps flash on for the opening of the exp, and the beginning of the Electrical Age. A Tesla-designed power plant, built by Westinghouse

at Niagara Falls in 1896, would soon bring the magic of AC current to New York City, lighting up Broadway itself.

Tesla moved his lab to Colorado Springs in 1899, where he could examine the conductive nature of low-pressure air, part of his research into wireless transmission of electrical power. Around Pikes Peak, his team worked with the largest Tesla coil ever made (15 meters in diameter) performing high-voltage, high-frequency experiments that created electric arcs (essentially man-made lightning) that could be seen for miles. Funded by J.P. Morgan, Tesla went on to oversee the construction of the Wardenclyffe Tower at Shoreham, New York in 1901. Standing 187 feet tall and anchored 300 feet into the ground, this massive magnifying transmitter, also known as a "harmonic oscillator" was built to transmit messages, even facsimile images, across the Atlantic Ocean to England. This "Tesla Tower" had the potential to transmit electricity for free by creating a channel between the Earth and the ionosphere that could be tapped into, possibly in a similar way that the Great Pyramid may have functioned. When faced with the prospect of wireless power and free energy that he couldn't meter or charge the public for, the staunch capitalist J.P Morgan withdrew funding and inventions that could provide free electric power to anyone anywhere on the planet were suppressed.

STARGATES: DOORWAYS OF THE GODS

High up in the Hayu Marca mountain region of Southern Peru stands "The Gate of the Gods," or *La Puerta de Hayu Marca*, a huge door-like structure carved out of rock. Situated in a spirit-forest, or stone-forest, the local indigenous people call the area "the City of the Gods," perhaps due to the large array of unusual man-made-looking rock formations spread about the terrain. Measuring seven meters in height by seven meters wide, local legend has it that the gate's large square archway etched in a natural rock face served as a portal for the gods to travel to other worlds. Centered at the base of this doorway stands a human-sized alcove, two-meters in height and about a meter wide where it is presumed that mere mortals crossed through the solid stone into unknown mystical dimensions.



FIG. 4 - LA PUERTA DE HAYU MARCA - PERU

The Native Peoples of Lake Titicaca and the surrounding region had long told legends of a mythic doorway leading to the "lands of the Gods" that the heroes of ancient times would enter in order to join deities on the other side. In order to pass through this portal, the heroes had to perform a special ritual using a key shaped like a golden disc, called "the Key of the Gods of the Seven Rays," which had fallen from the sky sometime in the distant past. Locals even told of a prophecy that one day in the future, the gate would open "much bigger than it actually is" and allow the gods to return in "their solar ships" to the awe of humankind.

The location of this extraordinary doorway remained unknown to the outside world, but in 1996, Jose Luis Delgado Mamani, a guide for mountaineering tourists was familiarizing himself with the area when he stumbled across the enormous stone monument of *La Puerta de Hayu Marca.* He stood in amazement. According to Delgado, he had seen that same gate in recurring dreams: "When I saw the structure for the first time, I almost passed out. I have dreamed of such a construction repeatedly over the years, but in the dream the path to the door was paved with pink marble, and with pink marble statues lining either side of the path. In the dream, I also saw that the smaller door was open and there was a brilliant blue light coming from what looked like a shimmering tunnel. I have commented to my family many times about these dreams, and so, when I finally gazed upon the doorway, it was a revelation from God."[6]

Interestingly, Mamani's discovery matched another "Gate of the Gods" legend involving the circular depression found within the smaller door frame of the monument. Around the 16th century, when Spanish conquistadors plundered the territory for gold and treasure, it is said that an Incan priest named Amaru Maru from the Temple of the Seven Rays decided he wasn't going to let the "sacred golden disc" (the Key to the Gods of the Seven Rays) into the wrong hands. He fled into the mountains of Hayu Marca, where he presented the disc key to several shaman priests guarding the doorway. Maru placed the golden disc into a circular depression within the stone door. The stunned shamans watched as a portal opened before them emitting

a bright blue light onto the surrounding red rock. Maru relinquished the disc to one of the presiding shamans, then he stepped through the blue-lit gateway and was never seen again. His legend lives on in another name given to the site, *El Portal de Amaru Maru.*

Today, mystical pilgrims from around the world travel to Hayu Marca, considering the site to be a mythic doorway, multidimensional portal, or "stargate" to other worlds. They commonly recount experiences of feeling powerful energies, seeing unusual lights, having prophetic visions, or even citing UFO phenomenon there. In her online journal, shamanic practitioner Carla Fox described some incredible encounters upon visiting the site: "When I tuned into the Stargate... I started connecting with the energetic lineages of beings that resided there. I was drawn back through time and dimension, and thus labeling this a lineage of inter-dimensional Stargate travelers that could journey outside of time and space. They were androgynous in nature and were perfectly balanced... By embodying the energetic patterns that were now entering my heart through my back leaning up against the wall, I was re-membering more of my abilities of being able to travel in this way. This would include travel to any destination, even off-planet, multidimensional travel, being in many places at once, shifting the space-time continuum, slowing or accelerating time, and having a greater access to the quantum field."[7]

Is it possible places and sites on Earth are portals to other worlds, galaxies, planets, or higher dimensions? Could *La Puerta de Hayu Marca* be one of them, and if so, did those old legends hold some important truth lost in the past? Author Brent Swanser, author of *The Mysterious Universe* argues: "The ancient world is infused with all manner of mysteries that have perplexed us or faded into history, and among these remarkable inventions and displays of knowledge often shown by various peoples of the past, ranging from great feats of engineering, to strange devices, to remarkably accurate maps of the stars, and more. Often inexplicable and baffling, these curiosities demonstrate that, far from being primitives, these ancients often had access to technology and skills far ahead of their times. But some incredible artifacts, structures, and sites discovered around the world

seem to suggest that this knowledge may have passed even beyond that, to reach out into the world of science fiction and fantasy and hint at a possible ability to step through doorways in order to traverse time and space or somehow move through dimensions or worlds," referring to "the anomalous portals and stargates of the ancients."[8]

In his article, "Mysterious Portals and Stargates of the Ancient World," Swancer enumerates a number of doors to other dimensions speculated to have been built long ago. He writes about Bolivia's "Gate of the Sun" found within the ruins of the ancient city of Tiahuanaco. Once the center of a sprawling empire, the city was believed to be the location where the sun god Viracocha chose to create the human race. According to legend, he used its magnificent sun gate – made out of a monolithic block of stone with decorated etchings of winged figures in its archways – "to travel from one dimension or world to the other." Many believe the Gate of the Sun lies along the same ley line as that of *La Puerta de Hayu Marca*, and given the structures' architectural similarities (large square arches with a smaller rectangular doorway inside) mystics and esoteric archaeologists today wonder if they were somehow connected in design and function.

"Considering its role as an important ancient civilization, it is perhaps no surprise that Egypt should have its own stargate," writes Swancer. "Perhaps the most well-known of these is the site called Abu Ghurab, located at the Abu Sir Pyramids and just about a 20-minute drive from the Great Pyramid of Giza." This temple of worship to the sun god Ra, built by 5th Dynasty pharaoh Niussere around 2400 BC, is mostly rubble, but a giant platform fashioned from alabaster and shaped into the symbol of the hieroglyphic *hotep*, meaning "peace," might have served as a portal for Egyptian priests "to harness and channel certain vibrations and earth energies, to convey a kind of harmonic resonance, in order to create an enhanced sense of enlightenment and awareness of the universe. This supposedly allowed one to attune themselves to the universe and to directly communicate with sacred spirits of the universe called the *Neters*, which were beings said to have on occasion actually visited Earth, possibly through Abu Ghurab itself, essentially making it a stargate."[9]



FIG. 5 - ABU GHURAB - EGYPT

According to Swancer, other notable star portals include *Sakwala Chakraya*, otherwise known as "The Stargate of Sri Lanka," where unearthly-looking symbols etched into stone on a grid six-feet in diameter (with four accompanying stone chairs in front of it) represents "some sort of code-key to open a gateway between worlds, or even an ancient star map." Stargate author and researcher Elizabeth Vegh believes there is a portal that the Sumerian kings and gods used "to travel around the universe" hidden underneath the ruins of the Mesopotamian city of Eridu along the Euphrates River. Another Sumerian stargate is rumored to be located in a large ziggurat near Nasiriyah, 230 miles southeast of Baghdad, which has fueled tales of global government conspiracies.

Swancer writes: "The stargate was allegedly discovered in the 1920s, and when word got out that it was there and actually worked

many governments sent out expeditions to try and find it for their own purposes." Some claim the Anglo-Iraqi War of 1941 was used as an excuse to control the stargate, and in later years "that the United States actually launched the Iraq War of 2003 for the purpose of getting their hands on the stargate," worrying that Saddam Hussein himself may have learned how to harness its power. Swancer concludes: "There have been a few whistleblowers who allegedly have come out of the woodwork to confirm that the U.S. wanted access to this technology, including one Dan Burisch, who claims that he was part of a covert team that went into Iraq on a mission to find the portal."[10]

I have come to believe that most military bases in the US and around the world are located at or near earth energy power spots to tap into and control them. This came to me back in 1986 while on a journey to the enigmatic White Sands National Park in New Mexico that has a large Air Force base adjacent to it. I've come to see a similar relationship between the largest US Marine Base in Twentynine Palms, CA being next to Joshua Tree National Park. Both of these parks are noted by some people to be power spots of earth energies and it seems to be no coincidence that there are military bases next to them that are tapping into this. This may also be the reason wars are fought in various locations around the globe such as Vietnam, Afghanistan, the Falkland Islands and the Middle East; to gain control of these global grid points.

MAPPING THE WORLD GRID

Believing that the planet is connected by a vast web of subtle energy, scholars and ley line researchers have attempted to map these flow patterns in a model that they call the "World Grid." Plato first proposed that the basic structure of the Earth evolved from a matrix of geometric shapes known as Platonic Solids. He argued that the world's energy grid was shaped like a dodecahedron, composed of twelve regular pentagonal faces and twenty vertices on its surface, but that over time the planet would evolve into a more complex icosahedron (a twenty-faced polyhedron). Ivan P. Sanderson, a professional biologist from New Jersey, continued this study with advantage of modern communication technology and statistical data analysis. In 1972, he published an article entitled "The Twelve Devil's Graveyards Around the World" in *Saga* magazine where he tracked the triangular areas in the world where "physical anomalies" had been commonly reported amongst ships and airplanes. Places like the Bermuda Triangle and Devils' Sea east of Japan showed a heavy concentration of "space dilation," evidenced by compass misalignments, navigational equipment failure, and loss of radio contact due to the Earth's electromagnetic field. Sanderson cited five of these "Devil's Graveyards" or "Vile Vortices" in the Northern Hemisphere, five in the Southern, and one at each pole, forming an icosahedron with twelve vertices, as Plato had suggested.

An unusual team of Russian investigators added upon Sanderson's trailblazing work. Nikolai Goncharov, a Moscow historian obsessed with ancient civilizations followed an "intuitive pulse" to locate the centers of early human culture on a globe, discovering a possible pattern or "geometric regularity" behind their genesis. He teamed up with Vyacheslav Morozov, a construction engineer, and Valery Makarov, an electronics specialist, and made the next step in the formation of the World Grid. In the journal *The USSR Academy of Sciences*, they published an article titled "Is the Earth a Crystal?" which added a dodecahedron to Sanderson's grid pattern.

Inspired by these concepts, but feeling they were incomplete, husband and wife scientists Bethe Hagens (an anthropology professor) and William Becker (a professor of industrial design) applied the work of design-scientist Buckminister Fuller to the World Grid Model. They used his "Composite of Primary and Secondary Icosahedron Great Circle Sets" that Fuller utilized in his most widely known invention, the geodesic dome. Together, Hagens and Becker formulated what is largely considered to be a finalized model of the planetary energy grid, a Unified Vector Geometry 120 Polyhedron (UVG 120), also known as the "Earth Star."

Proponents of the Earth Star grid note that it accurately outlines the continents, various mountain regions, ocean currents, tectonic plates, and places of volcanic activity. Hagens and Becker claim that "the Earth [is] really a living crystal being with a geometric skeleton that could be mapped in its patterns of energy flows... ocean currents, the winds, river systems, and distributions of precious minerals. It even seemed that ancient humans had known this sacred, hidden body of the Earth, and sited their civilizations to take advantage of her very visceral powers."[11]

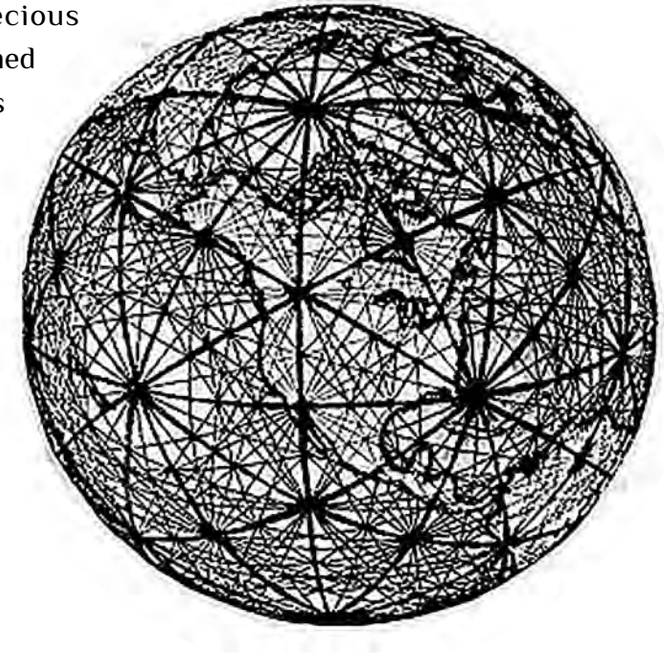


FIG. 6 - BECKER HAGENS EARTH GRID MAP

THE EMERALD MODEM

My research into the World Grid, and the placement of sacred sites along its ley lines, led me to Richard Leviton's 2004 book *The Emerald Modem: A Users Guide to the Earth's Interactive Energy Body*. While in England, Leviton, a senior editor at Hampton Roads Publishing and author of fourteen books on myth, metaphysics, and natural medicine, suddenly found his inner guidance leading him to energetically potent locations in the Somerset landscape. "I sat on hills and valleys and rocks under sunlight, moonlight, rain, snow and fog, and had visions. I started to see another landscape behind the apparent landscape. It was an apparitional landscape with stars, planets, galaxies, angels, spirits of Nature, mythic deities, and divinity."[12]

Leviton's journey would eventually bring about his own unique spiritual practice, the "Blazing Star Meditation," which enabled him to communicate with entities called the Ofanim, a family of angels believed to have assisted (alongside other higher dimensional beings) in the creation of the Earth. Receiving information from these heavenly voices, *The Emerald Modem* describes 85 interactive sacred features of the Earth, one of which contains all of them – an emerald green cube (the "Emerald Modem") that macrocosmically constitutes the totality of the planet's energy body and microcosmically is contained within every human's heart chakra. According to Leviton: "The Cube of Space is a cosmic jewel: a six-sided, double-terminated lovely green Emerald bigger than the entire planet and placed around it as a kind of master energy field." Leviton says it is "the Heart within the Heart, midway between the outer and inner heart chakras in the human. It is the place where the "Ultimate Divine" resides in each human. It is pure consciousness beyond space and time, transcending the Mind... Picture a double-terminated, two-inch-long crystal positioned vertically, at the right side of the sternum and you give yourself access to this arcane Heart."[13]

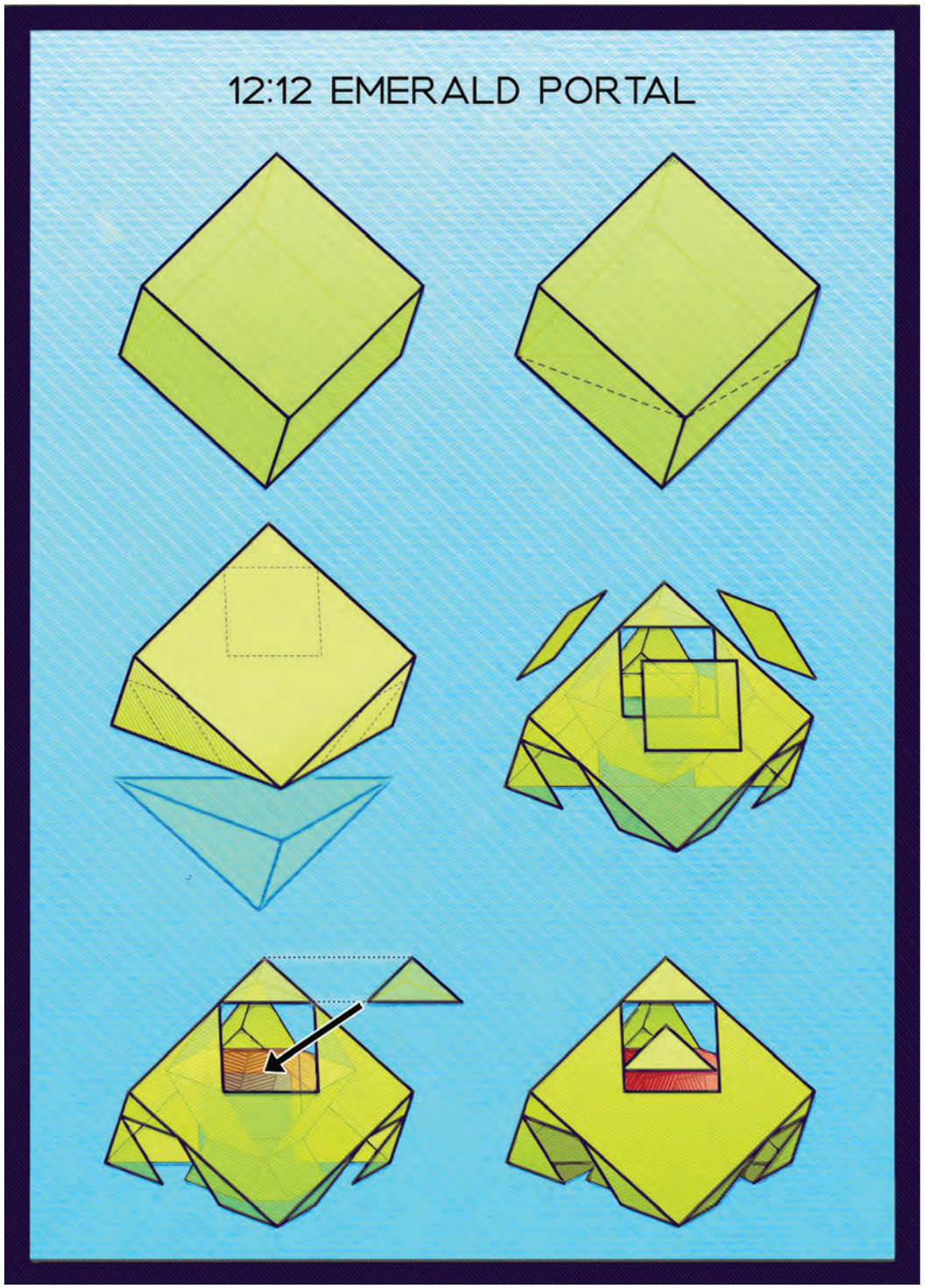


FIG. 7 - EMERALD PORTAL

Leviton makes the comparison that just as we use modems to connect our computers to the internet, we can utilize this etheric emerald green cube within our heart chakra to form a direct link to the total information of the earth's energy matrix, allowing us to commune with the underlying forces driving our planet's conscious evolution. He even explained how this Emerald contains the fabric of the entire universe. "The Cube of Space is the totality of the earth's geomantic body; we carry it within us as the Emerald, and this same Emerald or Cube of Space is the structure of reality."[14]

I read Leviton's work after burning the 11:11 Diamond Portal at Burning Man 2005. A friend suggested the idea of placing future Portal structures at different sacred sites on the planet to help channel and interact with the energy from these locations. Even though we consider places like Stonehenge and the Great Pyramid to be sacred power sites, in fact, every part of the planet is connected to the World Grid and has divine energies flowing within them. More important than location was the form the next Portal would take. My investigations drew me to the Emerald Modem's relationship with the earth's energy matrix and the human heart chakra, inspiring me to create my next Portal design. I started with Leviton's emerald green "Cube of Space," which is the same color as the first Diamond Portal, as well as the color of the heart chakra and all plant life across the planet – trees, grass, algae, moss. The main intent was to make an interactive space that would incorporate sacred geometry specifically designed to align and integrate participants' energy body to that of the Earth's.

Originally, I was planning to build it on the same scale as the Diamond Portal, sixteen feet on edge, but this would have made it extremely expensive to build and large and difficult to transport in sections, so the design was reduced to an eight-foot cube that I could afford and transport to Burning Man and other festivals. Starting with a cube, a rather plain shape in and of itself, I needed to find a practical way to enable people to inhabit and interact with the space, so I began by making a paper model and deconstructing it. As described in *The Emerald Modem*, I positioned the cube with its corners up and down and I removed the bottom corner along the diagonals of the lower three



FIG. 8 - EMERALD PORTAL - BURNING MAN - 2006



FIG. 9 - EMERALD PORTAL OUTLINE - BURNING MAN - 2006

faces to make the base an equilateral triangle that can sit flat on the ground (see Illustration). Square openings, almost touching the edges of the cube, were cut out of the upper three faces along the horizontal diagonals. A hexagonal platform connected these three openings so people could sit and gaze out across the views of the festival. A half cuboctahedron was created by connecting the three square cutouts between the openings below this platform, along with triangles between them. This sits on an inverted quarter cuboctahedron as a base. A backrest the same shape as the very upper corner of the cube was added to the center of the hexagonal platform.

I then cut three more square openings out of the bottom triangular faces, allowing access to the interior corner nooks that people could meditate in, hold healing sessions, have small cuddle puddles, or simply find shelter from Burning Man's intense sun and sand storms. Hidden within the central half-cube octahedron, the Quasar Wave Transducer produced soothing vibrations throughout the structure's sacred geometries activating the experience. It was on a timer that turned the QWT off for twelve minutes twelve times a day, leaving it on for 108 minutes at time between cycles, thus bringing 12:12 into a temporal experience during the course of day. I also welded a second Emerald Portal Outline out of square steel tubing that could be climbed on like a complex jungle gym. This version highlighted the Portal's geometry more clearly, showing the relationship between the 90^0 coordinate system of cubes and the 60^0 coordinate system of the internal cuboctahedron. The central half cuboctahedron in both versions was painted the same deep maroon of the Diamond Portal's central cylinder.

For Burning Man 2006, once again my campmates from Taos, New Mexico helped me build the Emerald Portal on the ancient dry lakebed ("the Playa") at 12:12 and a mile out from the central giant "Man" effigy. The enormous landscape is nearly inhospitable to life, and yet it provides a huge open canvas – a hard, flat expanse where every single item needed for the temporary city of 35,000 people (at that time, it has now grown to over twice that) had to be brought there and taken away with intention, "leaving no trace" behind. Burning Man

makes for an unusual surreal dreamscape where no commerce (except for the Center Camp Cafe and ice vending) or any type of corporate sponsorship or branding is allowed and the most imaginative creative artistic expression is encouraged from everyone attending. There is a saying there: “No Spectators Allowed”. It is a sacred and profane place where contemporary pilgrims across the globe come to contribute and experience outrageous art cars and large-scale art installations, festive costuming, pyro-technic revelry, late-night electronic dancing and diverse theme camps and workshops.

Starting in 1999 (the first year I attended), the city has been laid out like a clock face with radial streets every half hour between 2:00 and 10:00, a central open space with the towering effigy of “the Man” at the center, the memorial Temple structure at 12:00 o’clock, the communal gathering space of Center Camp at 6:00, and all other camps in the city between 2:00 and 10:00, leaving the space between 10:00 and 2:00 extending out wide open for art installations. I related this layout to a concept from radionics, an esoteric healing science where by using angles determined on a circular protractor, you can douse with a pendulum where to place various items such as crystals, medicines, or essential oils to help heal someone remotely. I chose to place the Emerald Portal along the 12:12 axis on the Burning Man clock (a next step from the 11:11 Diamond Portal) as this placed the Portal slightly left of the central axis of the city, just as the location of the human heart is slightly to the left of the human body’s central axis. The intent was for the Portal to serve as the heart of the city aligning the energy of the earth with the festival’s many participants.

After Burning Man 2008 the Emerald Portal was taken on a West Coast Tour to the EarthDance Festival in Mendocino County, Burning Man’s Decompression event in San Francisco, and the 2012 Conference in the Bay Area, where people outside of the Burning Man Festival could have the interactive and transformational experience that the Portal provided.

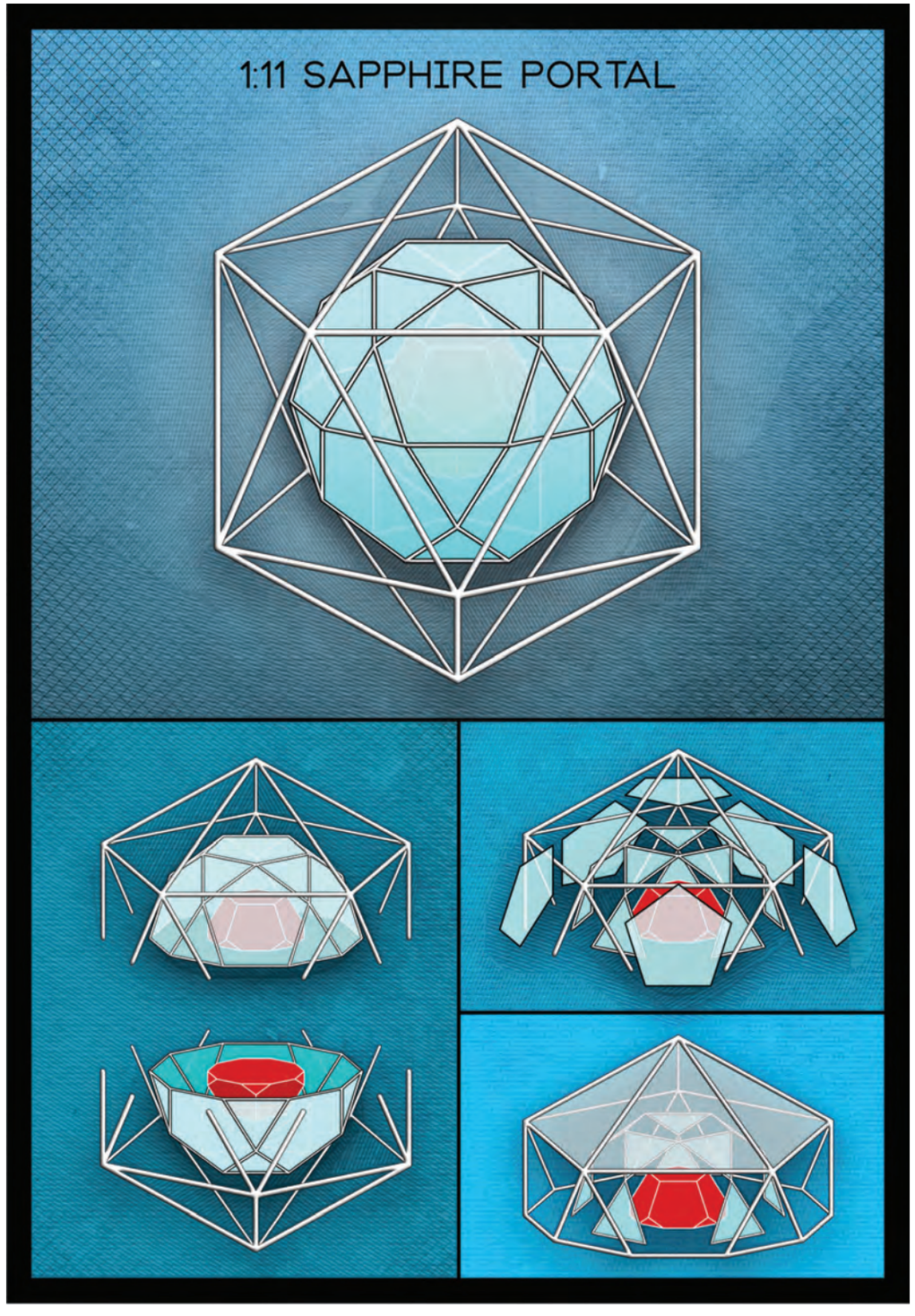


FIG. 10 - SAPPHIRE PORTAL

ETHERIC SKY BLUE DISH

I was inspired to create the design for the next Portal to bring to Burning Man in 2007 after reading the rest of *The Emerald Modem*. Based on the concept of "etheric blue dishes" from the book, the idea was to build an enormous sky-blue dish that would provide an environment of floating in the sky. In channeled visions, Leviton would see "A Blue Dish... a flattened parabolic dish made of light and placed like a tea saucer under the 'cups' of sacred sites. The idea was the



FIG. 11 - 1:11 SAPPHIRE PORTAL - BURNING MAN - 2007

angelic world sent down high consciousness and light vibrations like a gentle rain; humans grounded it... but it also reflected back up into the atmosphere for the sylphs to distribute in their realms."[15] Underneath megalithic circles like that of Avebury and Stonehenge, he saw an etheric blue dish made of light that not only collected high-vibrational energy for the benefit of those on earth, but mirrored it back up into the air. According to Leviton, "This regular circulation of angelic light through the sky grid helped to regulate not only the planet's weather, both global and local, but the quality and mobility of humanity's thought and the reciprocal effects on atmospheric conditions."[16]. Leviton believed ancient stone henges were harmonically constructed, where "the number of stones in a given circle was important in terms of the acoustic effect that circle generated. If we think somewhat metaphorically, of each stone as a musical instrument... the full array of these tones or sound (and their multiple harmonics) created a complex, three-dimensional wave-form shape, a cymatic structure."[17]

I didn't actually think I could realize a project of the size and magnitude of what I had envisioned, but when talking with my Burning Man campmate Doug Kaufman, a local Taos building contractor who had helped me construct the two previous Portals, he thought it was such a good concept that he committed to help me make this vision a reality, pledging to help fund and build it. We began to work on this enormous task in a large warehouse we rented in Taos. I wanted to build the 1:11 Sapphire Portal as large as possible so I designed it as a forty-eight sided "circle" using 4' x 10' foot sheets of plywood, making it over sixty feet in diameter. This ring wall was double-faced with the outer walls vertical and the inner walls sloped outwardly at 72^0 and painted sky blue. One five-foot-high opening facing due east allowed access to the interior sky blue carpeted space. Like the etheric blue dishes of the ancient megaliths, I envisioned the Sapphire Portal would be able to collect cosmic energy from the sky and distribute it among those who entered its sacred space. I also saw this as an upgraded activation from the Emerald Portal, since it moved up from the green color of the fourth/heart chakra to the blue color of the throat chakra. The fifth chakra is thought to be the energetic center of communication, creative expression, as well as a gateway to higher

intelligence, celestial connection, and some say a portal to the fifth dimension.

The open interior space needed some sort of interactive structures and shade to make it usable during the heat of the midday desert sun. I was inspired once again by a section near the end of *The Emerald Modem* where Leviton describes the Earth's energy body being comprised of all the Platonic solids, and that at this time in the planet's evolution, it's transforming into a more complex icosidodecahedron. As Leviton puts it: "the Earth grid would eventually morph into...an icosidodecahedron...a combination of the dodecahedron and icosahedron. It is more than just the superimposition of the two Platonic solids, which the now 'old' Earth grid exhibits. It is more like melting the two Platonic solids and regrowing a new crystalline shape out of their combined essence called the icosidodecahedron. This is the new shape of Earth, now being grown."[18]

I created three nested geometries, starting with half of a dodecahedron built from plywood and painted the same deep maroon of the centers of the Diamond and Emerald Portals, three feet high and seven feet wide, to house a Quasar Wave Transducer speaker which would vibrate the structure from its central location, as well as have speakers placed throughout the outer wall to vibrate the entire space. This was surrounded by the key element, half of an icosidodecahedron made from square steel tubing with the ten triangles covered with stainless steel mirrors, approximately twelve feet wide and six feet high. Synchronistically the icosidodecahedron is composed of twenty triangles and twelve pentagons, referencing the number 2012 which is the year of the highly prophesied shift at the end of the Mayan calendar. This key element made it possible for participants to inhabit the evolutionary geometry of the Earth's energy body and align their energy body to it. These two concentrically nested geometries at the Portal's center were then surrounded by a half icosahedron steel tubing structure covered in aluminet shade cloth, which was thirteen feet high and twenty feet in diameter, to provide respite from the blazing Nevada sun.

The Sapphire Portal was placed at the 1:11 position on the Burning Man layout to continue in the numbering sequence of the previous two Portals and located as far out as possible near the perimeter fence, well over a mile from the central Man, making it a remote destination on the fringe of the city. Since this project had a substantial budget, we were fortunate to receive partial funding from the minimal techno DJ group Wolf + Lamb in exchange for them being able to host sunrise dance parties inside it. They had a special request to experience the sunrise cresting the distant flat horizon, so I created a 28-foot section on wheels that was able to open the sky-blue dish at dawn. Once the sun was well above the horizon, the wall was closed again. Perhaps not so different from the etheric blue dishes of the ancient stone circles, participants witnessed the glowing orange sunrise shine it's dawning rays into the Sapphire Portal as the music of the DJs and energy of the dancers collected and resonated harmonically throughout the installation.

After Burning Man, the central section of the Sapphire Portal was exhibited in Taos for two months under a grant I received from the State of New Mexico Art in Public Places program, which sponsored a different town and theme each year. It just so happened that Taos was chosen for 2007 and the theme was "The Earth," which the concept of the piece fit perfectly. The entire Sapphire Portal returned to Burning Man in 2008, where instead of DJ dance parties, I hosted several sound healing sessions called "Galactivations" conducted by Jonah Kai and his friends using didgeridoos, Tibetan and crystal bowls, drums, flutes and other instruments that played along with the Quasar Wave Transducer. The outer wall was destroyed in an intense windstorm the very last night of Burning Man 2008. The central geometries have gone on to be installed in many other locales after Burning Man – EarthDance in Mendocino, the Beloved Festival in Oregon, Symbiosis on Lake Woodford, RainDance in the Santa Cruz hills, Lightning in a Bottle in Southern California and Lucidity in Santa Barbara – to name just a few.

The intention for visitors interacting with the Portals is for them to have the ability to connect to the Earth's evolution and

understand their place and relationship with the planet much more in-depth, and by doing that, they would hopefully then have greater respect for the Earth and make choices to live in sustainable harmony. I realized that the Emerald and Sapphire Portals served as interactive instruments that could be used to facilitate a person's inner awakening, aligning them with the conscious evolution of our world. Visitors have shared testimonials of their profound experiences interacting with the Portals – tales of feeling connected with the Earth, of feeling soothed to a deep state of peace and healing, activating chakras, even communicating with members of distant "star families."

Archaeological evidence indicates that ancient civilizations had a deep understanding of the Earth's energy system, which they interacted with through a vast grid of megalithic sites around the planet. Modern civilization has dammed up rivers, decimated forests and paved over our sacred meadows and valleys with highway systems, losing much of that knowledge today. But a new awareness is coming into being, an awakening of evolved consciousness that recognizes and remembers this ancient knowledge: in places and gatherings like the temporary city of the Burning Man Festival in Nevada and numerous other transformational festivals around the world; intentional communities like Findhorn in Scotland, Tamera in Portugal and Damanhur with its amazing temples hand dug into the Italian Alps; and the experimental township of Auroville in south-India that is a universal city in the making. Humanity is beginning to remember our connection to the Earth's energy grids, learning once again how to access and harness this understanding through both ancient wisdom and modern technology. We are coming to understand that what we think and feel can significantly influence the environment around us and that our collective actions as a species can help bring our world into greater harmonic alignment.



FIG. 12 - MODEL OF AUROVILLE - INDIA

CHAPTER 4

THE PORTALS:
SHIFT TO THE 5TH DIMENSION

ACTIVATING THE CHAKRAS

The Portal installations that I create serve as multidimensional alignment tools to interface between the Earth's energy field and that of the human energy body. Across the globe, yogis, shamanic practitioners, and spiritual teachers see our body as having seven primary energy centers, known as chakras, that both receive and transmit universal energy into our physical form. In Sanskrit, the word chakra means "wheel" or "disc" and according to many wisdom lineages, they connect and interface our three-dimensional body with the subtle energies of the cosmos. According to Anodea Judith, bestselling author of *Wheels of Life: The Classic Guide to the Chakra System*: "Chakras are organizing centers for the reception, assimilation, and transmission of life energies. Our chakras, as core centers, form the coordinating network of our complicated mind/body system. From instinctual behavior to consciously planned strategies, from emotions to artistic creations, the chakras are the master programs that govern our life, loves, learning and illumination. As seven vibratory modalities, the chakras form a mythical Rainbow Bridge, a connecting channel linking Heaven and Earth, mind and body, spirit and matter, past and future. As we spin through the tumultuous times of our present era, the chakras act as gears turning the spiral of evolution, drawing us ever onward toward the still untapped frontiers of consciousness and its infinite potential."[1]

The Rainbow Bridge she describes refers to the red, orange, yellow, green, blue, indigo, violet color spectrum of these energy portals as they rise up the central energy channel, the *Sushumna* column, from base of the perineum to the crown of the head, each pulling in life-sustaining power through a spiral or vortex motion. Each chakra vibrates to a specific vowel sound and corresponds to different aspects of human consciousness, psychological aspects, and bodily functions as well as each of the elements. The red root chakra (*Muladhara*) at the base of the spine has masculine energy relating to the element of earth and aspects of our survival, security, and primal awareness. The second orange "sacral chakra" (*Svadhisthana*) is a feminine energy corresponding with the element of water and our sexuality. The third yellow solar plexus chakra (*Manipura*) is

associated with fire and is the seat of willpower, dominance, and control. These three chakras comprise the lower physical aspects. The fourth heart chakra (*Anahata*) is green, embodies the element of air, is the center of unconditional love and compassion, and is the bridge between the lower three and upper three chakras. The fifth throat chakra (*Vishuddha*) is the first of the upper three spiritual chakras connecting the heart to the mind, is blue in color, has a masculine energy and is associated with the element of sound and our ability to communicate and express ourselves creatively. The sixth chakra (*Ajna*), also known as the third eye, is indigo, connects to the element of light and governs our psychic and intuitive abilities to see beyond the 3D material world into higher dimensional realities. The seventh crown chakra (*Sahasrara*) at the top of the head is seen to be either violet or white and connects us to our spiritual nature and divinity. As we evolve, both as individuals and as a collective species, we move up the spectrum of this inner multidimensional reality. The "warmer" colors, such as the red, orange, and yellow of the first three chakras maintain a lower frequency than that of the "cooler" colors of blue, indigo, and violet of the upper chakras. When we activate the subtler frequencies of the upper chakras, like a divine radio tuner, we become aligned to (and therefore can readily receive) the higher frequencies flowing through our universe.

Many believe that over the last 10,000 years of civilization, humans have been caught in a third-dimensional, hyper-masculine control of power reality corresponding to the third chakra. As *Wheels of Life* author Anodea Judith states: "From the perspective of the Chakra System, the challenges that face us today can be understood as the passage through the chakra most associated with transformation itself, the fiery third chakra. We are burning the fuel of the past to illuminate the path of the future. Chakra three represents the current dominant values of power, will, energy and aggression, ego and autonomy, that must be incorporated, resolved, and transcended in our journey to the next level, chakra four, the realm of the heart, with attributes of peace, balance, compassion, and love. We can look at this passage as a collective ritual of 'coming of age in the heart'."[2]

The Portal installations are a form of sacred technology intended to assist humanity to enter the heart-based consciousness

that Judith articulates. This is a shift to a new dimension of being, where every human on Earth recognizes the sacredness and oneness of not only all life, but all of existence, so that they treat everything and everyone with empathy and respect. There seems to be a bifurcation or split taking place in the evolution of humanity at this point: one path is heart-based and organic in nature, embodying the principle of unconditional love (which some are describing as "fifth-dimensional ascension"), while the other trajectory is dominated by a dogged adherence to a third-dimensional control matrix, which can be seen in a long history of imperialism and human warfare, even in contemporary society's over-obsession with artificial intelligence and transhumanism. As Judith says: "From the patriarchal domination of the Iron Age through the rising Scientific and Industrial revolutions, two world wars, and countless other violent skirmishes, to the current creation of spacecraft and computer technology – the third chakra characteristics of aggression, technology, and political power still haunt us today. Issues of power and energy, excessive control and domination of others, are paramount in today's current events."[3]

But the evolutionary fires of western civilization – from the making of candles to the burning of fossil fuels to the crucible of the Atomic Age – are propelling us up the Rainbow Bridge, out of egoic self-centeredness and into the higher vibrational fourth chakra, green like the color of life, lighter in its elemental principle of air, and connected to infinite compassion, universal forgiveness, and the reconciliation of opposites through the power of love. In western alchemy and gnostic Christianity, the heart becomes the center point of the cross, the central valve of the human energy system, where the vertical and horizontal spiritual-electric currents meet in a divine alchemy seen in the Flaming Heart of Jesus. It's the place where the above and below, good and evil, and polarity consciousness itself dissolve into awakening and unification. The heart chakra is the answer to a riddle, and a heavenly promise, proclaimed in the oldest gnostic text, *The Gospel of Thomas*: "When you make the two one, and when you make the inside like the outside and the outside like the inside, and the above like the below, and when you make the male and female one and the same, so the male not be male nor the female female... then you will enter the kingdom."[4]

THE 2.22 AMETHYST AND HEART STAR PORTALS

At first, the Diamond Portal's chartreuse green color was chosen through synchronicity. Once I realized the Diamond Portal's connection to the heart chakra, I carried this over to the Emerald Portal with the intention of it opening the fourth chakra's evolutionary powers to transcend and unify, helping people to leave the mundane struggle of 3D consciousness behind. Maureen J. St. Germain, author of *Waking up in 5D: A Practical Guide to Multidimensional Transformation* describes this change in both a personal and global perspective: "The original purpose of third dimension was to explore the vast variety that polarity can provide. Just imagine the amazing variety we have explored around the extremes of polarity. This cycle has ended, and we are winding up the way we did things in third dimension. Things have changed, the rules have changed, and it's not the same game we've been playing for eons. This means that our way of thinking (good versus evil), our way of doing (one person above another), and our way of being (everyone for him or herself) are changing."[5]

Over time, I came to understand the Portals as a journey through the chakras, each one being a "sculptural stargate" to connect participants into new dimensions within themselves. After the first two green heart-based Portals, I moved up the Rainbow Bridge to the blue hue of the throat chakra, the color of the sky, and the etheric blue dishes of the Earth's energy body that inspired the development of the Sapphire Portal.

The next Portal for 2009's Burning Man Festival was designed through a collaborative process. The first four years that I had brought Portals to Burning Man, from 2004 to 2007, I had the help of my friends who I camped with from Taos, NM. For 2008 all of my Taos campmates who previously assisted me were involved in another project, so I formed my own group and camp to bring the Sapphire Portal back. This was the beginning of what I called the "Portal Collective," gathering together people who were interested in helping create and bring Portal installations to festivals and events.

Casey Greenling, a raw food chef and visionary artist from New Mexico had been inspired ever since experiencing the Emerald Portal became the first member of the Portal Collective. He suggested that this next Portal be indigo in color to resonate with the third eye chakra, and based on a stellated dodecahedron, both of these being a progression from the color and geometries of the Sapphire Portal. The stellated dodecahedron contains another relationship between the dodecahedron and icosahedron (the two geometries featured in the previous Sapphire Portal): connecting all of the vertices or points of the stellated dodecahedron makes an icosahedron. Ronald L. Holt, director of the Flower of Life organization, explains the shape's significance in the following quote: "The Stellated Dodecahedron holds the template of all the preceding templates expressed as geometric forms. It is an expression and model of integrated completion and coherent unity of all the foundational templates. The Stellated Dodecahedron stimulates us to evolve into self-realized conscious awareness with our open heart and with high levels of impeccability, self-responsibility and integrity. It also helps us integrate and harmonize a true group unity."[6]

The activating potential of the sixth chakra can be witnessed in the global phenomenon of "indigo children." For the past few decades, it's believed that highly psychic and intuitive beings have been incarnating on Earth in waves. With the resonant frequencies of their indigo auras, or energy bodies, their presence alone helps elevate people and the planet into higher states of consciousness. "An Indigo Child is an upgraded blueprint of humanity, a term that came up when addressing the aura colors of these very different kids. Previously, auric fields were expected shades of the rainbow, but the Indigos' field was dominated by a royal blue color, establishing a change of course for humanity. Gifted souls, on a clear mission to challenge and shift reality, they first began appearing in the 1970's. Beyond psychic awareness, they are highly driven and creative with a perception that sees through the established norms of society. Old souls indeed, their mission is clearly laid out to shake up the modern world and pave the way for future generations to create greater peace and harmony for all."[7]

I took on Casey Greenling's inspiration for an indigo-colored stellated dodecahedron and began the task of turning the concept into a fully interactive, large-scale installation called the 2:22 Amethyst Portal. I worked a long time trying to design it as the complete shape but couldn't figure out how to make the structure stable and enable people to access the interior, so I decided to remove one of the twelve stellations for the shape to sit firmly on the ground and allow easy access to the interior space. All previous Portal structures were made either of wood or steel. For this design I combined these and built a steel frame in eleven sections of each stellation that bolt together and could be easily transported by nesting them inside each other like paper cups. The outer plywood panels were screwed into wood framing that was attached to the steel pipes. The interior was painted the chartreuse green of the first two Portals to connect the third eye back to the heart chakra. As the indigo color activates the more intuitive and psychic awareness of the third eye chakra, it is important to connect that energy back down to the heart chakra to integrate it into the body. The size of this Portal was determined by the size of 4x8 foot plywood sheets with each triangular facet being 4 feet wide. This made the entire structure approximately seventeen feet across and fifteen feet high. The interior was large enough to hold sixteen people or more that were vibrated by the Quasar Wave Transducer concealed beneath the floor. Indigo LED lights were mounted on the outside tips of the upper six stellations and chartreuse green LEDs illuminated the inside from the corners of these tips. In the spring of 2009, I first built a steel tubing Amethyst Portal Outline of a stellated dodecahedron using 10-foot steel pipes painted indigo for the Figment Festival on Governors Island in New York City. The full-size version was then made for Burning Man 2009 that summer in a warehouse space rented in Taos, New Mexico.

Following the synchronistic numbering of the Portals, the installation was located at 2:22 on the festival map, which meant the Amethyst Portal would be placed within the center of the city and not in the outer playa a mile or more out from the Man where all the previous Portals had been. This made the Portal in very close proximity to the loud dance camps, the effigy of the Man, and numerous other

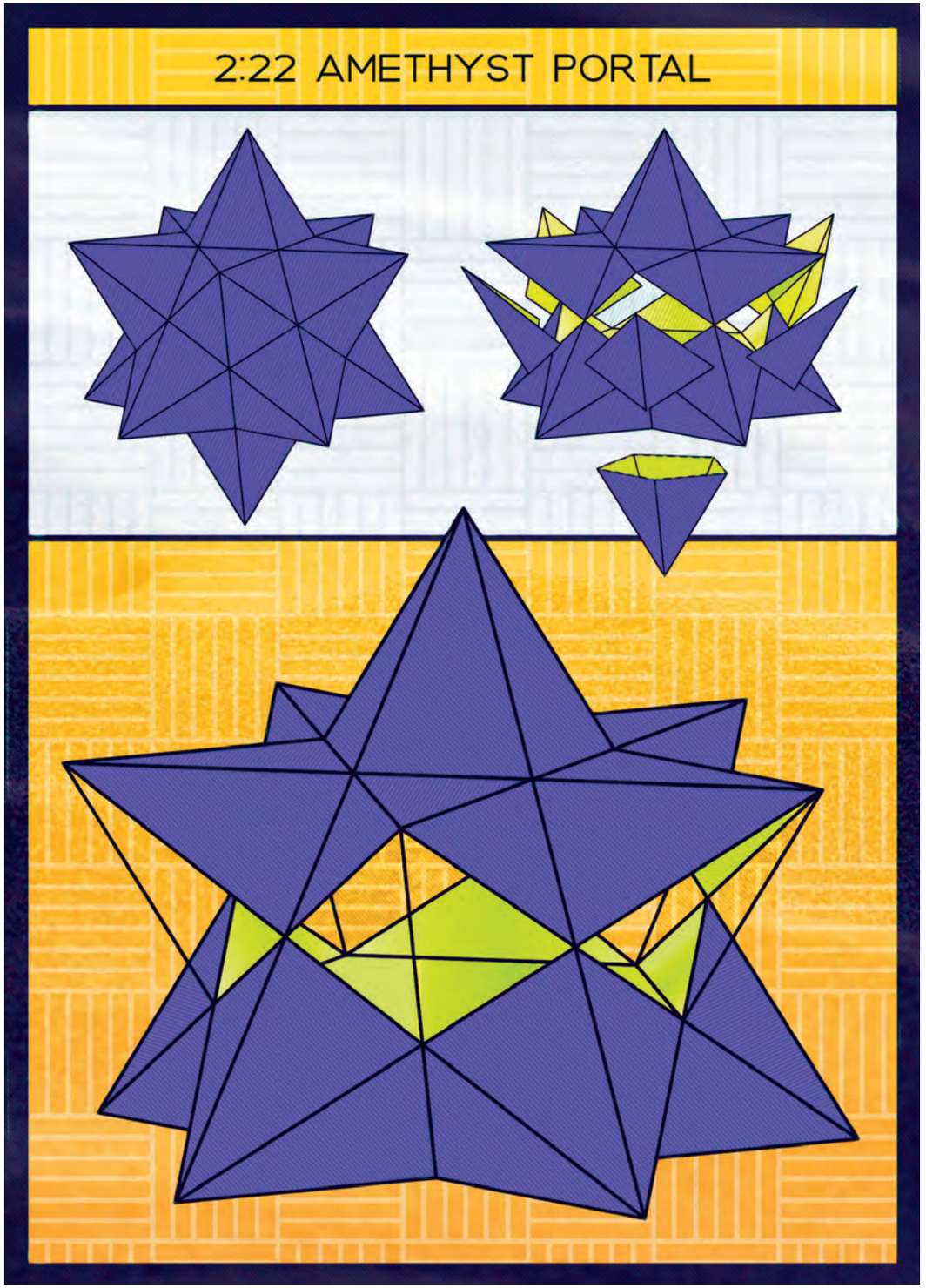


FIG. 1 - 2:22 AMETHYST PORTAL



Fig. 2 - 2:22 Amethyst Portal - Burning Man - 2009

After returning from the 2009 Burning Man Festival, I was inspired to combine the five-pointed star plan of the Amethyst Portal's stellated dodecahedron with the original Diamond Portal shape to create the Heart Star Portal. Having five points instead of the original two, while keeping the Diamond Portal's angle of a seven-pointed star (51.43^0), it retained the same colors and golden ratio relationships of the original design. A sixteen-foot tall version was proposed to be built for Burning Man that would have a five-sided curved interior space to climb up into with the Quasar Wave Transducer vibrating it from inside, but that hasn't been realized yet. However, I did build a 10-foot tall steel tubing "Outline version" in 2010 for Burning Man that has gone on to numerous other festivals. This Heart Star Portal Outline has incredible ergonomics for people to climb on and do three-dimensional acrobatics, dance, and yoga. I displayed it at the Whole Earth Expo in San Francisco in 2011 where aerial yoga instructor Jen Healy bought one for her to teach and train her unique form of 3D movement to students and practitioners on what she called a "Quantum Playground." In 2012, I mounted a new Heart Star Portal on top of my van to serve as a Burning Man art car. Disguising the van in matching chartreuse fabric, the Portal became a mobile art installation affording great views of the festival, and the burning of the Man.

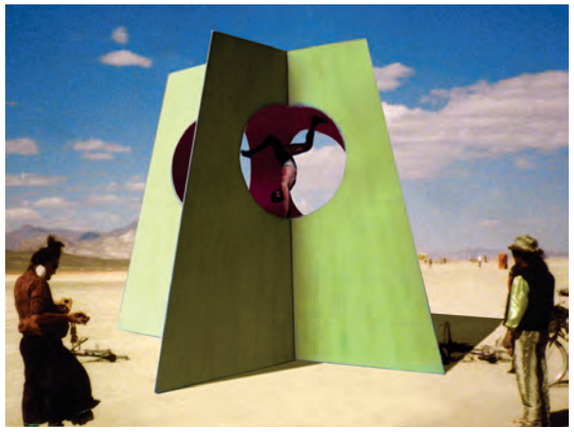


Fig. 3 - Heart Star Portal Simulation



Fig. 4 - Heart Star Portal Mobile - Burning Man - 2013

THE OCTAPORTAL: HOLON OF BALANCE

While still living part-time in NYC I was asked to contribute a piece to the Burning Man inspired Transmutation party in Brooklyn New York for New Year's Eve 2009/10. I had recently been introduced to and studying sound healer Tom Kenyon's website and was greatly influenced by his channeled work with the Hathors, a group of beings who Kenyon describes as "interdimensional" and "intergalactic," connected to ancient Egypt through the Temples of the Goddess Hathor, as well as several other ancient cultures. Kenyon channels their meditations offering assistance on the shift we are going through. He is guided to use his voice to create sound healing meditations to assist in this global transformation. I was inspired by the Hathor channeled "Holon of Balance" meditation that instructs one to visualize an octahedron around yourself to assist in transiting the chaotic Earth changes taking place as a result of the planetary evolution we are going through. This message resonated with me deeply, as I had been thinking of the Portals as being akin to lifeboats that can transport us from the sinking ship of the 3D Industrialized Technocratic world to the shores of a New Earth of sacred beauty and harmony, inspiring me to create the OctaPortal for this event.

According to Kenyon's channeled information: "Holons are created in the realm of your mind or imagination, but they compel energy to flow in distinct ways... [They] are specific geometric shapes that are third dimensional in nature and affect consciousness in specific ways... all aspects of the self, including bodily intelligence, i.e. DNA." The Holon of Balance Meditation is based on the platonic solid of the octahedron, consisting of two square-based pyramids connected at the base with one pyramid pointing down and the other pyramid pointing up. Kenyon notes that "this specific three-dimensional geometry occurs naturally in nature, especially in the forms of some crystals, atomic and molecular bonds. It is, by nature, a very stable shape. It is, esoterically speaking, the meeting and balancing of male and female polarity, heaven and earth. In order to create this holon, you sense or imagine a line that goes through the top of the head down

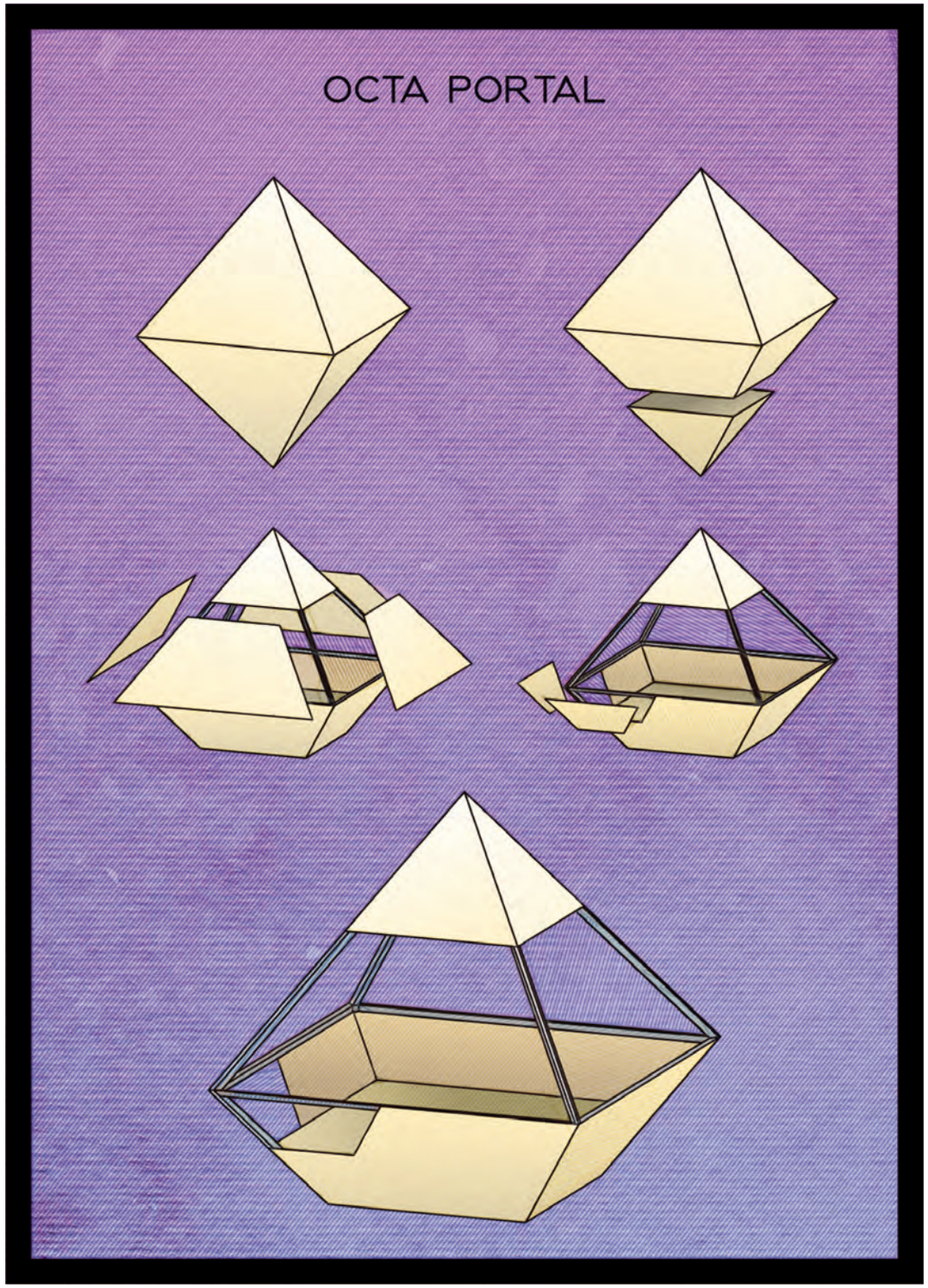


FIG. 5 - OCTAPORTAL

through the center of the body, down through the perineum past the feet. The central line is the axis of the octahedron." This ascension tool is meant to "impart feelings of comfort and safety... and compel the subtle energies within you to reach toward a state of balance."[8]

Inspired by the Hathors' "Holon of Balance," I built a 10-foot octahedron truncated at one vertex so it can sit with a vertex point up, constructed out of 2x4 lumber and plywood, making it economical and relatively easy to build. It had a Quasar Wave Transducer under the floor vibrating it with low-frequency feedback and the edges were outlined in electro-luminescent wire for night-time lighting. The Transmutation party was held in a 26,000 square-foot warehouse in Sunset Park, Brooklyn. Crowds packed in for the New Year's Eve extravaganza and the OctaPortal made for a cozy, meditative nook and sacred geometrical chill-out space for the all-night event. After the event the Portal found a permanent home in the backyard of a space that had been rather synchronistically named "The One Love Portal" in Bushwick, Brooklyn. Here, they hosted conscious gatherings and workshops for activating psychic abilities, using crystals, calling in

guides, and connecting with higher dimensional intelligences. One evening the hostess LQ turned to me and said intuitively, "Harlan, you are the Portal, and your work is an externalization of who you are!" When she said that I considered how all humans are potential Portals made of universal sacred geometrical vibrational fields and flowing with multidimensional energy.

The smaller size and economy of materials of the OctaPortal made it easily reproducible, so I was able to build one in the UK for the Secret Garden Party festival in July 2010 on my way to the Boom Festival in Portugal, where the Amethyst Portal had been shipped to be displayed there in August. I produced a third one for the Moksha gallery to exhibit during the Art Basel Miami Art Fair Dec 2-5, 2009 and made a fourth one for Burning Man 2011 that went on to the Melonites Festival in Green River Utah and the Evolver "Conscientia" retreat at the Boulder Mountain Guest Ranch in Utah. A fifth one was commissioned in 2013 for a private residence in LA and I built a sixth one for the 2017 Okeechobee Festival in Fla.

FIG. 6 - OCTAPORTAL - BURNING MAN - 2011



2012 - THE 12:21 TURQUOISE PORTAL

The Mayan Calendar serves as a gateway into the rich and complex Mayan understanding of the cyclical nature of time, the cosmos, and consciousness itself. Unlike the limited, linear Gregorian calendar, which only marks our planet's 365-day rotation around the sun (with a leap day thrown in every fourth year), the Mesoamerican Mayans take on a multidimensional perspective of time with three interlocking calendars. The *Tzolkin*, meaning "the distribution of the days," is their "Divine Calendar," or "Sacred Round," a 260-day calendar with twenty periods of thirteen days, used to determine when spiritual and ceremonial events take place. The solar calendar or Haab has 365 days made up of eighteen months of twenty days each, which adds up to 360 days with the remaining five days at the end of the year considered an unlucky, dangerous time known as the *Wayeb*. Together, the *Tzolkin* and *Haab* form "the Calendar Round," which repeats in 52-year intervals, and is still used among some of the Maya living today.

The Long Count is an astronomical calendar, with each universal cycle lasting 2,880,000 days. The beginning date of this calendar has been determined to be August 11, 3114 BC. In an article for the American Association for the Advancement of Science, writer Susan Borowski explains: "The date marks the creation of human beings, according to the Maya... Mayan time is marked in days (one day is called a *kin*), periods of 20 days (a *uinal*, or 20 kin), 360 days (a *tun*, or 18 *uinal*), 7,200 days (a katun, or 20 *tun*) and 144,000 days (a *baktun*, or 20 *katun*). December 21, 2012 marks the ending of the 13th *baktun*, which ends the Long Count cycle of 5,126 solar years. A typical Mayan date would be a combination of all three calendars, for example: 13.0.0.0.0 4 Ahau, 8 *Kumku*. The 13.0.0.0.0 is the Long Count date, 4 *Ahau* is the Tzolkin date, and 8 *Kumku* is the Haab date. At the end of the 13th baktun, the Long Count calendar resets to 0.0.0.0.0. The ancient Maya reportedly believed that with each end of the Universal cycle, the Universe *itself* would 'reset' by ending and starting over — not just the calendar — hence the doomsday interpretation."[9]

The end of the Long Count, on the winter solstice of December 21, 2012 created a global wave of interest, "the 2012 Phenomenon," which influenced a large number of the world's population. While survivalists packed up supplies for the worst of doomsday scenarios and a *2012* titled Hollywood blockbuster shook audiences with cataclysmic solar flares, massive earthquakes, and megatsunamis destroying cities, a number of mystical investigators, transformational authors, and a rising consciousness movement saw this as a significant moment, a temporal portal, for rebirth from the destructive ways of the old world towards a more magical and sustainable existence of the new world. Author John Major Jenkins propagated the concept of a 2012 "galactic alignment" when "the position of the solstice sun will be aligned with the Milky Way galaxy. This solstice-galaxy alignment is a rare occurrence, happening only once every 26,000 years" with December 21, 2012 having a "formative influence on human evolution."[10] Terence McKenna, the author of *The Archaic Revival* and *True Hallucinations*, saw a planetary shift in humanity based on the *I Ching*, fractal patterns in time, and novelty theory that culminated in an evolutionary phenomenon called "Timewave Zero" on the 2012 winter solstice.

For the cresting transformational wave of the 2012 movement I was inspired to create the 12:21 Turquoise Portal. At first what guided me most was the idea of being bathed in the very soothing energy and high vibrations of the color turquoise. Turquoise is the color of the higher heart chakra, which is being activated in humanity as part of this global shift. The previous Portals had started with the green of the heart chakra and progressed through blue of the throat chakra and indigo of the third eye, with the interior returning to the green of the heart chakra, so this progression to turquoise of the higher heart was in perfect order. The Portal's geometry would be based on the rhombic triacontahedron that I first learned of in Drunvalo Melchidezek's *Birth of a New Humanity* documentary, released in 2010. In it, he explained how the Earth's vibrational energy grid from the beginning of time has been evolving, with each new geometrical pattern reflected in the life and consciousness inhabiting the planet. According to Drunvalo, the planet's energy grid is currently evolving

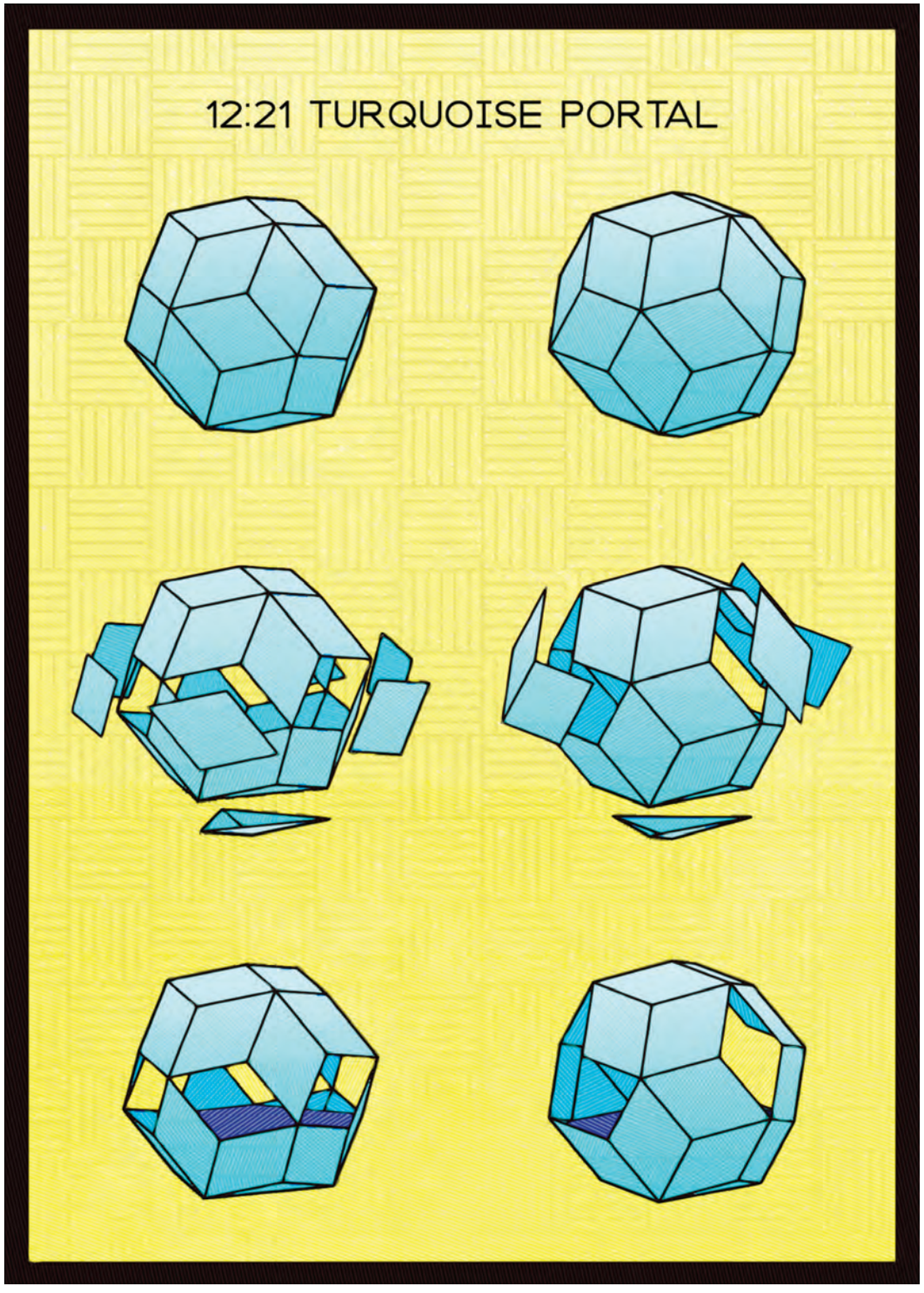


FIG. 7 - TURQUOISE PORTALS

into a rhombic triacontahedron, a geometry that will bring humanity's consciousness into harmony and balance with the entire Earth, as opposed to the current geometrical energy grid that has held humanity in separation and conflict.

This evolution of the Earth's energy grid is a key to the transition taking place. The rhombic triacontahedron consists of thirty rhombic (or diamond) facets. The diagonals of the faces are in golden ratio, with the shorter ones making a dodecahedron (twelve pentagons) and the longer ones making an icosahedron (twenty triangles), thus containing another relationship of the geometries that were utilized in the previous two Portals. I chose turquoise for the color of the outer shell to stimulate the evolution to the higher heart chakra and indigo for the floor inside to reconnect this energy to the third eye (sixth chakra). I chose 12:21 to relate it to the end date of the Mayan Calendar, 12/21/2012, and the galactic alignment predicted to take place. 12:21 is also the mirror next step from the original 11:11 of the first Diamond Portal.

For the beginning of 2012, I was invited to bring the Turquoise Portal to the Earth's Southern Hemisphere, creating this sacred geometry for the Australian festival scene. I received a dual commission to install the 12:21 Turquoise Portal at the Rainbow Serpent Festival outside of Melbourne in January and the Earth Freq Festival near Brisbane in February. I flew there on Christmas of 2011 to attend the week-long Woodford Music Festival near Brisbane, with no idea where or how I could construct the Portal the following month. Through a series of synchronicities, I was introduced to the visionary eco-community Starseed Gardens in Byron Bay where I was able to construct the installation. Its two-dozen residents held a unique mission: "to create abundant systems of perpetual renewal, build community, teach and model productive living systems and share knowledge with the world."[11] Starseed Gardens was built in and around an old abandoned hog farm and they rented me one of their large sheds where I could construct the Portal while I camped in a bamboo grove. Unfortunately, hail had greatly damaged the roof and frequent rainstorms poured in throughout my time there. With the assistance of

a resident who was a set designer and dome-builder, Marti Wizdome, we persevered through the flooding and the Portal came together in just one week.

Marti was unable to help me make the two-day drive across Australia to the Rainbow Serpent Festival outside of Melbourne and build the installation there. I was fortunate that another Byron Bay local named Andrew Onto showed up to assist me in this endeavor. We arrived several days before the festival started with a small crew I had assembled to set up the Portal in time for opening day, January 27, 2012. Over twenty-thousand participants came for the world-class line-up of music, art installations and transformational speakers from around the globe. It had grown from a small gathering in a secluded clearing to an "internationally recognized, multifaceted weekend of dance, colour, expression and celebration." Rainbow Serpent featured over 100 musical artists, performers, and transformational workshop leaders. We placed the 12:21 Turquoise Portal in a central location, and upon its completion, a team running a nearby crystal meditation dome gave an activation blessing and opening ceremony for the installation. The piece had six facets around the perimeter open to allow people access to the interior space. Once inside, participants experienced the floor vibrating with the Quasar Wave Transducer and were surrounded by the structure's geometry and its higher-heart-chakra turquoise color.

After Rainbow Serpent, we brought the installation back to Starseed Gardens where an event was held with Android Jones doing live digital video painting projections on it accompanied by the master ambient musician Robert Rich. From there it went to the Earth Freq Festival, a smaller intentional gathering with a focus on "creating a meaningful space to raise awareness and share useful information on environmental issues and sustainable lifestyle choices, consolidate community bonds, and provide a positive and transformative festival experience in the beautiful Australian outdoors."[12]

After my two-month visit to Australia, I traveled for another month to nearby Bali, then returned to my new studio warehouse in Grass Valley, California to build a second 12:21 Turquoise Portal. I

developed a different configuration for this one with the help of a good friend who I met through the Sapphire Portal at Burning Man, Lewis Kofsky. He modeled the shape using 3D software and experimented with leaving out different faces to access the interior, settling on a design with only five facets being removed for a bilateral symmetry similar to a human head. It debuted at the Symbiosis Pyramid Eclipse Festival at Pyramid Lake, Nevada in April. The gathering brought in popular musical acts, DJs, and speakers in the transformational scene. I was included in this lineup to present on the Sacred Geometry of the Portals and gave my talk to a full house of several hundred people. The 12:21 Turquoise Portal was featured at fourteen more events the following two years.



FIG. 8 - 12:21 TURQUOISE PORTAL - BURNING MAN - 2012

NEW EARTH GRID STAR: DEC. 21, 2012

For the long-prophesied day of December 21, 2012, I arranged to build a Portal installation at the Synthesis Festival taking place outside of the ancient ruins of Chichen Itza in the Yucatan Peninsula of Mexico. Inside that vast stone Mayan complex still stands the Temple of Kukulkan, a stepped pyramid rising ninety-eight feet in height and measuring 181 feet on each side of the base in honor of the deity of Kukulkan, the winged-serpent god predicted to return to earth during the Earth's great galactic alignment in 2012. Kukulkan is thought to symbolize a balance of energies where Earth (the serpent), and Heaven (the wings) unite in perfect alchemical harmony. This is represented most profoundly during the spring and autumn equinoxes when sunlight hitting the pyramid structure creates a descending serpent shadow that dances down the edge of the staircase. God has finally come back to Earth.

I arrived at the festival grounds near Chichen Itza before the festival began, planning on creating a geometric dome structure twenty feet in diameter based on the golden ratio icosahedron and dodecahedron contained within the rhombic triacontahedron. This would focus on the underlying significant aspect of the 12:21 Turquoise Portal's geometry without using the rhombic triacontahedron geometry, embodying the key geometry that Russian scientists (and husband and wife team Bethe Hagens and William Becker) had modeled the planet's energy grid upon – what they called "The New Earth Grid Star." My intention was to build this large-scale Portal to offer a space for participants to directly experience these geometries of the Earth's evolving energy body to help align their personal energy bodies to this new vibrational pattern. However, plans changed when the steel hub connectors I had fabricated and shipped never arrived. Fortunately, part of the Synthesis gathering was held at a stone carving gallery that had a workshop facility to work in. My friend Satchi Om was helping with the festival and working on making a pyramid structure out of copper pipe. I was able to collaborate with him to construct a smaller New Earth Grid Star installation made of copper pipe as well.

We drove to the local hardware store to buy the pipe and have it cut to length. The ten-foot lengths of pipe were cut at the golden mean to make the edges of the intersecting icosahedron and dodecahedron, forming a six-foot diameter New Earth Grid Star.

As it turned out, I couldn't have planned it better. Two-thousand attendees had traveled across the globe, coming from different parts of the planet to gather at this one sacred location and focus their energies on the 2012 shift. Speakers like *Pyramid Power* author Patrick Flannigan, and Mayan elder and calendar expert Hunbatz Men held talks, workshops, and ceremonies. On the dawn of December 21st, the copper pipe New Earth Grid Star was relocated to the center of the ceremonial space of the festival's campgrounds. Given the Portal's new smaller dimensions, the shipping blunder synchronistically transformed into a terrific advantage as this new smaller Portal could now be easily moved and utilized for the central focus of the solstice ritual. As the sun rose on this auspicious day, and perhaps a new era, crowds dressed in white focused their blessings, hopes, and loving intentions for the planet on the conductive copper Portal shaped in the geometric grid of a New Earth Consciousness connecting their prayers to the evolution of the globe.



FIG. 9 - NEW EARTH GRID STAR - CHICHEN ITZA MEXICO - DEC. 21, 2012

PACHAMAMA, REFORMATION AND ALCYONE PORTALS

For Burning Man 2014, I designed a desert-colored wall structure influenced by the Sapphire Portal's sky blue wall. Instead of the wall being made of forty-eight ten-foot panels sloping outward at 72°, it was based on a thirty-six sided polygon with only thirty-three 4x8-foot tapered plywood panels sloping inward at 60°, creating a twelve-foot wide opening to access the fifty-foot diameter interior space that provided shade and shelter within the inward sloping walls. The structure was divided into eleven bays of three panels each. Cabinets were built into four of these bays to contain the Quasar Wave Transducer speakers, offer storage for other instruments and equipment and for the first time, a full-range sound system in 2015 and 2016 that played recordings of Tibetan bowls, guided meditations, and other sound healing journeys.

While developing this project, I was introduced to a group from Austin, Texas that was working on bringing an installation called the Pachamama Portal to Burning Man. Their design consisted of a central dodecahedron that contained a variety of sound healing instruments on each of the faces that participants could play, with a nine-foot diameter inflatable satellite-image globe of the Earth mounted on top of it. Positioned around this were twelve lotus-petal-shaped sling couches big enough for two people to recline in. As this project was very much aligned with the concept of the Portals I had been making, we decided to collaborate and install their project within the Portal wall I was designing. My Portal design had no plans for what would be in the center of the space, and the Pachamama Portal had no shelter from the frequent dust storms at Burning Man, so the two pieces complimented each other perfectly as if it were one design. In keeping with choosing the location of the Portals on the clock plan of Black Rock City, we chose to have it placed at 11:44, as the Pachamama Portal crew wanted to be as close to the middle of Burning Man's "Playa" as possible. Their mission was to help "Activate Global Equilibrium," creating a "fully sustainable Earth Temple of visionary art, sound

healing, light, sacred geometry, vortex math and orgone energy." We met on the Playa a few days before the event started and set up our installations together for a very successful collaboration. A friend of mine who experienced the Pachamama Portal at night commented that, while lounging in a lotus petal hammock and looking up at the illuminated globe against the night sky, it actually felt like she was looking down at the Earth from space.



FIG. 10 - 11:44 PACHAMAMA PORTAL - BURNING MAN - 2014

The Portal wall returned to Burning Man in 2015 for an entirely new collaboration with long-time Burning Man paper maché sculpture artist Kathy D'Onfrio, and a first time Burning Man participant Mark Sims, who designed and built a wind and solar-power station for it. Mark's power station had a vertical wind turbine and photovoltaic solar-panels mounted on a mast supported by a half dodecahedron

that housed the batteries, charge controller and inverter. It was placed in the center surrounded by the icosidodecahedron stainless steel mirror structure from the Sapphire Portal. The vertical wind turbine is a proprietary design that made an incredible sound when spinning and added an elegant kinetic effect to the experience. Kathy and I were fans of each other's Burning Man installations for many years, so we decided to collaborate together for our 2015 projects. Kathy's pieces had been located on the 12:00 axis at the furthest point out near the perimeter fence, so we chose to place the Portal at 11:55 and near the perimeter in keeping with the numeric coding of my previous installations and being very close to the twelve-o-clock stroke of midnight, ultimately signifying the global shift that is taking place. The theme for the collaboration was to create a space for the resolution of duality. We chose the name "Reformation Portal" from an interview that the founder of Burning Man, Larry Harvey, gave to Bloomberg Businessweek online magazine on Feb 5, 2015 titled "Billionaires at Burning Man." The last paragraph of the interview ends with him saying his mission is to reform the one percent:

"For his part, Harvey, who personally invited Grover Norquist last year, continues to see the arrival of the ultrawealthy as a good thing for Burning Man. 'I want to convince people that it isn't as if the 1 Percent represents an evil bacillus that like Ebola will sweep through our city,' he says. 'That's not possible. Much of the anger is because of a feeling of impotency. The whole issue of the 1 Percent has been a matter of public discourse for some time now, and nothing has changed. People are frustrated.... My mission is to reform the 1 Percent."[13]

Kathy created life-size paper maché statues to fill the space: two blue aliens seated at the entrance greeting visitors, a wedding ceremony presided over by a flaming entity who stood between bright-green figures of the Egyptian gods Ptah (the deity responsible for the creation of the universe by thought and word) and Sekhmet (goddess of destruction and healing), and twelve towering purple and green cats based on Auguste Rodin's sculpture, "The Burghers of Calais,"

where the governors of the defeated city walked out to give their lives to their captors during the time of the Hundred Year's War, only to have them spared. These twelve figures represented the one percent of our time reforming their ways. Kathy also covered the outside with eleven spiral woven pairs of bougainvillea vines, representing the intertwining of duality.

I invited musicians to conduct live sound healing journeys playing didgeridoos, drums, flutes, and other meditative instruments during the course of the week. We also hosted tea service in the space. When these live sonic journeys weren't happening, a full range sound system installed within the wall played recordings of Tibetan bowls, tuning forks, and guided meditations along with the Quasar Wave Transducer vibrating the space with the constantly changing low frequencies. On the afternoon of the last Saturday, before the Man burned, we hosted a global synchronized meditation created by Tom Kenyon called 'A Bridge Between Worlds," at which well over a hundred people attended.



FIG. 11 - 11:55 REFORMATION PORTAL OVERVIEW - BURNING MAN - 2015



FIG. 12 - 11:55 REFORMATION PORTAL INTERIOR - BURNING MAN - 2015

The wall returned to Burning Man again in 2016 with minimal collaboration in the space, leaving it largely open for a serene experience. The Portal moved to 1:44, which placed it far off to one side in the east and nearly perfectly lined-up with the direction of the sunrise. I renamed it the Alcyone Portal, after the brightest star in the constellation of the Pleiades. I placed the 11:11 Diamond Portal Outline in front of the entrance, its angled sides synchronistically matching up with the angles of the walls. I asked my friend Ash Tree to create seven zones for each of the chakras around the inside perimeter of the space. To do this, she wrapped yarns, hung ribbons, and mounted posters showing the chakra's Sanskrit symbol, all the colors of the respective chakras in each of the seven open bays. This put the heart chakra at the very back center, with the heart-based Diamond Portal Outline installed in front of the entrance directly opposite. In the center were the dodecahedron wind and solar power station, along with the icosidodecahedron stainless steel mirror structure from the Sapphire Portal surrounding it. Live sound healing journeys,

workshops and tea service happened regularly in the space, along with recorded meditations and sound journeys playing on a surround sound system, as well as the Quasar Wave Transducer vibrating the space with its subsonic feedback. It was a peaceful yet powerful container for people to have a transformative experience.



FIG. 13 - 1:44 ALCYONE PORTAL - BURNING MAN - 2016



FIG. 14 - ALCYONE PORTAL - SOUND HEALING AND TEA HOUSE - BURNING MAN - 2016

1:44 INTER-DIMENSIONAL SPACE-TIME PORTAL

The enigmatic 1:44 Inter-dimensional Space Time Portal, which debuted at Burning Man 2022, was hidden far off on the 2 o'clock side near the perimeter trash fence where it had unobstructed views of the sunrise each morning. Only a small percentage of the 80,000 attendees found their way out there. The placement was intentional due to its esoteric nature, which was not meant to be inundated by the masses, although the influence of the installation rippled out to have a positive effect well beyond the festival itself.

This installation was a collaboration with South African Intuitive and Medium Maraya, who had attended Burning Man for the first time in 2019. We met in Sedona in November 2019 where we discussed ideas for working together at Burning Man 2020. She downloaded the imagery and understanding of the structure on the full moon of that month, consisting of three rings aligned north/south, east/west and



FIG. 15 - 1:44 INTER-DIMENSIONAL SPACE TIME PORTAL - BURNING MAN - 2022

horizontal representing the circles and cycles of time and space that surround a central twelve stepped pyramid. When viewed from above this makes the cross in the circle, the Earth's astrological symbol. Its intended to be a materialized version of the space within the heart that aligns the timelines and dimensions enabling us to access and embody our multi-dimensional existence. To represent the two vertical rings, I created arches that sit on the horizontal ring and designed the stepped pyramid based on the proportions of the Mayan pyramid at Chichen Itza.

We were honored to receive an art grant from Burning Man for 2020, which was then postponed to 2022, to help fund the construction. My crew and I built it that summer out of marine grade plywood and redwood, making it weather proof, and we brought it to Burning Man. Maraya led live activation ceremonies every sunrise and sunset, the rest of the time a recording of her could be heard quietly from hidden speakers while the Quasar Wave Transducer vibrated the entire



FIG. 16 - 1:44 INTER-DIMENSIONAL SPACE TIME PORTAL - BURNING MAN - 2022

structure with its subtle cat purring sounds. Participants could climb and sit on the pyramid's steps, the ring or even the very top of the arches, and enter inside the pyramid to lounge on carpet and cushions. The interior walls and angled backrest (that implied the downward pointing pyramid which completed the octahedral form) were covered with the latest James Webb telescope deep field view of distant galaxies which faded into the pyramid shaped ceiling that had photos of faces of an Egyptian pyramid (making an inside out pyramid) backlit to glow at night providing soft interior illumination. The arches and ring had 72 different Light Language symbols channeled by Maraya that were cut out and lit up from within to illuminate the exterior.



FIG. 17 - 1:44 INTER-DIMENSIONAL SPACE TIME PORTAL - BURNING MAN - 2022

PORTAL TO THE NEW EARTH

In 2006 I started bringing the Portal installations to transformational festivals outside of Burning Man, beginning with Dreamtime in Paonia, Colorado, and since then have gone on to bring them to over 100 festivals around the world. These festivals all have a common thread of being vibrational gateways for personal and collective transformation through dance music bringing people together in an ecstatic form. By sharing music, art, workshops, food and creating a temporary urban environment to interact and live in creates an experience not found in our everyday default world of consumerism and corporate culture. These gatherings are a sort of alchemical crucible experimenting with creating a new world and acting as seeds of planetary evolution.

The idea to host my own event of this kind came about by visiting an incredible community tucked away down a dead-end dirt road in the Joshua Tree, California desert. I first visited Garth's Boulder Gardens in 2008, where Garth and I immediately bonded over our mutual visions of humans living in sacred harmony with the earth. In 1982, Garth Bowles, who had been a spiritual seeker walking across California for years, finally settled down and purchased a square mile (640 acres) of Joshua trees and huge boulder piles near Pioneertown in Joshua Tree, CA, and has stewarded it ever since then. Garth lived in a cloth tepee for many years but when it finally wore out, he stuccoed over it to create a more permanent and protective structure heated by a wood stove and powered by solar electricity. There are no paved roads, indoor plumbing or electric grid on the land. He installed a solar-powered well, piping water all across the property into holding tanks and ponds, making the area a haven for fish, frogs, turtles and migrating birds. Garth allows a small community of like-minded people to live there with him to help with the gardens and chores, using the outdoor living room and kitchen for daily life. He keeps the property open to the public year-round for any intrepid visitors that may find it, on a donation basis. In some ways, what most inspired me about Garth's property wasn't what they were doing, but what they were *not* doing. There are no conventional permitted buildings constructed

with unsustainable materials. Instead, Garth is developing the place slowly and minimally so that everything is in sacred harmony with the land, fitting his vision of "bringing Heaven on Earth." To this end, he even named the road that accesses it "God's Way Love."

Garth had allowed an amphitheater to be constructed on the property for gatherings and performances, which gave me the idea to host an event to share his vision he has created there on the land while having my Portals set up with a full line up of music, workshops and sound baths. The concept was to share the experience of what Garth has created there with the festival attendees and bring in funds to benefit Boulder Gardens. We sat in his teepee one day discussing it and came up with the name "Portal to the New Earth" together. The first informal gathering was held in May 2014 with only seventeen people coming together for potluck meals and an afternoon sharing circle in the amphitheater. In May 2015 the attendance doubled, all meals for the group were provided, and we had several workshops and sound healing journeys throughout the course of the weekend. In May 2016, the festival finally expanded into a full-fledged event for over 100 people with a full lineup of electronic and acoustic music, workshops, sound healing journeys, yoga classes, and other activities. Garth limited attendance to 200 people to keep the impact on the land to a minimum. Three more events of this nature were held there October 2016, May 2017 and May 2019. All these gatherings were alcohol and drug-free, utilized fresh water from his well, featured the teachings of spiritual elders and communal dining, and were focused on a wide range of transformative sound healings. The live dance music, hiking on the land, and the use of Garth's incredible sauna and pool (built into the boulders) were the icing on the cake. These "evolutionary gatherings" featured the Amethyst and Heart Star Portals as the festival's central structures along with a few other installations and healing areas. The intent of these gatherings has been to create a space for people to embody the principles and spirit of the New Earth awakening on the planet at this time.

PART 2

CONCEIVING FUTURE ENVIRONMENTS: THE SACRED REINHABITATION OF GAIA

CHAPTER 5

SYNERGETICS AND THE DESIGN SCIENCE REVOLUTION

BUCKMINSTER FULLER: THE COMPREHENSIVE DESIGN SCIENTIST

In the fall of 1979, when I was twenty years old, I was enrolled in the University of Miami's music engineering program (I only lasted one semester before dropping out to form a New Wave rock band). I wanted to be both a musician and an engineer to combine these two interests in designing audio equipment, guitars, and speaker systems. At the time, I was renting a room in a house with two other roommates in the Coral Gables neighborhood near the university. The owner of the house had some unusual books lying around, one being the 1975 epic 2-inch thick tome *Synergetics: Explorations in the Geometry of Thinking*, written by 20th-century inventor and visionary R. Buckminster Fuller. The book is a culmination of his lifelong investigation into the underlying nature of how the universe operates based on first-hand experience. It explores both the physical and metaphysical aspects of how the universe operates in a comprehensive and in-depth numerically ordered format. Fuller wrote in a strange and complex language that thrilled my intellect, sparked my imagination, and blew my mind open.

In that dense opus, he used difficult-to-decipher jargon, making up many of his own terms along the way. For instance, here is a sample from the book, explaining the star-tetrahedron and vector equilibrium's geometry, to give an idea of how complicated his writing is: "There is a syntropic pulsation receptivity and an outward pulsation in dynamic symmetry of the star tetrahedron. As an energy radiator, it is entropic. It does not regenerate itself internally, i.e., gravitationally, as does the isotropic vector matrix's vector equilibrium. The star tetrahedron's entropy may be the basis of irreversible radiation, whereas the syntropic vector equilibrium's reversibility--inwardly-outwardly--is the basis for the gravitationally maintained integrity of Universe. The vector equilibrium produces conservation of omnidynamic Universe despite many entropic local energy dissipations of star tetrahedra. The star tetrahedron is in balance with the vector equilibrium--pumpable, irreversible, like the electron in behavior. It has the capability of self-positionability by converting its energy receipts

to unique refraction sequences, which could change output actions to other dynamic, distances-keeping orbits, in respect to the--also only remotely existent and operating--icosahedron, and its 15 unique, great-circle self-dichotomizing; which icosahedra can only associate with other icosahedra in either linear-beam export or octahedral orbital hover-arounds in respect to any vector equilibrium nuclear group."[1]

With its challenging terminology, and composed in a numerical index-type fashion, *Synergetics* was not the kind of book you read cover to cover, but in separate little bits, here and there. By skimming through it and reading random pages, my mind began formulating a much greater understanding than each individual concept taken by itself. This, I learned, was the essence of Fuller's genius and the vision of his life's work, which he coined the word "synergy", meaning that the behavior of whole systems is unpredicted by the behavior of their parts taken separately. Bucky's use of language was not the most easily accessible, but I became hooked, diving in as deep as I could. I went on to read the majority of his published works (some much easier to understand than *Synergetics I* and *II*), including his earliest title *Nine Chains to the Moon* (1938), as well as *Ideas and Integrities* (1963), *Operating Manual for Spaceship Earth* (1968) and his last two books *Critical Path* (1981) and *Grunch of Giants* (1983). When reading Bucky, it's been stated that "your mind is stretched and turned in a way that is, at first, disorienting. Think of it instead as a reorientation – a real orientation that can at first can be dizzying... His books are thinking tools, catalysts for 'shape-shifting,' for leaping far beyond 'the box' of normal habitual thought processes... like learning a new language or a new computer program... reading Bucky is just the kind of endeavor that can help us build brain cells and their interconnections."[2]

Dr. R. Buckminster Fuller held many titles during his long and illustrious career — engineer, inventor, mathematician, philosopher, author, scientist, even poet. He published thirty books; received forty-seven honorary degrees and numerous architectural, industrial, and design awards. For decades, he traveled the world lecturing to large audiences, and in 1983 (shortly before his death), he was awarded the Presidential Medal of Freedom, the nation's highest civilian honor

for his achievements. He coined or popularized many terms, such as geodesic, synergy, Dymaxion, ephemeralization, vector equilibrium and tensegrity. Hard to pin down, the press labeled him, "the greatest living mind," "the Leonardo Da Vinci of our times," "the Ben Franklin of the Space Age," and "a new world thinker if there ever was one." But in a TV interview where he was asked to describe himself, he humbly told the host, "I'm a very average human being." He is most well known for being the inventor of the geodesic dome, but his work extends into all fields of life and can be summarized by one of his terms: "Design Science Revolution" – his proposed scientific and socio-economic revolution accomplished by shifting from "weaponry to livingry" through the application of what he called *comprehensive anticipatory design science* to benefit all of humanity equally.

Fuller was born in Milton, Massachusetts on July 12, 1895. One of the greatest visionaries of the 20th century took his first breath at a time when humanity was still traveling around in horse and buggy. As he stated in his own words: "I was born at an extraordinary moment. In 1895, the year I was born, the X-ray was discovered. You could then see what had previously been invisible. When I was 3, the electron was discovered. When I was 7, the first automobile drove into the city of Boston. I was brought up being told that it was inherently impossible for man to fly. When I was 8, the Wright Brothers flew. By the time I was 11, Marconi's wireless was in practical use to signal SOS. When I was 14, man got to the North Pole. When I was 16, he got to the South Pole. So impossibles were happening seemingly every day. Evolution is integrating all humanity. We are accelerating together at a tremendous pace."[3]

In his early years, Fuller developed an appreciation of nature and an understanding of the principles of boat maintenance and construction on family excursions to Bear Island in Penobscot Bay, Maine. He attended Harvard in 1913 but was dismissed due to excessive socializing and missing his exams. He returned in 1915 but was once again expelled. In World War 1, he served in the U.S. Navy as a radio operator and as a crash rescue-boat commander. In the summer of 1917, he married Anne Hewlett and after the war, he helped his

father-in-law, James Monroe Hewlett develop the Stockade Building System company for manufacturing lightweight weatherproof housing. Together they developed a new method for producing reinforced concrete buildings, providing Fuller the first of more than two-dozen patents in his lifetime.

But success eluded him; the company financially collapsed and at the age of 32, with a newborn daughter Allegra and a dependent wife, Fuller found himself poor, unemployed, and without an accredited education to advance his career. He fell into a depression, drank heavily, and took long walks around Chicago. In the fall of 1927, he considered committing suicide so that his family could cash in on his life insurance policy. Standing on a cliff above Lake Michigan, Bucky was thinking of jumping, when he had a sudden realization that would alter the course of his life: "In committing suicide, I seemingly would never again have to feel the pain and mortification of my failures and errors, but the only-by-experience-winnable inventory of knowledge that I had accrued would also be forever lost — an inventory of information that, if I did not commit suicide, might prove to be of critical advantage to others, possibly to all others, possibly to Universe... If I take an oath never again to work for my own advantage and to work only for all others for whom my experience-gained knowledge may be of benefit, I may be justified in not throwing myself away."[4] Throughout his entire adult life, Bucky used himself as an experiment to see what one human could do based only on experience and observation. It was in that moment where Fuller dedicated his intellectual endeavors for the betterment of all humanity, a common theme throughout all his work. After this experience, he spent nearly two years in reclusion, reflecting on how his skills and knowledge could best contribute to the world.

MORE WITH LESS: DYMAXION CARS AND DEPLOYABLE UNITS

Perhaps one of the most quoted thinkers of the 20th century, Buckminster Fuller has stated: "It is now highly feasible to take care of everybody on Earth at a 'higher standard of living than any have ever known'... It no longer has to be you or me. Selfishness is unnecessary and henceforth unrationalizable as mandated by survival. War is obsolete... It is a matter of converting the high technology from weaponry to livingry."[5] In the early 1930s, during the Depression-era, Fuller built three groundbreaking and futuristic automobile prototypes with naval architect Starling Burgess called the Dymaxion Car. Fuller coined the term Dymaxion, a portmanteau of the words dynamic ("Dy"), maximum ("max"), and tension ("ion), signifying "maximum gain of advantage from minimal energy input." Using his family inheritance and investor money, he designed a vehicle that wasn't just a car, but something that might one day even be able to fly – an "Omni-Medium Transport," as he called it. The car incorporated highly innovative features compared with the Model T of the time, including a three-wheel configuration with rear-wheel steering, front-wheel drive, and a longer twenty-foot aerodynamic design. Applying the Dymaxion principle of "doing less with more," the car could transport up to eleven passengers, reach speeds of 90 miles per hour, get 30 miles per gallon all while having the capability to turn on a dime. The zeppelin-shaped car created such a buzz that the NYPD asked Fuller to stop driving into Manhattan, where onlookers gaped at its sci-fi exterior, repeatedly stopping traffic for hours at a time. But Fuller's dreams of a resource-efficient, mass-produced "Omni-Medium Transport" ended abruptly when another car crashed into the Dymaxion during a widely publicized test-drive for the 1933 Chicago's World's Fair. The test driver was killed in the accident, and two passengers injured. Although subsequent investigations exonerated the Dymaxion prototype of any liability, newspaper headlines of the fatality scared off any future investors.



Fig. 1 - Buckminster Fuller Dymaxion Car - 1933

Understanding the need to conserve the planet's resources ("doing more with less"), Fuller offered a way to mass-produce affordable, easily transportable, and environmentally efficient domiciles with the Dymaxion House. While originally conceived of in the 1920s, it was during the post-WWII housing boom that Fuller attempted to create a new industry for mass-produced Dymaxion Houses, or Dymaxion Deployment Units (DDUs), as they were to be called. He designed a home that was heated and cooled by natural means, made its own power, was storm-proof, and constructed of aluminum that required no periodic painting, reroofing, or maintenance. Originally called "the 4D House," the Dymaxion Unit, with its round shape minimized heat loss and the amount of materials needed. The flying-saucer looking building weighed a mere three tons, instead of 150 tons like an average home at that time. You could quickly change the floor plan as required, squeezing bedrooms in to make more room in the living space for social gatherings. Its advanced ventilation design drew dust to the floor through filters, reducing the need to vacuum or

clean. The entire DDU could be constructed without the aid of nails, screws or cement, and the aluminum used was non-oxidizing so no paint was necessary to coat the house.

In 1946, Bucky built a prototype design of the Dymaxion House in Wichita, Kansas. Its aerodynamic shape reduced wind-resistance and was hurricane-proof while convection currents inside kept the air cool in summer. After WWII there were massive amounts of aluminum from the aircraft industry ready to be recycled so the DDU was built out of aluminum using aircraft construction techniques. The reactions to the prototype were extraordinarily positive among the public and Bucky's team received over 30,000 pre-orders for the Dymaxion Units. Nevertheless, they were never produced on an industrial scale, as they were considered a threat to architects being able to make a living designing houses. Also, Fuller, a consummate perfectionist, felt he could improve the design and was not entirely satisfied with his prototype. He refused to begin production rather than allowing the "unfinished" design to go to market, putting a final end to the Dymaxion Housing initiative.

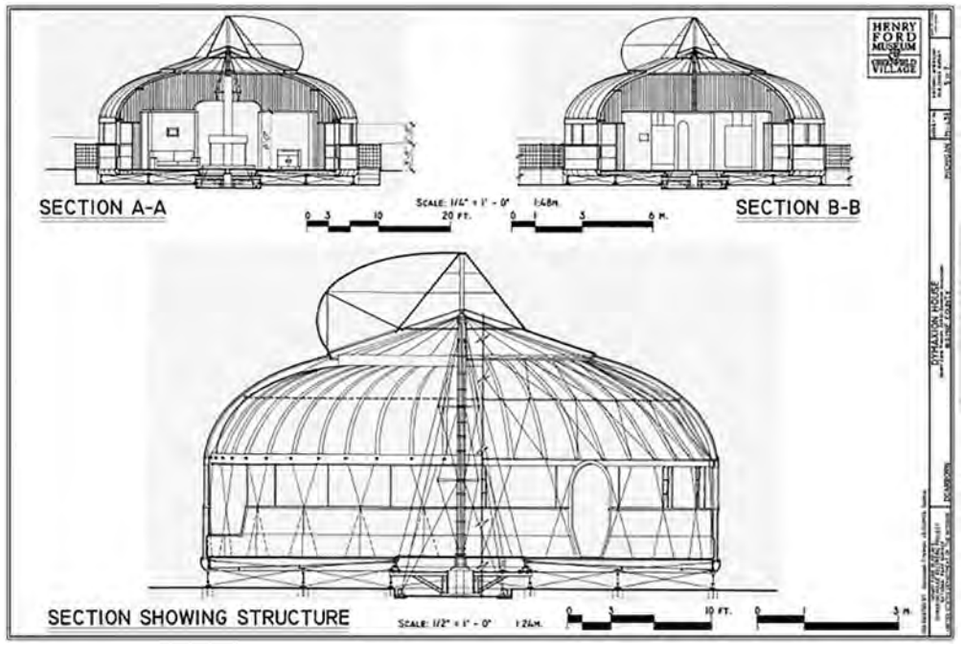


Fig. 2 - Buckminster Fuller - Dymaxion House - 1946

BUCKY'S MASTERPIECE: THE GEODESIC DOME

After the collapse of his Dymaxion Deployment Unit venture, Fuller accepted an invitation to teach at Black Mountain College in North Carolina during the summers of 1948 and 1949. With the encouragement of fellow professors and students, he began developing an invention that would eventually make him world-famous: the geodesic dome. A dome of this type had previously been developed in 1922 by German engineer Walther Bauersfeld in Jena, Germany

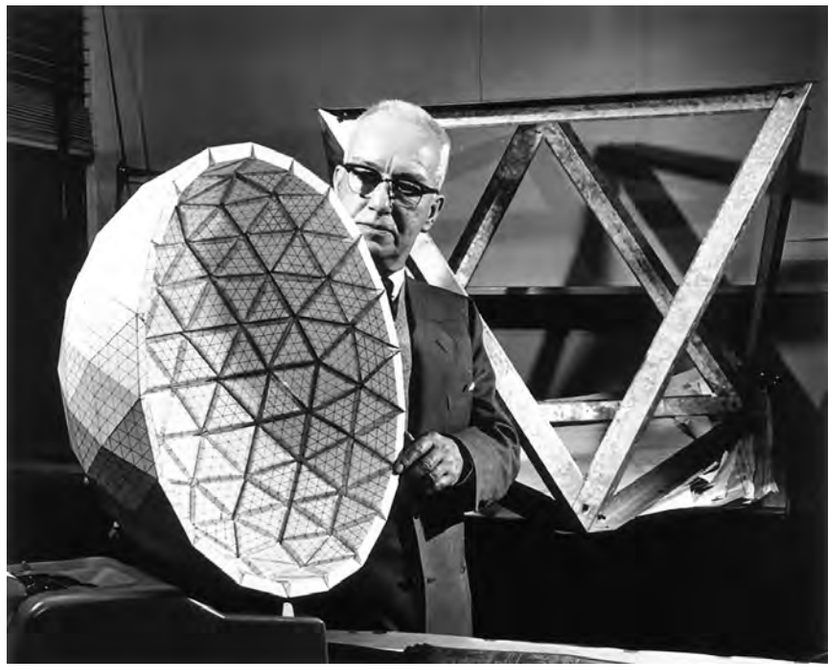


FIG. 3 - BUCKMINSTER FULLER WITH MODEL OF A GEODESIC DOME

as a projection surface for the Zeiss optics company's planetarium projector, but besides this example, no other versions of it were produced and this example failed to receive global recognition. Fuller developed the dome structure starting with an icosahedron and dividing the triangles into smaller triangles that all touched the surface of an imaginary sphere that surrounded it, thus its name "geodesic," a term which means the shortest lines connecting points on the

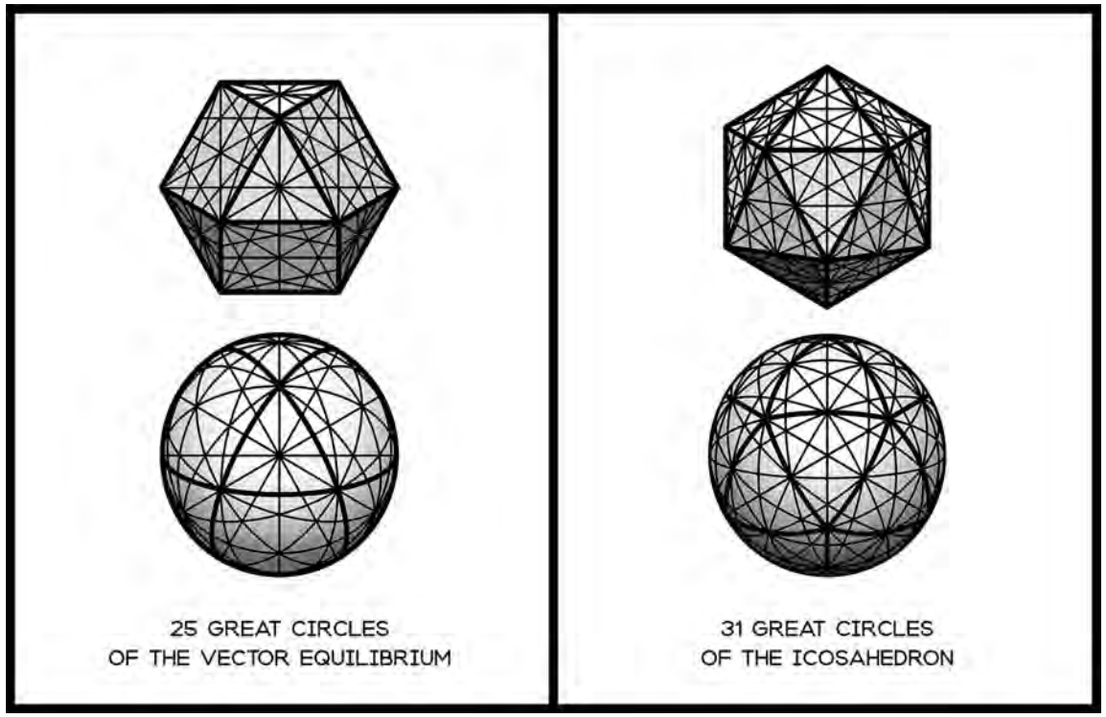


FIG. 4 - CASEY HOUSE'S ILLUSTRATIONS OF GREAT CIRCLES BASED ON THE WORK OF BUCKMINSTER FULLER

surface of a sphere. This invention came as a result of his incredibly detailed investigations of "Great Circles" on a sphere mentioned in the quote cited at the beginning of this chapter from his encyclopedic tome *Synergetic*s. Musician, designer and the illustrator of this book, Casey House, has created graphics that make clear the relationship of these "Great Circles," which can be seen in the design section of his website casey-house.com.

Fuller realized that if a spherical structure was created from triangles, it would have unparalleled strength. A triangle has structural integrity that makes it inherently much stronger than the non-structural rectangular shapes normally used in modern architecture. In 1949, Fuller erected his first geodesic dome that could sustain its own weight. Measuring fourteen feet in diameter and constructed of aluminum aircraft tubing and a vinyl-plastic skin, the geodesic structure was able to support several people hanging

from it at one time. “Doing more with less,” the sphere enclosed the largest volume of interior space with the least amount of surface area, saving significantly on materials and cost. When the sphere’s diameter was doubled, it would quadruple its square footage and produce eight times the volume. The geodesic dome provides an extremely efficient interior because air and energy are allowed to circulate without obstruction, enabling heating and cooling to occur organically. The annual energy use for a dome owner has been estimated at thirty percent less than that of traditionally built homes. Realizing the structure’s many benefits, the US Marine Corps commissioned Fuller to build thousands of small geodesic domes that could be delivered to the military anywhere around the world by helicopter, which could then be assembled within two hours by staff on hand. Larger Fuller domes were put to use as weather stations, long-range radar stations, and storage depots, withstanding many intense weather situations, from Polar ice to summer heat to raging windstorms.

Fuller’s lightweight triangulated structural lattice was granted a US patent in 1954, as Bauersfeld’s prior geodesic design was not patented. The magnificent US Pavilion at Montreal’s Expo ‘67 was one of Bucky’s most impressive of domes. Its 250-foot diameter made it the largest clear spanning structure in the world. The dome was so large that the elevated train that gave visitors incredible views of the Expo ran through its interior. This geodesic marvel announced Bucky’s architectural genius to the world, and it captivated the imagination of young and upcoming architects.

The iconic image of Disney’s Epcot Center (completed in October, 1982) features a Bucky-inspired, aluminum-paneled geodesic complete sphere 165 feet in diameter called “Spaceship Earth,” housing a “time-machine experience” theme ride throughout its sci-fi-worthy architecture. Today, the biggest of all these structures is the Fukuoka Yahuoko! Dome in Japan. Measuring 216 meters (over 700 feet) in diameter, this geodesic giant serves as a music and sports stadium with 38,585 seats and a retractable roof. Bucky lived comfortably with his wife Anne in a geodesic dome until his death in 1983. According to the Buckminster Fuller Institute, “today there are more than 300,000

geodesic domes around the world, ranging from shelters in California and Africa to radar stations in remote locations, as well as geodesic structures on countless children’s playgrounds.”[6] It’s almost impossible to imagine the Burning Man Festival without the hundreds of geodesic domes that pop up every year, sheltering many of its diverse theme camps from intense daytime heat and apocalyptic sandstorms of the Black Rock Desert.



FIG. 5 - US PAVILION AT MONTREAL’S EXPO ‘67

THE AIROCEAN MAP AND THE WORLD GAME

Although the geodesic domes never sold to the capacity that Fuller had envisioned, they did bring him international acclaim and he became a highly revered speaker from the 1950s to his passing in 1983. With a diminutive height of 5'2", one of the greatest men of the last century could barely be seen over the podiums he graced. Calling his lectures "Thinking Out Loud," he would start slow and pick up the pace until he was speaking at "500 miles per hour" on the topics of technology, engineering, environmentalism, philosophy, and more. He often lectured for hours with one colleague recalling a time when Bucky and his audience got so involved, his talk stretched over eighteen hours in one sitting. Fuller saw himself in a race between education and catastrophe, advancing a design science revolution that would benefit all of humanity in the face of growing environmental crises.

Fuller recognized the world as a complex, interconnected system of life-sustaining resources and evolutionary processes. In 1954, he brought the vision of our world closer together with the official publication of "The Airocean World Map." This was an updated version of his "Dymaxion Map," a projection of the globe onto the surface of an icosahedron, which could be unfolded and flattened into two dimensions. The Airocean map of the world showed the planet as nearly one island, or contiguous landmass within one vast ocean, without any visually obvious distortion of the relative shapes and sizes of the land areas, and without splitting any continents. According to the Buckminster Fuller Institute, "Traditional world maps reinforce the elements that separate humanity and fail to highlight the patterns and relationships emerging from the ever-evolving and accelerating process of globalization. Instead of serving as 'a precise means for seeing the world from the dynamic, cosmic and comprehensive viewpoint,' the maps we use still cause humanity to 'appear inherently disassociated, remote, self-interestedly preoccupied with the political concept of its got to be you or me; there is not enough for both."[7]

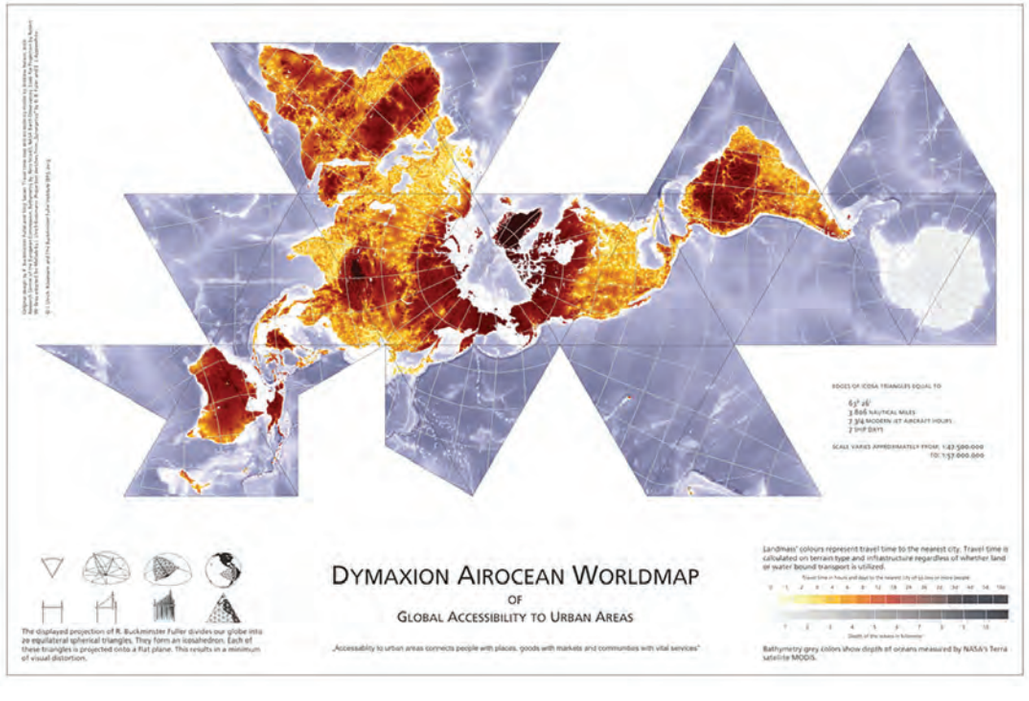


FIG. 6 - DYMAXION MAP

R. Buckminster Fuller designated the time period of 1965-1975 as the "World Design Science Decade" (the Buckminster Fuller Institute has just announced they are designating 2020-2030 the second Design Science Decade). He had become a "full-blown guru-intellectual" by then, in the vein of Noam Chomsky and Marshall McLuhan, and he leveraged his celebrity status to advocate "The World Game," a techno-utopian initiative to catalog and redistribute the planet's resources for the benefit of the many. Desiring to facilitate a "comprehensive, anticipatory, design science approach" to addressing the problems of the world, Fuller reached out to the public to make this possible. The World Game aimed to challenge the global elite controlling the world's resources for their own selfish objectives. Fuller recruited engineers, data scientists, and inspired young people to "game-plan" on the Airocean Map, plotting resources, trends, and scenarios essential for holistically solving the problems of starvation, poverty, pollution, military conflict, and resource distribution still plaguing our world.

THE SYNERGETICS OF SPACESHIP EARTH

In 1968, Fuller, now in his 70s, published one of his most seminal and popular books, *Operating Manual for Spaceship Earth*. Written in layman's language to be accessible by most anyone, Fuller addressed some of the greatest challenges facing humanity, calling for a design revolution that would guide "Spaceship Earth" to a sustainable future. His mission was clear and simple from the opening quote: "To make the world work for 100% of humanity, in the shortest possible time, through spontaneous cooperation without ecological offense or disadvantage of anyone."[8] This book is as relevant today as when it was first published in the late sixties.

Fuller saw the whole planet as an intricately-crafted vessel flying through outer space at enormous speeds with fundamental design controls, equipment, and life-supporting systems for those traveling on board. In Bucky's own words: "Our little Spaceship Earth is only eight thousand miles in diameter, which is almost a negligible dimension in the vastness of space. Our nearest star – our energy-supplying mother-ship, the Sun – is ninety-two million miles away, and the next nearest star is one hundred thousand times further away... Earth is right now traveling at sixty thousand miles an hour around the sun and is also spinning axially, which, at the latitude of Washington D.C., adds approximately one thousand miles per hour to our motion...That is a whole lot of spin."[9]

Fuller sees the Earth as "a mechanical vehicle, just as is an automobile," pointing out that a car is "an integrally-designed machine" with complex electrical and mechanical systems that all need to be harmoniously working together for the vehicle to operate successfully. You put in water, oil and gas, start the engine, hit the accelerator, turn the steering wheel, and pump the brakes. If anyone of these functions fail, the integrity of the whole system falls into jeopardy. Unlike our automobiles, Spaceship Earth does not come with a warranty or instructions. "Thus, because the instruction manual was missing we are learning how we safely can anticipate the consequences of

an increasing number of alternative ways for extending satisfactory survival and growth – both physical and metaphysical."[10] For Bucky, a focus on specialization leads to extinction, as a true design scientist must come to understand the synergetic relationship of the many integrated parts of our planetary Spaceship in order to ensure survival and thriveability for all its inhabitants.

In order for "Earthians" to better understand their interconnected relationship with Spaceship Earth, Fuller starts his *Operating Manual* with a unique, Bucky-lensed perspective on human history. This not only allows us to see where we come from but how we've been evolving and how we can learn from those lessons to transform and co-create a future that works for all. He sees the birth of civilization and the subsequent "dominator empires" that sprang from it, as originating from maritime cultures. Early seafaring civilizations benefited greatly from the technological advances gained from navigating the waterways and trading ideas and materials with the diverse cultures they encountered. This resulted in the rise of "The Great Pirates" whose maritime advantages allowed them to control the Earth's abundance by technological power and the might of the sword. The world's natural resources would be siphoned up through a military-backed hierarchy to a small percentage of the global elite.

These tyrants of the seas enlisted the geniuses and design scientists of their times – the renaissance-minded who could see things as a comprehensive whole versus narrow-minded specialization. He cites Leonardo da Vinci, who not only produced great works of art and design but engineered fortified defenses and military weaponry. As Bucky states, "truly large-scale venturing on the world's ocean's commenced, and the strong sword-leader patrons as admirals put their Leonardos to work, first in designing their new and powerful world-girdling ships. Next, they took their Leonardos to sea with them as their seagoing Merlins to invent ever more powerful tools and strategies on a world-around basis to implement their great campaigns to best all the other Great Pirates, thereby enabling them to become masters of the world and all of its people and wealth."[11]

According to Fuller, even kings and queens of nations were subjected to the rule of the Great Pirates, creating puppet governments that divert the wealth of regions into the hands of a powerful few. Bucky called this "absolute world-controlling through their local-stooge sovereigns and prime ministers." Steamships were built, bridges constructed, railroads cut over vast landscapes, and steel furnaces blasted, funneling the planet's resources to the Great Pirates. But in the twentieth century, they lost the reigns of power with the onslaught of science. "Technology was going from wired to wireless, from track to trackless, from pipe to pipeless, and from visible structural muscle to the invisible chemical element strengths of metallic alloys and electro-magnets. The Great Pirates came out of the first world war unable to cope knowledgeably with what was going on in the advanced scientific frontiers of industry."[12]

The rule of the Great Pirates had come to an end but because they had operated secretly, the systems they had established continued on. International trade, currency exchange, global banking, and economic accounting remained hidden from the public eye as the growing corporate forces of the twentieth century took control. In his last works, *Critical Path* and *Grunch of Giants*, Fuller would take on the global corporate behemoth exerting their dominance in a post-World War II military-industrial complex. The acronym GRUNCH stands for Gross Universal Cash Heist. Bucky shows how humanity has found itself at the limits of the planet's natural resources, as we face political, economic, environmental, and ethical crises, and what we can do about it.

When it comes to the sustainable future of Spaceship Earth, Fuller both warns and inspires us to take comprehensive action at this crucial time: "This cushion-for-error of humanity's survival and growth up to now was apparently provided just as a bird inside of the egg is provided with liquid nutriment to develop it to a certain point. But then by design the nutriment is exhausted at just the time the chick is large enough to be able to locomote on its own legs... Our innocent, trial-and-error-sustaining nutriment is exhausted. We are

going to have to spread our wings of intellect and fly, or perish; that is, we must dare immediately to fly by the generalized principles governing [the] universe and not by the ground rules of yesterday's superstitious and erroneously conditioned reflexes."[13] For Fuller, we must move away from specialization, where humans are mere cogs in the wheel of the industrial age, and comprehensive thinking to solve the biggest issues of our day. He considers the computer the key for this transformation, as it is a "superspecialist" that can work night and day without rest, at superhumanly sustainable speeds. As Bucky states, "Evolution is apparently intent that man fulfill a much greater destiny than that of being a simple muscle and reflex machine – a slave automaton – *automation* displaces *automatons*."[14]

Fuller sees the utopian destiny of humankind achieved through the evolutionary process of synergy. According to Bucky: "Synergy is the only word in our language that means behavior of whole systems unpredicted by the separately observed behaviors of any of the system's separate parts or any subassembly of the system's parts. There is nothing in the chemistry of a toenail that predicts the existence of a human being."[15] Imagine all the components of a camera had been taken apart and put on a desk. You wouldn't be able to tell from each individual part how they all function together to produce the image-capturing device. The same could be said of the human body. Fuller cites how modern scientists have had to see beyond the limits of specialization to better understand the whole operating manual of a human being. Biologists, chemists, and physicists learned that they needed to comprehend the overlapping relationship of atoms, molecules, and cells, and that their professional fields were being integrated. They're having to see beyond each individual part to comprehend the system as a working whole.

Fuller argues that a similar synergistic approach needs to be applied to the body of Spaceship Earth: "There is nothing about an electron alone that forecasts a proton, nor is there anything about the Earth or the moon that forecasts the co-existence of the Sun. The solar system is synergetic – unpredicted by its separate parts. But the interplay of Sun as supply ship of Earth and the moon's

gravitationally produced tidal pulsations on Earth all interact to produce the biosphere's chemical conditions which permit but do not cause the regeneration of life on Spaceship Earth. This is all synergetic. There is nothing about the gases given off respiratorily by Earth's green vegetation that predicts that those gases will be essential to the life support of all mammals aboard Spaceship Earth, and nothing about the mammals that predicts the gases which they give off respiratorily are essential to the support of the vegetation aboard our Spaceship Earth. Universe is synergetic. Life is synergetic."[16]

He coined the term "ephemeralization" meaning the ability of technological advancement to do "more and more with less and less until eventually you can do everything with nothing". The "everything with nothing" can be seen in how gravity acts in tension without any visible connection, or how the entire physical universe arose from the Big Bang. Bucky predicts that ephemeralization would improve the living standards of an ever-growing population despite the Earth's finite resources, claiming that in the twentieth century alone, the process helped provide a degree of health and comfort to forty-four percent of humanity, something that had previously only been available to one percent of the world's population. As Bucky states, "Amongst other grand strategies for making the world work and taking care of everybody is the design science revolution of providing ever more effective tools and services with ever less, real resource investment per each unit of end performance. For instance, a communications satellite, weighing only one-quarter of a ton is now out-performing the transoceanic communication capabilities of 175 thousand tons of copper cable."[17] One could only wonder what Bucky would think today. The postal service has largely been replaced with email, print encyclopedias with Wikipedia, vinyl records, VHS cassettes and CDs with online streaming, and bookshelves with Kindle. Twenty years ago it would have taken a massive room of equipment to match the technological power found in a single handheld smartphone.

Fuller would also redefine the idea of wealth and our relationship to global resources. "Wealth is our organized capability to cope effectively with the environment in sustaining our healthy regeneration

and decreasing both the physical and metaphysical restrictions of the forward days of our lives."[18] He challenged our concept of work and labor production, suggesting that people could be paid to stay at home to follow their passions and interests, and if only a small percentage of them came up with innovative concepts, those visionary ideas would prove so beneficial to industry and humanity that it would make up for the others not producing such things. He called for economics to serve all beings, not just the corporate elite, and often reminded us that nothing in the universe had to be paid to do what it does, except our species: "I see the hydrogen atom doesn't have to earn a living before behaving like a hydrogen atom. In fact, as best I can see, only human beings operate on the basis of 'having to earn a living.' The concept is one introduced into social conventions only by the temporal power structure's dictums of the ages. If I am doing what God's evolutionary strategy needs to have accomplished, I need spend no further time worrying about such matters."[19]

THE FULLER EFFECT

The visionary ideas of R. Buckminster Fuller have made a profound impact on generations of scientists, designers, artists, architects, engineers, and conscious leaders. In 1985 (two years after Fuller's death), professors Robert Curl, Harold Kroto, and Richard Smalley discovered that the 60 atoms of a spherical carbon molecule were arrayed in a structure similar to a geodesic dome, so they named this C60 molecule "buckminsterfullerene," an achievement that would deliver them the 1996 Nobel Prize in Chemistry. On July 12, 2004, the United States Post Office issued a commemorative stamp honoring R. Buckminster Fuller's contribution to the world on the fiftieth anniversary of his patent for the geodesic dome. The stamp featured the same portrait *Time Magazine* used for the cover of their January 10, 1964 issue. Fuller has been the subject of two documentary films: *The World of Buckminster Fuller* (1971) and *Buckminster Fuller: Thinking Out Loud* (1996). In June 2008, the Whitney Museum of American Art hosted an exhibition of Bucky's work, "Buckminster Fuller: Starting with the Universe," which represented six decades of his revolutionary design-science approach to architecture, transportation, communication, and resource distribution. The exhibition traveled to Chicago's Museum of Contemporary Art the following year.

The Buckminster Fuller Institute continues his legacy "with an international network of cross-disciplinary thinkers and doers... dedicated to catalyzing transformative solutions to complex global problems through design thinking education."[10] They facilitate a convergence across the disciplines of art, science, design and technology, drawing attention to and supporting the best examples of whole-system thinking. The Institute hosts a yearly Buckminster Fuller Challenge Prize competition, offering a highly-coveted $100,000 award to the winning application that uses creative design-science solutions to solve some of the world's most urgent problems. As we confront the challenges of these critical times, Fuller's interest and understanding of the synergetic principles of our world guide the way for us to make this incredible transition to a more sustainable society

that works for all of humanity. "For Bucky the answers to the problems of our world are all around us in the beautiful design of the universe. And in the end, more than the facts, figures, particular predictions, or solutions he developed, were the underlying principles of the universe to which he was pointing. Thank goodness, nature reveals to us the state of the art in design and technology, if we will look."[21] We end this chapter on R. Buckminster Fuller with his most ubiquitous quote: "You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."[22] My intention with this book is to inspire the building of this new model!

CHAPTER 6

ARCOLOGY: INTEGRATING ARCHITECTURE AND ECOLOGY

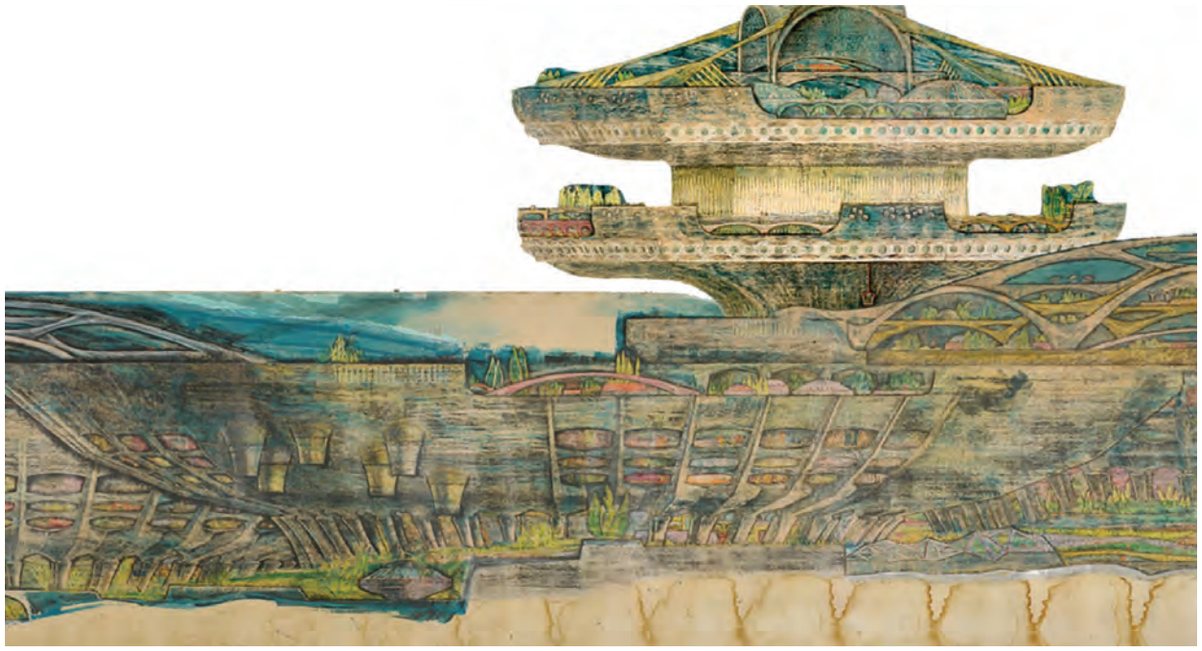


FIG. 1 - PAOLO SOLERI - SCROLL DRAWINGS OF ARCOLOGIES

PAOLO SOLERI: INSPIRING FUTURE ENVIRONMENTS

In 1981 I visited a gallery in the Soho arts district of New York City that would change my life. In the main exhibition space, large scrolls of architectural sketch paper stretched out across the gallery's walls along with pedestals of complex models arranged in the room. On these scrolls were drawings and sketches of immense megastructure cities enmeshed in their own organic, natural environment. Drawn in pencil and crayon, these eco-futuristic vertical cities were the brainchild of one man, Italian architect Paolo Soleri, and his concept of "arcology," which embodied the fusion of architecture and ecology into a comprehensive urban design formula. An arcology is a highly integrated and compact three-dimensional urban structure that is the opposite of the current suburban sprawl's wasteful consumption of land and resources, which tend to isolate people from each other and the community. Soleri describes the arcology concept this way: "In nature, as organisms evolve, they increase in complexity and become a more compact system. A city should similarly evolve, functioning as a living system. Architecture and ecology as one integral process, is capable of demonstrating positive response to the many problems of urban civilization – population growth, pollution, energy/natural resource depletion, food scarcity, and quality of life. Arcology recognizes the necessity of the radical reorganization of the sprawling urban landscape into dense, integrated, three-dimensional cities in order to support the complex activities that sustain human culture."[1]

The scrolls contained radical ideas and visions for how we could build cities in a way that had never been done before utilizing modern construction techniques. They explored concepts for creating dense urban environments that incorporate ecology into them while preserving the surrounding natural landscape. Critic and professor of philosophy Holcombe M. Austin describes what people experienced at Soleri's exhibitions: "What they saw were beautiful Lucite models of cities that would rise three hundred stories, not slabs or boxes but intricate polyhedral structures open to light and air yet so ingeniously designed and so masterfully compacted that instead of the coast-

to-coast sprawl of megalopolis, humankind could be housed on a fraction of today's required urban acreage. These humanely adequate, ecologically justified arcologies, Soleri contends, would save for us what remains of unspoiled open land. Indeed, they could reverse the current trend and free land for restoration and human enjoyment."[2]

Inspired by his sustainable, whole-systems architectural vision for developing cities, I bought Soleri's book *Arcology: City in the Image of the Man* (published in 1969 by MIT Press) at the gallery's front desk. Devouring his innovative concepts while also recalling my studies of R. Buckminster Fuller, I soon realized that my traditional engineering path wasn't going in the right direction and within weeks, I dropped out of Brooklyn Polytechnic's Engineering School and enrolled in the Environmental Design program at Parsons School of Design, where I thought I could study the likes of Fuller and Soleri in greater breadth and depth. At Parsons, I quickly learned that these were not part of the curriculum, instead, we would learn about more mainstream architects like Frank Lloyd Wright, Mies Van der Rohe, Le Corbusier, Robert Venturi, and Michael Graves. It was up to me to create an independent study thesis for my senior year, where I submitted a paper titled "Future Environments," which researched the works of visionary architects exploring concepts similar to Fuller and Soleri. These thinkers, spanning the 20th century, envisioned cities that work in harmony with nature in a way that is vastly different from what our current societal paradigm offers. This book is the current result of my lifelong interest in these visionary concepts.

"THE URBAN EFFECT"

Paolo Soleri, an Italian architect most well-known for his visionary utopian city designs, was born on the summer solstice in Turin, Italy on June 21, 1919. Receiving a doctorate in architecture from Turin Polytechnic in 1946, he worked for Frank Lloyd Wright at Taliesin West in Arizona from 1947 to 1949. He returned to Italy in the early fifties to design and build the Ceramica Artistica Solimene, in Vietri on the Amalfi coast. The ceramics factory would provide a small scale model of what arcology could do. Several stories high, Soleri's bold design incorporated a facade of ceramic elements set alongside glass. Large windows inundated the building with natural light while the ceramic-cone decoration promoted the factory's products. Even today, the building is diverse, compact, serving a variety of overlapping functions – residential space, ceramics factory, showroom, and office headquarters. The interior is tied together by a spiral ramp, allowing ceramic products to travel downward through the various stages of production into the retail shop or shipping department.

In 1956, Soleri moved permanently to the United States, to a property in Scottsdale, Arizona, where he established the Cosanti Foundation to develop and explore his concept of integrating architecture and ecology. Starting in 1959 with his plans for Mesa City (a desert utopia intended for two million people), Soleri drew a series of gigantic urban centers that rose vertically into the sky rather than horizontally along the ground. He designed these three-dimensional megastructures to preserve the surrounding natural landscape while increasing human interactions of living and working by condensing the layout spatially based on what he calls the "Urban Effect". According to Soleri's calculations, an arcology would only need about two percent of the land of a typical city with a similar population while providing a richer cultural fabric with more occupational and public services than current urban environments. Today's cities devote well over fifty percent of land to roads and automobiles. The multi-use nature of arcology eliminates the space used by cars from within the urban area to put residential, commercial, and community spaces within

easy reach of each other, where walking would be the main form of transportation within the city.

An arcology's direct proximity to uninhabited wilderness provides the city dweller with constant, immediate, and low-impact access to rural space as well as allowing agriculture to be situated near the city, maximizing the logistical efficiency of food distribution systems. Arcology utilizes passive solar architectural techniques such as the apse effect, greenhouse architecture, and garment architecture to reduce the energy usage of the city, especially in terms of heating, lighting and cooling. Overall, arcology seeks to embody a "Lean Alternative" to hyper-consumption and wastefulness through more frugal, efficient, and intelligent city design.

Arcology theory holds that this leanness is obtainable only via the miniaturization intrinsic to the Urban Effect, the complex interaction between diverse entities and organisms which mark healthy systems both in the natural world and in successful and culturally significant cities throughout history. "Miniaturization has produced hypercomplex forms of organic interactivity through the course of evolutionary time—a process that Soleri has dubbed the miniaturization-complexity-duration principle (MCD). The operation of this principle has generated what he refers to as the urban effect, which argues that the advent of cities was not the origin of urban life; to the contrary, it was the urban effect, the organizing of subcellular components and cells into increasingly advanced forms of life, that ultimately impelled the founding of cities. In other words, there is an evolutionary continuity between the hypercomplex, interactive urban structure of molecular organisms and the hypercomplex, interactive urban structure of the hyperorganism that is the city, the apex of human culture and civilization. Urban life in all its forms, from cellular to civilizational, is a product of MCD in action."[3]

Tracing MCD as the evolutionary engine of life that generates increasingly complex formations of the urban effect over time, Soleri extrapolates that cities can forge human evolution but that suburban development, by contrast, is a weakening and parasitic phenomenon. He sees suburbanism as "the metastasis of the city into a planetary

hermitage," producing isolation and intensified privatization. But in cities, we can observe the benefits of combining functions and activities within urban space. A vibrant sense of community with increased cultural interaction are some of the benefits of this urban effect. The spaces within the city become shared, public spaces – accessible by all, respected in common, thriving with socialization and growth. With its multi-purpose, mixed-use spaces the city synergistically becomes a much richer entity than the sum of its parts.

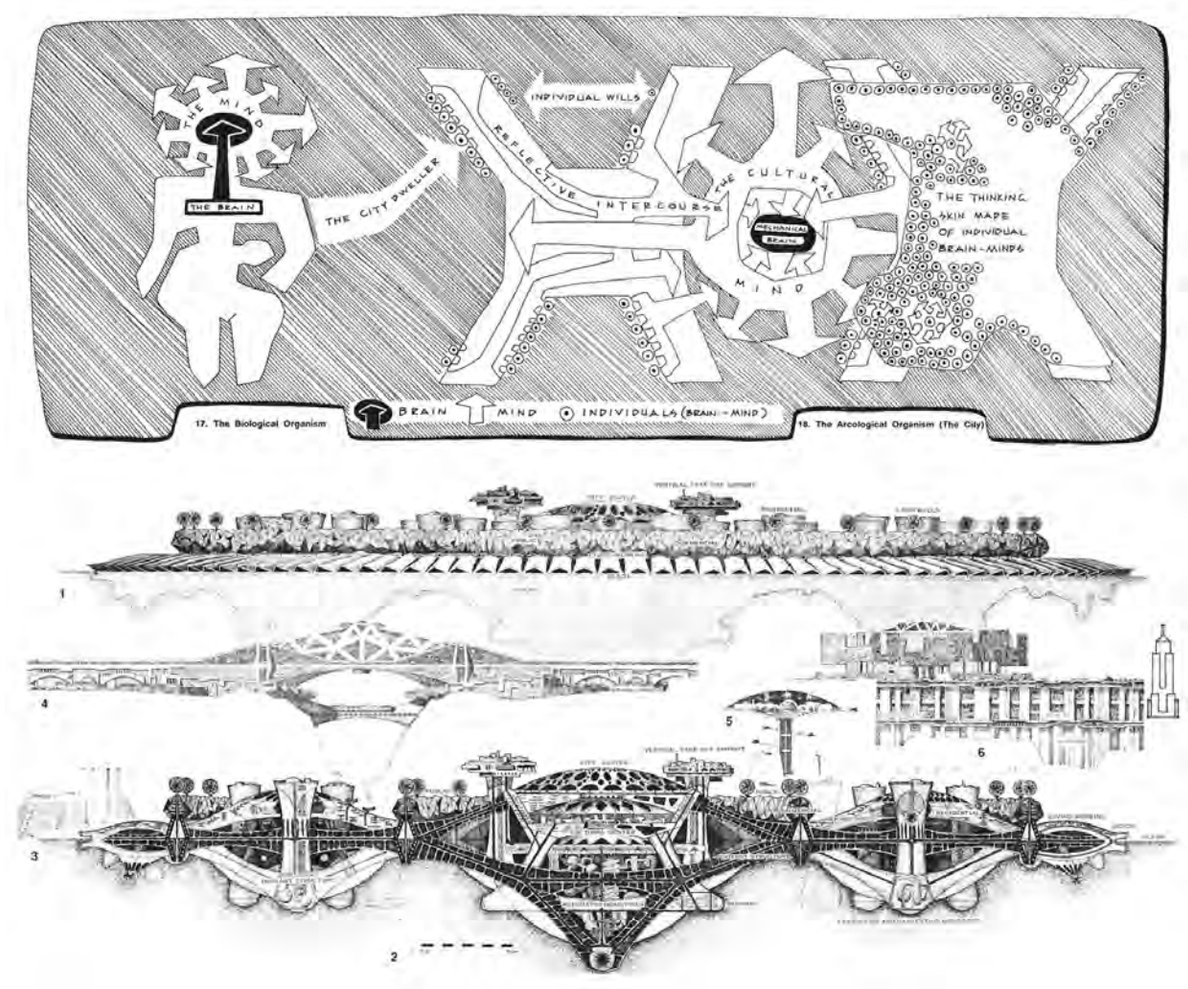


FIG. 2 - SAMPLE FROM PAOLO SOLERI'S ARCOLOGY: CITY IN THE IMAGE OF MAN - 1969

Soleri's conception of the city is not just practical and resource-saving, but is an extension of the very nature of what it means to be a human: "At its heart, arcology implies a humanism. Human beings have complex emotional, intellectual, and existential needs that only the realm of cultural creation can address and assuage. They cannot live packed into colonies patterned on beehives or termite hills; the qualities of the city must respond and correspond to the profounder human needs. Arcology's humanistic subtitle, *The City in the Image of Man*, is a reminder that human beings are highly individuated personae whose vital needs are as much cultural as they are physical. A person can die of meaninglessness as readily as he or she can die of starvation. It follows that the 'sustainability' of urban formations implies more than healthy ecosystems. Sustainable cities must also address questions of justice and equity, tolerance and compassion, and opportunities to grow and flourish through exposure to beauty as much as possible and to misery, degradation, and directionless cultural inertia as little as possible. Urban structures are essentially a means of bringing individuals together into a complex cooperative life — an urban life with potentials far transcending the tribal — and we thereby civilize ourselves. Civilization is epitomized in the civilized person, in the human element and attitude, not in buildings and cultural products per se. How we live together—in what spirit and with what intention—defines the heart of civility."[4]

ARCOSANTI: CITY OF THE FUTURE

At around fifty years old, Soleri burst into the public limelight with two major events: the publication of his groundbreaking book, *Arcology: The City in the Image of Man* (1969), and a large exhibition that showcased his work at the Corcoran Gallery of Art in Washington, DC, in 1970, attended by more than 100,000 visitors over a period of two months. The book and exhibition put Soleri and Arcology on the map, and with new interest and investment pouring in, Soleri began to build a version of Mesa City, though not in the ambitious terms of the original scroll drawings. Around halfway between Phoenix and Flagstaff in the Sonoran high desert construction started up on a smaller scale community called Arcosanti. The building of Arcosanti proceeded gradually with construction assisted by unpaid students who attended five-week workshops held continuously throughout the year. It was partially financed by the sale of the sculptural ceramic and bronze wind-bells that Soleri's team produced at Cosanti in Scottsdale and at Arcosanti. I attended one of these five-week workshops in the summer of 1983 and helped finish the cabinetry and woodwork in the amphitheater building while getting to meet Soleri to learn directly from him and experience living in his community.

A central feature of Arcosanti is its unusual design. Paolo developed a method to cast concrete panels in a bed of silt, many with decorative artwork integrated directly into them, giving the rooms a texture and color that meshes with the landscape. These panels are then assembled into the various buildings and the central arched vaults. The half-dome apses of the bronze and ceramic workshops are cast in place, with other buildings integrated into them. All the buildings are oriented south for solar efficiency with the apse designs permitting in a maximum amount of sunlight in the winter and a minimal amount during the summer. The buildings' layouts are intricate and organic, producing increased social interaction and spaces for cultural activities. Soleri's studio (which he operated until his death in 2013) is placed on top of a "three-story solar greenhouse" that served as the heating system for the whole East wing of the complex. At Arcosanti

the windows tend to be fabricated in circles rather than squares, roofs often double as stairs, and buildings blend together through a network of pathways framing gorgeous views of the Arizona desert.

Over the years, the urban construction has slowly been building on a 4,060-acre land preserve. Soleri's goal was for up to 5,000 people, but the population has generally remained under 150 residents at any given time. There are currently thirteen major structures on the site; including a visitor's center/cafe, amphitheater, ceramics and bronze bell foundries, a ring of apartment residences, community swimming pool, and office and studio complex. Arcosanti primarily remains an educational center, with 50,000 visitors per year taking tours and attending events and concerts hosted there. Construction is halted on any new buildings due to having to get the two-mile dirt access road paved at a cost beyond what can be afforded.

Soleri's work is carried on since his death in 2013 with an influx of younger people living at Arcosanti to further explore and bring to fruition his principles of Arcology. Starting in 2017, they have hosted an annual event called Convergence to share these and other ecological ideas in the container of Arcosanti's urban laboratory. While this experiment in urban design has become an inspiration for visionary architects, design scientists, and sustainability advocates, it has never come close to becoming the full-fledged city of many thousands of people that Soleri had originally conceived. While the population remains relatively small at Arcosanti, thousands of acres in the Sonoran desert continue to be swallowed up by the relentless onslaught of suburban sprawl, including subdivision homes built directly across the mesa from it.



FIG. 3 - ARCOSANTI, AZ

INFLUENCES OF ARCOLOGY

For Soleri, "sustainable high-density cities are not an end in themselves but a means to civilizing and transforming ourselves and the world. The city is an evolutionary instrument, an advanced technology for catalyzing human self-creation and self-transcendence through collective social venture; it is a hyperorganism, evolving toward new forms by putting the we before the me, while respecting and cultivating the individual persona as such."[5] Soleri's concepts of *complexity miniaturization* and *frugality* was aligned with Bucky's *ephemeralization*, how urban structures can do more with less in their integration with nature while providing a higher-standard of life for the populace.

In a similar vein as Soleri's visions, Eugene Tsui is another pioneer in urban megastructures. The design of his two-mile high, trumpet bell-shaped tension structure "Ultima Tower/Sky Tower" is a fully integrated ecological urban environment proposed in 1991. Its structure is like a suspension cable bridge stood on end with upper-level wall thicknesses the same as the lower-level wall thicknesses due to the weight distributed by tension, unlike other structural systems soaring hundreds of meters high. The concept has 120 levels that would house one million people. The scale of this mega-structure is such that its base is well over a mile wide. One must not think in terms of floors but, instead, imagine entire landscaped neighborhood districts comprising public spaces and residential, office, and retail buildings with each succeeding level 30 to 50 meters higher above.

"The concept can be thought of as what would happen if nature grew upwards with multi-soil levels. Ultima Tower itself acts like a living organism with its wind and atmospheric energy conversion systems, photovoltaic exterior sheathing, and opening/closing cowl-vent windows that allow natural air into the interior without mechanical intervention. The exterior walls are made of structural glass that conforms to a crisscrossing double-helix cable strand tension system that disperses all exterior forces along the surface. If

wind or earthquake shock waves push or disturb one portion of the structure, the other portion absorbs and dissipates those potentially destructive forces. Ecological efficiency is key and all areas of the structure feature resource-conserving technology such as recycled building materials, compost toilets, nature-based water cleansing systems for all buildings, plentiful amounts of forest, plant life, and water-based ecosystems."[6]

In essence, Ultima Tower is more an ecosystems design than an architectural habitation design. Sunlight is brought into the center of the structure by means of a hollow, mirrored core that reflects and disperses light within the structure. The tower sits in a natural lake setting where water is drawn up throughout the structure and used for irrigation and cooling. Everything in Sky City is powered by sustainable non-polluting energy.

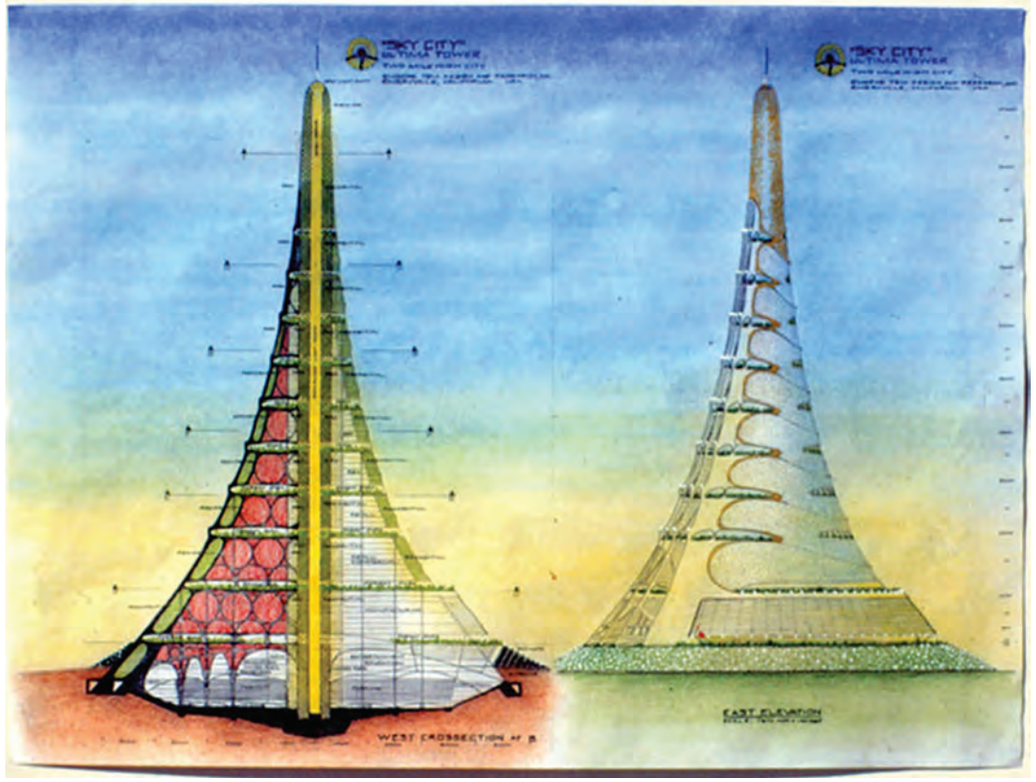


FIG. 4 - EUGENE TSUI - SKY CITY - 1991

CRYSTAL CITIES: BRUNO TAUT'S ALPINE ARCHITECTURE

Throughout my studies at Parsons School of Design, I was required to take art history courses as part of the general curriculum which is how I learned of one of my greatest inspirations in the field of visionary city design. In one of these classes, the professor showed a slide of an illustration by early twentieth century German expressionist architect Bruno Taut. He had drawn an elaborate, glowing crystal city on top of a mountain. It was a large scale arcology that could host a significant population, but what really struck me was the magical interconnection these crystal structures formed with the natural environment of the mountainscape. This illustration immediately caught my attention, more than any other architecture I had previously come across, and I was called to delve further into Taut's life and his work.

Born in Konigsberg, Germany in 1880, the visionary architect best known for his theoretical work, speculative writings, and a several exhibition buildings, was also a prolific architect, urban planner, and author during Germany's Weimar period. Taut was responsible for a number of ground-breaking buildings such as the Träger-Verkaufskontor pavilion in Berlin (1910), the Monument des Eisens in Leipzig (1913), and served as the architect of several famed housing developments in Berlin, such as Hufeisensiedlung (1925-33) and Onkel Toms Hütte (1926-31).

In 1914, he created the most acclaimed building of his career, The Glass House (or Crystal Pavilion). As war was gripping the European continent, the German glass industry commissioned Taut to build a prismatic glass-dome structure for the Deutscher Werkbund (German Association of Craftsmen) exhibition in Cologne. While the piece had the practical purpose of demonstrating new methods that glass could be integrated in architecture, Taut wanted to highlight the relationship of glass to human emotion and spirituality, and how beauty is a better alternative to war. Taut was hugely inspired by the

work of German philosopher Paul Scheerbart – who believed that in modern architecture natural light should "invade" all interior spaces, which would provide a beneficial and transformational effect for those inside. Inscribed around the outside of the pavilion were several of Sheerbart's aphorisms, such as "Light wants to penetrate the whole cosmos and is alive in the crystal." Taut described this temple as "reflections of light whose colors began at the base with a dark blue and rose up through moss green and golden yellow to culminate at the top in a luminous pale yellow."[7] The Crystal Pavilion was a pineapple-shaped two-story structure with glass staircases that led to an upper room revealing a kaleidoscope of colored light that filtered through the vitreous dome. Between the staircases was a seven-tiered cascading waterfall with underwater lighting. The Glass House fulfilled both the mission of the burgeoning glass industry while being imbued with Taut's spiritual ideals.

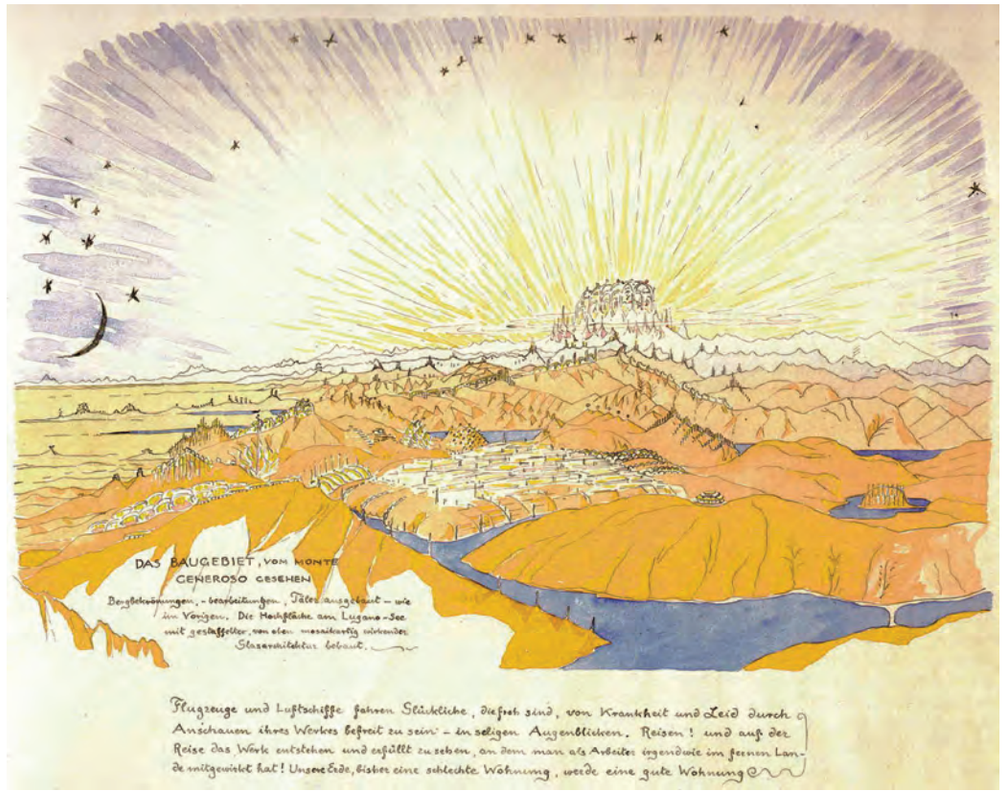


FIG. 5 - BRUNO TAUT - ALPINE ARCHITECTURE - 1919

His most seminal published work was *Alpine Architecture* (1919), which has been called "arguably the most ambitious architectural treatise of the 20th century."[8] Excerpts of it abounded in history texts but a copy of the original publication was extremely difficult to find until Matthias Scherren republished a complete copy of it in 2004. It included the entire original work, all of Taut's notes on the sides of his original hand-drawn illustrations along with additional essays, commentary and translations. In the preface of this new book Scherren writes: "Motivated by disgust with the war, Taut projected the utopia of a complete reconstruction of the world in the spirit of empathy, a serious attempt to flush out the architect's moral claim of being capable of altering life, indeed nature herself."[9] *Alpine Architecture* consists of thirty colorful plates that Taut conceived and illustrated. He divided the book into five sections: crystal buildings, utopian cities in the Alps, continents around the world covered with these structures, and science fiction cities floating in outer space. The treatise includes Taut's pacifist ideals given the European tragedy of WWI, as well as his mystical and spiritual study into human interaction with the natural world. In almost William Blake-like fashion, the plates illustrate visions of incredible structures in river canyons and mountainsides, crystalline cityscapes adorning pristine mountaintops, vast areas of land filled with these utopian inhabitations and impossible imaginary cities floating in space, all rendered in beautiful watercolor drawings.

Both Scheerbart and Taut were influenced by the German psychophysicist Gustav Theodor Fechner (1801-1887), who is credited with creating the field of psychophysics, the branch of psychology that deals with the relationships between physical stimuli and mental phenomena. Fechner was a monist, meaning that he believed that everything comes from one, or that all things in existence go back to an original source. "A key theme of Fechner's speculations in natural philosophy was the notion of universal animation. In his eyes, not only plants but all inorganic matter, including the planet and stars, were animate beings with an individuality of their own that was nevertheless mysteriously interwoven with that of other living creatures."[10] He was also of the thought that everything in the universe is made of dynamic

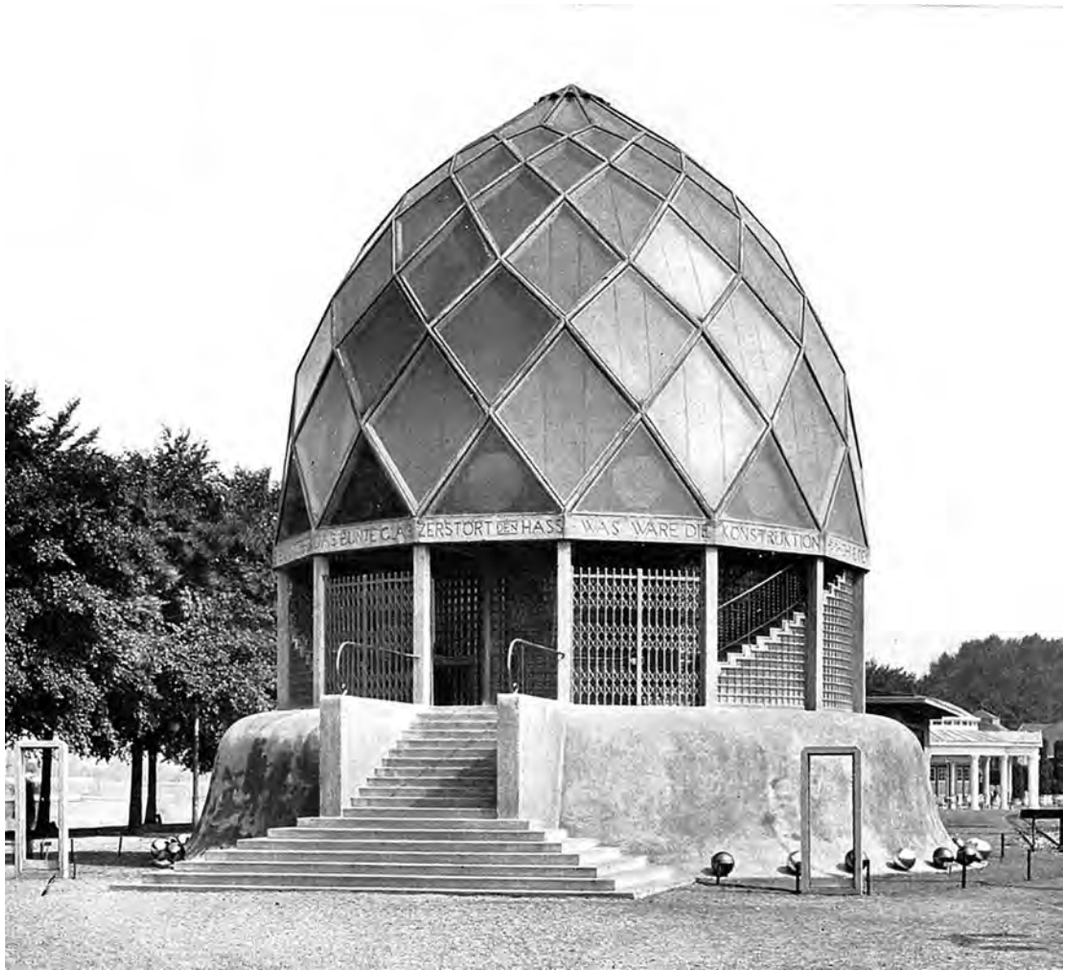


FIG. 6 - BRUNO TAUT - GLASS HOUSE - COLOGNE, GERMANY - 1914

waves and vibration and it is only when these frequencies interface with your sense organs that they convert into light, sound, and touch.

"For Fechner, the Earth itself was 'the whole of that of which our body is merely a member, the whole of that in permanence which our body is only in passing; [it] relates to that [member] as an entire tree relates to a shoot, a complex knot to a single loop in it, a lasting body to a transitory, small organ."[11] This greatly influenced Taut's visions of having the entire population participate not only in the building of these visionary cities for human habitation, but in the transformation of the Earth to benefit all animals, plants, even minerals, water, and air. You can witness this living, breathing aspect

of the world in the illustrations of *Alpine Architecture* and the written titles and descriptions on the plates themselves. For example, plate twelve has an image of a crystal city on top of a mountain peak with the inscription: "GREAT IS NATURE. Eternally beautiful an eternal creatress, in the atom and in the gigantic mountain. Everything an eternal NEW CREATION. We too are her atoms and follow her laws -- in creating. Inactively marveling at her is sentimental. WE CREATE IN HER, WITH HER AND WE ADORN HER!"[12] Plate thirteen features a composite of four drawings of Alpine peaks and canyons adorned with various crystalline architectural structures with a call for humans to awaken to the Gaian mind: "THE ROCKS LIVE! THEY SAY: We are the organs of the Goddess Earth -- but you worms -- yes you are that also -- you hovel architects must first become artists! Build -- build us! We do not want to be merely grotesque, we want to become beautiful through the human spirit. Build the World Architecture!"[13]

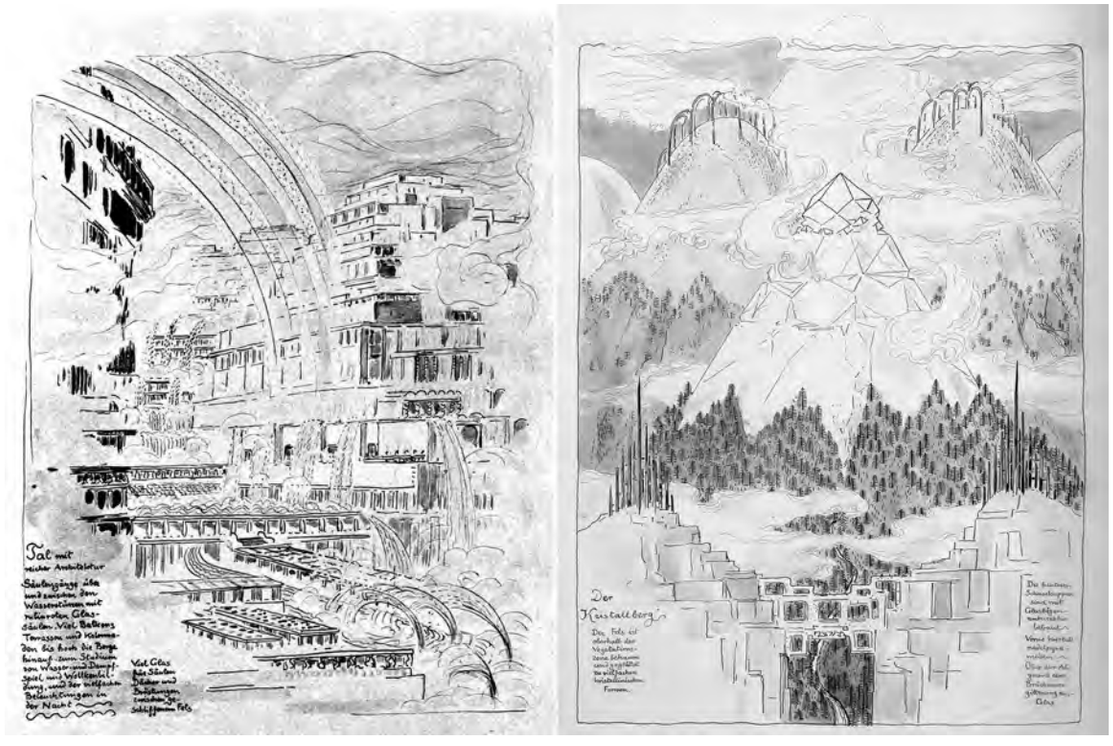


FIG. 7 - BRUNO TAUT - ALPINE ARCHITECTURE - 1919

CHAPTER 7

EVOLUTIONARY VISIONS: NATURE AS A BASIS FOR DESIGN

BIOMIMICRY AND ORGANIC DESIGN

Biomimicry finds solutions to human challenges by emulating designs and concepts of the natural world. One of the most famous early examples of this methodology comes from Renaissance Italy, where Leonardo da Vinci took sketches of the anatomy of birds to help craft his original designs for human flying machines. While unsuccessful at the time in its practical use, centuries later we can see iterations of these ideas in the airplanes, helicopters, and wing-suits of today. The Wright Brothers drew inspiration for the first successful aircraft launch, and landing, in 1903 by observing how pigeons moved in flight. American inventor, engineer, and biophysicist Otto Schmitt coined the term *biomimetics* in 1957 to describe the process of applying ideas in the biological world to technological innovation. The more popular term of *biomimicry* appeared in the early 1980s, but was widely popularized with the 1997 publication of *Biomimicry: Innovation Inspired by Nature*, authored by the scientist Janine Benyus. In the book, she defines biomimicry as a "new science that studies nature's models and then imitates or takes inspiration from these designs and processes to solve human problems."[1] Benyus suggests looking to nature as a trilogy of "Model, Measure, and Mentor" with a central focus on sustainability.

Today, biomimicry is an evolving science producing many practical applications for buildings, transportation, and eco-friendly materials. For instance, in Japan engineers were faced with the problem of bullet trains creating loud shock waves upon entering tunnels, which caused structural damage to the tunnels themselves. The design team assigned to solve this issue decided to shave down the train's blunt front nose cap, replacing it with a much more aerodynamic, streamlined form based on the beaks of Kingfisher birds, who can dive into water without making much of a splash. This modification made the trains ten percent faster, used fifteen percent less electricity, and completely ended the damaging effects of "tunnel boom." Applying nature's incredible design technology, researchers are now modeling wind turbines after the propulsion capabilities of humpback whale's fins; they are studying

the Stenocara beetle of the arid Namib Desert to harvest water from the air, learning about the mechanical function of woodpeckers' beaks to develop better shock absorbers, and producing bioluminescent camouflage like that of squids and other cephalopods.[2]

The biomimicry movement has gained much traction and attention over the last few decades and we are now learning how to design habitats by aligning with the way nature works. Once upon a time, we called things that humans made "technology," from steam engines and oil rigs to the "high-technology" of computers, satellites, and jets. But we are coming to learn there is no separation between humans and nature; that the biological environment contains advanced technological know-how and some of the leading-edge architects and engineers of our times are now blurring the line and designing buildings based upon the principles of nature.

One of the early pioneers of this work is William Katavolos, who's been a professor at the Architecture School at Pratt Institute since the sixties. His career in the avant-garde first began back in the late 1940's and early 1950's when he and two other Pratt students, Ross Littell and Douglas Kelle, created a furniture line that included the popular "T" chair, a sturdy three-legged chrome and leather frame

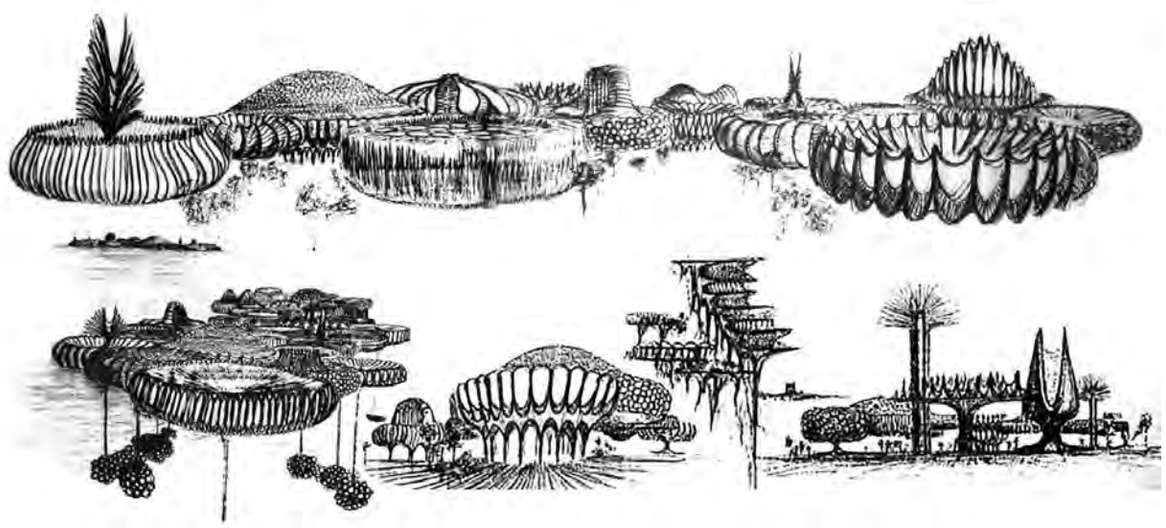


FIG. 1 - WM KATAVOLOS - ORGANIC ARCHITECTURE - 1959

support sling seat which was so popular and revolutionary that it won the 1952 A.I.D. award for best furniture design in America. "T" chair models have been placed in the permanent collections of both the MoMA and the Louvre.

In the late fifties, Katavolos's book *Organics* was published in the Netherlands and subsequently canonized as a "modern manifesto" in Ulrich Conrads's compendium *Programs and Manifestoes on 20th-Century Architecture*. In *Organics*, Katavolos proposes the groundbreaking concept of "chemical architecture," or "liquid architecture," grown from polymers. He argues that humans don't simply have to construct buildings, but they can *grow* structures organically as we see in nature with trees, vines, green algae, and crystal clusters. As Katavolos states: "Man must stop making and manipulating, and instead allow architecture to happen. There is a way beyond building just as the principles of waves, parabolas and plummet lines exist beyond the mediums in which they form. So must architecture free itself from traditional patterns and become organic... New discoveries in chemistry have led to the production of powdered and liquid materials which when suitably treated with certain activating agents expand to great size and then catalize [sic] and become rigid. We are rapidly gaining the necessary knowledge of the molecular structure of these chemicals, together with the necessary techniques that will lead to the production of materials which will have a specific program of behavior built into them, while still in the submicroscopic stage. Accordingly, it will be possible to take minute quantities of powder and make them expand into predetermined shapes such as spheres, tubes, and toruses."[3]

As co-director of the Center for Experimental Structures at Pratt, Katavolos has overseen the practical development of such chemicals, but his team has only used them in a limited capacity. He imagines a strange, futuristic world where buildings grow organically from their chemical make-up, like giant oaks following the programming built in their molecular structure from a small sapling to a great old tree. "Houses such as this would grow to certain sizes, sub-divide or fuse for larger functions," says Katavolos. "Great vaults

would be produced with parabolic jets that catalize [sic] on contact with the air. Exploding patterns of an instantaneous architecture of transformations, into desired densities, into known directions, for calculated durations. In the morning suburbs might come together to create cities, and at night move like music to other moorings for cultural needs or to produce the socio-political patterns that the new life demands."[4]

No doubt Katavolos's greatest inspiration for architects and urban designers came from his graceful illustrations of organic cities floating on water. These future-topias depict a serene, balanced environment where circular homes made of natural materials grow into one another, buoyed upon the sea with structures tangling and dripping like the roots and limbs of vines. Buildings resemble flowers, ferns, venus-fly-traps, forming a sort of organic amusement park of pleasure and delight for the inhabitants of this floating world. Here, in these early designs for ecologically-minded architecture, we find a vision for how humans can integrate harmoniously with the elements of water, land, and air, reestablishing our sacred connection to Mother Gaia.

VERTICAL CITIES

In a 2013 *Archinect* article, reviewer Eric Chavkin called Glen Howard Small "the hesitant father of Green Architecture." Small's design concepts for "the Vertical City," "Biomorphic Biosphere Megastructures," and the "Green Machine" have inspired a generation of sustainable architects and city designers. An urban planner and ecologically-focused architectural professor, according to *The Los Angeles Times*, he was "a young lion of Southern California architecture in the early 1970s, influencing culture as dynamically as Spielberg and Lucas did with their films. Small was one of the seven founders of the Southern California Institute of Architecture, or SCI-Arc, in 1972. His architectural visions were, in keeping with that time, sweeping, abstract and ecologically friendly."[5] He is best remembered for his ambitious proposals to develop urban solutions that worked in harmony with the natural constraints of planetary resources. His daughter Lucia Small made the documentary *My Father the Genius* in 2002 on his life's work of saving the world through architecture.

In 1965, Small began to develop concepts based on the question of what an entire city and region would be like if it were created in harmony with "the principles that nature sets up." He believed that nature was "the ultimate technology," and that "when you start to apply the principles that govern nature to your design, you are going to end up with [cities] that look like nature."[6] Small started by sketching in 1964 a "Vertical Ribbed Pedestal City" that rose out of the San Francisco Hills, where he was living at the time. The megastructure was impressively tall, organic, tree-like with roots, trunk, and branches, and slightly Dr. Seussian in its utopian design. Small described the developed concept in his online blog www.smallatlarge.com: "I drew a couple of crude sketches one evening of huge ribbed tree-like structures rising out of the hills of San Francisco. The branches bridged with adjoining structural trees. The interior drawing looked out on the Golden Gate Bridge, one of the few structures I revere."[7]

These ideas and his portfolio of projects opened the doors for him to pursue his masters degree at the Cranbrook Academy of Art on a full scholarship, in Bloomfield Hills, MI, a GM executive suburb of Detroit. Small "rebelled against the pattern of existing cities", instead believing in the preservation and restoration of the environment that challenged the centuries-long trend of cities gobbling up enormous acreages of land as they grew and evolved. In his characteristic witty and cynical tone, Small elucidates the waste and ecological destruction of these cities on his blog: "Although the globe has huge amounts of open wilderness land, the cancerous deep pile carpet of man's development is left unchecked. What started as small self-sufficient settlements along waterways turned into New York, Paris, London, Berlin, Hong Kong, Rio, Moscow, LA, etc. The cities affecting large regions for food, wood, animals, fish, water, power. Their demands for coal mining, petroleum, reservoirs, and garbage disposal reach out to the furthest corners of the world."[8]

Under the tutelage of his mentor, architectural professor Glen Paulsen at Cranbrook, Small was encouraged to develop, in a visionary yet rational manner, designs for cities that dealt with the issues of pollution, resource consumption, and population growth. Small began drafting sketches of these organic, vertical behemoths, scaling up to 5,000 feet into the sky. Extraordinarily ambitious, Small considered the mid-sixties as a fortuitous time to investigate new models of large-scale, ecological urban living: "The idea was to make the minimum impact on the natural environment by making the city as self-sufficient as possible. I had a sincere interest in ecology and felt it was the logical solution. There were alarming predictions of out of control world population growth, thus threatening and frightening people into considering the regional scale approach I was proposing. In 1965 the public was just beginning to take notice of the destruction of our country's natural resources."[9]

Small developed an organic design system of a continuous, hollow, mountain-like geometric megastructure for the Motor City's future. He envisioned this vertical structure being able to grow over time in the same way as any human or animal evolves. "The three-

dimensional growth pattern started like a small child and grew by expanding all parts to an adult. Allowing for expansion by pushing out from central building machines, straight members that increased at their base, thus allowing the compression members (like the poles of a tent) to increase in size by adding onto the existing at the base and pushing the top upward. I had done a study of a barnacle growing at the base and pushing the top upward."[10]

He presented these futuristic city designs to the public as a serious proposal as to how human habitations should be built, but they were far too radical, impractical and costly to be embraced and implemented. They were glimpses and inspirations of what was possible, of an ideal way for humans to live in a vertical city that is alive and growing, allowing the land beneath to be restored naturally. Besides the drawings and models he created depicting the concept, Small described in writing what it might be like to live in one: "What is it like to be in the Vertical City? In my mind I am there, but how do you convey this to the general public. To convey this I drew drawings. But the drawings are so different and strange from what the public perceives as streets and living spaces that a certain confusion arises of what it would really be like in the Vertical City. The exterior is like a rugged green mountain range rising vertically out of the flat countryside. Covered in foliage with dwelling units resembling flowers and mushrooms cantilevering from the sides. Water cascades down its sides. The interior of the vertical city is like being in a huge enclosed greenhouse canyon."[11]

Small, upon graduation from Cranbrook, continued working in the Detroit area on idealistic planning schemes, before eventually moving back to California where he set up an architecture studio in Venice Beach. The vertical city for Detroit evolved into the "Biomorphic Biosphere" for the ultimate urban sprawl: Los Angeles. The Biomorphic Biosphere envisioned an organic megastructure that condensed this sprawl throughout the whole of Los Angeles into a vertically growing city. Within this biologically harmonious framework, warm air could rise, cool, and fall like a still, condensing water to be collected in pristine urban reservoirs within a sustainable ecosystem. This

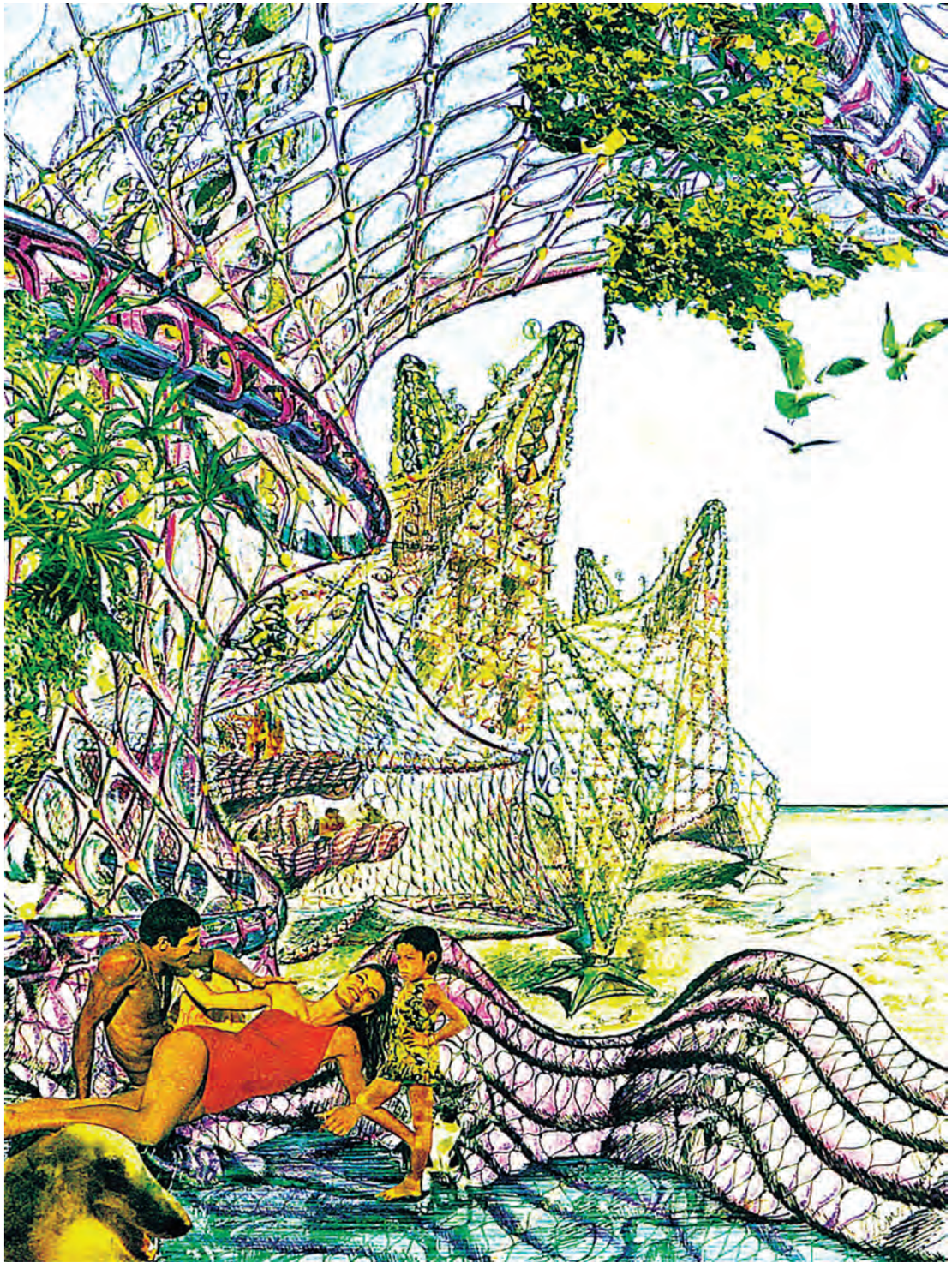


Fig. 2 - Glen Small - Biomorphic Biosphere - 1969

visionary city would expand and restore itself organically and, if the urban population went into decline, the biotech structure could reverse its momentum and even start to consume itself. Small describes where he came up with the name: “The word biomorphic was introduced to me by Dan Lieberman, an architect in Mill Valley, that I worked with briefly. It means evoking images of biological organisms. Biosphere is the living crust of the Earth where living organisms can exist.”[12]

While it may be challenging to envision the practical application of such a bold and unusual concept, Small has given us a written cross-section of what this biomorphic mega-structure would encompass, including entirely different climates based upon the varying altitudes within the structure. “Elevation... Reaching 5,000 ft to 8000 ft, creating a variety of climates from tropical at the base and alpine at the top. Swimming to skiing, mangoes to pine nuts. Some days clouds on the outside hang in at 2,000 ft and the structure breaking through to the sun above. Like cutting through the clouds in a plane and floating in the sun. The runoff excess water creates small lakes in the restored landscape. The Los Angeles Basin was lush with plants and abundant animals, when the Spanish first arrived.”[13] This radical concept of mountainous three-dimensional cities bursting through the clouds was far beyond any developers interest, finances or capabilities to build. Small asked himself, “Where are the visionary developers to build the biomorphic biosphere at any scale. Do they exist or was that just a fleeting era of the past?”[14]

Small’s next project was more down to earth, basically a miniaturized affordable version of the Biomorphic Biosphere called the “Green Machine”: a low-income housing project which incorporated airstream trailers and prefab lightweight modular housing (designed specifically for the project) into a raised tubular steel polyhedra frame filled with plants and trees. The space-frame structure integrated nature and domiciles in a compact three-dimensional urban environment that was solar zoned to allow sunlight to reach adjacent properties. Small described this eco-communal experience as part greenhouse, part living unit, part neighborhood playground with slides going down to the parking areas below it for even adults to

enjoy: “The concept is a vertical trailer park with a demountable frame (similar to steel scaffolding). A truncated solar pyramid with cantilever pads to receive movable living units... The enclosed walkways (17’ wide x 17’ high), functioned as communal spaces for kids to play, adults to talk, greenhouse gardening. Twenty-four pads for living units (1150-1250 square feet each) were adjacent to the walkways.”[15] The National Endowment for the Arts provided Small with a modest grant to develop the Green Machine concept. There was interest in realizing the project, but in the end, the City of Los Angeles declined the funds to build it. In a city plagued with massive sprawl, high-rents, and a constant housing crisis, the Green Machine stalled out before it could hit the road.

In 2010 Small took advantage of the internet, with the help of his friend Tim Barnes, to get his ideas out to the world by creating a website blog SmallatLarge.com that documents all of his work in extensive detail. It gave him an outlet to express his projects and all of his influences in his own words. The blog has made it quite easy for people all over the planet to not only learn about Small’s visionary work, but to comment and interact with him.

In 2012 he submitted a project for the world-renowned eVolo high rise competition called the “Downtown Tropisphere”. This project adapts an existing city’s high rise structures with a suspension eco membrane enclosure that shades, is transparent, and opens as needed to create an enclosed weather space of 65 to 75 degrees year-round using natural ventilation with solar, wind, and renewable energy sources. This structure would create an evaporative still system to collect water through condensation to be collected and used to grow abundant green foliage throughout the city, thus creating a huge greenhouse living space that requires only visual and noise barriers between properties. This creates a controlled ideal environment for people to live and thrive in while giving them close and easy access to the surrounding pristine nature.

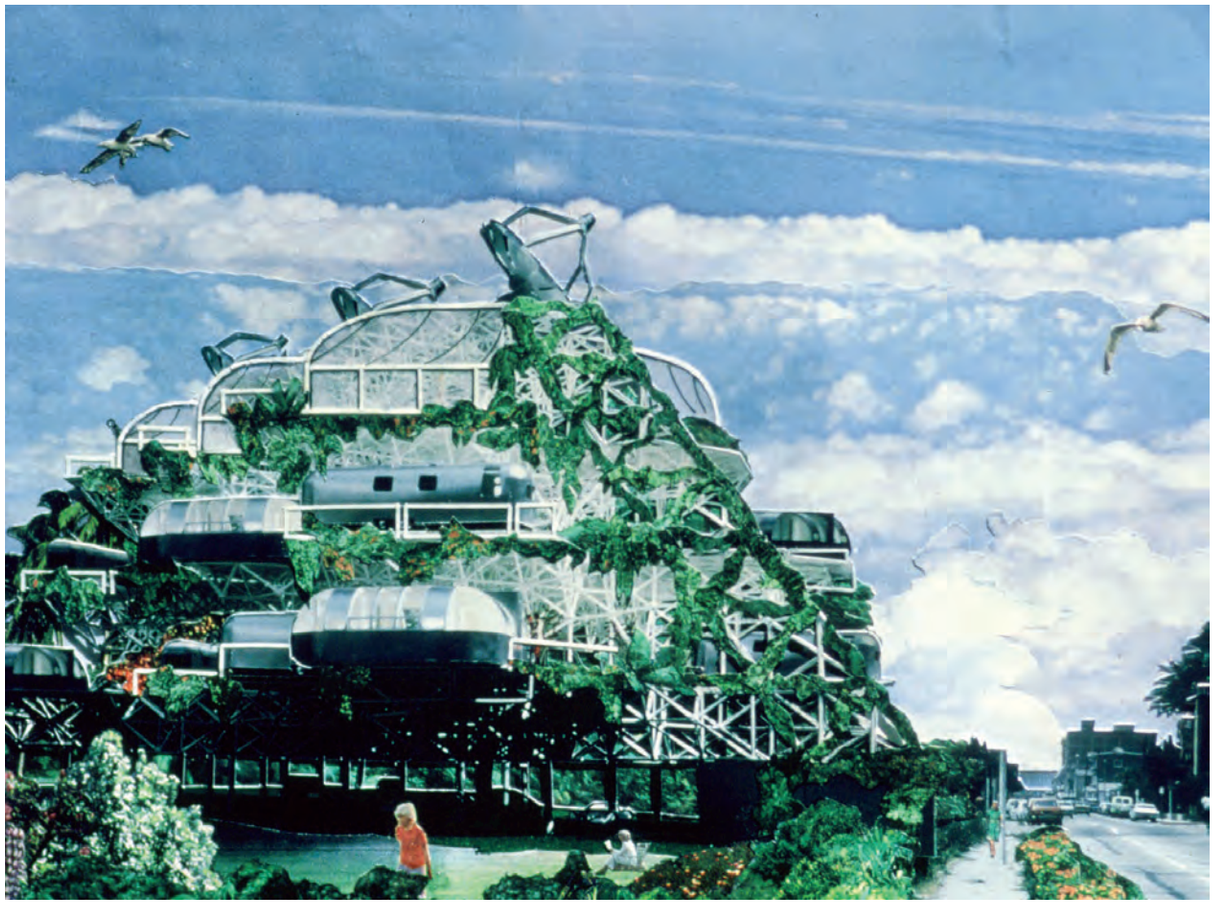


FIG. 3 - GLEN SMALL - GREEN MACHINE PROPOSAL - 1970

HIGHRISE OF HOMES

James Wines is an American architect, artist, and author who has dedicated his career to the integration of architecture, visual arts, sculpture, green technologies, and urban design. He became Chair of the Environmental Design department of Parsons School of Design in1984, while I was studying there, until his departure in 1990. Currently a professor at Penn State University, he has lectured on sustainability and environmental design concepts to audiences in more than fifty countries worldwide. He believes that the natural environment should be as much a part of the architectural vocabulary as that of conventional building materials. During his long career, Wines won more than two-dozen prestigious art and architecture awards, including the 2013 National Design Award for Lifetime Achievement, 2011 ANCE International Architect Award, and 1995 Chrysler Award for Design Innovation. Over thirty museums house his drawings, among them the Museum of Modern Art in Manhattan, the Victoria and Albert Museum in London, and the Centre Pompidou in Paris. He has published seven books, including *De-Architecture* in 1987 and *Green Architecture* in 2000, and has designed more than 150 projects for private and municipal clients in over eleven countries.

Wines is most well-known for founding SITE (Sculpture In The Environment) in 1970 with three other partners. He has remained the head of the internationally acclaimed architecture studio ever since. Known for integrating artistic concepts and ecology into design projects, SITE's collaborative team has completed projects in the US, France, Japan, China, Qatar, and Dubai. I had the honor of working for SITE part-time while studying at Parson's and full time once I graduated, before I started my own art furniture company in 1987. This afforded me first-hand experience of the studios' practice of integrating natural and built environments to create "aesthetically imaginative visually memorable, environmentally responsible, and economically viable structures." For Wines, green architecture isn't just about sustainability, but developing beautiful buildings that people will continue to enjoy living in: "Without art, the whole idea

of sustainability fails, because people would never want to keep an aesthetically inferior building, no matter how well-stocked it is with green technologies, recycled materials, thermal glasses"[16]

The SITE team brought housing design to new heights when they conceptualized a vertical community prototype called "Highrise of Homes" in the early 1980's. The idea uses the steel frame of a conventional highrise apartment building filling in the open spaces with suburban-style homes creating a three-dimensional village-like community. The plan was to "accommodate people's conflicting desires to enjoy the cultural advantages of an urban center, without sacrificing the private home identity and garden space associated with suburbia."[17] Rather than conventional apartments, the structure offered residents the option to choose their own style of family home within the multi-level building, integrating green garden space throughout. Shops,



FIG. 4 - JAMES WINES - HIGHRISE OF HOMES - 1980



Fig. 5 - James Wines - Antilia Vertiscape - 2014

offices, and other facilities on the ground and middle floors create a dynamic neighborhood throughout the structure.

"Whereas urban skyscrapers are normally made up of identical, stacked, boxlike units, the Highrise of Homes would allow flexibility and individual choice. The wide variety of house styles, gardens, hedges, and fences... provides a sense of the personal identity and human connection that are generally erased by the austere and repetitive elements of architectural formalism. Placing the sociological and psychological needs of the inhabitant over the aesthetic sensibilities of the architect, Wines produces a merge of suburb and city, a collage of architectures collectively created by its inhabitants and by the art of chance. Developers considered Battery Park City, New York, as a possible location for the project, but it was ultimately never built."[18]

The SITE studio has amazed sustainable architectural proponents over the years with other elevated and imaginative ecologically integrated concepts, especially the Antilia "Vertiscape" Tower designed in 2003. Developed for the Ambani industrial family of Dubai, this multi-story structure hosts a number of public gardens on different levels with a residence on the top floor. A cable support system allows each floor plane to be built at ground level and then raised into its final aerial position within the tower. The building incorporates Indian Vastu principles, which integrate natural elements with human transformation. Each separate level aligns with a different element as you rise up the tower – earth, water, fire, air, sound, light – leading to enlightenment at the top floor. Vertiscape is stunning and harmonious to the eye, a total integration of dripping green plant-energy throughout the levels, the vibrations of the elements inundating floor space as you go up this organic vertical landscape into the blue heavens of the sky.

TERRAFORM ONE AND FAB TREE HABS

Over the last couple of decades bioarchitecture innovator Mitchell Joachim has become a leader in socio-ecological design, resilient city concepts, and sustainable urban planning. He was chosen by *Wired* for "The 2008 Smart List: 15 People the Next President Should Listen To" and *Rolling Stone Magazine* honored Mitchell as one of "The 100 People Who Are Changing America." In 2006 he founded Terreform ONE, a nonprofit architectural design group that integrates ecological and biological principles into the urban environment. Cultivating resilience through biotech innovations, they speculate about the ways in which emerging technologies can help develop inclusive spaces through green master-planning to urban self-sufficiency infrastructures, the regenerative use of natural materials, community development activities, bio-design, and smart mobility vehicles for cities.

Terreform ONE's project "New York 2106 Post Carbon City State" envisions a future where the Big Apple becomes entirely self-sufficient in its vital necessities, including energy, food, water, air, employment, housing, manufacturing, and waste processing. The ambitious endeavor would consist of a citywide "greenfill," the immediate transfer of street space from cars to pedestrian and public space, and a covering of the urban environment with vertical gardens and urban farms to bring oxygen, beauty, and sustainability to millions of people. Streets become building sites, as new, highly autonomous buildings grow in sections and wind their way down streets and avenues and vacant lots. The old, deteriorated fabric of the city fades away and is replaced by productive green space and a new labyrinth of irregular blocks that encourage a diverse and interactive cultural life. The project even imagines public transportation where blimps move slowly through the streets connecting buildings at upper stories, functioning like ski lifts where commuters can jump on and off at their convenience. When asked about the current feasibility of such an ambitious eco-urban overhaul, Joachim notes: "It took 15 to 20 years



FIG. 6 - MITCHELL JOACHIM - POST CARBON CITYSTATE

to get a hybrid car. To change the basic paradigm for how we make buildings, 40 to 50 years. To change a city? That's 100 to 150 years."[19]

Joachim and his team have been revolutionizing the way we think about building homes with their Fab Tree Hab project. Rather than cutting down a tree to make into lumber and then transporting it to the construction site to build into a house, rather a tree is trained to be grown directly into a habitable structure. They propose a method to grow homes from trees, creating living structures that are grafted into shape with prefabricated Computer Numeric Controlled (CNC) reusable scaffolds, creating dwellings that are fully integrated into the natural environment. Through a process called "pleaching," a method of weaving together branches and vines, the tree home grows to form living archways, lattices, and walls. The load-bearing part of the structure uses trees that self-graft, such as oak, elm, or dogwood. The vines form a dense protective layer woven along the exterior, interspersed with soil pockets and growing plants.

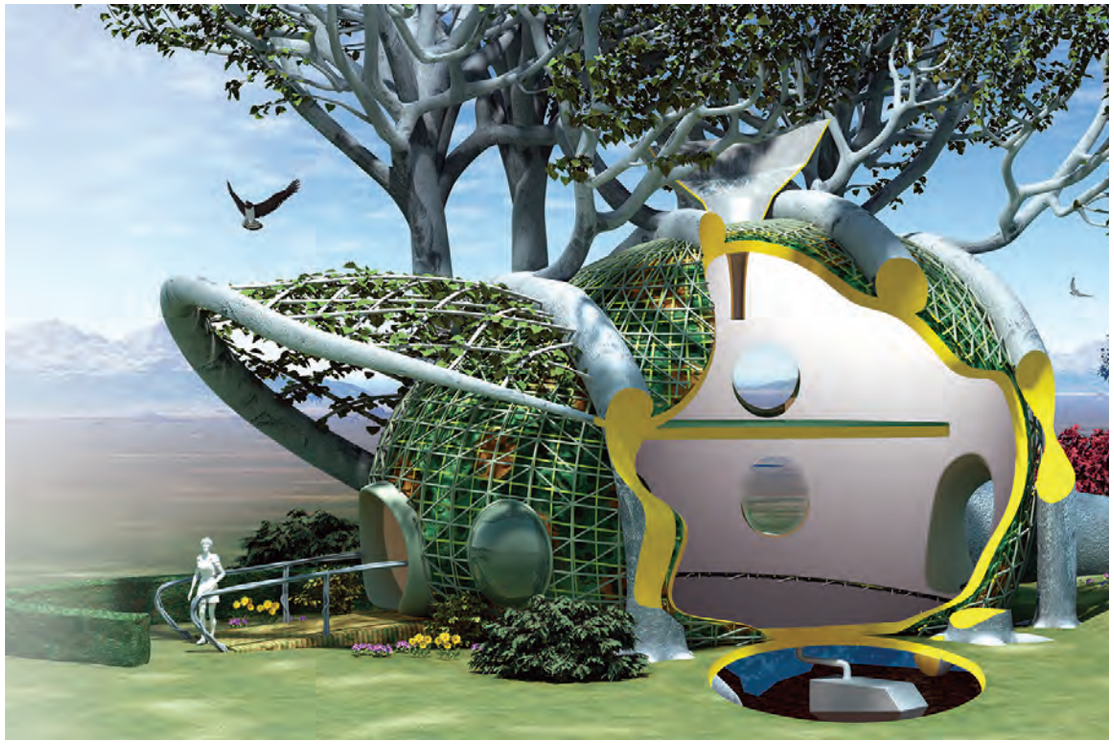


FIG. 7 - MITCHELL JOACHIM - FAB TREE HAB

In his Ted Talk, "Don't build a home, grow it!" Joachim explains how Fab Tree Hab offers an ecological solution to the "McPeople, McCars, McMansions" American lifestyle of waste and consumption. How can we build big and sustainably with millions of Americans needing dwelling space in a resource-tapped world? He argues that with CNC and the technology of pleaching, we can graft trees together into one continuous geometric vascular system that will grow and form a home. Joachim states, "It fits into the environment, it is the environment, it is the landscape and you can have a 100 million of these homes and it's great because they suck carbon... Imagine regrowing a village; it takes about 7-10 years and it's all green."[20] Although this may seem entirely impractical in terms of time and current building methods, it is an important exploration into how we can conceive and create our built environment to be in harmony with nature.

BIOMIMETIC BUILDINGS AND FLOATING CITIES

Belgian-born, Paris-based architect Vincent Callebaut designs massive "biomimetic buildings" to offer ecological solutions for the major urban and environmental challenges facing us today. Callebaut invented the concept of "archibiotect" in 2008 as a transdisciplinary approach to fuse architecture and biotechnologies. "Whereas the primary reason of architecture has been to protect man against nature, the contemporary city strives to reconcile human beings and their natural ecosystems. The garden is no more placed side-by-side to the building; it is the building! The architecture becomes cultivable, edible and sustainable."[21] Among his many projects are buildings that produce their own power, pollution-removing towers, sci-fi-worthy floating eco-cities, and vertical urban forests and food farms. Each of his green projects takes into consideration "bioclimatic rules," such as solar cycles and prevailing wind directions with renewable energy technologies in the form of wind turbines, solar energy, rainwater recycling, and upcycling of biomaterial. In the last two decades, his firm has developed fifty projects, including several currently under construction that embody all of these ideals in futuristic-looking, organic flowing designs.

In 2018 construction was completed for a twenty-one-story sustainable residential tower in Taipei, Taiwan. Situated in the dense and overpopulated Xinyin District of the city, the eco-designed building rises up in the shape of a twisting double helix DNA molecule, representing the symbol of life itself. The vertical habitat hosts 23,000 trees and shrubs that can absorb 130 tons of carbon dioxide (CO_2) emissions each year. The soaring apartment complex utilizes natural lighting and ventilation, rooftop solar panels, and the recycling of organic waste. Called "Tao Zhu Yin Yuan" ("The Retreat of the Tao Zhu"), "The tower presents a pioneer concept of sustainable residential eco-construction that aims at limiting the ecological footprint of its inhabitants by researching the right symbiosis between the human being and the Nature," explains Callebaut. "The tower is eco-designed



Fig. 8 - Vincent Callebaut - Tao Zhu Yin Yuan - Taipei, Taiwan



Fig. 9 - Vincent Callebaut - 5 Farming Bridges of Mosul Rendering

to represent the perfect fusion between Climate, Landscape and Architecture."[22]

- 2018 In the heart of Cairo, Egypt, Callebaut's massive project "The Gate of Heliopolis" is coming to its final stages of completion. Set in the vital corridor of al Nozha Street in Nasr City, Callebaut has created a gorgeous and enormous "sustainable landmark" to help transform the New Cairo into "a vertical, green, dense, and hyper-connected eco-system." The building is an urban green oasis offering multiple views of the surrounding area. It provides underground parking on four levels, a supermarket on another, three levels of commercial zoning, and nine levels of housing and office space. The rooftop features solar panels, solar heating tubes, and impressive vertical gardens. "The ambition of the Gate Project is to create a new prototype of inhabited ecosystem that combines *passivhaus* principles and renewable energy technology to assure 50% of energy saving."[23]

Along with his projects currently under construction, Callebaut has been gaining global acclaim for his grandiose conceptual designs,

such as a proposed "Gothic and Biomimetic Forest" restoration of Paris's fire-ravaged Notre Dame Cathedral, a giant harp-shaped megastructure called "Dragonfly" that would bring metabolic farming and urban agriculture to New York Harbor, and a "Perfumed Jungle" of techno-organic skyscrapers that would immerse a densely populated Hong Kong in a sustainable green environment. His prize-winning "The 5 Farming Bridges" proposes the rebuilding of Mosul, Iraq with five megastructure inhabited bridges that would reconnect the west and east districts across the Tigris, which were destroyed during the recent military conflict. Recycling the debris from war ruins and rubble, he envisions large drones that 3D print geometric arched "stacked housing" for 53,000 new homes that would be integrated with urban farming.

His bio-tech floating megastructure designs have also been creating an international buzz. These plans include the "Aequorea Oceanscraper," a multilayered structure to be built off the coast of Brazil. This small city would feature 10,000 housing units, sea farms, community orchards, phytopurification lagoons, and coral gardens. His floating "Ecopolis" for climate refugees, named "Lilypad," has the double-sided intention of expanding sustainability while providing housing for future climate-change refugees. "It is a true amphibian half aquatic and half terrestrial city, able to accommodate 50,000 inhabitants and inviting the biodiversity to develop its fauna and flora around a central lagoon of soft water collecting and purifying the rain waters... The goal is to create a harmonious coexistence of Human / Nature and to explore new modes of living in the sea by building with fluidity collective spaces in proximity, overwhelming spaces of social inclusion suitable to the meeting of all the inhabitants – denizen or foreign-born, recent or old, young or aged people."[24] As incredible as these futuristic visions may seem, through the successful construction of the "Tao Zhu Yin Yuan" tower in Taipei and the near-completion of "The Gate of Heliopolis" in Cairo, Vincent Callebaut's firm is demonstrating that mass-scale ecotopian architecture is already becoming a reality.

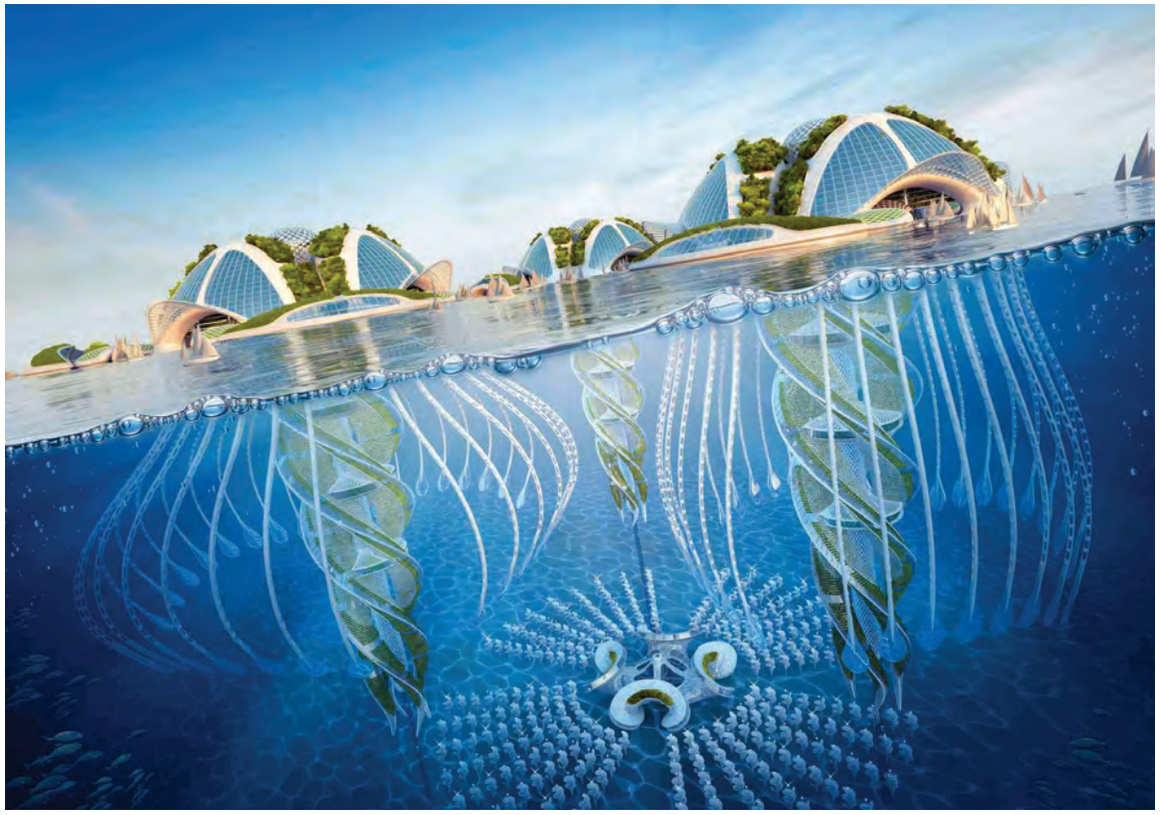




FIG. 10 - VINCENT CALLEBAUT - AEQUOREA OCEANSCRAPER

CHAPTER 8

THE TWELVE SPIRAL CITY: A MULTI-DIMENSIONAL HABITAT OF THE FUTURE

DIMENSIONS OF PARADISE: THE CELESTIAL CITY

In 1988, Inner Traditions book publishers reissued John Michell's 1971 title, *The Dimensions of Paradise: Sacred Geometry, Ancient Science, and the Heavenly Order on Earth*. In this book, *The New View Over Atlantis* author describes how societies throughout history have seen themselves facing some kind of universal calamity or impending catastrophe. According to Michell, as we confront the immense contemporary challenges of global warming, species extinction, resource exhaustion, and overpopulation, we find ourselves in a similar day-of-reckoning mindset as that of previous generations: "The present age is commonly perceived as a time of crisis in which all civilized institutions are threatened by unpredictable forces and the future of life on earth is by no means assured. There is evidence enough to justify such forebodings, but popular belief in imminent destruction of the world has not been confined to our own period; it has recurred throughout history, and earlier legends tell of universal floods, fires, and periodic cataclysms in the distant past."[1]

Michell notes an unusual phenomenon that accompanies this type of apocalyptic thinking, where mystics, visionaries, and even massive amounts of the population witness the materialization of a heavenly city floating above the Earth. According to Michell, "At such times, a certain form becomes activated within the contemporary mind, the image of a celestial city. Sightings of the aerial New Jerusalem, as described by St. John the Divine in Revelation at the beginning of the Christian era, have been reported on many subsequent occasions, often at moments of millenarian excitement. Many Christians early in the third century believed that they would live to witness the descent of the New Jerusalem, and their hopes were raised when a beautiful walled city became apparent in the skies over Judaea. According to Tertullian, it was seen every morning for forty days, fading away as the dawn lightened. Some eight hundred years later, bands of poor pilgrims, struggling across Europe toward Jerusalem during the People's Crusade, were sustained by visions of a glorious city in the air above them to which ghostly crowds were flocking."[2]

Michell understood these celestial cities to be based on a divine proportion, where sacred numbers and measurements embodied the precision, perfection, and harmony of the universe: “The ancient philosophers venerated the established image of the celestial city and based all their studies on it, regarding it as the true, revealed image of God’s creation and thus the appointed standard for all human affairs. In terms of the ‘sacred’ units of measure (those that represent fractions of both the universe as a macrocosm and the human microcosm), its dimensions displayed certain numbers, which were also prominent in ancient astronomy, timekeeping, and all other numerical sciences.”[3] He argues that the knowledge and utilization of these divine proportions were what kept ancient empires thriving for epochs, but that such heavenly insight had been lost by Plato’s time, so the Greek philosopher had to resurrect truths that had been forgotten by every culture in the classic world, except the Egyptians.

According to Mitchell, this knowledge of divinely measured cities, laid out in harmonic numbers for spiritual awakening, has diminished more and more over time until we end up with the profane, grid-patterned cities of the present day. Michell believes that with the destructive forces of our current world, we may be well-primed for a new era that incorporates numerical universal laws that can renew and revitalize the spirit of contemporary society through the construction of a holy city.

The New View Over Atlantis shows how humans might create a modern sacred city founded upon the forgotten wisdom of divine geometric order. Based upon Plato’s principles and the work of St. John, he created a two-dimensional diagram called “The New Jerusalem” or “Heavenly City,” featuring twelve circular-shaped districts in a ring, the number representing the universal principles seen in traditions like the twelve tribes of Israel, the twelve apostles, and the twelve signs of the zodiac. Michell’s proportions extend throughout the city-size structure in a complex relationship of numerological significance. Two of these being the sum of the integers of every measurement in this diagram is nine and there are musically harmonic ratio between many of these numbers. Here is Michell describing some of the ancient

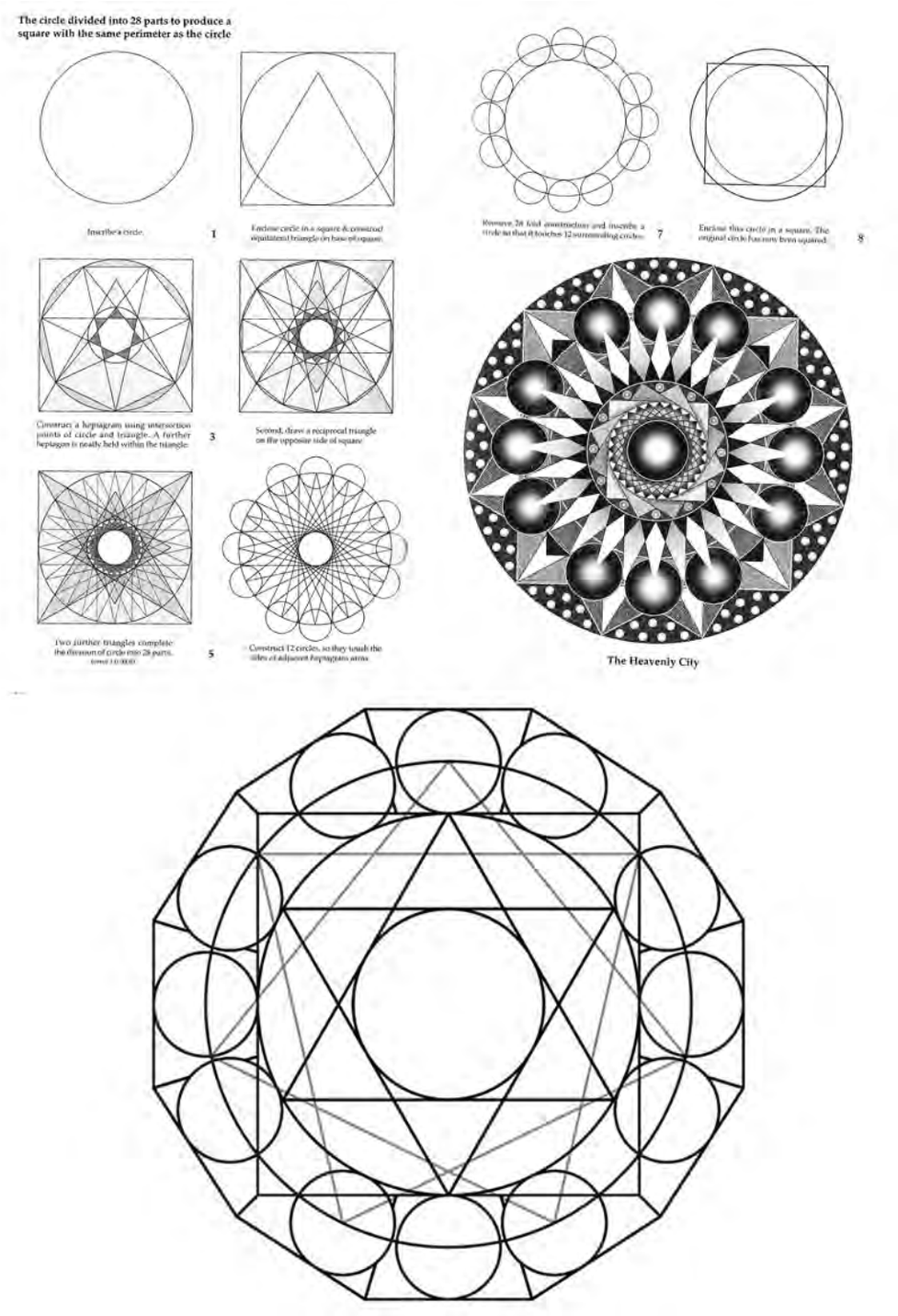


FIG. 1 - JOHN MICHELL - HEAVENLY CITY DIAGRAM

numerology and harmonic principles embedded within this city design: "The ratio between the numbers 216 and 144 is 3:2 (a musical fifth), and this is also the ratio between the areas of two parts of the New Jerusalem, the ring of width, 2,880 feet in cross-section and the outer pair of rings with combined width of 2,160 feet. Their respective areas are 144 x 316,000 square feet and 216 x 316,800 square feet. Numerically, therefore, these two parts of the diagram represent the Inferior Principle of earth and the Superior Principle of the heavens."[4]

SACRED NUMBERS AND THE TWELVE SPIRAL CITY

While studying at Parsons researching many projects for my Future Environments thesis similar to the architectural visions proposed by Bruno Taut and Paolo Soleri, I came across a little-known project by architect Ann Griswold Tyng called the Spiral Urban Hierarchy. Tyng worked with the renowned architect Louis Kahn in the 40's and 50's before setting off on her own. She developed this project along with other buildings and concepts throughout the 60's and 70's utilizing her studies of geometry, proportion and nature. During this period she published *Urban Space Systems as Living Form* in the Royal Architectural Institute of Canada's November 1968 issue. In it, she writes "Proposed urban space systems need the dynamic flexibility and variety which can be derived from organic forms through their fundamental principles of asymmetry, proportional principles of scale both for internal and external growth, and hierarchical levels of form organization which can include complexity within simplicity."[5]

The Graham Foundation staged a major retrospective of her life's work titled "Inhabiting Geometry" at the Institute of Contemporary Art Philadelphia in 2011. "This exhibition presents the work of the visionary architect and theorist Anne Tyng. Since the 1950s, when she worked closely with Louis I. Kahn and independently pioneered habitable space-frame architecture, Tyng has applied natural and numeric systems to build forms on all scales, from urban plans to domestic spaces. This exhibition features room size models of the five platonic solids (the tetrahedron, cube, octahedron, dodecahedron and icosahedron). Identified in ancient times, the platonic solids are the only regular equilateral and equiangular polyhedra. These forms can be found in nature, such as in the structure of crystals. The installation, together with archival material, illustrates the synthesis of Tyng's life-long research on advanced geometry and how she derives her own built forms through the symmetries, orders, and dynamic progressions by which one form in geometry becomes another."[6]

In the *Domus* magazine interview coinciding with her exhibition, Tyng describes her city-sized 3-D Spiral Urban Hierarchy: "In my *Urban Hierarchy* project, there are rectangular or square houses connected by a roadway which is basically a helix with a circular access. Houses are set over each other along this spiraling roadway, and each section has a spiral access to the highway, giving the whole thing a cyclical sequence with recurring symmetries of squares, circles, helixes and spirals. The largest scale reveals and connects symmetries for human inhabitation."[7]

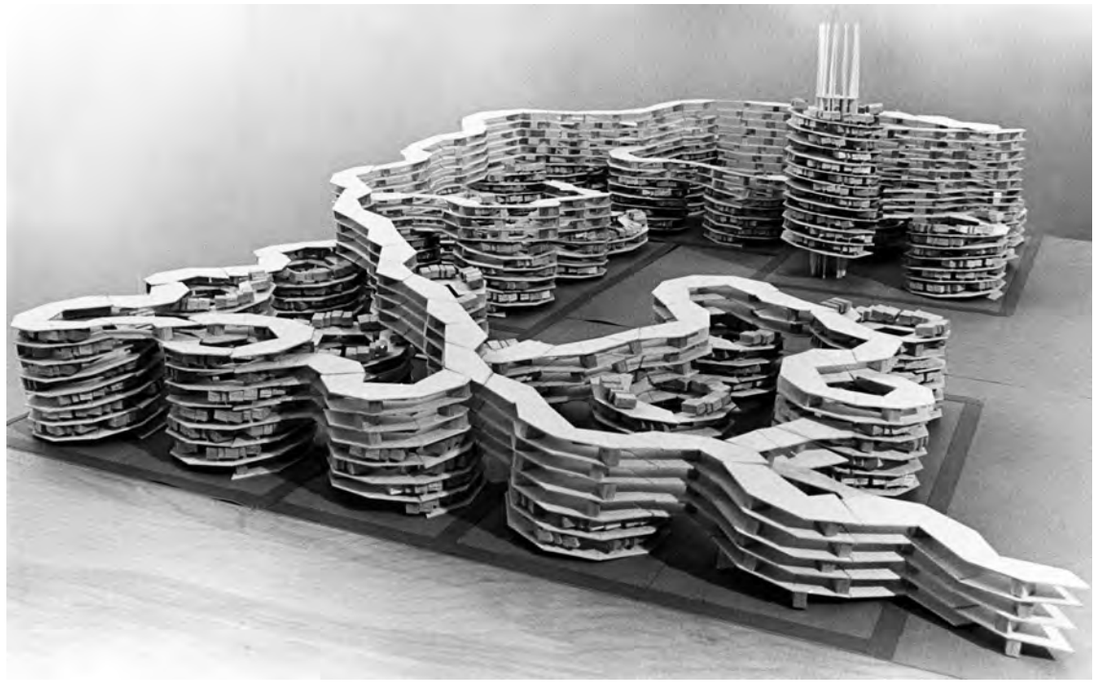


FIG. 2 - ANNE GRISWOLD TYNG - URBAN SPIRAL HIERARCHY - 1969

Greatly inspired by this vision of a spiraling 3-D cityscape, I extrapolated Michell's 2-D diagram of the "Heavenly City" or "New Jerusalem" into an organic megastructure with the twelve circles becoming spiraling city streets that grew vertically over time. Utilizing this geometrical layout, The Twelve Spiral City utilizes Paolo Soleri's concept of Arcology (architecture + ecology) with an emphasis on

managing the flow of people and materials within the structure: "The arcology concept proposes a highly integrated and compact three-dimensional urban form that is the opposite of urban sprawl... The complexification and miniaturization of the city enables radical conservation of land, energy, and resources."[8] – Soleri

The Twelve Spiral City is an ecologically integrated urban megastructure conceived to be built over time, level by level, in an undeveloped and relatively flat environment. It utilizes principles of biomimicry, recognizing the city as a living, growing organism that evolves over time. Using these concepts creates a sustainable environment and structure that expresses an evolved consciousness and symbiotic relationship with the Earth. Greenery is integrated throughout the city with public and private gardens, open spaces, rooftop agriculture, and plant-and-tree-lined streets to oxygenate the dense urban environment. Human-scale gravity and electric-powered vehicles eliminates the pollution you find in current car-centric cities while rainwater collection, waste recycling, and renewable energy keep the urban area clean, green, and pristine.

In April 2008, I gave a presentation on the Twelve Spiral City at the Seventh EcoCity Summit in San Francisco, including exhibiting a 3-D model depicting the spiraling ramp megastructure. Based on Michell's harmonic principles that all dimension numbers add up to nine, the twelve circles in the geometrical plan consist of spiraling ramps 316.8 feet wide and 2,160 feet in diameter (with a radius of 1,080 feet). They are arrayed in a circle with a radius of 5,040 feet in four groups of three, leaving a central open circle 7,920 feet in diameter for green space, city parks, and urban gardens. The spiraling ramps rise 144 feet between levels and incorporate all the utilities and infrastructure necessary for urban living. The ramps have dual levels – the street level is divided into inner and outer building plots 76.5 feet wide with pathways along both inner and outer edges and down the center, and a rooftop level 45 feet above the streets interconnecting the rooftops of the buildings. The ramp's thickness of nine feet leaves ninety feet of airspace between the rooftop level and the next spiral level above it for sunlight to enter and for the plants and trees to grow.

The building plots on the ramps are open to individual development of human-scale habitations up to the four-story-high roof level, providing for a rich diversity of personalized home designs. This specific feature was based on the concept developed in SITE's' "Highrise of Homes," but instead of a variety of suburban houses, it would incorporate all sorts of newly developed approaches to architecture. Even though residents would be living in a giant megastructure, they would be inhabiting human-scale dwellings surrounded by lush gardens.

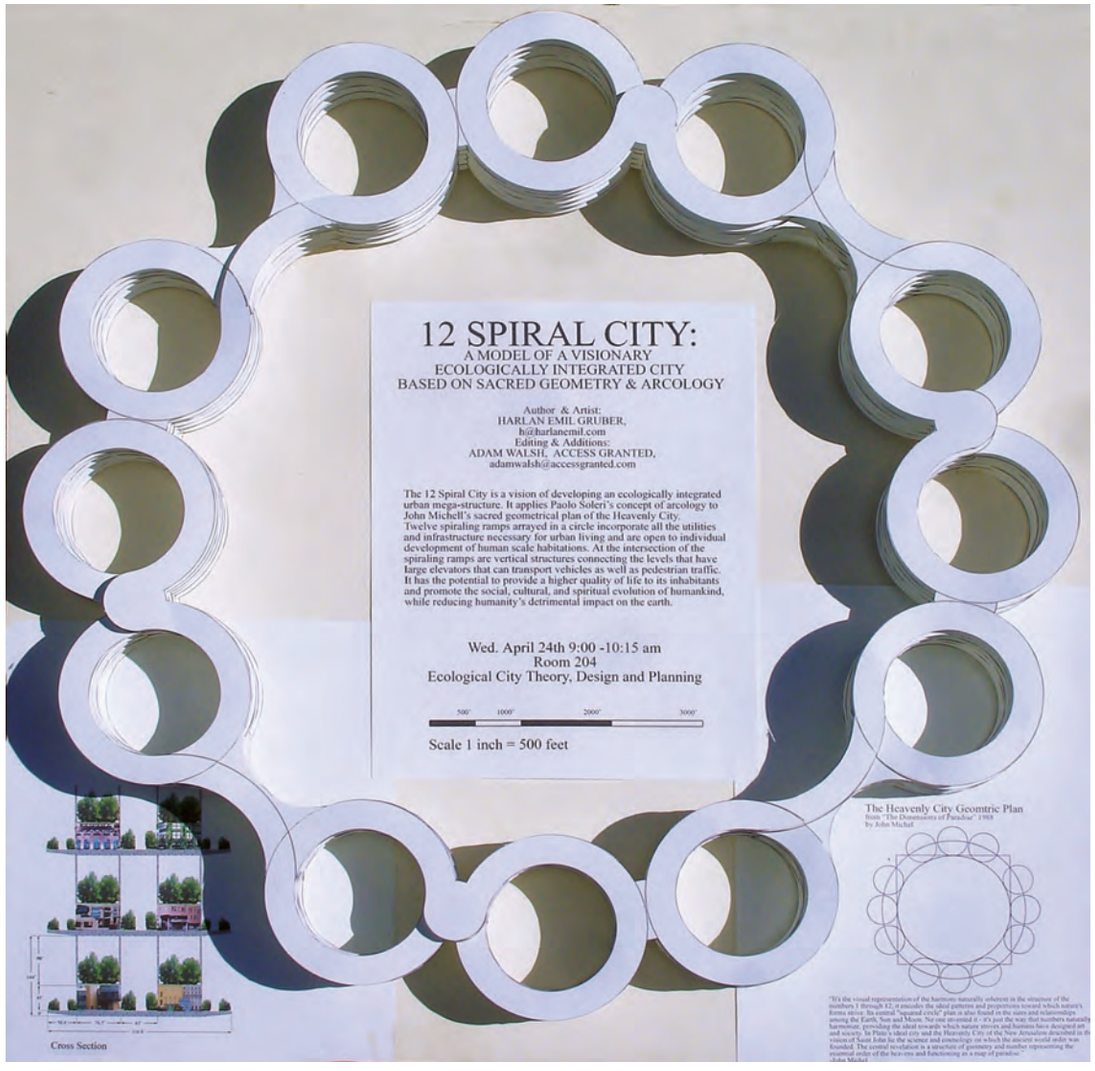


FIG. 3 - 12 SPIRAL CITY MODEL AND PRESENTATION - 2008



FIG. 4 - 12 SPIRAL CITY - 3D RENDERINGS - 2026

URBAN EVOLUTION AND COMPLEXITY MINIATURIZATION

In modern cities, we have become accustomed to streets being paved in a rigid grid pattern. In the 12 Spiral City every street would be an elegant spiral with a gentle slope for walking and riding that can be coasted downhill. Each spiral has three streets: ones on the inner and outer edges of the ramps and a central street between the two rows of buildings. The middle street allows pedestrians to stroll between homes with flowing streams that watering their gardens. Vehicles are limited to the outer and inner streets, including bikes and scooters commuting quickly from one place to another within the city and delivering goods and services to the residential neighborhoods. There are radial streets allowing connections between these concentric streets. Connecting the levels at the eight intersections of the spirals are vertically continuous commercial tower structures for stores, businesses and offices, as well as elevators big enough to transport vehicles and pedestrians between levels. These would not be the current gas-guzzling, full-size cars and trucks of current modern cities but rather human-scale, electric golf-cart style vehicles, as well as all other forms of personal transportation such as scooters, bicycles, rollerblades, skateboards, hoverboards, etc. Commuters would be able to coast down the spirals throughout the city, taking elevators at the intersecting towers to move vertically up the megastructure when needed. In this manner, the entire city would have a natural downhill movement and flow. Water would be pumped up into holding tanks at the top of the megastructure to flow down in streams irrigating the diverse flora within the eco-city while also creating negative ions to purify the air.

Even though New York City is one of the densest cultural centers of humanity, the majority of its space is given over to streets and parking for cars and trucks, not buildings, parks or pedestrians. The Twelve Spiral City utilizes Soleri's "complexity miniaturization" concept to increase the cultural density of urban habitation by removing all the space given over to large vehicles, streets and parking.

Eliminating all the noise and pollution associated with fossil fuel powered vehicles has the potential to provide a higher quality of life for the city's inhabitants, while promoting a denser environment for the social, cultural, and spiritual evolution of humankind, as well as reducing humanity's detrimental impact on the Earth created by suburban sprawl.

Each of the twelve spirals would serve as a different cultural center for the various aspects of society, just as cities are naturally divided into districts that attract a certain type of social activity or business. Cities naturally segregate "like with like". New York City offers a good example of this urban phenomenon which changes and evolves over time. Manhattan is comprised of such places: the East Village attracts progressive hip culture, musicians, and artists; the West Village is home for the gay community; and the Upper East and West Sides are family oriented. Businesses traditionally congregate in centers such as the Garment District, the Flower District, the Meat Packing District, and most famously the Wall Street Financial district with the New York Stock Exchange. Ethnic groups cluster in areas like Chinatown, Harlem, and Little Italy. An example of the evolution of an area is Soho, where the cast iron buildings from the late 19th century industrial revolution fell out of use in the mid-20th Century, to be taken over by artists which then eventually spawned the art gallery district. This eventually turned the area into a high-end consumer shopping district, while the galleries relocated to the Chelsea area where industrial buildings became available when those businesses relocated out of the city.

The Twelve Spiral City embraces this cultural diversity. Just as the astrological zodiac is divided into twelve different signs with their unique archetypal attributes; in this model, each of the twelve spiral ramps becomes its own district for the cultural activities and services centered there. For instance, one spiral would host all the museums, galleries, theaters and music venues; another for education with schools and universities; technology and manufacturing located on a different spiral, while other spirals would feature family residential areas, civic administration, sports activities, restaurants, bars and

night-life entertainment. The layout of the twelve-spiral megastructure organically encourages a rich, multi-layered, diverse urban culture, with each of the spiral's focus determined at the onset of construction and allowed to evolve over time with the spiral's upward growth.

The process of building this immense consolidated city megastructure with all its individual dwellings and businesses is similar to the flow of materials and growth that is found in plants and animals, taking place over time, level by level, eventually reaching twelve levels for a total height of 1,728 feet. Constructed with cutting edge building technologies utilizing new materials that are stronger and lighter, this two mile wide organic habitation embodies Paolo Soleri's dream that cities can be dynamic living organisms that evolve over time, in a surrounding landscape kept naturally pristine. The central mile and a half diameter open space between all Twelve Spirals, as well as the three-tenths of a mile diameter spaces inside each individual spiral, will have a mix of natural landscaped parks that integrate the local wildlife interspersed with amphitheaters for performances, fields and arenas for sports, and a variety of cultivated gardens and arboretums.



Fig. 5 - 12 Spiral City Partially Built - 3D Renderings - 2026

CHAPTER 9

TERRAQUAFORMING: TRANSFORMING THE EARTH TO BENEFIT ALL LIFE

ENTER THE PORTAL

Imagine a world where billions of people know how to harness the immense creative powers of sound. An entire planet rises to a new octave of awareness, where the resonant frequencies of the upper heart heal, renew, and restore our being, integrating body, mind, and spirit, the upper and the lower, the inner and the outer, the heavens and the earth-bound aspects of our existence. We remember how to create healing vibrations that align our actions for the benefit of future generations and all of creation. Sound can directly connect us with our higher dimensional selves, as we channel light languages and galactic frequencies that reawaken our divine origin and our interconnection with the totality of the universe.

Imagine integrating the archetypal essence of geometry into everything built on the Earth. After all, the meaning of the word "geometry" broken down and translated from its Greek origin is "geo" meaning "earth," "metry," "measure." The understanding that all of creation is manifested utilizing geometrical principles – from the subatomic "Structure of the Vacuum" to the shape of supergalactic clusters – can be applied to all human endeavors. Thus the human-built environment would be in accord with this innate principle of manifestation.

Imagine an Earth where humans are conscious and act in coherence with the grid energies of our planet. Sustainable eco-villages are planned according to the ley lines of Mother Gaia, accessing her true power for the health and wellbeing of these thriving communities. The visions seen in movies of Hobbit-house hamlets that are integrated into the Earth, Tatooine-esque sustainable desert dwellings that convert moisture into potable water, or *Avatar*-like tree villages enmeshed in forests can become our everyday reality where we actually live. In these eco-communities, sacred art and geometrical monuments are constructed to channel and receive Earth grid energies, like they once did in long-forgotten civilizations. Gatherings and festivals hosted at these places will bring people together to synergize and synthesize

their visions, dreams, and desires to create greater congruence and balance in our world.

Imagine a planet where civilization and its multifarious political, religious, educational, and economic systems are focused on one mission: "To make the world work for 100% of humanity, in the shortest possible time, through spontaneous cooperation without ecological offense or disadvantage of anyone."[1] Long-time fears of overpopulation, resource exhaustion, climate change and species extinction give way to the awareness of universal abundance and nature's ability to create order and harmony for life to thrive. Compact three-dimensional Arcologies preserve the land from the previous onslaught of suburban sprawl. Bruno-Taut-esque cities integrated with the natural environment create magical landscapes for millions to inhabit. Biomorphic megastructures soar into the clouds and spiral into dynamic, culturally rich neighborhoods, built on the measurements of divine proportion, ecological orientation, and sacred energy flow. Each of these new ways of inhabiting the land serves as its own Synergetic Portal to a flourishing New Earth.

THE FIVE ARCHETYPAL ELEMENTS AND TERRAQUAFORMING PRINCIPLES

Imagine inhabited environments that recognize and are in accord with the five archetypal elements: air, fire, earth, water, and aether. Envision a reality where we no longer take for granted the circulatory power of air and its ability to enliven the world. The life giving warmth and energy of fire is respected and kept in balance with the ecosystem. We perceive the entire earth as our own body. Water is revered and held sacred to be kept pure and clean. The spiritual connecting essence of the aether, which has been lost for centuries due to its suppression by the dominator cultures, is once again recognized as a principle to inform the way that we design and develop our sacred lands, waters, and civilization on planet Earth.

The knowledge of the elements' archetypal energies inspires the art of "TerrAquaforming," a method to integrate water and land into human habitations for richer biodiversity and regenerative environments. I have begun developing this concept in projects from rural ecological communities to densely populated metropolises that combines permaculture principles of integrating water into a landscape with metaphysical understandings of the sacred spiritual living properties of water. Permaculture is a design principle to create permanent regenerative agriculture for community development in accord with indigenous worldview that is in harmony with nature as opposed to the Western industrialized methods that are detrimental to the health of ecosystems. The incorporation and utilization of water is the number one priority in any permaculture design, having developed many different ways to capture, store and channel it based on whole systems thinking that are aligned with the way nature operates. TerrAquaforming uses this knowledge as a starting point and takes it a step further by integrating the metaphysical understanding of water as a living intelligence not only responsible for all of life, but the actual spiritual foundation of it.

One of the most important researchers into this underlying nature of water is the Austrian Forester Viktor Schauberger. His life work was devoted to understanding the subtle nature of water: "He viewed water as a living being and looked upon nature as a beautifully interconnected whole, and through his inventions and writings he has become a conduit to a kind of spiritual science of nature's subtle energies."[2] As the steward for a large pristine primeval forest reserve in Austria at the turn of the 20th century, he was able to study water flowing in undisturbed nature. His motto was to "comprehend and copy" nature. These studies led to his discovery of the implosive life giving force of vortex energy flow found in water. "Viktor Schauberger's basic thesis contains a universal, twofold movement principle. He meant that life sustains by a gathering, implosive type of movement and reversed, a spreading, explosive movement that leads to the extinguishing of life. With the implosive movement coolness, suction, growth and healthiness follows. The explosive movement generates heat, pressure, fragmentation, illness, and death. His opinion was that man had only succeeded in mastering the movement of death in order to release energy. All known engines are based on explosion, heat and pressure. To only use the explosive movement, definitely leads to the destruction of nature."[3] He used this concept to develop non-polluting forms of energy production, which have been suppressed. He understood the subtle living energies that natural spring and mountain water have and developed ways to purify water to this state.

His work was introduced to modern times through the 1973 book *Living Water*: *Viktor Schauberger and the Secrets of Natural Energy* by Olof Alexandersson and also the 1995 book *Living Energies: An Exposition of Concepts Related to the Theories of Viktor Schauberger* by Callum Coats. In the foreword of the latter book, the publisher, Bartholomew Wellow of Living Energies, writes of the significance of Schauberger's work: "Living Energies may become the catalyst for re-writing all the textbooks of science and the manuals of politics and planning. It shows how humanity can take its place as the responsible guardians of a very precious centre of life in the Universe. We see this as required reading for anyone planning to participate in the next

century. It is a guide to the new millennium!"[4] Coats has gone on to collect and publish all of Schauberger's writings in a series of books: *The Water Wizard, Nature as Teacher, The Fertile Earth* and *The Energy Revolution*. Many people are devoted to studying this work and applying it to real world projects as documented in the 2008 film on his life *"Comprehend and Copy Nature"* by Frans Fitzke. Schauberger's pioneering work is the foundation of the TerrAquaforming technique – to understand the life-giving property of water and integrate it into how humans consciously interact and inhabit the Earth. It's rather ludicrous how our current civilization treats the water of the entire planet without any regard, polluting and killing it. It is time to reverse this relationship and regard water as sacred in every way that it is utilized.

Another brilliant and significant researcher into the flowing forms found in all living patterns is Theodor Schwenk, a disciple of Rudolph Steiner's spiritual science, who published his seminal work *Sensitive Chaos: The Creation of Flowing Forms in Water and Air* in 1965. This in depth study shows how flowing forms are responsible for all living and natural expressions. It also recognizes the underlying spiritual nature of water, which our modern civilization has forgotten. Clearing forests, filling in wetlands, straightening and damming rivers and toxifying the earth all go against this: "A way of thinking solely to what is profitable cannot perceive the vital coherence of all things in nature. Today we must learn from nature how uneconomical and shortsighted our way of thinking has been. Indeed, everywhere a change is now coming about; the recognition of vital coherence of living things is gaining ground. It is being realized that the living circulations cannot be destroyed without dire consequences..."[5] The principles outlined in this book can be understood and applied to human made designs to be in accord with the natural flow of all life on Earth. This is the underlying philosophy and science of recognizing water's deeper connection to all life that is employed in TerrAquaforming projects.

There are examples all over the world of our ancient ancestors employing TerrAquaforming techniques, going all the way back to

Plato's description of the mythical city of Atlantis: a series of concentric rings of earth and water surrounding a central island. The most notable still extant examples of ancient TerrAquaforming are the agricultural terraces built into mountains to make them accessible for farming. These are found from the Canary Islands to the ruins of the Incan Empire in South America, and especially all over Asia where incredibly extensive terraces were created in steep terrain long ago to grow rice. These rice terraces are found from mainland China to Vietnam and Japan, and are especially well known in Bali. The most famous and ancient examples are the Banaue Rice Terraces in the Philippines that are thought to be over 2000 years old. Other examples of ancient TerrAquaforming are the system of canals created at Tiwanaku in Bolivia that channeled water to fields and helped to keep them from freezing in the cold, high altitude nights. The temples at Angkor Wat in Cambodia are surrounded by huge, precisely dug moats over 600 feet wide and miles long. There are many more examples to be found

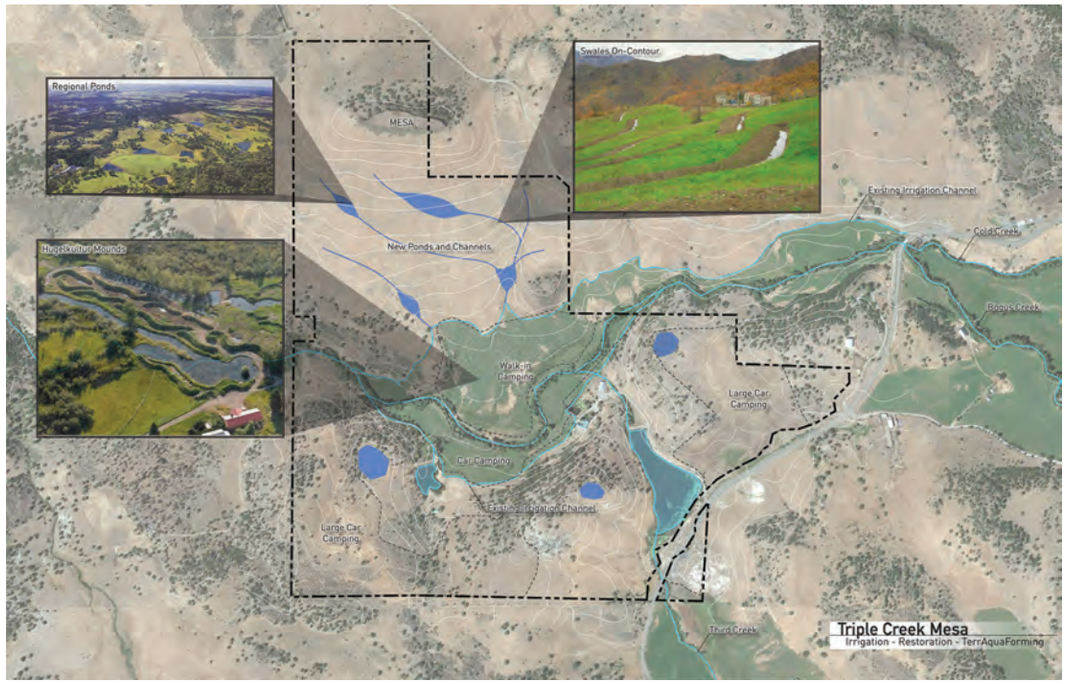


FIG. 1 - TRIPLE CREEK MESA - TERRAQUAFORM PROJECT

throughout the ruins of the ancient world, as our ancestors understood the importance of integrating water and land.

TerrAquaforming techniques are now being applied to Triple Creek Mesa Ranch, a 400-acre property near Montague, California purchased by the Alliance for Good to be developed into a community that can host festivals of up to 20,000 people several times a year with a proposed year-round community of 300 people. On this property, three streams run through what has been historically and currently used as a cattle ranch. Rather than the current system that dams and uses this water to flood-irrigate the pastures for cattle grazing, we are conceptualizing how to create a thriving eco-village by diverting the water into naturally flowing aqueducts and ponds to be used for the gardens and trees while also creating a natural flow for wildlife to flourish throughout the festival grounds, communal areas, and residences of this sustainable environment.

I'm also working with a team to apply TerrAquaforming techniques to the development of the 3800 acre Fly Ranch recently acquired by the Burning Man organization. The description from the website reads: "The Fly Ranch project is an opportunity to create a year-round rural incubator for Burning Man culture and a catalyst for innovation and creativity in the world."[6] The site is hydrologically active with numerous springs, so it's an ideal candidate for applying the principles of TerrAquaforming to integrate the water in the most conscious and ecological way to benefit and preserve the natural aspects while creating the infrastructure for people to visit, live, and work there. Using these principles will allow the most beneficial development of the property for both human use and fostering natural wildlife.

TerrAquaforming techniques can also be utilized in urban metropolises like New York City to bring them back into alignment with nature, such as applying them to the remediation of Newtown Creek, the waterway that divides the densely packed boroughs of Brooklyn and Queens. It is currently one of the most polluted waterways surrounded by a twentieth-century industrialized zone of warehouses, parking lots, and factories that pollute it. This area

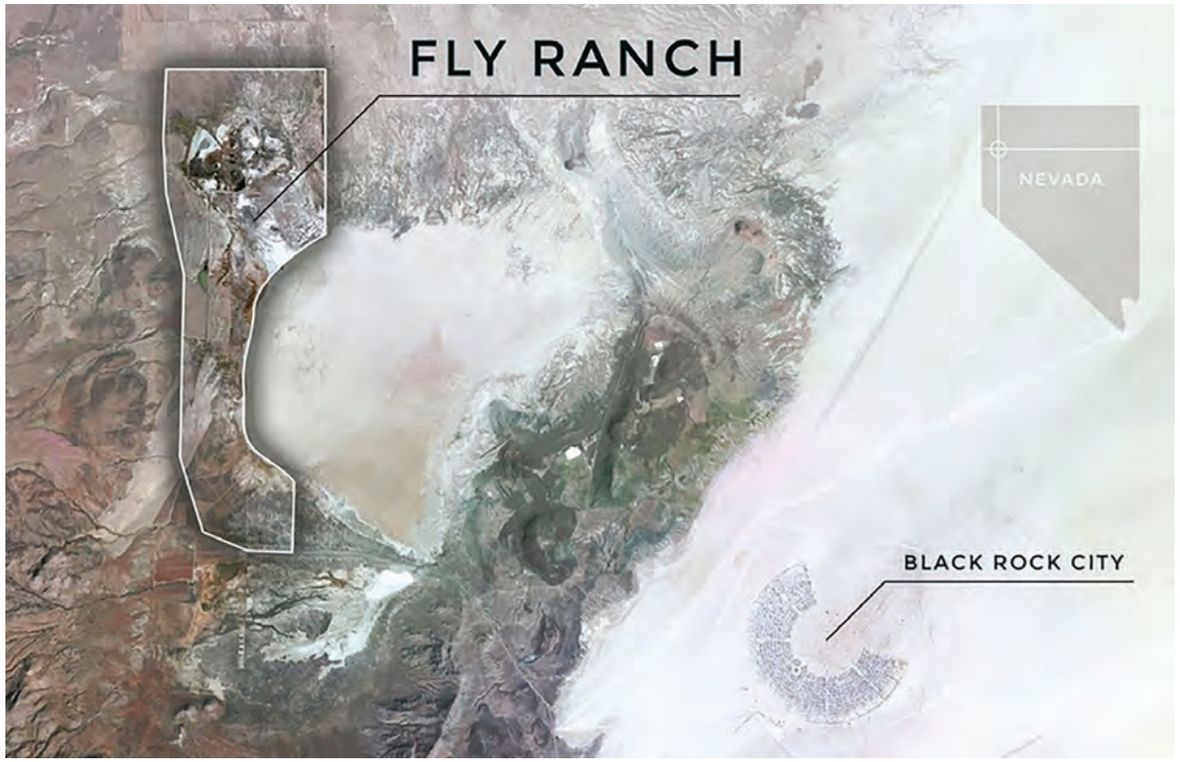
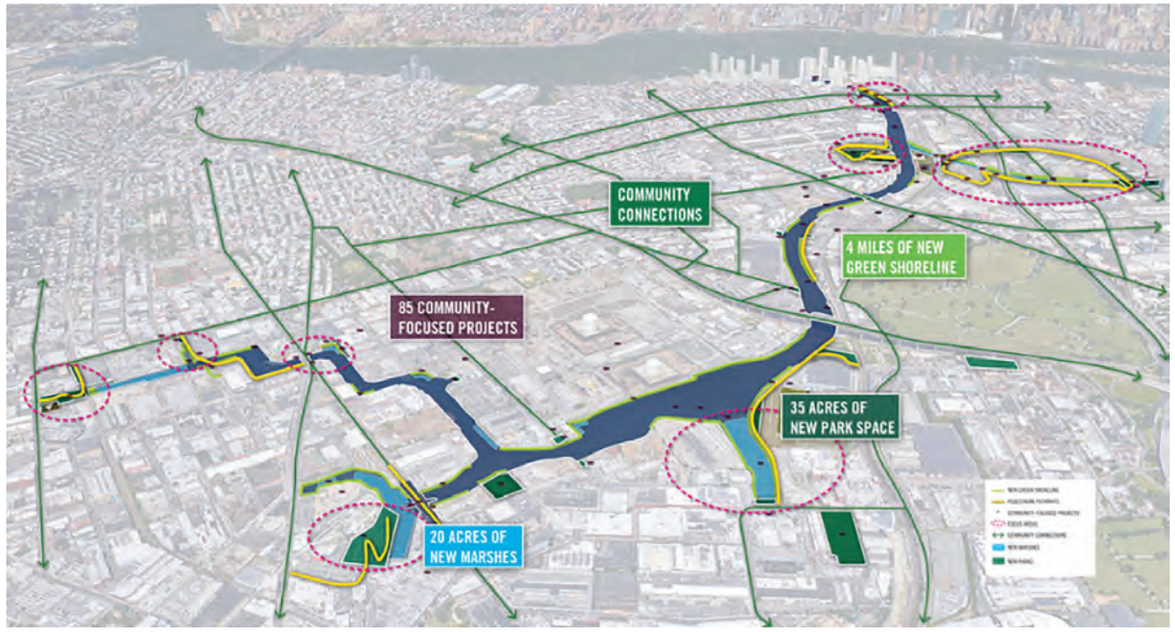


FIG. 2 - BURNING MAN'S FLY RANCH IN RELATION TO BLACK ROCK CITY

can be transformed into a twenty-first century habitation for both humans and native wildlife to flourish by integrating lush wetlands into an urban environment. Currently, massive bulkheads separate the water from the urban industrial environment where rampant pollution is the norm. Instead, we could free this restricted water into canals, ponds, and multi-branching streams with natural wetlands; bringing back pristine flora and fauna along with human-scale homes, local businesses, parks, organic gardens, and communal spaces. To this end, NY's Clean Water Advocate Riverkeeper and the Newton Creek Alliance has completed a major study called the Newton Creek Vision Plan 2018 that invites public participation for the revitalization of the waterway. This study is focused on the remediation and restoration of the incredibly polluted site for public recreation and resilience of the waterway to the urban environment. Although this plan falls short of the total integration of the waterway into the human habitation as

TerrAquaforming proposes, it is an important first step. Ultimately, Terraquaforming would go beyond this plan by integrating all the homes and businesses into nature for a green city environment that is beautiful, harmonious, and regenerative.



HTTPS://VIEW.PUBLITAS.COM/RIVERKEEPER/NEWTOWN-CREEK-VISION-PLAN-2018/PAGE/156-157

FIG. 3 - NEWTON CREEK VISION PLAN - 2018

A SYNERGETIC FUTURE FOR ALL

Imagine now walking down the pathways of a place that has been fully developed with TerrAquaforming. The homes and businesses are all built with loving care by hand, using long lasting natural materials such as stone, wood and earth, or newly developed man made materials such as hempcrete, high tech ceramics or structural integrated panels (SIPS) made with all natural materials. These are all fashioned with utmost intent and spirit, making the structures come alive. The bottom line for these buildings isn't how cost effective they are to build, but how beautiful and long lasting they are. These are surrounded by gardens that are created both for their aesthetic beauty and to provide food. The plants used in these gardens are diverse heirloom varieties grown with natural non toxic techniques; gone are the massive monoculture fields of genetic modified plants using toxic fertilizers, pesticides and herbicides. Instead of massive orchards of the same type of fruit or nut trees, there are food forests of a variety of trees interspersed throughout the community. The pathways are made of compacted earth, not asphalt or concrete paving, as they only need to provide for walking and lightweight, slow moving vehicles such as bikes, scooters and small carts. Following one of these paths from the residential area leads to the central public common space where there is room for markets and gatherings to take place. This area is surrounded by businesses selling handmade wares, cafes and restaurants offering foods made from the local gardens and art galleries and performance spaces presenting the creative output of the inhabitants. Verdant parks that are irrigated by a network of waterways provide space for a variety of sports and recreation to take place. At night, this is all lit with the most beautiful and subtle natural lighting, just enough to see your way without being overly harsh or glaring. Light pollution will be nearly eliminated so the night sky will once again be dark enough to see the stars clearly. The whole energy and vibration of the place is harmonious and peaceful; birds are singing, children laughing, people talking, gardens are tended by hand without obnoxious sounds of gas engines, no cars are speeding around.

Now visualize a steep mountain canyon that has been transformed into terraces wide enough for homes and gardens. The river that once flowed down the center is now diverted into waterways along the terraces. These streams and ponds at each level of this terraced village spiral back into the central waterway. Dams are built in the lower foothills creating lakes. The land around these lakes has been formed into extremely convoluted shapes, providing the most edge for wetlands and water/earth boundary. These peninsulas provides the space for homes, gardens and businesses to be built on, connected with pathways suited for pedestrians, bikes, scooters, skates and carts. It would even be possible for residents to live on houseboats that are able to move between different parts of the community along the interspersed waterways. High-speed automobiles and trucks are parked at facilities on the outskirts of these TerrAqauformed communities, where they can be accessed to travel long distances to other communities.

In today's rapidly accelerating information age, we have acquired a new level of interconnection that allows us to share visionary ideas, concepts, and resources at an unprecedented rate. As we emerge through a world-wide portal of transition, we bring in, and benefit from, all the elements of who we are, individually, and collectively as a society. This is how the universe works – a vast, multi-layered organism that is greater than the sum of its parts. Synthesizing our unique gifts, we come together to build a bold meta-vision that has never before been realized on the planet. In this time of great crisis, enormous synergetic opportunities become available to all who hear the call. Although we often don't fully acknowledge it, humans wield an incredible creative force in the shaping of reality. As divine beings in 3-D form, we each bring forth immense talents, perspective, and catalytic energy to birth into being the new world that is possible.

We often take for granted how our world is completely dominated by human ingenuity, invention, and design. Over the last century, the automobile has completely altered the way we travel, transport goods, socialize, and develop our towns and cities. The current designs of our houses, appliances, and amenities have utterly

changed how we experience our daily reality, and civilization as a whole. In the last few decades, we have witnessed the advent of ubiquitous computers connected through the internet, and the ultimate "complexity miniaturization" device, the smart phone with its ability to do so many things.

It is important to make a distinction between the path of human-centered technology and that of nature, between technology from the head or biotechnology from the heart. The former leads us down a dystopian path of machine-based transhumanism and scarcity to a *Terminator*-like world, while the heart-centered path is aligned with the regenerative and abundant biologic and organic principles employed naturally throughout the universe. We are currently at a moment of intense challenge and enormous change. It is up to each one of us to come together from the heart to play our synergetic role to create a New Earth of Love and Light.



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Harlan Emil Gruber (b. Jan. 14, 1959, NY) has combined his interest in science and art to shape a respected design career. A student of Physics at Emory University and of Electrical Engineering at University of Miami and Georgia Tech, Harlan Emil subsequently received a degree in the field of Environmental Design from Parsons School of Design, New York (1985). Mr. Gruber worked for the design firm SITE Projects of New York before launching his independent career in 1987. He has exhibited at galleries in New York, Chicago, Taos, and Santa Fe, NM. Harlan Emil was the founder of Pluto Dog, Inc. (1988-1993), which produced his sculptural furniture as well as a partner in Pluto Dog on the Earth, an avant garde boutique in the lower east side of NYC 1989-94. He designed the first three retail stores for the clothing company 555 Soul (1991-1996) and the bar Openair (2001), all in NYC.

In 1996 Harlan Emil moved part time to Taos, New Mexico, while still living part time in New York. He relocated to California in 2010, living in Oakland, Grass Valley and now Joshua Tree while keeping a place in Taos.

He has been attending the Burning Man festival in Nevada since 1999, creating large scale sculptures for it starting in 2003. He sees Burning Man as a global crossroads where the transformation of our current world paradigm is taking place, and he works to bring this transformation to as many people as possible. He has exhibited his installations at numerous events and festivals around the world.

He is now focusing on his interest in conceiving regenerative eco-villages and cities based on his lifelong studies of Buckminster Fuller, Paolo Soleri and other visionary architects and thinkers.