620.00 **Tetrahedron**

620.01 In the conceptual process of developing the disciplines for carrying on the process of consideration, the process of temporarily putting aside the irrelevancies and working more closely for the relationships between the components that are considered relevant, we find that a geometry of configuration emerges from our awareness of the minimum considered components. A minimum constellation emerges from our preoccupation with getting rid of the irrelevancies. The geometry appears out of pure conceptuality. We dismiss the irrelevancies in the search for understanding, and we finally come down to the minimum set that may form a system to divide Universe into macrocosm and microcosm, which is a set of four items of consideration. The minimum consideration is a four-star affair that is tetrahedral. Between the four stars that form the vertexes of the tetrahedron, which is the simplest system in Universe, there are six edges that constitute all the possible relationships between those four stars.

620.02 The tetrahedron occurs conceptually independent of events and independent of relative size.

620.03 By tetrahedron, we mean the minimum thinkable set that would subdivide Universe and have interconnectedness where it comes back upon itself. The four points have six interrelatednesses. There are two kinds of number systems involved: four being prime number two and six being prime number three. So there are two very important kinds of oscillating quantities numberwise, and they begin to generate all kinds of fundamentally useful mathematics. The basic structural unit of physical Universe quantation, tetrahedron has the fundamental prime number oneness.

620.04 Around any one vertex of the tetrahedron, there are three planes. Looking down on a tetrahedron from above, we see three faces and three edges. There are these three edges and three faces around any one vertex. That seems very symmetrical and nice. You say that is logical; how could it be anything else? But if we think about it some more, it may seem rather strange because we observe three faces and three edges from an inventory of four faces and six edges. They are not the same inventories. It is interesting that we come out with symmetry around each of the points out of a dissimilar inventory.

620.05 The tetrahedron is the first and simplest subdivision of Universe because it could not have an insideness and an outsideness unless it had four vertexes and six edges. There are four areal subdivisions and four interweaving vertexes or prime convergences in its six-trajectory isolation system. The vertexial set of four local-event foci coincides with the requirement of quantum mathematics for four unique quanta numbers for each uniquely considerable quantum.


Fig. 620.06

620.06 With three positive edges and three negative edges, the tetrahedron provides a vectorial quantum model in conceptual array in which the right helix corresponds to the proton set (with electron and antineutrino) and the left helix corresponds to the neutron set (with positron and neutrino). The neutron group has a fundamental leftness and the proton group has a fundamental rightness. They are not mirror images. In the tetrahedron, the two groups interact integrally. The tetrahedron is a form of energy package.

620.07 The tetrahedron is transformable, but its topological and quantum identity persists in whole units throughout all experiments with physical Universe. All of the definable structuring of Universe is tetrahedrally coordinate in rational number increments of the tetrahedron.

620.08 Organic chemistry and inorganic chemistry are both tetrahedrally coordinate. This relates to the thinking process where the fundamental configuration came out a tetrahedron. Nature's formulations here are a very, very high frequency. Nature makes viruses in split seconds. Whatever she does has very high frequency. We come to tetrahedron as the first spontaneous aggregate of the experiences. We discover that nature is using tetrahedron in her fundamental formulation of the organic and inorganic chemistry. All structures are tetrahedrally based, and we find our thoughts resolving themselves spontaneously into the tetrahedron as it comes to the generalization of the special cases that are the physics or the chemistry.

620.09 We are at all times seeking how it can be that nature can develop viruses or billions of beautiful bubbles in the wake of a ship. How does she formulate these lovely geometries so rapidly? She must have some fundamentally pure and simple way of developing these extraordinary life cells at the rate she develops them. When we get to something as simple as finding that the tetrahedron is the minimum thinkable set that subdivides Universe and has relatedness, and that the chemist found all the structuring of nature to be tetrahedral, in some cases vertex to vertex, in others interlinked edge to edge, we find, as our thoughts go this way, that it is a very satisfying experience.

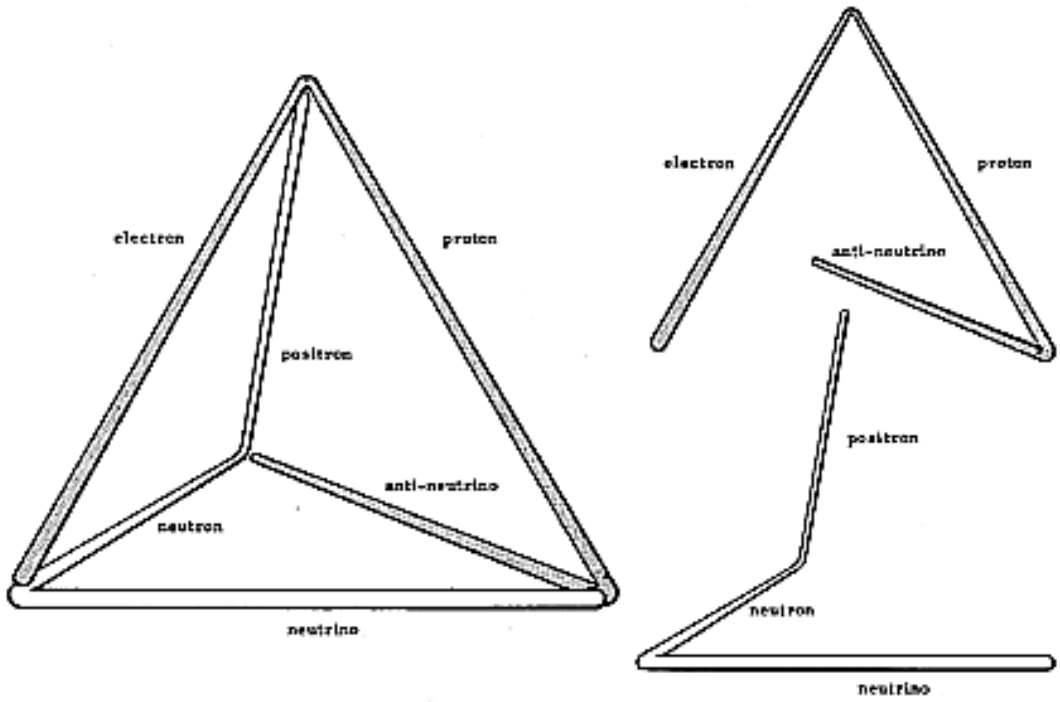

Fig. 620.06 Tetrahedron as Vectorial Model of Quantum: The tetrahedron as a basic vectorial model is the fundamental structural system of the Universe. The open-ended triangular spiral as action, reaction, and resultant (proton, electron, and anti-neutrino; or neutron, positron, and neutrino) becomes half quantum. An association of positive and negative half-quantum units identifies the tetrahedron as one quantum.

620.10 All polyhedra may be subdivided into component tetrahedra, but no tetrahedron may be subdivided into component polyhedra of less than the tetrahedron's four faces.

620.11 The triangle is the minimum polygon and the tetrahedron is the minimum structural system, for we cannot find an enclosure of less than four sides, that is to say, of less than 720 degrees of interior- (or exterior-) angle interaction. The tetrahedron is a tetrahedron independent of its edge lengths or its relative volume. In tetrahedra of any size, the angles are always sumtotally 720 degrees.

620.12 Substituting the word *tetrahedron* for the number two completes my long attempt to convert all the previously unidentifiable integers of topology into geometrical conceptuality. Thus we see both the rational energy quantum of physics and the topological tetrahedron of the isotropic vector matrix rationally accounting all physical and metaphysical systems. (See Secs. 221.01 and 424.02.)

621.00 **Constant Properties of the Tetrahedron**

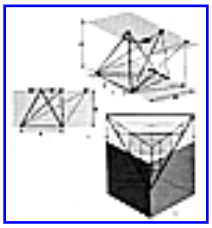

Fig. 621.01

621.01 Evaluated in conventional terms of cubical unity, the volume of a tetrahedron is one-third the base area times the altitude; in synergetics, however, the volume of the tetrahedron is unity and the cube is threefold unity. Any asymmetric tetrahedron will have a volume equal to any other tetrahedron so long as they have common base areas and common altitudes. (See Sec. 923.20.)

621.02 Among geometrical systems, a tetrahedron encloses the minimum volume with the most surface, and a sphere encloses the most volume with the least surface.

621.03 A cone is simply a tetrahedron being rotated. Omnidirectional growth—which means all life—can be accommodated only by tetrahedron.

621.04 There is a minimum of four unique planes nonparallel to one another. The four planes of the tetrahedron can never be parallel to one another. So there are four unique perpendiculars to the tetrahedron's four unique faces, and they make up a four- dimensional system.

621.05 Sixth-powering is all the perpendiculars to the 12 faces of the rhombic dodecahedron.

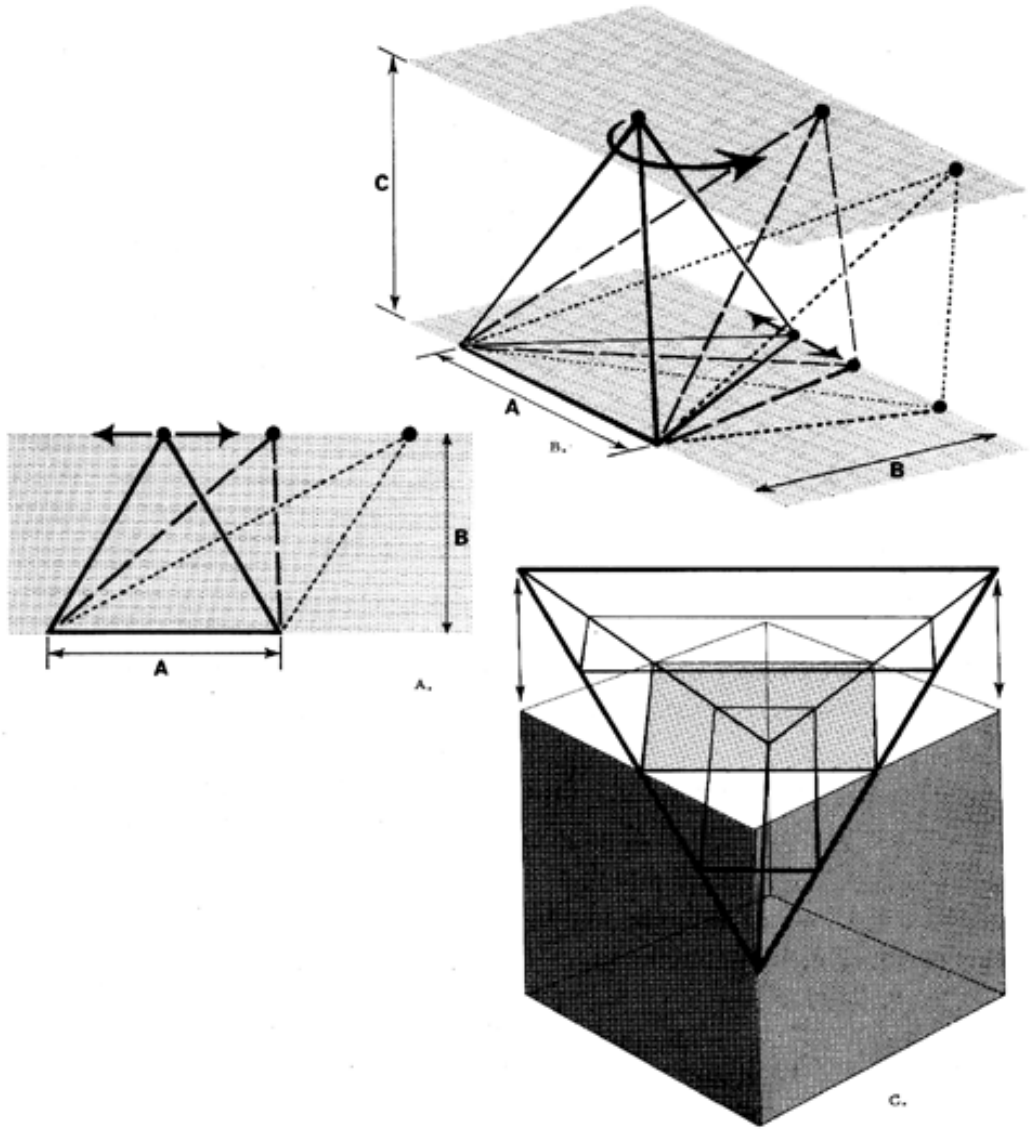

Fig. 621.01 Constant Properties of the Tetrahedron:

A. The area of a triangle is one-half the base times the altitude. Any arbitrary triangle will have the same area as any other triangle so long as they have a common base and altitude. Here is shown a system with two constants, A and B, and two variables_the edges of the triangle excepting A.
B. The volume of a tetrahedron is one-third the base area times the altitude. Any arbitrary tetrahedron will have a volume equal to any other tetrahedron so long as they have common base areas and common altitudes. Here is shown a system in which there are three constants, A, B, C, and five variables_all the tetrahedron edges excluding A.
C. As the tetrahedron is pulled out from the cube, the circumference around the tetrahedron remains equal when taken at the points where cube and tetrahedron edges cross; i.e. any rectangular plane taken through the regular tetrahedron will have a circumference equal to any other rectangular plane taken through the same tetrahedron, and this circumference will be twice the length of the tetrahedron edge.

621.06 When we try to fill all space with *regular* tetrahedra, we are frustrated because the tetrahedra will not fill in the voids above the triangular-based grid pattern. But the regular tetrahedron is a complementary space filler with the octahedron. Sec. 951 describes irregular tetrahedral allspace fillers.

621.07 The tetrahedron and octahedron can be produced by multilayered closest packing of spheres. The surface shell of the icosahedron can be made of any one layer-but only one layer-of closest-packed spheres; the icosahedron refuses radial closest packing.

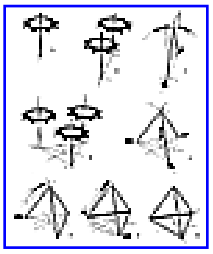
Fig. 621.10

621.10 **Six Vectors Provide Minimum Stability:** If we have one stick standing alone on a table, it may be balanced to stand alone, but it is free to fall in any direction. The same is true of two or three such sticks. Even if the two or three sticks are connected at the top in an interference, they are only immobilized for the moment, as their feet can slide out from under them. Four or five sticks propped up as triangles are free to collapse as a hinge action. Six members are required to complete multidimensional stability—our friend tetrahedron and the six positive, six negative degrees of freedom showing up again.

621.20 **Tepee-Tripod:** The tepee-tripod affords the best picture of what happens locally to an assemblage of six vectors or less. The three sides of a tepee-tripod are composed first of three vertical triangles rising from a fourth ground triangle and subsequently rocking toward one another until their respective apexes and edges are congruent. The three triangles plus the one on the ground constitute a minimum system, for they have minimum "withinness." Any one edge of our tepee acting alone, as a pole with a universal joint base, would fall over into a horizontal position. Two edges of the tepee acting alone form a triangle with the ground and act as a hinge, with no way to oppose rotation toward horizontal position except when prevented from falling by interference with a third edge pole, falling toward and into congruence with the other two poles' common vertex. The three base feet of the three poles of the tepee-tripod would slide away outwardly from one another were it not for the ground, whose structural integrity coheres the three feet and produces three invisible chords preventing the three feet from spreading. This makes the six edges of the tetrahedron. (See Secs. 521.32 and 1012.37.)

621.30 **Camera Tripod**

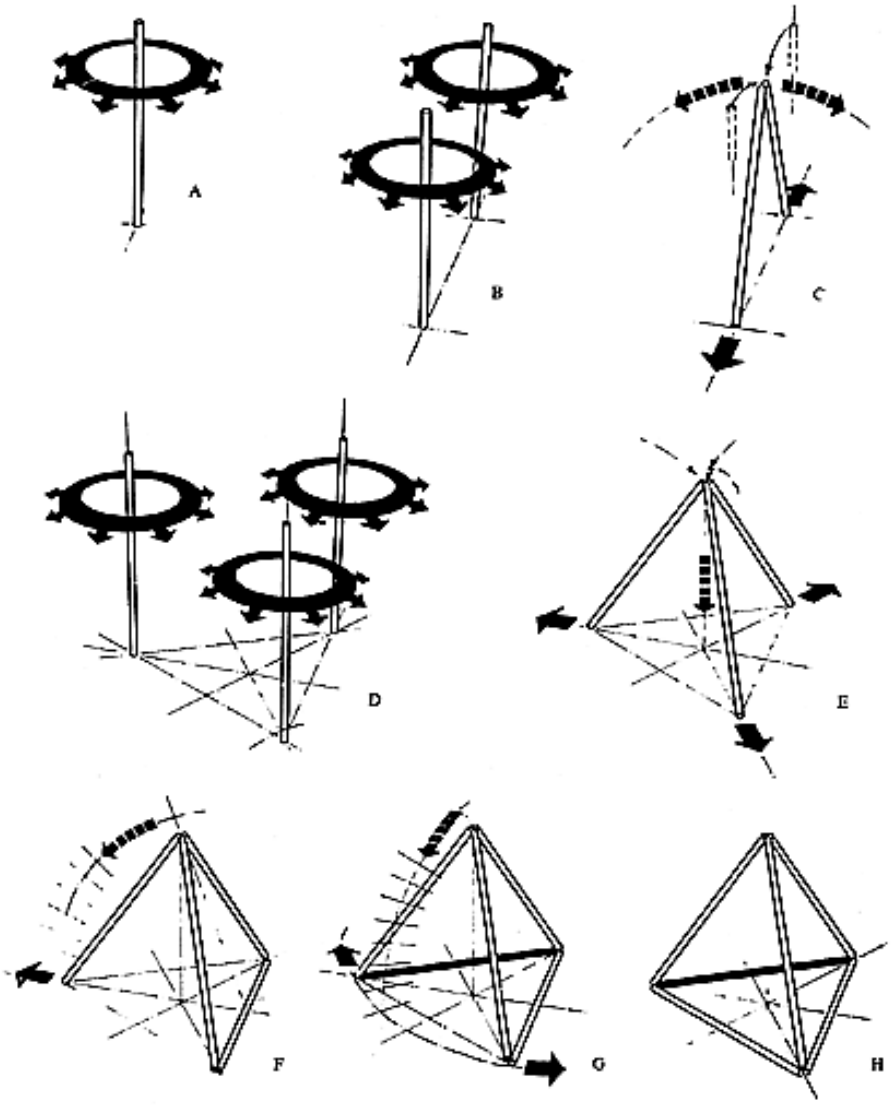

Fig. 621.10 Falling Sticks: Six Vectors Provide Minimum Stability:

A. Stick standing alone is free to fall in any direction.
B. Two sticks: free to fall in any direction.
C. Two sticks joined: free to fall in two directions and to slide apart at bases.
D. Three sticks: free to fall in any direction.
E. Three sticks joined: only free to slide apart at bases.
F. Four sticks: a propped-up triangle_the prop is free to slide out.
G. Five members: two triangles may collapse as with a hinge action.
H. Six members: complete multidimensional stability_the tetrahedron.

621.31 A simple model of the effective conservation of regenerative Universe is to be had in a camera tripod which, when its legs are folded and parallel, finds the centers of gravity and mass of its three individual legs in close proximity to one another. As the legs are progressively hinged outward from one another, the respective centers of mass and gravity recede from one another. From Newton's second law we know that as bodies increase their distance apart at an arithmetical rate, their interattractiveness decreases at a rate of the second power of the distance change—i.e., at double the distance the interattraction decreases to one-quarter intensity. Since the legs are fastened to one another at only one end (the top end), if the floor is slippery, the three bottom ends tend to slide apart at an accelerated rate.

621.32 We may think of the individual legs of the tripod as being energy vectors. The "length" of a vector equals the mass times the velocity of the force operative in given directions. We now open the equilengthed tripod legs until their bottom terminals are equidistant from one another, that distance being the same length as the uniform length of any one of the legs. Next we take three steel rods, each equal in length, mass, and structural strength to any one of the tripod legs, which renders them of equal force vector value to that of the tripod set. Next we weld the three rods together at three corner angles to form a triangle, against whose corners we will set the three bottom ends of the three downwardly and outwardly thrusting legs of the tripod. As gravity pulls the tripod Earthward, the tendency of these legs to disassociate further is powerfully arrested by the tensile integrity of the rod triangle on the ground, in which both ends of all three are joined together.

621.33 Assuming the three disassociative vectorial forces of the tripod legs to be equal to the associative vectorial force of the three-welded-together rods, we find the three-jointed closed system to be more effective than the one-jointed system. In this model the associative group in the closed triangle represents the gravity of Universe and the disassociative group—the tripod legs—represents the radiation of Universe. The whole model is the tetrahedron: the simplest structural system.

621.34 Think of the head of the camera tripod as an energy nucleus. We find that when nuclear energy becomes disassociated as radiation, it does so in a focused and limited direction unless it is intercepted and reflectively focused in a concave mirror. Radiation is inherently omnidirectional in its distribution from the nucleus outward, but it can be directionally focused. Gravity is totally embracing and convergently contractive toward all its system centers of Scenario Universe, and it cannot be focused. Like the circular waves made by an object dropped in the water, both gravitational and radiational growth-in-time patterns are concentrically arrayed; gravity convergently and contractively concentric, radiation divergently and expansively concentric. Frequency of concentricity occurrence is relative to the cyclic system considered.

Next Section: 622.00
