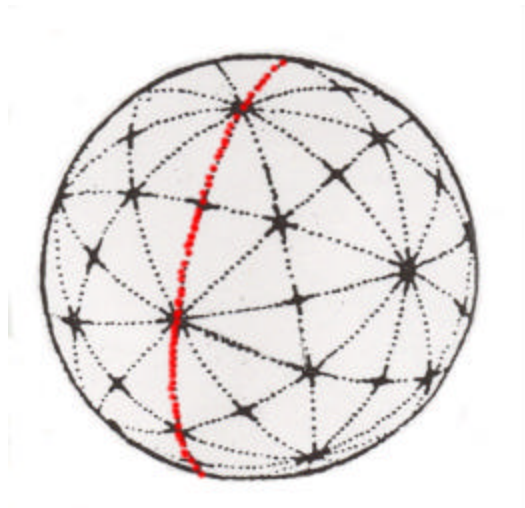


## Geometry: An Ancient, Universal Teaching Model of Unity

Bethe Hagens, Ph.D.

There is a secret stone, hidden in a deep well,  
worthless and rejected, concealed in dung or filth.

It is a thing which is found everywhere,  
which is a stone and no stone,  
contemptible and precious,  
hidden, concealed, and yet known to everyone.



### ***The Spherical Cosmic Container***

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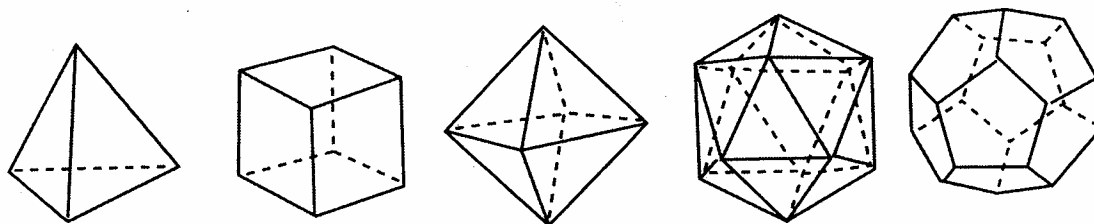
So many metaphors are encapsulated in legends of this secret alchemical stone, the Philosopher's Stone, that it is almost impossible to know where to begin. Buried within the self, within the everyday world, within life itself, is a common essence—a *shape*, a creative vessel in which the elements of creation are mixed and transformed.

This "stone which is no stone" is intangible--a metaphor as deep as Breath, as profound as Love, and as intelligent as Light. It is an ideal form, one that can be grasped by the intellect but never actually seen. Eternal and unchanging, it is the sacred container of ever-changing cosmic processes—the *Rock of Ages*. It is an image that sheds light on form, gives the sense of predictability or "memory" to pieces of knowledge that might otherwise seem random.

As educators, we are involved in a highly alchemical process—the nurture of loving minds and intelligent hearts within the students we encounter. Our role is sacred, and mysterious. For almost twenty five years, I have used the spherical geometric shape (shown above) in my teaching. It might actually be *the* Philosopher's Stone! But in any case, it is my secret stone and the "container" I use to store, remember and relatively quickly sort and search the overwhelming amounts of information I encounter in my life. It has been used throughout human history by great educators. . .be they philosophers, shamans, priests, biologists, or artists. . .to communicate and illustrate the profound unity of all that exists in the world. That this geometric shape has been so effectively used in the past gives me hope for the future. We have ready and waiting a tangible framework for communication across cultures and disciplines that is time-tested and beloved by people around the world.

Plato used this same geometric shape to organize his teachings about the origins of life. He called it the ideal body of the cosmos, the Mother of Becoming. He describes it as a sphere gridded into 120 rounded triangles that "contains" the five dynamic elements of creation: Fire, Earth, Air, Water, and Aether (Life Energy). Spiritual leaders among the Indian tribes of North America had a remarkably similar vision. The Sioux universe, for example, is also spherical and contains the same five creative elements. In the Beginning, they say, the universe was composed of numberless hoops, each a kind of skeleton with no substance. All was orbits within orbits within orbits. Primordial Earth was made up of sixteen sacred hoops to which the Creator called the various powers and manifestations of material reality. Fifteen of these hoops interlock to create a sphere of 120 triangles identical to Plato's. The sixteenth hoop is Earth's orbit around the sun—the ecliptic.

Most, if not all, of the world's cosmologies accord to the same five elements primary dynamic roles in the cycles of transformation of the living material cosmos—that is, in what we would call the *ecosystem, environment, Gaia, or Mother Earth*. **Fire** is purification. **Earth** a principle of materialization; **Air** a cosmic cycle of breath; **Water** flow; and **Aether** an ineffable refinement. In the Platonic cosmos, each of these elements was symbolized by one of five perfectly symmetrical geometric shapes (the so-called Platonic solids). These same shapes were well-known and modeled by many earlier cultures, though *geometry* (the art/science of Earth measuring) is usually attributed to the Greeks.



### ***The Five Platonic Solids***

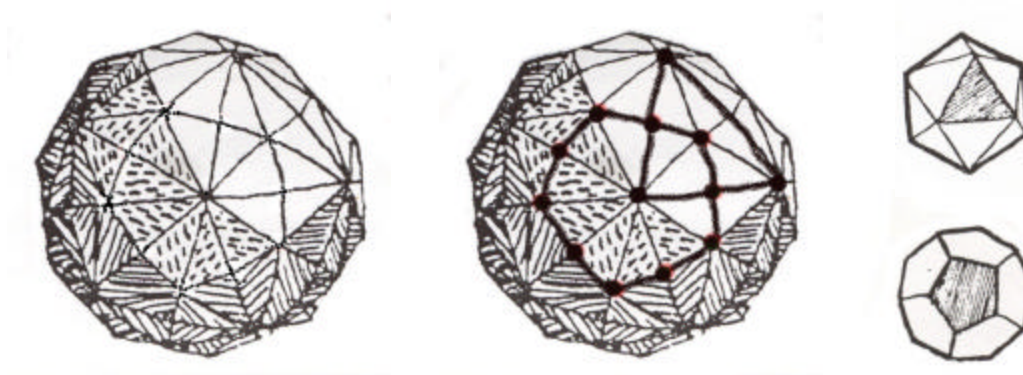
***Tetrahedron (Fire), Cube (Earth), Octahedron (Air), Icosahedron (Water) and Dodecahedron (Aether/Life Energy)***

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These perfect geometric shapes are all "contained" in Plato's spherical cosmic container. Each of the five shapes can be positioned inside the 15-hoop, 120-triangle sphere so that every one of its corners will fall on the corner of one of the sphere's triangles. It *organizes* forms. It isn't visible, but it holds everything in order and is in this way the masterplan of natural structure and "found everywhere".

The five perfect shapes can actually be seen at virtually every scale imaginable, from the topography of planet Earth to crystals, pollen grains, plankton, and molecules. The microscopic protein shells of many common viruses (shown below) are actually a structural *meshing* of two of the shapes-- the icosahedron (Water) and the dodecahedron (Life Energy). These viruses can be imagined as crystalline versions of the perfectly

spherical Philosopher's Stone. Even Plato's elemental symbolism applies! Viruses are currently being identified as primary agents of the evolutionary process (Life Energy) that can proceed only within the fluids of a host cell (Water). The words *virus* and *environment* stem from an identical linguistic root, *vir*.



### ***A Virus***

*For purposes of illustration, one face of the interpenetrating dodecahedron (highlighted pentagon) and icosahedron (highlighted triangle) are shown on the virus to the right.*

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Plato arranged the elements in order of increasing geometric complexity, from the most *basic* (the tetrahedron) to the most complex and difficult to construct (the dodecahedron). Scientists today use an identical geometric hierarchy to explain principles of molecular and cellular growth and bonding. The most basic molecule, for example, is modeled as if it consisted of four atoms spaced equidistantly from each other at the corners of a tetrahedron (Plato's first element, Fire). The same model is used to describe the miraculous growth of a fertilized egg cell. The initial division of the egg into interconnected halves of a sphere is followed immediately by a second division that creates a blastomere, a tetrahedral cluster of four cells.

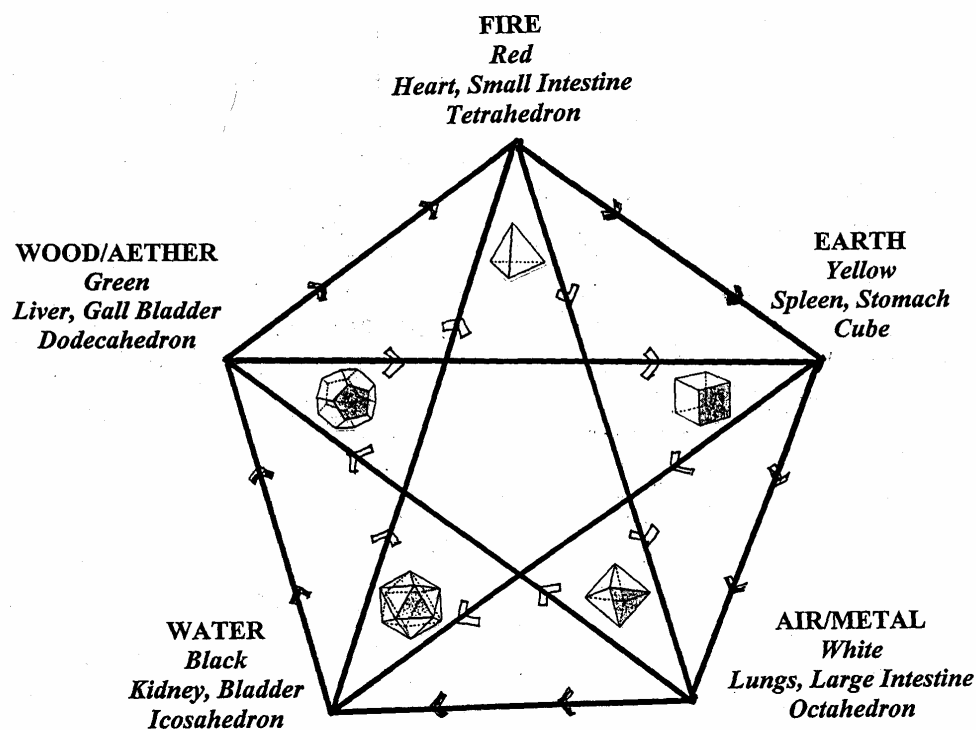
The Periodic Table of the Elements is organized around these same five geometric shapes. Elements with the same molecular base shape (gold, copper and silver are all cubic, for example) have many broadly analogous physical properties. Chemical bonding

of molecules with different base shapes is possible because of their unique structural transformability and ability to "link" at various corners of the 120-triangle perfect cosmic container, the invisible spherical Philosopher's Stone.

At a macroscopic level, Earth itself is now being modeled as a kind of giant aggregate molecule, a composite body gravitationally bonded or "fused" together out of numerous "planetesimals" that once orbited the sun. Scientists also believe that the intense heat of the Earth at the time of its birth (*plasma* or Fire) drove lighter elements (*solids* or Earth) upwards to form the crust of the planet. Over time, *gases* (Air) and *liquids* (Water) bubbled up through cracks in the crust. These were the preconditions of biological transformation and *evolution* (Life). This order of elemental transformation is identical to Plato's.

The ancient Chinese conceptualized a cosmos of Fire, Earth, Metal/Air, Water and Wood using a pentagonal Chart of Elements (shown below). Each dynamic element in this system also represented a color, a function of an organ in the human body, and a position (rather than a shape) in the universal scheme of creation and destruction. The *Creative Order* (symbolized by the pentagon) led to increasing material complexity. The *Destructive Order* (symbolized by the pentangle) led to progressively more subtle states of matter. No direct evidence survives to indicate whether or not ancient Chinese philosophers also used geometric shapes to represent the five elements in the Chart, but it seems almost certain that they did. The most ancient Chinese wisdom is now long lost to book burnings. In any case, Plato also attached colors to the elements (which were also shapes)-- and Greek and Chinese color symbolism is identical. The Creative Order in the Chinese chart reflects the Greek order of increasing geometric complexity.

There is also a faint trace of the Platonic shapes in Buddhist *stupas* (or *sotobas*), traditional grave stones that are still used throughout India, China, and Japan. These markers are stylized miniature replicas of the great architectural dome stupas that contain purported physical remains of the Buddha and that symbolize the eternal return of matter to the real world of spirit. The base of these *stupas* is a cube that represents Earth, the



*Chinese Chart of the Elements*

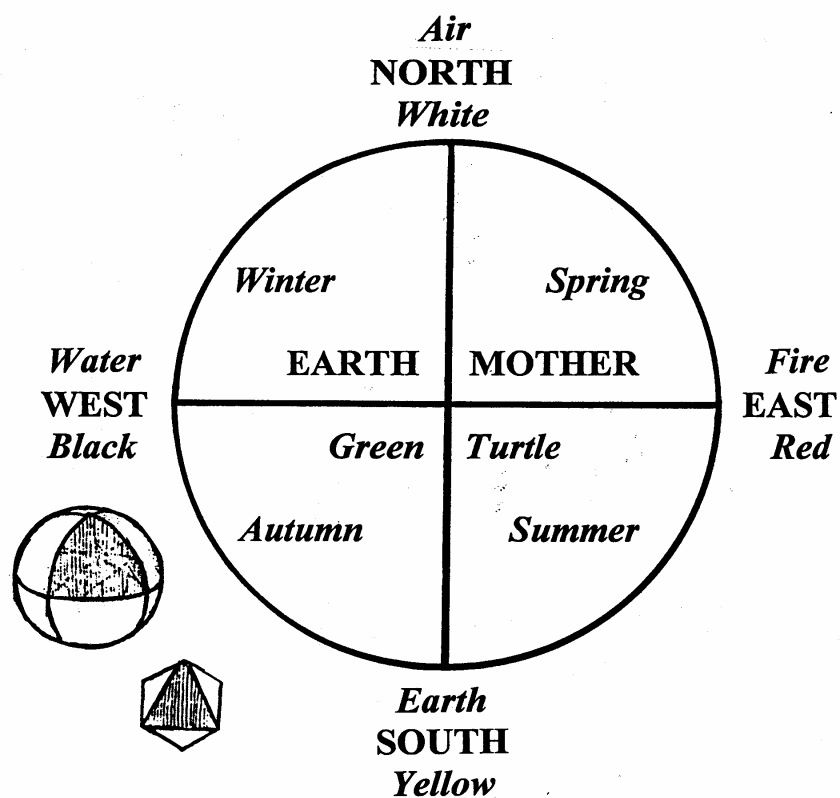
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stable foundation upon which all is built. Stacked upon it are a sphere (of Water), a triangular shape (representing Fire, symbol of elements in transformation), a crescent (symbolizing Air, the inverted vault of the sky and the wind), and finally a tapered sphere (Aether dissipating into perfect space). The elements of the *stupa* are always stacked in this order, one identical to the Destructive Order of the Chinese cosmos.

In the Americas, cosmic diagrams were often laid out as medicine wheels—large circles of sacred stones that represented the transformative, healing powers of the elements and their geographical orientation in the universal scheme of creation. Like Stonehenge and other ancient megalithic astronomical observatories, these much smaller scale stone constructions functioned as calendar-clocks. Every medicine wheel was intentionally designed to honor and to maintain the regenerative energies of a position in the cosmos unique in time, space, and transformative significance. Each was built in harmony with the sacred, hidden, ideal order. In addition, the stones were road signs that

could be “read” by the rising and setting positions of the sun, moon, planets, and stars as they traversed their hoop-like paths around the Earth.

Position in time and space, in the context of endless cyclic flux, seems to have far outweighed any importance that might have been attached by American Indian cultures to the progressional “order” of the elements. The medicine wheel merged element, season, direction, color and life form. It served as a plan for ceremonial lodges and a compositional framework for sacred art. It was a totality, an ideal of life fully and properly lived. The responsibility and privilege of being human was, over the course of a lifetime, to embrace and know each of the elements, thereby closing the hoop and completing an individual sacred circle. The Sioux holy man and visionary, Black Elk, used colors identical to those of the Chinese and Greeks to symbolize these elements.



### *Sacred Hoop of the Sioux*

*If visualized as a two-dimensional picture of three interlocking hoops,  
the “crossed circle” is also a spherical octahedron (Air)*

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I am fascinated by the possibilities for using this common language of color, element, direction, and shape “contained” in the Philosopher’s Stone. What does it mean, for example, that a *cube* is *yellow*, *south* and *earth*? Or that *fire* is *red*, *east*, and a *tetrahedron*? I am not sure, but I do know that as I read the mythologies of different peoples in different times, this symbolic code remains constant. A detail in one myth or cosmology will often shed light on another of completely different origin. In addition, the code is a mnemonic or memory-aiding device. I remember *north* is *white* (because of snow), *air* (Arctic winds) and *octahedron*—that *east* is the *red* dawn of sunrise (*fire*) and the *tetrahedron* (flame-shaped). It is no coincidence that *Mnemosyne*, the Greek goddess of Memory, is the daughter of the goddess *Gaia* from whose name comes the word *geometry*.

According to legend, the mysterious Philosopher’s Stone is “concealed in dung.” This aspect of its nature is quite clearly revealed in ancient Afro-Egyptian art and mythology. These peoples imagined the cosmos as a dungball rolled across the heavens each day by the sacred scarab, *scarabaeus sacer*, a winged beetle. The scarab symbolized a universal power of self-regeneration which drove the Sun along its path. Earth contained and transformed this power.

It is very difficult to estimate just how far back in time scarab symbology really extends. A number of carved artifacts from Paleolithic Europe (at least 20,000 years BP) that have been identified as regenerative goddess figurines are also extremely accurate models of beetles emerging from pupae. In fact, the fit between ancient artifacts and cosmologies with contemporary biology is so remarkable on many fronts that the future almost certainly holds a partnership between these two currently unrelated academic fields.

The scarab was the emblem of a culture that placed great value upon the life-sustaining products and transformative processes and of bodies. Egyptian artwork built upon similarities of posture and proportion to combine and transform human, animal, mineral, vegetable and celestial beings in much the same way that chemists today diagram molecular connections. On the walls of tombs and monuments, we find species

merged, one into another, along regular geometric pathways—for example, the angles of elbow, ankle, knee or joint; the tilt of a head on a stem or spinal column.

From Plato we learn that the Egyptians revered the residues and excretions of all these bodies. Human by-products (especially feces, spittle, and phlegm) were the foods and creative substances of the gods. The mythology of *Gaia*, the Greek goddess of Earth whose name is now used to label a scientific hypothesis about the unitary nature of Earth as a sun-powered living system, is probably a derivative of this tradition. In fact, many cultures used the sound *ga* or *ga-ya* for “Earth” in a way that implied a divine transformative capacity. In Egypt, this divine nature of Earth was a male god, *Geb*. In Semitic (the language family of Arabs and Jews), it was *gâlâl* which meant “rolling dungball.” The terrible *Wheel* rolling in the air in the Old Testament Book of Ezekial (also derived from *gâlâl*) is composed of wheels that “turned not,” an image highly reminiscent of the Sioux hoops of Earth creation.

Clearly it takes some rethinking to imagine *Gaia* as a dungball in our Solar System, and yet this is the essence of the most ancient wisdom of the elements and the geometry which allows their infinite transformability into one another. Earth and Sun are uniquely compatible partners. There is much more than poetic beauty in this cosmology of Earth. It metaphorically encapsulates the bio-geo-chemical processes of Fire, Earth, Air, Water and Life that maintain planetary ecological balance (oxidation, reduction, gasification, liquefaction, evaporation, distillation, bacterial bloom, viral encounter).

Since the time of the ancient Egyptians, however, the Western conception of the cosmos has become increasingly antiseptic. Although Plato was educated in the tactile, sensuous Egyptian traditions, the body of his perfect 120-triangle cosmic mother was austere: “Neither was the rounded spherical shape in need of any organ by which to take food into itself and discharge it later after digestion. . .for it was designed to supply its own nourishment from its own decay” (*Timaeus*). He imagined Earth as a game ball, a spherical dodecahedron—a soccerball! “Earth looks from above, if you could see it,” Plato wrote in *Phaedo*, “like one of those twelve-patch leather balls.”



***Russian Earth Grid, 1974***

Used with permission of Valery Makarov

Over the last twenty years, close on the heels of our first view of Earth from space, I have been part of a group of researchers around the world who have begun to reopen the case on Plato's soccerball model. We have begun to visualize the 120-triangle/15 hoop sphere as an actual map of Earth that can chart broad global patterns of cloud movements, ocean currents, mountain ranges, river systems, coastlines, and other terrestrial energy formations. Our exercises in geometric geography have led to another discovery, vast in its implications. The very same geometric design has been extremely effective in predicting the locations of important archaeological sites. We think it possible that for some rather lengthy time in human history, the 120-triangle model may actually have been used as a system of coordinates not unlike latitude and longitude.<sup>1</sup>

Contemporary research using the map has been successful at crossing disciplinary, cultural, and language barriers. I think this has been because the *research design*, the map itself, is an inherently shared symbol—the Philosopher's Stone. And as I

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<sup>1</sup> For a teacher's copy of my full-color, wall-sized geometric Earth map and additional teaching materials, please write to Bethe Hagens, Union Institute and University, 440 E. McMillan St., Cincinnati, OH 45206 or email [bethe.hagens@tui.edu](mailto:bethe.hagens@tui.edu).

hope I have shown, its meanings and implications are buried as deeply within mythologies, religions, and science as in the molecules of our bodies. My real enthusiasm about the 120-triangle map is not just its use as a predictive system, but its potential as a tool for equitable global conversations about the future. We may never know how, or even if, the map was actually used in the past. (Maps such as the Piri Reis chart of the Atlantic and the 14<sup>th</sup> century diCanestris “diamond” map of the Mediterranean strongly suggest that it was!) We can, however, make the operating assumption that humans share a basic, highly sophisticated geometric intelligence that has taken them in different directions—all metaphorically compatible. Geometry provides a context within which different historical understandings and beliefs about the natural and built environment can enhance, rather than compete with, one another.

There is a warning that comes with geometry, and I close with a traditional tale about a typical “geometry spirit”. Among the Oneida Indians of the Iroquois Confederacy, a story is told about Shagodjowe’ Gowa, a spiritual being who lived “in the Beginning”. Alone and without companions, he simply assumed that he had created all the forms and beings he saw around him. This angered the Great Maker, who punished him for his pride by smashing him up against a cliff and breaking his nose and jaw. His distorted face is represented by the “false face” masks that contemporary Oneida wear in their ceremonies and which preserve the memory of his primal error. The masks are also a reminder that Great Maker spared Shagodjowe’ Gowa’s life because he agreed to work among humans and to impart to them his knowledge of how shapes—forms—could be used as a protection. Shagodjowe’ Gowa clearly communicates that geometry is not God: that material creations only approach geometric perfection and that it is in the shared imagining of them that peace and human happiness can be attained.