220.00 **Synergetics Principles**

220.01 **Principles**

220.011 The synergetics principles described in this work are experimentally demonstrable.

220.02 Principles are entirely and only intellectually discernible. The fundamental generalized mathematical principles govern subjective comprehension and objective realization by man of his conscious participation in evolutionary events of the Universe.

220.03 Pure principles are usable. They are reducible from theory to practice.

220.04 A generalized principle holds true in *every* case. If there is one single exception, then it is no longer a generalized principle. No one generalization ever contradicts another generalization in any respect. They are all interaccommodating .

220.05 The physical Universe is a self-regenerative process. Its regenerative interrelationships and intertransformings are governed by a complex code of weightless, generalized principles. The principles are metaphysical. The complex code of eternal metaphysical principles is omni-interaccommodative; that is, it has no intercontradiction. To be classifiable as “generalized,” principles cannot terminate or go on vacation. If indeed they *are* generalized, they are eternal, timeless.

220.10 **Reality and Eternality**

220.11 What the mathematicians have been calling abstraction is reality. When they are inadequate in their abstraction, then they are irrelevant to reality. The mathematicians feel that they can do anything they want with their abstraction because they don’t relate it to reality. And, of course, they *can* really do anything they want with their abstractions, even though, like masturbation, it is irrelevant to the propagation of life.

220.12 The only reality is the abstraction of principles, the eternal generalized principles. Most people talk of reality as just the afterimage effects—the realization lags that register superficially and are asymmetric and off center and thereby induce the awareness called life. The principles themselves have different lag rates and different interferences. When we get to reality, it's absolutely eternal.

220.13 The inherent inaccuracy is what people call the reality. Man's way of apprehending is always slow: ergo, the superficial and erroneous impressions of solids and things that can be explained only in principle.

221.00 **Principle of Unity**

221.01 Synergetics constitutes the original disclosure of a hierarchy of rational quantation and topological interrelationships of all experiential phenomena which is omnirationally accounted when we assume the volume of the tetrahedron and its six vectors to constitute both metaphysical and physical unity. (See chart at 223.64.) (See Sec. 620.12.)

222.00 **Omnidirectional Closest Packing of Spheres**

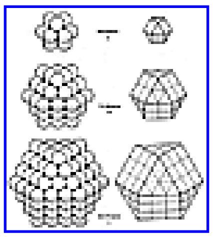
Fig. 222.01

222.01 Definition: The omnidirectional concentric closest packing of equal radius spheres about a nuclear sphere forms a matrix of vector equilibria of progressively higher frequencies. The number of vertexes or spheres in any given shell or layer is edge frequency (*F*) to the second power times ten plus two.

222.02 Equation:

$10F^2 + 2$ = the number of vertexes or spheres in any layer,

Where,

F = edge frequency, i.e., the number of outer-layer edge modules.

222.03 The frequency can be considered as the number of layers (concentric shells or radius) or the number of edge modules of the vector equilibrium. The number of layers and the number of edge modules is the same. The frequency, that is the number of edge modules, is the number of spaces between the spheres, and not the number of spheres, in the outer layer edge.

222.10 **Equation for Cumulative Number of Spheres:** The equation for the total number of vertexes, or sphere centers, in all symmetrically concentric vector equilibria shells is:

$$10(F_1^2 + F_2^2 + F_3^2 + \cdots + F_n^2) + 2F_n + 1$$

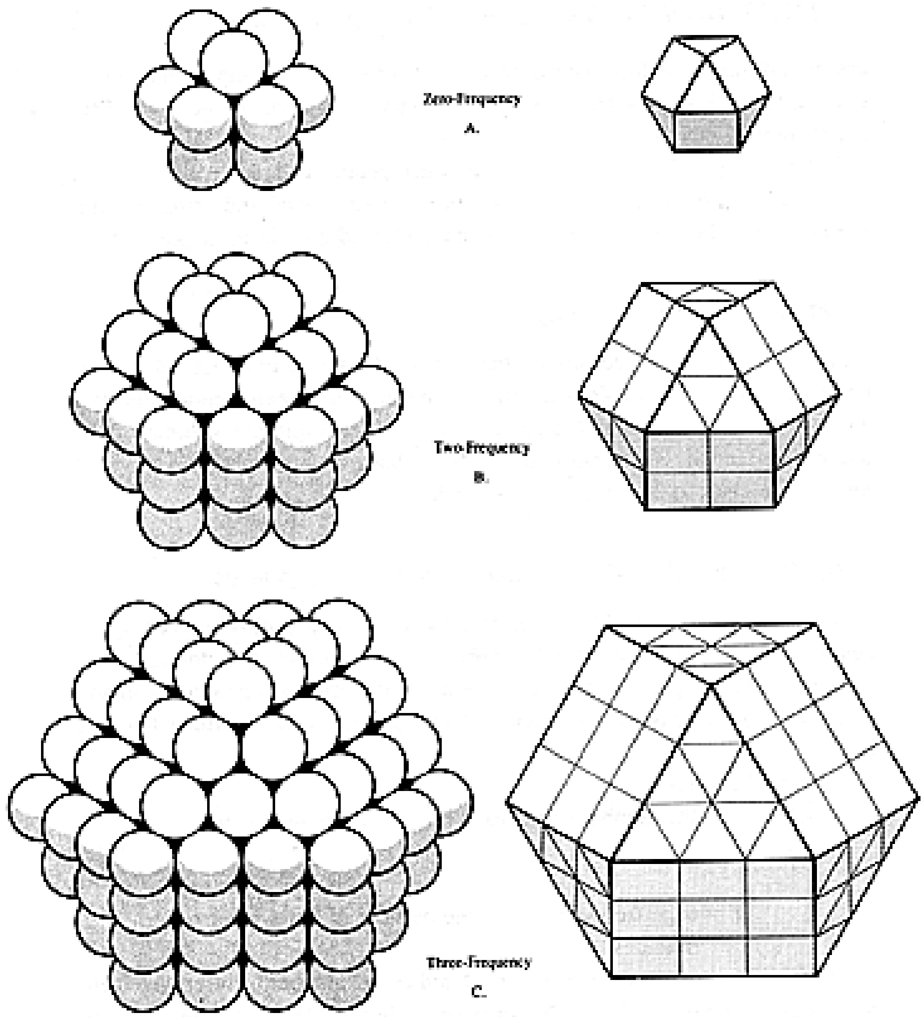

Fig. 222.01 *Equation for Omnidirectional Closest Packing of Spheres:* Omnidirectional concentric closest packings of equal spheres about a nuclear sphere form series of vector equilibria of progressively higher frequencies. The number of spheres or vertexes on any symmetrically concentric shell outer layer is given by the equation $10\ F^2 + 2$, where F = Frequency. The frequency can be considered as the number of layers (concentric shells or radius) or the number of edge modules on the vector equilibrium. A one-frequency sphere packing system has 12 spheres on the outer layer (A) and a one-frequency vector equilibrium has 12 vertexes. If another layer of spheres are packed around the one-frequency system, exactly 42 additional spheres are required to make this a two-frequency system (B). If still another layer of spheres is added to the two-frequency system, exactly 92 additional spheres are required to make the three-frequency system (C). A four-frequency system will have 162 spheres on its outer layer. A five-frequency system will have 252 spheres on its outer layer, etc.

222.20 Characteristics of Closest Packing of Spheres: The closest packing of spheres begins with two spheres tangent to each other, rather than omnidirectionally. A third sphere may become closest packed by becoming tangent to both of the first two, while causing each of the first two also to be tangent to the two others: this is inherently a triangle.

222.21 A fourth sphere may become closest packed by becoming tangent to all three of the first three, while causing each of the others to be tangent to all three others of the four-sphere group: this is inherently a tetrahedron.

222.22 Further closest packing of spheres is accomplished by the omniequiangular, intertriangulating, and omnitangential aggregating of identical-radius spheres. In omnidirectional closest-packing arrays, each single sphere finds itself surrounded by, and tangent to, at most, 12 other spheres. Any center sphere and the surrounding 12 spheres altogether describe four planar hexagons, symmetrically surrounding the center sphere.

222.23 *Excess of Two in Each Layer:* The first layer consists of 12 spheres tangentially surrounding a nuclear sphere; the second omnisurrounding tangential layer consists of 42 spheres; the third 92, and the order of successively enclosing layers will be 162 spheres, 252 spheres, and so forth. Each layer has an excess of two diametrically positioned spheres which describe the successive poles of the 25 alternative neutral axes of spin of the nuclear group. (See illustrations 450.11a and 450.11b.)

222.24 *Three Layers Unique to Each Nucleus:* In closest packing of spheres, the third layer of 92 spheres contains eight new potential nuclei which do not, however, become active nuclei until each has three more layers surrounding it—three layers being unique to each nucleus.

222.25 *Isotropic Vector Matrix:* The closest packing of spheres characterizes all crystalline assemblages of atoms. All the crystals coincide with the set of all the polyhedra permitted by the complex configurations of the isotropic vector matrix (see Sec. 420), a multidimensional matrix in which the vertexes are everywhere the same and equidistant from one another. Each vertex can be the center of an identical-diameter sphere whose diameter is equal to the uniform vector's length. Each sphere will be tangent to the spheres surrounding it. The points of tangency are always at the mid-vectors.

222.26 The polyhedral shape of these nuclear assemblages of closest-packed spheres—reliably interdefined by the isotropic vector matrix's vertexes—is always that of the vector equilibrium, having always six square openings ("faces") and eight triangular openings ("faces").

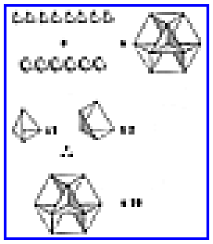
Fig. 222.30

222.30 **Volume of Vector Equilibrium:** If the geometric volume of one of the uniform tetrahedra, as delineated internally by the lines of the isotropic vector matrix system, is taken as volumetric unity, then the volume of the vector equilibrium will be 20.

222.31 The volume of any series of vector equilibria of progressively higher frequencies is always *frequency to the third power times 20.*

222.32 *Equation for Volume of Vector Equilibrium:*

Volume of vector equilibrium $= 20F^3$,

Where F = frequency.

222.40 **Mathematical Evolution of Formula for Omnidirectional Closest Packing of Spheres:** If we take an inventory of the number of balls in successive vector equilibria layers in omnidirectional closest packing of spheres, we find that there are 12 balls in the first layer, 42 balls in the second layer, and 92 balls in the third. If we add a fourth layer, we will need 162 balls, and a fifth layer will require 252 balls. The number of balls in each layer always comes out with the number two as a suffix. We know that this system is a decimal system of notation. Therefore, we are counting in what the mathematician calls congruence in modulo ten—a modulus of ten units—and there is a constant excess of two.

222.41 In algebraic work, if you use a constant suffix—where you always have, say, 33 and 53—you could treat them as 30 and 50 and come out with the same algebraic conditions. Therefore, if all these terminate with the number two, we can drop off the two and not affect the algebraic relationships. If we drop off the number two in the last column, they will all be zeros. So in the case of omnidirectional closest packing of spheres, the sequence will read; 10, 40, 90, 160, 250, 360, and so forth. Since each one of these is a multiple of 10, we may divide each of them by 10, and then we have 1, 4, 9, 16, 25, and 36, which we recognize as a progression of second powering—two to the second power, three to the second power, and so forth.

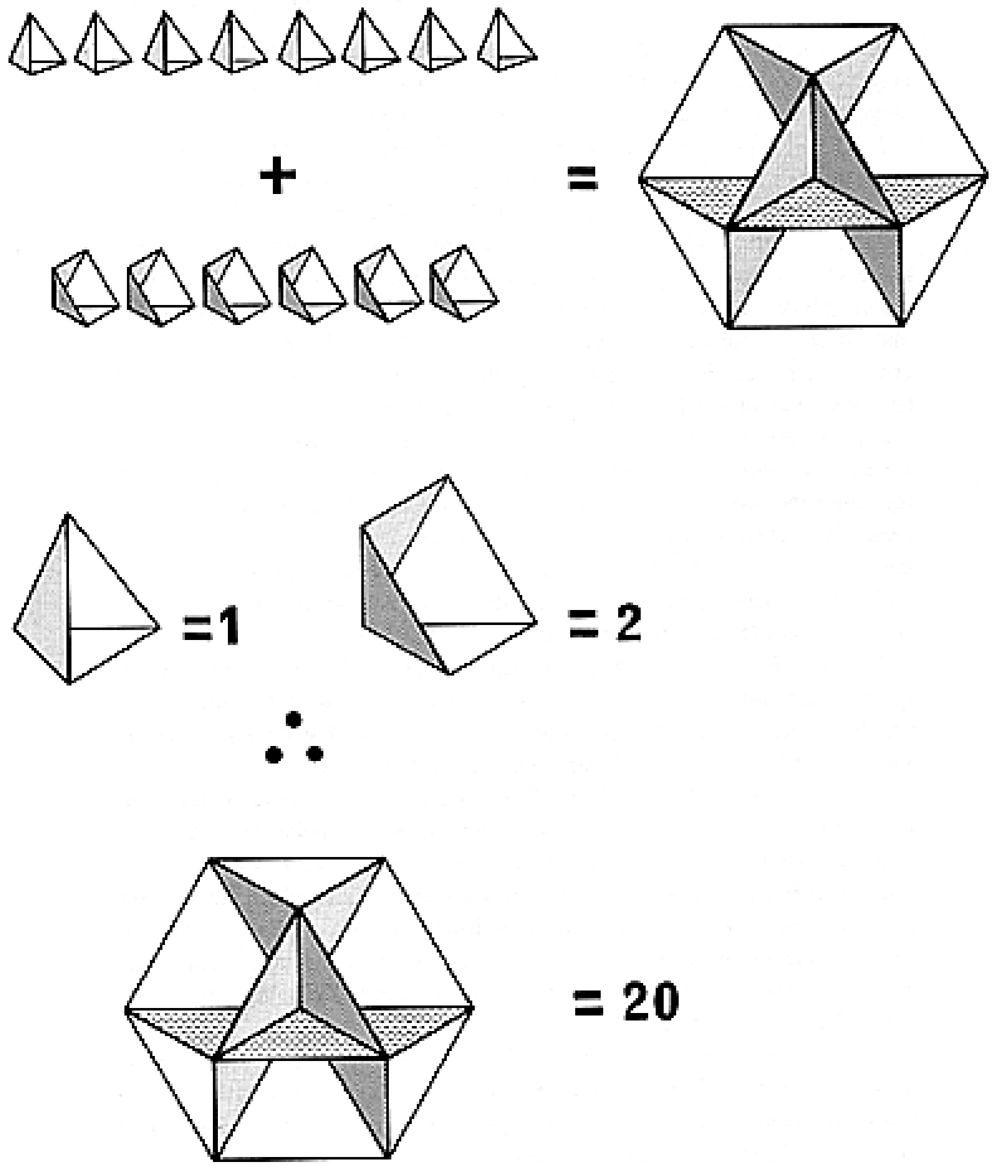

Fig. 222.30 *Volume Of Vector Equilibrium:* The volume of the vector equilibrium consists of eight tetrahedra and six half-octahedra. Therefore, the volume of the vector equilibrium is exactly twenty.

222.42 In describing the number of balls in any one layer, we can use the term frequency of modular subdivisions of the radii or chords as defined by the number of layers around the nuclear ball. In the vector equilibrium, the number of modular subdivisions of the radii is exactly the same as the number of modular subdivisions of the chords (the "edge units"), so we can say that *frequency to the second power times ten plus two* is the number of balls in any given layer.

222.43 This simple formula governing the rate at which balls are agglomerated around other balls or shells in closest packing is an elegant manifest of the reliably incisive transactions, formings, and transformings of Universe. I made that discovery in the late 1930s and published it in 1944. The molecular biologists have confirmed and developed my formula by virtue of which we can predict the number of nodes in the external protein shells of all the viruses, within which shells are housed the DNA-RNA-programmed design controls of all the biological species and of all the individuals within those species. Although the polio virus is quite different from the common cold virus, and both are different from other viruses, all of them employ frequency to the second power times ten plus two in producing those most powerful structural enclosures of all the biological regeneration of life. It is the structural power of these geodesic-sphere shells that makes so lethal those viruses unfriendly to man. They are almost indestructible.

222.50 **Classes of Closest Packing:** There are three classes of closest packing of unit-radius spheres:

222.51 **SYSTEMATIC** *Symmetrical Omnidirectional Closest Packing:* Twelve spheres closest pack omnitangentially around one central nuclear sphere. Further symmetrical enclosure by closest-packed sphere layers agglomerate in successive vector equilibria. The nucleus is inherent.

222.52 **ASYMMETRICAL** *Closest Packed Conglomerates:* Closest-packed conglomerates may be linear, planar, or “crocodile.” Closest packed spheres without nuclear organization tend to arrange themselves as the octet truss or the isotropic vector matrix. The nuclei are incidental.

222.53 **VOLUMETRIC** *Symmetrical Closest Packing:* These are nonnuclear symmetrical embracements by an outer layer. The outer layer may be any frequency, but it may not be expanded or contracted by the addition inwardly or outwardly of complete closest-packed layers. Each single-layer frequency embracement must be individually constituted. Volumetric symmetrical closest packing aggregates in most economical forms as an icosahedron geodesic network. The nucleus is excluded.

Next Section: 223.00