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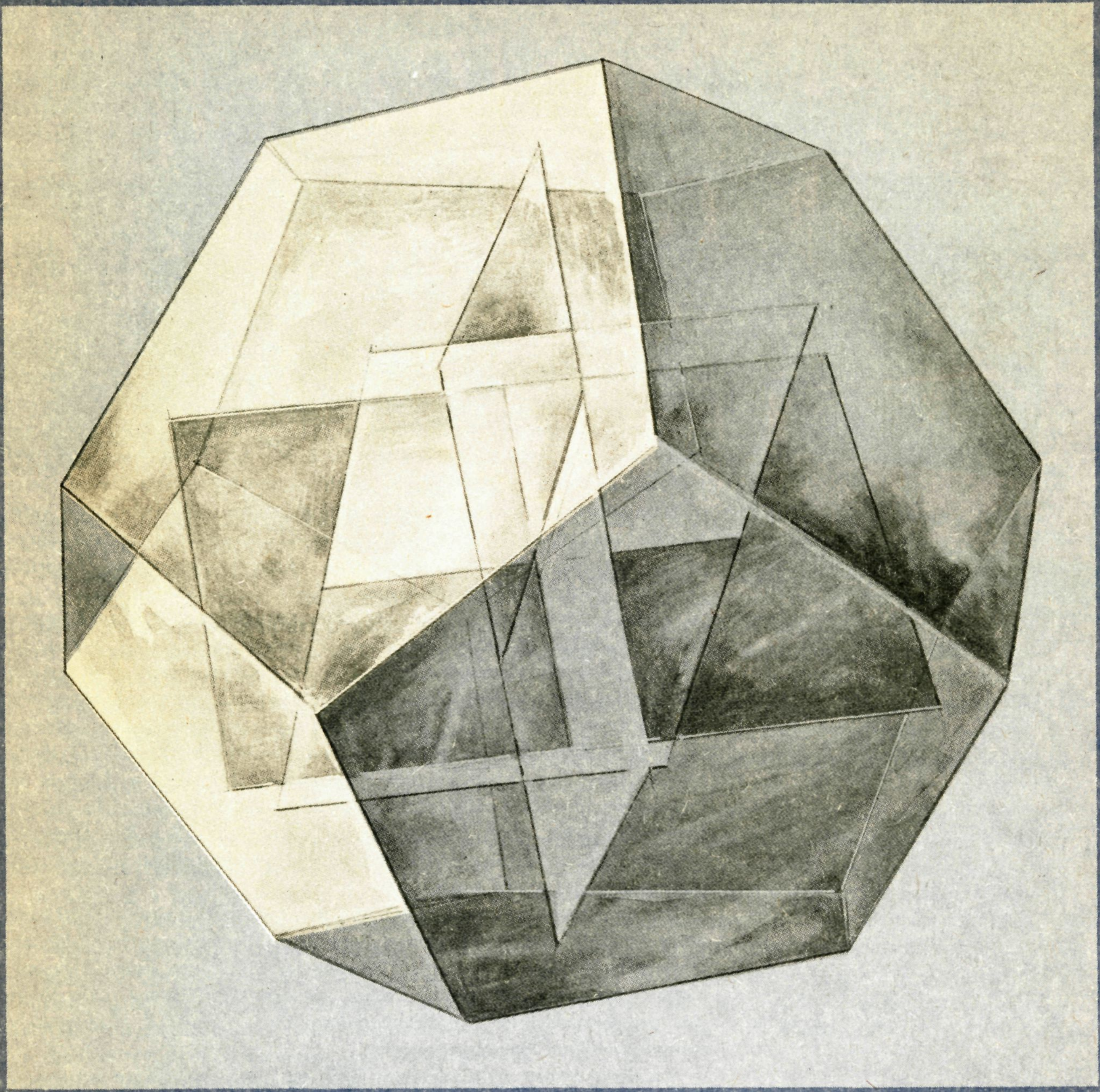
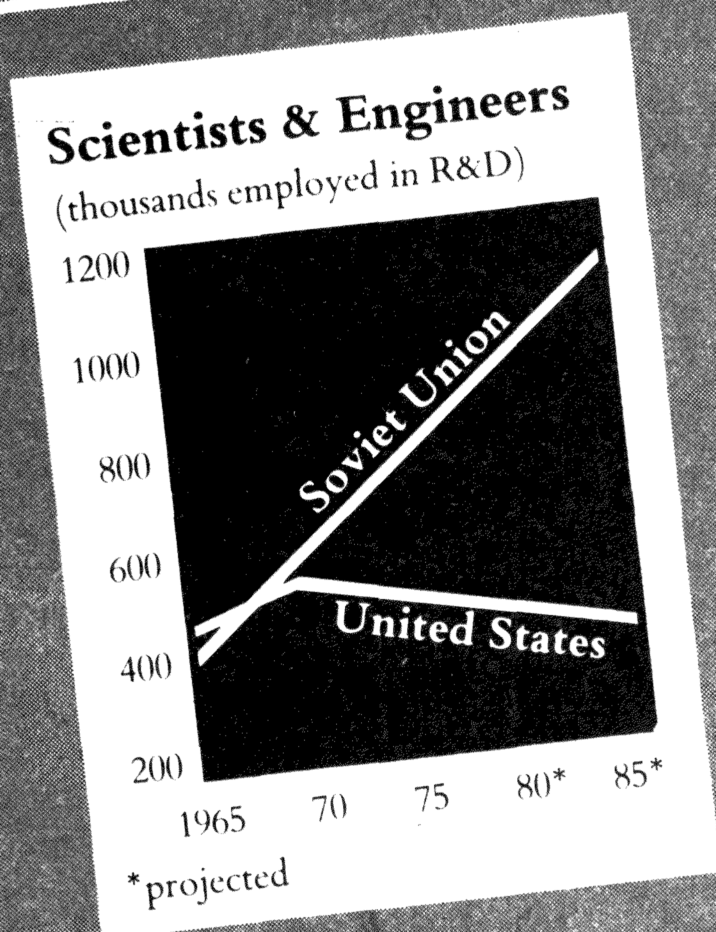


The U.S. Could Still Surpass The Soviets in Science

by Lyndon H. LaRouche, Jr.



TODAY, no qualified policy-maker denies that the Soviet Union has moved far ahead of the United States in numbers and suitable employment of qualified scientists and related professionals. The Soviet accomplishment is viewed in proper light if we add that by the turn of the present century, India will have as many or more scientists and related professionals than the United States, according to presently prevailing trends.

Comparing the U.S.A. and U.S.S.R. in quality of scientific work, the picture is more mixed. In advanced plasma-physics, such as relativistic-beam technologies, the Soviet Union is clearly ahead, and its research is conducted on a much broader base than U.S. work. In some of the current Soviet school textbooks we have studied, the quality is clearly not up to classical German standards set by Felix Klein and others. There are no miracles in the known unit-quality of Soviet education, simply a lot more of it than in any nation of Western Europe or North America today.

The United States could quickly overtake and surpass the Soviets in science if two basic changes in educational policy were forcefully introduced rather immediately.

First, junk all the "liberal school reforms" since John Dewey's rampage, and establish a curriculum up to the policy-standards of Wilhelm von Humboldt's reforms of the Prussian educational system.

Second, redefine the qualifications of teachers and content of the curriculum along the lines proposed by Lyndon H. LaRouche, Jr. in several recently published locations. A giant step in scientific competence of the United States could be achieved if the standpoint of classical "continental science" were made the sole basis for pre-science and science curricula, provided educators and policy-makers have the intellectual courage to repudiate the influence of Descartes, Newton, Cauchy, and Maxwell in textbooks and curricula-design.

LaRouche, long a campaigner for the physics-standpoint of Bernhard Riemann and the importance of Georg Cantor's crucial work of the 1871-1883 period, has been supervising an international research-project over recent years. This research has involved the part-time or nearly full-time work of a few score of researchers in the United States, Mexico, France, Italy, Germany, and Sweden, including the work on Riemann, Cantor, Dirichlet, et al. currently being conducted chiefly by Drs. Uwe Parpart and Jonathan Tennenbaum. The emphasis has been on previously unpublished manuscripts and correspondence of some of the greatest figures in science, from Leibniz through Cantor, and has also benefitted significantly from the specialized knowledge and assistance of dedicated archivists and researchers of several nations.

For example, approximately 100,000 pages of Leibniz's manuscripts have never been published. No competent overview of Riemann's work and life has yet been published, and most of the commentary on Leibniz, Euler, Riemann, Cantor, and others from British sources, and from the "History of the Exact Sciences" association of Johns Hopkins Professor C. Truesdell, is deliberately fraudulent on those and related matters.

Over the coming period, one may hope that a growing flood of articles and books reporting numerous valuable discoveries from such documents should appear, partially from the authorship of members of the research team. Meanwhile, LaRouche writes from his privileged vantage-point as supervisor of those efforts, reporting what are now firmly-documented conclusions bearing upon the pre-science and science curricula for primary and secondary schools.

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Every normal child reaching the age of between sixteen and eighteen years should and could have gained a working knowledge of the methods of mathematical physics through Riemannian topology. This were feasible if primary and secondary education are modeled upon the principles of classical education prescribed by Wilhelm von Humboldt, and if the approach taken to teaching of geometry were governed from the beginning by the approach we identify here.

To accomplish such a science program, we shall be obliged to wage a stiff political fight against dug-in opposition within the scientific and teaching communities themselves. For reasons we shall identify here, the key to a leap upward in U.S. science-potentials is to free ourselves at last from the disorienting heritage of Descartes, Newton, Cauchy, Maxwell, Mach, and Bertrand Russell. The partisans of that disorienting heritage will fight bitterly, not failing to employ the traditional methods of the Inquisition, if the history of that faction's past thuggery against Kepler, William Gilbert, Leibniz, Legendre, Riemann, Cantor, and Felix Klein can be taken as indication.

Rather than proving that warning straightaway, we shall outline the foundation for that twofold judgment, in the course of stating the case summarily in a more orderly sequence of argument.

The key to the necessary approach is the work of the founder of modern mathematical physics, Johannes Kepler (1571-1630).[1] Shockingly, but not properly astonishing, Kepler's three major published works, the works founding modern mathematical physics, have yet to be published in English. More shocking, but also not properly astonishing, the available representation of Kepler's work given in English-language university textbooks and related published sources is a falsification of all of the essential points.

Who has perpetrated this and similar frauds, and for reason of what motive?

Over the past four centuries, each step of progress in the internal features of mathematical physics (and related inquiries) has been the continuing battlefield for a violent, most literally political, combat between two irreconcilable factions. The British names for these two warring factions are the *British empiricists* (including the Viennese neo-positivists), on the one side, and the "continental science" of Kepler, Leibniz, Euler, Monge, and Riemann (among numerous

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others), on the opposing side.

Each of the two opposing factions has had its own distinctive conceptions respecting the purpose, principles, and methods for scientific inquiry. Although there is a significant degree of agreement between the two factions on the representation of some important algebraic formulations, there is no significant agreement between the two either on the interpretation of those formulations or on the methods of scientific discovery.

The paradigmatic figures for the faction which the British hate and denounce as "continental science" include, as we have noted, Kepler, Leibniz, Euler, Monge, and Riemann. The scientific method of this faction is the *geometric* approach to the lawful composition of the universe. This is based historically on the precedents of Plato, Archimedes, and Nicholas of Cusa.

The paradigmatic figures for the British-Jesuit opposition to geometric methods of Kepler include Descartes, Newton, Cauchy, and Maxwell, and also such German Cauchyites as Leopold Kronecker and Richard Dedekind, as well as Ernst Mach and the evil Bertrand Russell. This British empiricist-positivist faction's method is a *numerological* (e.g., "statistical") misconception of *algebraic* methods, coupled with the treatment of physical space in terms of "action-at-a-distance." The historical origin of this numerological-algebraic method is principally the *cabalistic* superstitions of the Mesopotamian Magi cults, plus the ancient Chinese cult of Taoism. Philosophically, radical empiricism, such as that of Maxwell, Mach, and Russell, is closely related in conception and in pedigree to the modern synthetic-pagan cults of theosophy and anthroposophy. The central figure most frequently referenced as an ancient classical model for empiricism is Aristotle, the famous agent of the Delphi cult of Apollo-Lucifer.

Consequently, if a modern textbook purports to explain the accomplishments of Kepler, Leibniz, Euler, et al. from the empiricist standpoint of numerology-algebraic-method, the victimized student may gain what appears to be a plausible explanation for the algebraic formulations of Kepler, et al., but the student's understanding of such formulations and their derivation must necessarily be mental gibberish. This widespread condition of textbooks and classrooms is the principal cause for students' failures in science, even prior to the "structuralist schizophrenia" of the "new math" cult.

For related reasons, there can be no truly competent pre-science and science curriculum for public schools and universities until the issues of method separating the two opposing factions are brought to the consciousness of the pedagogue. This is not to propose to embed the issues of the Newton frauds against Kepler and Leibniz in the curriculum of the primary-school student. It is to insist that primary-school programs must be developed by persons who have themselves mastered those issues and understood their implications for primary as well as secondary education.

Geometry as "The Language of Vision"

The core of a proper classical approach to education is to define most of the curriculum as under the unifying heading of *language-philology. Philosophy* and *universal history,* as a single subject-category, is the only basic component of primary and secondary education outside the category of language-philology. We shall, in the main, put the content of philosophy and history curricula to one side here, and abstract geometry from its place within the department of language-philology.

We make this latter separation by dividing all language-subjects into two principal sub-categories: the *language of hearing* and the *language of vision.* The language of hearing includes grammar and vocabulary of various languages, including the student's native language. It also includes, as integral to the organization and development of the language of hearing, principles and applications of classical poetical composition, plus the elaboration of poetical composition according to classical prosodic principles as well-tempered polyphony. Everything else in language is *the language of vision.* The language of vision is referenced to Euclidean geometry, and the role of geometry in such forms of poetical visual composition as painting, sculpture, and architecture.

From the very beginning of the child's exposure to education in geometry, the curriculum and teacher must wean the child gradually from the nominalist delusion that the geometry of visual space is the geometry of the world as it exists apart from human visual space. It must be stressed, with aid of empirical experience in geometric constructions and observations, that Euclidean geometry is a language in the same sense as speech is the language of hearing. The necessity for this point is already self-evident to readers with a competent background in mathematical physics. For other readers, the point will begin to be sufficiently clear as we proceed further here.

As we have outlined the case in other published locations,[2] the proper definition of a literate form of "language of hearing" includes much more than a grammatical command of a vocabulary of between 50,000 and 100,000 terms in one's own language.

There are rigorous principles of grammar common to every literate language: nine tenses, five moods, two voices, perfect (self-reflexive) and imperfect action, and neither more nor less than seven basic grammatical cases. The models for study of this aspect of language are well-established by classical philology to be classical Greek literature (from Homer through Plato) and classical Sanskrit.

However, not only is classical poetic composition a part of the use of literate language; it is from such poetry, and only poetry that a language develops a literate form of syntax, and establishes rigorous rules for developing the forms of irony (simile, hyperbole, metaphor) which are the life of literate prose speech. (Any language whose grammarians outlaw metaphor is by that definition an illiterate form of language, incapable of expressing adequately scientific conceptions, for example.)

Music is, in turn, a byproduct of classical modes of poetic composition. However, music, in return, shapes poetry much as poetry properly shapes literate prose. Music is poetry sung (by human voice or instrument) polyphonically. This polyphonic elaboration of poetry requires nothing but the twelve-tone, octave scale, and a well-tempered valuation of the notes of a twenty-four key domain. Otherwise, it is not music—for reasons we have proven in other published locations.[3] The principles of the twenty-four key, well-tempered octave scale are the most fundamental principles of physics, as Johannes Kepler proved conclusively in his *Harmonies of the World,* and are adduced directly from the Thirteenth Book of Euclid's geometry, as Kepler proved.

So, music is the primary overlap between the two subcategories of language, between the language of hearing and the language of vision. The principle of the sonnet composed for polyphonic rendition is the perfected example of the direct connection between the two subcategories of literate language as a whole.

Since vision dominates the conceptual potentialities of the human mind, the most efficient program for rendering entire populations of youth stupid and irrational is to eliminate the teaching of classical geometry from the public schools. The lawful composition of the universe cannot be explicitly comprehended by the human mind except through aid of the language of vision, for reasons we shall soon enough identify.

As we have indicated earlier here, it is readily proven that the three-dimensional, time-directed universe of visual space is not the same as the real physical universe. Therefore, if such geometry is to be of any real use to mankind in uncovering the actually lawful ordering of the universe, it must be proven that there is some comprehensible form of correspondence between the world as it is and the world as it appears to us in terms of events in the visual field.

That correspondence is the key to the mathematical physics of Kepler, although the proof of the nature of such a correspondence was not adequately developed until breakthroughs effected by Riemann, Karl Weierstrass, and Cantor during the middle to late nineteenth century.

To restate this fundamental point: *The central problem of mathematical physics is the task of proving the nature of the correspondence between the relations visible to us in terms of visual space and the real universe apart from the experience of vision.*

Before the student graduates from secondary school, he or she must know the answer to that question. However, before the student can assimilate the answer, the student must first discover the question. That, in brief, is the governing principle for the ordering of the teaching of geometry and science in primary and secondary schools.

In the simplest terms of reference, the problem we have just named can be called a "mapping problem." We must assume, for the sake of the indicated question, that all the events occurring in the real world (outside visual space) can be mapped into visual space. We must also assume that we able to discover the principle governing such mapping, in some sneaky but conclusive manner. If those two conditions are met, then we are able to do two things, both of which are interrelated preconditions for the existence of a mathematical physics. We can prove that the relations among events in visual space are a lawful reflection of lawful relations in the universe apart from visual space. We are also able, on that basis, to use the symbology of visual space as the language for rigorously describing real processes outside the direct ken of visual space.

For that reason, we must approach Euclidean geometry as a language of vision, rather than as the substance of the physical universe apart from vision. Just as a literal interpretation of words in prose is a form of clinical schizophrenia called *nominalism,* so we must be aware of the insanity we incur were we to overlook the fact that the imagery of visual space is the language of vision, not the content of the reality to which that language refers.

Kepler's Achievement for Mathematical Physics

During the fourth century B.C., the most important discovery ever made in geometry was accomplished at the temple of Amon in Cyrenaica. This was the discovery that only five regular polyhedral solids can exist in Euclidean space. This discovery and its significance was first reported in Greek classical literature in the dialogues of Plato; for that reason, those five regular polyhedra have been commonly identified as the *five Platonic solids. The entirety of the progress of modern mathematical physics is based on the implications of that discovery;* Kepler was the first to prove that the entire solar system, and therefore all events within that solar system, was governed by the principle embedded in that geometric discovery.

The general program of pre-science and science education for primary and secondary schools is therefore based on this following preliminary task. The student must progress in mastery of Euclidean geometry up through the point the student is equipped to reproduce the proof discovered at the temple of Amon: that only five regular polyhedral solids are possible in Euclidean space. Once the student has reached that point of progress, the teacher must use the teacher's own mastery of the commentaries of Proclus and the relevant work of Luca Pacioli and Albrecht Dürer to bring the student to the opening conceptions of Kepler's *Harmonies of the World.*

At that point, the student must first master the

The Simplest Statement of the Golden Mean

The subject of the golden mean is crucial for understanding the connection between well-tempered polyphony and Kepler's discovery of the lawful composition of the solar system. Without a grounding in that elementary conception, and without following its application through Kepler's work, no amount of university studies could render a student competent in the ABC's of mathematical science.

Figure 1 shows line AB, divided by point C, lying such that the length of AB is to the length of AC as the length of AC is to the length of CB. The division is called the golden mean, or the proportion of mean and extreme. There is only one such proportion. If the short segment b and the long segment a are formed into a rectangle, it is called a golden rectangle. If the short side of the rectangle is length 1, the longer side will be length $(1+\sqrt{5})/2$ or approximately 1.618. We call this K.

Using the line AB in figure 1, we can construct a series of squares in successive golden mean relationship to one another (figure 2). Line AB is now side a, and is the height of the long side of a rectangle. The base of the rectangle is of the length AC. We thus define the largest of the squares inside the rectangle. In the figure we have also constructed a square on the length CB, and a third square on the length (AC−CB). We could next construct a square on the length CB−(AC−CB), and so on. This construction represents the notion of the golden mean in the form that it is usually introduced.

Figure 1

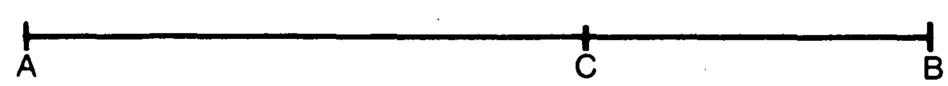
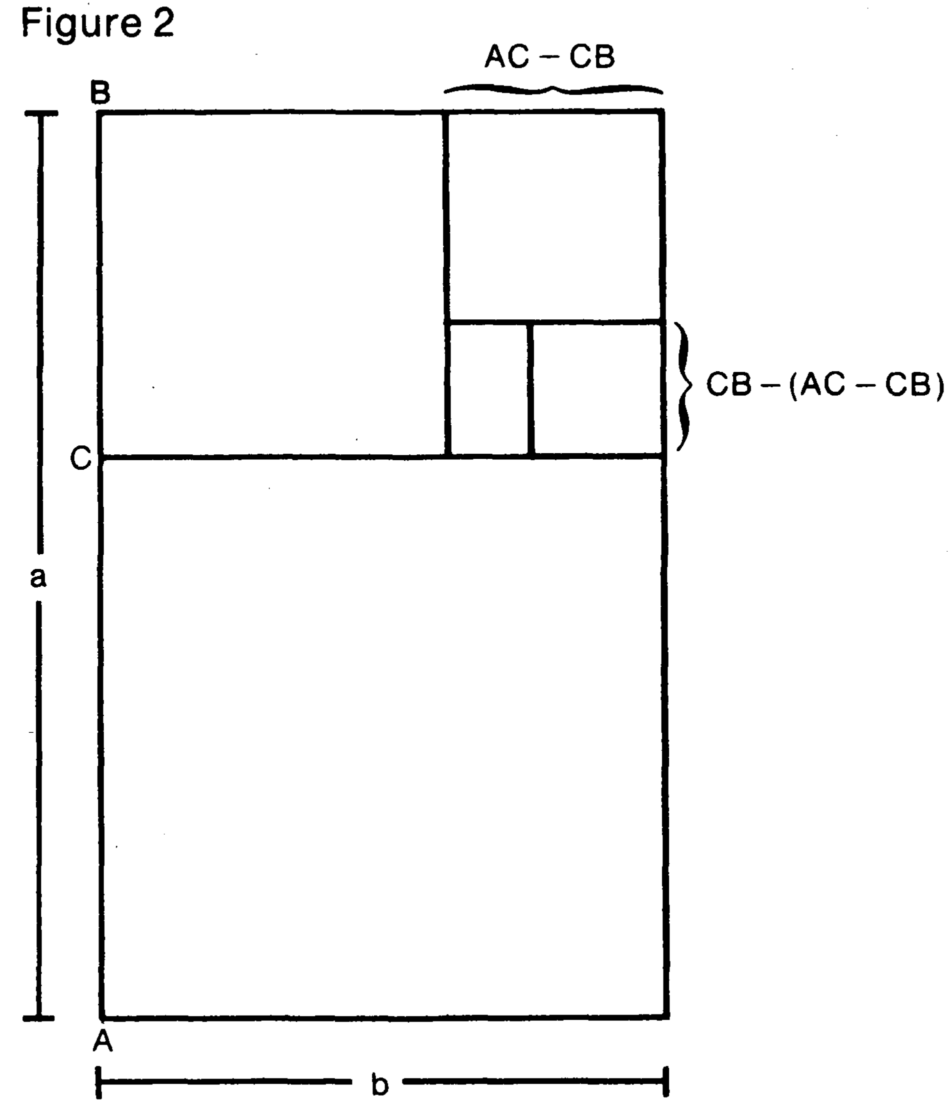


Figure 2



work of Kepler on the octave scale, and, from that, proceed to the main features of Kepler's solution to the lawful composition of the solar orbits.

The essential content of the three published works of Kepler should be one among the principal units of the entirety of pre-science/science education. This should be used to consolidate the student's mastery of projective systems (conics), and to become empirically as well as conceptually a master of the notion of the *divine proportion.*

In this phase of education, the student is qualified to begin serious study of painting, sculpture, and architecture from the vantage-point of exemplary works from such artists as Leonardo da Vinci and the School of Raphael. The student is also prepared to begin mastery of the principles of polyphony of Zarlino, and to prepare to undertake simple exercises in well-tempered polyphonic composition. This point should be reached by approximately thirteen or fourteen years of age; once the principle of the divine proportion is opened up for the student's mind, an entire new universe opens up for the student. At this point, some genuine future geniuses (if not all of them) will begin to be seen clearly emerging.

For students, this will be a wonderful point in the process of education. The task is to reach that point successfully. Few students will succeed in reaching it unless the teachers approach the earlier phases and this phase from the proper standpoint. The teacher must be guided by understanding not only of how geometry must be taught, but also of how it must not be taught.

What the existence of the five unique regular polyhedra proves is: this unique circumstance reveals to us the "mystery" of Euclidean geometry as a whole. This is the comprehension the student must reach; all preceding teaching of geometry must be governed by a rigorously patient determination to aid the student in developing those noise-free powers of insight needed to understand this significance of the five Plantonic solids.

Most of the work needed to inform the teaching of this in primary and secondary grades has already been done by Euclid, Proclus, Cusa, Pacioli, Dürer, Kepler, Gaspard Monge, and Riemann's geometry teacher, Jacob Steiner, with important additions done by and under the direction of Felix Klein. The teacher, at any grade level, who has not assimilated this discipline is not adequately qualified to teach mathematics in the public schools. If the teacher is otherwise qualified, this addition to the teacher's education must be added quickly. (Summer schools and other special teacher-education programs for all grade levels must be provided to remedy the prevailing deficiency presently existing.)

The point at which study of geometry passes over into study of science is the point at which the student is prepared for, and is successful in replicating Luca Pacioli's point: that the five Platonic solids prove that the universe is governed by a principle reflected into the visual field as the principle of the divine proportion: the family of proportionings defined in reference to the golden mean. It is to be stressed, *Kepler's discovery of the harmonic composition of the solar orbits proved that the principle of the divine proportion is the reflection in Euclidean space of an underlying law of composition of cause and effect in the universe.*

This discovery, rightly understood, is the unique demonstration which uncovers the principle of mapping correspondence between the ordering of processes in the real universe and the projection of those processes into the visual field. We could introduce a much stronger argument in this connection, but we omit that at this point to keep the report within the comprehension of a relatively greater range of readers.

To restate and develop the point we have just emphasized again: What Kepler proved, in determining the lawful composition of the solar orbits, is that the solar system as a whole is composed according to the principle of the divine proportion. He proved that the existence of possible intervals of orbits, as knowable in the visual field, is delimited by the principles underlying the uniqueness of the five Platonic solids for Euclidean space. He proved that this ordering of leaps in orbits was determined in exactly the same lawful manner as the twelve-tone octave scale for a twenty-four key domain.

Newton's Lies Against Kepler

Teachers must know this: Newton and others of the empiricist superstition have had fits of rage against Kepler on this point. They have argued, as did Newton, that Kepler's failure to prove the exact quantitative values for elliptical orbits according to the cabalistic methods of Newton was proof that Kepler had only made a "shrewd guess," and had, they argued, therefore proven and discovered nothing at all. The radioed results of the Voyagers' fly-bys of Jupiter and Saturn have given fresh, dramatic demonstration that Newton's mechanics is absurdly wrong for astrophysics. Kepler's method of geometric analysis gives the most exact values for orbits of planets and their moons presently available, with aid of the perfection of Kepler's methods of orbital calculation, first by Karl Gauss, and later through the work of Abel, Legendre, Jacobi, and Riemann's general solution to the problem of elliptical functions. On the Kepler-Newton issue, Voyagers' results are merely icing on the cake; competent scientists long ago knew Newton's mechanistic-numerological method to be absurd, and proved it so during the last period of the seventeenth century and the early eighteenth century.

Newton and his apologists also circulated the lie that Kepler did not know of a lawful principle of earthly gravitation. This is a formal lie, since Kepler's laws determine gravitation and since Kepler himself was explicitly aware of this connection. It is not only a lie, but a piece of rampant stupidity: If I prove the entire solar system to be governed by a law, I have proven the applicability of that law for every aspect of the solar system, as Kepler did.

Archimedes' Spiral: A Vital Qualification

As Leibniz emphasized, in the course of one of his several devastating criticisms of the fallacies of René Descartes' work, to provide a form of conical geometry applicable to the physical universe, we must integrate conics with the spiral of Archimedes. We shall not explain the significance of this fully in this location, since that would take us too deeply into specialized matters beyond the purpose of this report. However, the point is so important for educational programs that we should provide laymen policy-influencers with at least a sense of what this is all about. (The reader for whom this point is ABC will therefore indulge us patiently in this part of our exposition.)

First, the simplest description of the golden mean. Line AB is divided by point C, lying between A and B, such that the length of AB is to the length AC, as the length AC is to the length CB. A better illustration is provided by performing the same division with a rectangle. Side *a* is now the line AB, and is the height of the long side of the rectangle. The base of the rectangle is of the length AC. So, we define the largest of the squares inside the rectangle in our illustrative figure. In the figure we have also constructed a square on the length CB, and a third square on the length (AC − CB). We could next construct a square on the length CB − (AC − CB). Each of these squares would be in golden-mean ratio to one another, in succession. (See box on page 20.)

This same relationship arises as the basis for constructing a regular pentagon to be inscribed inside a circle: as the indirect method for dividing the circumference of a circle geometrically (straight-edge and ruler) into five equal parts. It is in this connection that the golden mean figures at the center of uniqueness of the five Platonic solids, and this relationship between the inscribed polygons which defines the octave scale in terms of progressions by fifths, and the lawful composition of the planetary orbits.

Next, let us consider the spiral of Archimedes as another expression of the golden-mean proportion. Let us consider this in three stages, in order to make the point stressed by Leibniz. We start with the simplest case, the spiral itself.

We have drawn an arrowed line from the center (origin) of the spiral outward. Call this line a *ray*. We have noted the distances along the line between the arms of the spiral, as a, b, c. In this case, $a:b = b:c$, and $(a+b): a = a:b$, and also, $(b+c): b = b:c$. These are golden-mean proportions.

Now, let us imagine the line (the ray) rotating around its origin in the same direction as the rotation of the spiral itself. The distances, a,b,c, will increase in magnitude, but will remain in the same proportions. As the spiral grows, the ray will increase the number of arms it cuts, and so forth and so on.

Next, let us imagine that this spiral is actually the end-view of a coil fitting against the side of a cone, that we are viewing the cone by looking directly at the center of its basis. It is for this reason that we imagine that we are seeing a spiral from that viewpoint, when we are actually seeing one view of a helix inscribed inside a cone. Let us view this helix inside the cone from a side-view of the cone, instead of an end-view.

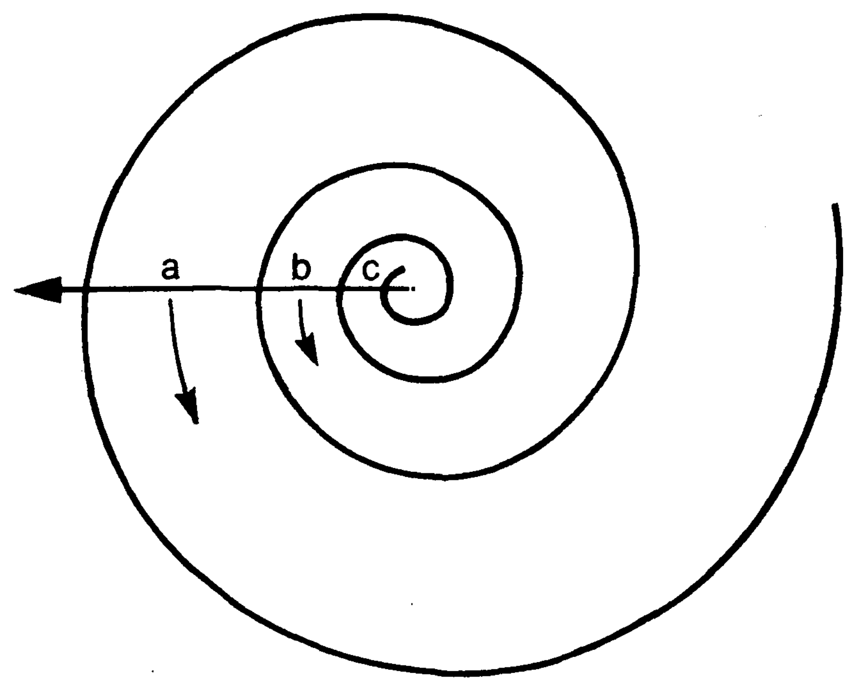
What has become of our ray as we shifted our view from the view of a spiral on a flat surface to a corresponding helix (three-dimensional figure) inscribed in a cone? If we have preserved the golden-mean proportion in the helix, as we had it in the spiral, we have the following alteration. Our ray is now, from a side-view, a member of the same family of such rays as a ray extended from the apex of the cone to the point at which the helix touches the base of the cone. All the distances between cuts of the ray by the coils of the helix must be in the golden-mean proportion. The same is true for a three-quarter view of the cone, and so forth and so on.

This is all quite elementary geometry, but it involves a crucial point which both Descartes and Newton failed to grasp. Does your nearest-available astronomy reference-source indicate any spirals satisfying these requirements in the universe? Is this not a properly obvious generalization of Kepler's laws?

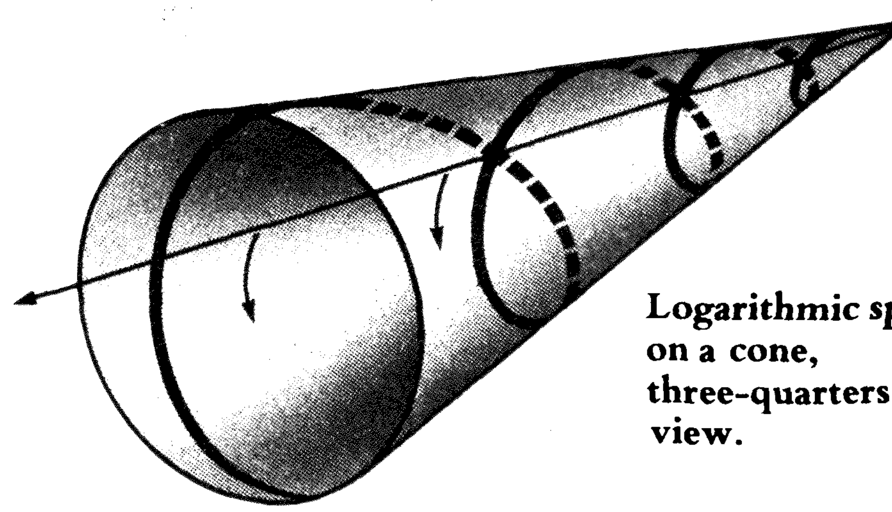
Next, on this matter of the helix, we add one

The Golden Mean and the Spiral

The golden mean is related to the logarithmic spiral. A nested sequence of golden rectangles suggests the shape of the logarithmic, or equiangular, spiral in which the angle the spiral makes with a radius vector is always the same, and the distance between each successive loop of the spiral grows by a constant multiple. If we draw a line from the center (origin) of the spiral outward, the distances along the line between the arms of the spiral will be in the golden mean proportions of a:b=b:c and (a+b):a=a:b and (b+c):b=b:c.

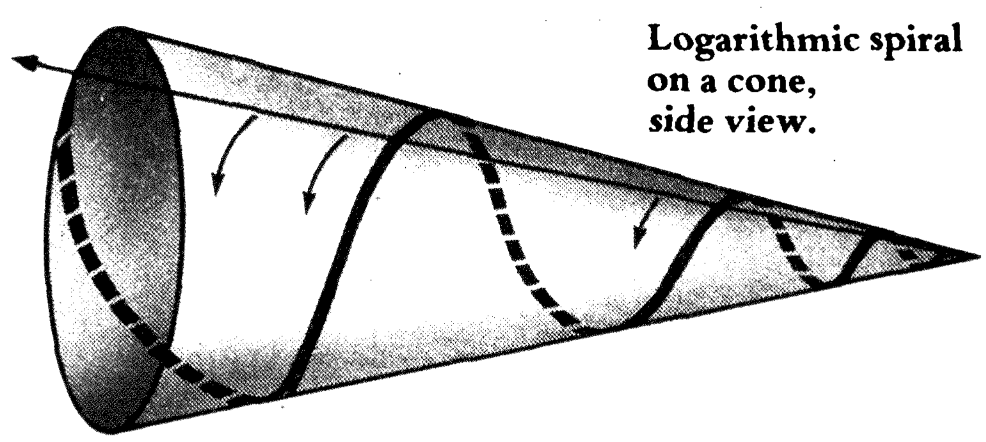


The Mapping Problem



Logarithmic spiral on a cone, three-quarters view.

The universe appears to us in the form of images projected onto the surface of a sphere around us—the points of which correspond to all the various directions in which we can look. Although these images do not directly represent the universe as the negentropic process it really is, the images mapped onto the visible universe share a fundamental property with the universe: namely closure, the universe is a closed continuous whole.

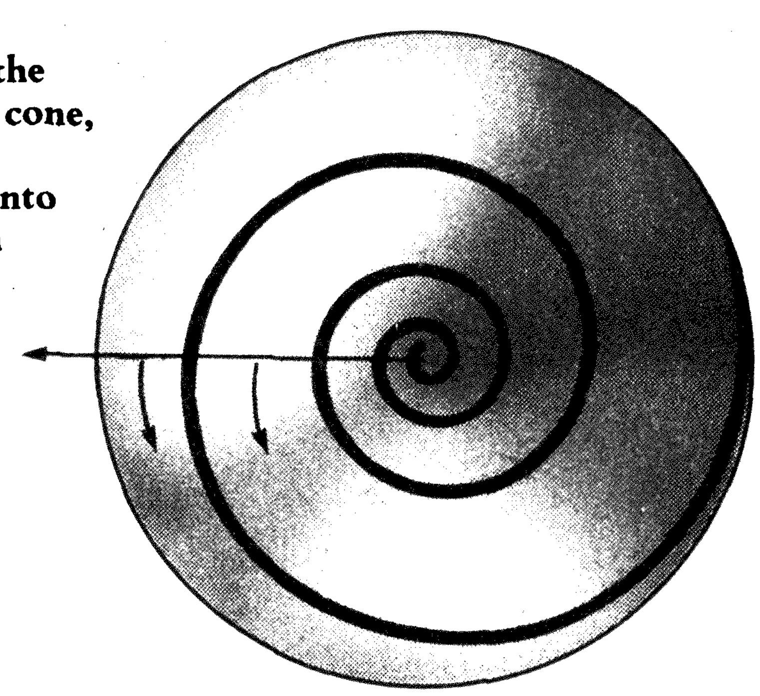


Logarithmic spiral on a cone, side view.

As the simplest metaphor for the projection (mapping) involved, we can reduce the three-dimensional world around us to a two dimensional space, the circle. We then think of a perpendicular cone with this circle as its base as analogous to real physical space; what we see as discrete phenomena on the circle (visual space) is a projection from the apex of continuous processes on the cone.

In conical geometry, the simplest, characteristic curves—the equivalent of straight lines—are logarithmic spirals. These are nothing other than curves of constant inclination or steepness on the cone, and are characterized by their property of self-similarity: the portions of the spiral between the apex and any two points are always scale models of each other. Shown here is a golden mean logarithmic spiral constructed on a cone, preserving the golden mean proportions in its three-dimensional (helix) form.

Seen from the apex of the cone, the helix projected onto the base is a spiral.



final point of emphasis. In both cases, the spiral and the helix inscribed in the cone, the geometrical figure was generated by rotation, not straight-line motion. (In fact, the golden-mean relationship defines a straight line, rather than a straight line defining the golden-mean relationship.)

This means that, after Kepler's discoveries, no form of geometry of visual space can be argued to correspond to the lawful composition of the universe unless the geometry of events in visual space is measurable against golden-mean proportions generated by rotation. In a visual space of relativistic time for ordering of events, the processes expressing the order of time must express displacement in physical space visualized in terms relative to golden-mean-measured proportions of compound rotational and three-dimensional displacement.

This is a key point which Descartes and Newton rejected, although the principle of the case we have just identified was well-documented before and during the seventeenth century. The observation, as we have just illustrated is monstrously elementary, but nearly everything important in science has flowed from such very elementary considerations.

From Kepler to Leibniz

Once the student has reached the vantage-point in Kepler we have just identified generally, the student is ready to make the leap into Leibniz's unique discovery of the *calculus of differences.* Newton's worthless version of the calculus should be completely ignored, along with Cauchy's nonsense.

The teacher must lead the student over the sequence of conceptual developments which lead from Kepler's into Leibniz's mathematics. The student must reexperience that process of discovery. It is for this reason that an honest history of science is so important—rejecting inclusively, the Madison "intuitionist" gibberish and the deliberate hoaxes of Professor Truesdell's "History of the Exact Sciences" project. An accurate historical approach to progress in basic conceptions of science is the reference point for sound curricula and teaching practices.

Although Kepler proved his hypotheses completely, he was acutely concerned with the secondary problems of numerical determination. His emphasis on the need to develop a calculus for elliptical functions is one such point. In this connection, he co-authored the first working ancestor of the modern digital computer—which worked. More important, from his own work he defined the specifications for developing a new branch of mathematics, which we today call the calculus.

Leibniz successfully completed the basic discovery of the calculus of differences (differential calculus) before 1676, eleven years before Newton's *Principia.*

Parpart has unearthed documentation proving that Leibniz's manuscript on the calculus was left with a Paris printer as Leibniz left France. After Leibniz left Paris, the printer claimed to have mislaid the manuscript. There is extant correspondence, between Leibniz and Paris, on this mislaid manuscript from that period, and the mislaid manuscript referenced in those letters did turn up later. Furthermore, Leibniz's unpublished working-papers from the period 1672-1675 show that he was already far more advanced in the calculus than he elected to report in the 1676 manuscript.

Did Newton steal the idea of the calculus from Leibniz's 1676 paper? There is both circumstantial evidence to indicate this likelihood, and there are glaring paradoxes in Newton's *Principia* which could not occur unless Newton had not worked out certain of the paradoxically contrasted conceptions, but had plagiarized at least some of them.

In any case, the fact that Leibniz invented the calculus, and not Newton, is conclusively documented, as the Bernoullis and others knew and published their findings during that period. However, Leibniz's proven priority of discovery is far less interesting than the fact that Newton's calculus is worthless and incompetent, whereas Leibniz's is the foundation of all related categories of subsequent developments. This superiority of Leibniz's work is not accidental. Leibniz did develop the calculus, by the only possible method by which it could be developed, on a basis which Newton violently rejected: Kepler's specifications. This set of facts shows the proper approach for secondary-school mathematics curricula.

We shall merely identify the key fact in this location. As Leibniz documents the history of the calculus of differences, his work in that direction began before he left Germany for Paris. His own preliminary work prepared him to appreciate the significance of the work of triangular series of integers, and of integer-denominators of fractions, of B. Pascal. In Paris, Leibniz worked not only from Pascal's published work, but was given direct access to Pascal's unpublished working-papers. It was by combining the contributions of Pascal on differences generated by triangular series, with the specifications for the calculus given in Leibniz's copies of Kepler's works (heavily marginally annotated in Leibniz's handwriting) that Leibniz invented the calculus of differences, and went beyond Kepler in developing the first modern mechanical calculating machine on the basis of the same principles.

There is a deeper implication to Leibniz's development of the calculus. Leibniz himself had a preliminary insight into the fact that *all numbers, including the integers, are of geometric origin.* He noted the correspondence between integer-series and geometric "nameables" in reviewing the origins of the calculus. However, the fuller implications of this could not begin to be comprehended until the successive later work of Euler, Gauss, Riemann, Weierstrass, and Cantor's 1871-1883 work on transfinite numbers. To discover the deeper implications of the geometric origin of all numbers, including the integers, it was necessary to elaborate Leibniz's *analysis situs* as the *topology* of "continental science," from Leonhard Euler through Riemann, Weierstrass, and Cantor.

It is into elementary topology that the student must move in mathematics once the derivation of Leibniz's calculus from the work of (chiefly) Kepler and Pascal is assimilated.

From Geometry into Topology

Topology (from the vantage-point of Euler and Riemann) is not difficult for adolescents to master, on condition that adequate previous training in geometry has been properly directed into and through the published discoveries of Kepler.

It must be stressed to policy-makers and teachers: The student's mind must not be disoriented and confused by the delusion that the *postulates* of Euclidean geometry are self-evident truths. On this account, the very name of *"axiom"* must be stricken from the geometry curricula and banned from the classroom. Otherwise, the student will seldom be able to comprehend the Thirteenth Book of Euclid and its implications, will be blocked mentally from understanding Kepler's work, and will not be able to grasp the simple "beauty" of elementary topology.

If a mind-damaged student (one conditioned to the formal-axiomatic standpoint) plunges into a topology he or she fails to understand from Kepler's vantage-point, and if that student assimilates what the student believes to be a plausible explanation of topology, that mind-damaged victim of earlier miseducation will be too easily lured into the schizophrenic "ivory tower" world of axiomatic topologies—from which "astral plane" few travelers have ever returned alive and sane.

The work of Felix Klein and his collaborators on teaching geometry in public schools should be a basic resource for policy-makers and teachers today. No student of mathematical physics should be graduated from an undergraduate university program until that student has completed a geometric construction of the nature Klein demanded of Göttingen graduates. Only a student who has fulfilled such conditions successfully is a student which an honorable university will certify as qualified to think clearly respecting scientific matters.

While stressing the work of Felix Klein et al., we must command policy-makers in education, and teachers to master the pedagogy of Gaspard Monge and Jacob Steiner. Only if the teaching of geometry, even in the earliest grades, is informed by the standpoint of Monge and Steiner, can we expect a significant proportion of students ever to understand geometry in a manner which is both sane and rigorous. We shall not repeat Monge's and Steiner's principles of pedagogy here, of course; there must be no substitute provided by which the teacher avoids a properly mandatory requirement to master the originals, or a reasonable translation thereof. There are a few policy-aspects of the matter, however, which we cannot omit from this report, if the continuity of the development we are outlining here is to be correctly understood.

In the teaching of Euclidean geometry, the word "postulate" must never be implied to mean anything but a specification of a corresponding instrument of construction, such as a compass or straight-edge. Equality in elementary geometry is never established by scalar measurement; it is established solely by means of a compass. Similarly, greater-than and lesser-than are determined by means of a compass, and in no other way. A "proof" in elementary geometry is the student's demonstration to himself or herself and the teacher (as well as the student's class-peers) that with such instruments, used in a prescribed manner, this specific result *can be constructed.*

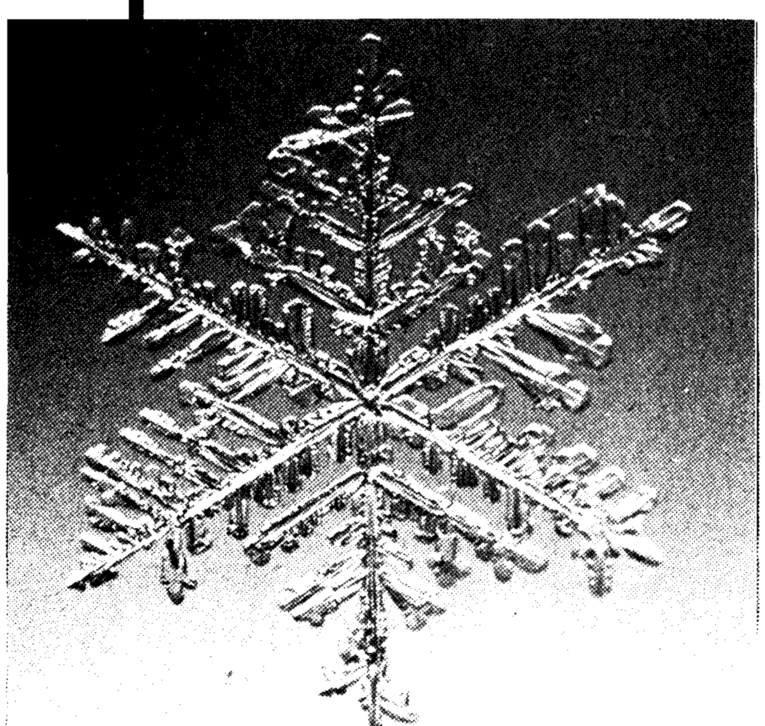
The most important conceptual problems in elementary geometry involve the geometrical correspondence of circles and straight lines. A straight line is constructed by constructing a circle, and then folding the circle in half. The circle is primary in visual space, and the straight line is a derived *nameable.* The compass determines the circle and the circle, by being folded exactly against itself, determines a straight line. If that small matter governs geometry instruction from the beginning, a great mass of superstituous nonsense is avoided among students. Once we have demonstrated the relationship of the circle to its diameter in that fashion, the instruments of compass and straight-edge form the original material basis for *postulates of construction* without attendant superstition.

This precaution prepares the student to comprehend the most fundamental principle of geometry and topology: that the circle is the primary actuality of all geometry, *a perfect geometrical existence created by rotation.* The circle is the key to mastering the conceptions of proportion and establishing the basis for the notion of measurement. The inscribing of polygons within circles is the basic operation of elementary geometry. This prepares the student for a later ready comprehension of complex numbers, with aid of consideration of the cases in which the circumference of a circle (for example) cannot be equally divided into a certain number of simple geometrical constructions. It also prepares the student for mastering all of the fundamental theorems of elementary topology, with emphasis on the work of Leonhard Euler.

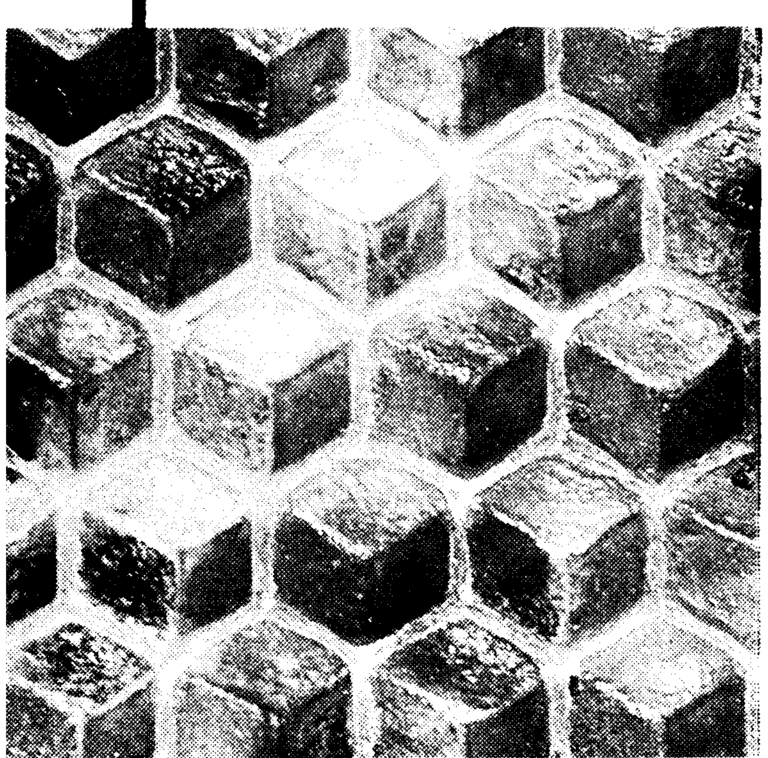
The fallacy, traditionally embedded in modern versions of Euclid's original work, that a straight line is determined by two points, is the simplest case of the sort of mind-damaging pedagogy which must be proscribed from textbooks and classroom

The miseducated student protests: "I make a point here, and a point there. Then, I pick up my straightedge and draw a straight line passing through those two points." Oh, that poor, cheated little tyke! His mental potential for scientific work is perhaps permanently damaged by so obvious a delusion. Does the poor little tyke delude himself he is Almighty God, creating points arbitrarily? How did those two pencil-marks, he terms points, come into existence? What ordered the movements of his arms to make those points? Why should those two points have occurred in those two locations on that piece of paper?

Why should a point lie in a particular region of



Hexagonal symmetry: a snowflake

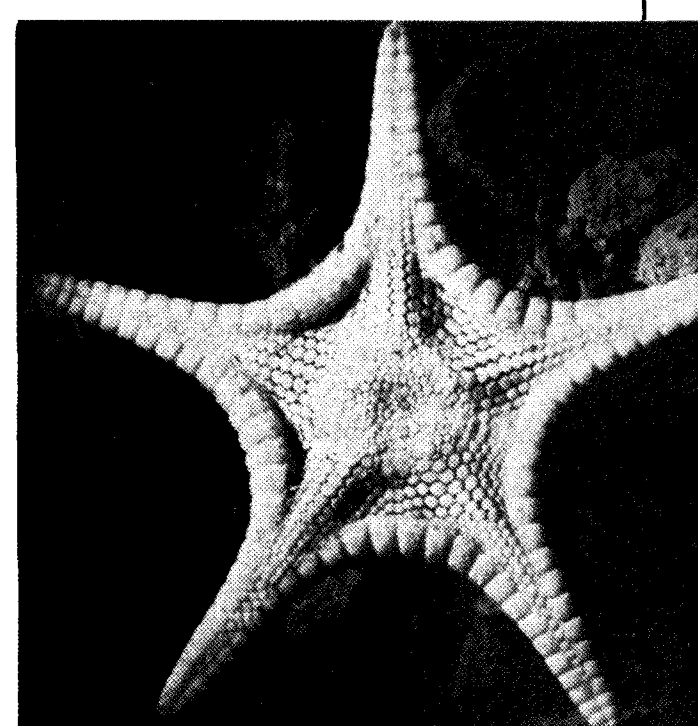


Hexagonal close-packing: a honeycomb

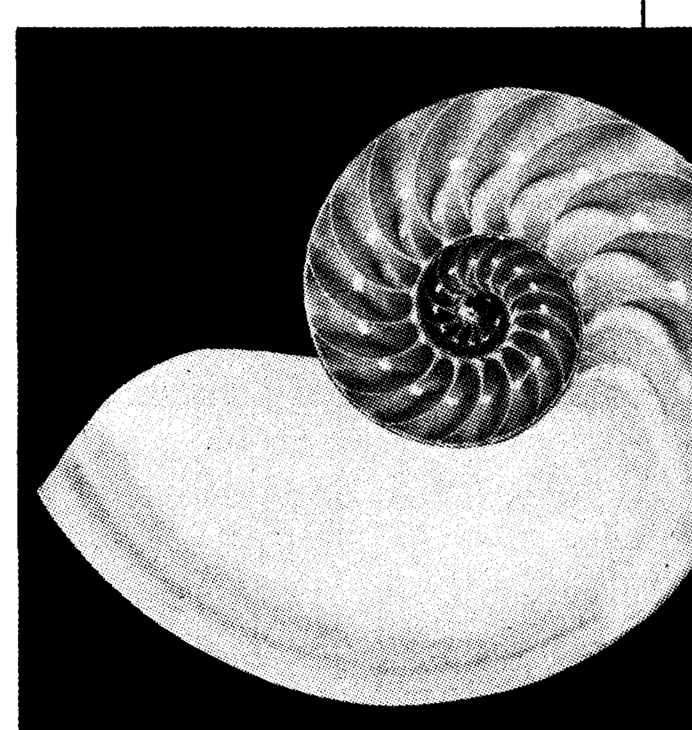
Geometry as the Language of Vision

The historical evolution of the universe is characterized by the succession of three main levels (manifolds) of development: the inorganic, the organic, and human reason. The first two are associated with characteristic symmetry properties. The inorganic domain is governed by the hexagonal symmetry characteristic of the snowflake and of most mineral crystals. The organic domain is characterized by fivefold, pentagonal symmetry as seen in the starfish and the pentadactylism of the human hand.

As Johannes Kepler identified in *The Six-Cornered Snowflake,* the sixfold symmetry of inorganic nature parallels the close-packing of spheres. When a bunch of globes are packed together so as to fill the smallest possible volume, a hexagon structure is formed by the six globes that can ring the central globe.



Pentagonal symmetry: a starfish



The spiral in nature: a nautilus shell

that particular piece of paper? I draw a line, and then another line; the intersection of those two lines is a determined region of ambiguity for both lines, which we call a "point." Otherwise, points have an arbitrary, insane relationship to visual space.

This is no trivial issue. Once the student has assimilated elementary topology, the importance of this becomes clearer. There is, however, a more fundamental issue than the principles of elementary topology at stake in this matter. We return to a matter emphasized earlier.

We stressed from the beginning that the geometry of visual space is essentially a language—the language of vision. The importance of that language depends upon a provable correspondence between the appearance of events in visual space and the composition of the ordering of the universe apart from vision. It is only to the extent that we determine a causal, principled kind of correspondence within visual space, that we have mapped events and processes in visual space with the rigor neeed to employ visual space as the basis for scientific statements which are provably true with respect to the lawful composition of the universe apart from vision.

If we forget this fundamental principle of mathematical physics at any point in the education of students, we tend to destroy the student's potential for scientific achievement.

True, "points," "lines" and "solids" are phenomena of visual space. However, if we proceed from that fact to insist arbitrarily that the mere existences of visual space are the actual existences *in that form* in physical space, we have made an insanely absurd assumption. Points, lines, and solids as they appear in visual space are merely the highly-distorted shadows of the physical reality they reflect. It is upon the proven certainty of that fact of distinction that all competent mathematical physics entirely depends.

The questions of competent mathematical physics are entirely of the form: *How did that phenomenon come into existence?* Hence, Monge's and Steiner's approaches to teaching of geometry reflect the indispensable prerequisites of tolerable educational policies for primary and secondary schools, as well as university education.

Here we are properly obliged to restate, in this new light, the point we made earlier. Kepler's method of solving the determination of the composition of the solar (and lunar) orbits, plus the fact of spiral nebulae, prove that the entire universe is coherently and consistently composed in such a manner that all lawful ordering in physical space occurs as projection of phenomena into visual space, in such a mapping-correspondence that these lawful relations in physical space take the form of proportions *relative to* the golden-mean relationships within visual space.

Therefore, if geometry is to provide, in the way only geometry can provide this, the language of vision indispensable to mathematical physics, we must not permit anything to exist in our analysis of visual space except as its relationship to other things in visual space is rigorously determined. A rigorous determination in geometry is a determination which depends upon no empiricist induction from phenomena treated as "self-evident occurrences." Statistics is not proof. A rigorous determination in geometry always interprets geometry as a whole from the vantage-point of the principle of divine proportions.

A point never has a self-evident existence, but only a determined existence. Two points do not determine a line; the intersection of two lines, or tangency of two closed curves in visual space determines the existence of a point. Lines have no self-evident existence in geometry, either. They come into existence through the intersection of surfaces. Surfaces have no self-evident existence, either; they come into being as the intersection of solids. And, so on and so forth.

That elimination of silly and dangerous delusions provides the student who has mastered Kepler and Leibniz's development of the calculus of differences with the preconditions for mastering elementary topology.

It is often stipulated to students of elementary topology that the fundamental difference between formal topology and physics is that in topology there is no scale of measure, at least as the notion of "measure" is conventionally understood today. On condition that this advice is not taken literally, not made an axiom of topology, that advice has a certain usefulness. It must be stressed that the advice is not strictly true, but only a useful working-assumption for certain limited aspects of classroom work.

The problem of "measure" in geometry (and physics practice) is the false and dangerous belief that the scales of measurement we so often thoughtlessly, overconfidently superimpose upon visual space, are in correspondence with the proportioning of relations in physical space as a whole. Kepler's achievements conclusively prove that that assumption of scalar measure is a dangerous delusion. The universe as a whole (physical space) measures its action relative to what we see reflected as divine proportionings in visual space.

Therefore, it is useful and necessary that the student's initial approach to elementary topology slightly exaggerate the repudiation of the scalar idea of measurement. This must not be continued too far, and must never be made an axiomatic principle of topology in texts or classroom-work. At a more advanced point, the notion of measurement is to be introduced to topology, but from an entirely different standpoint than the scalar delusion.

Among the most important conceptions to provide the student through aid of elementary topology is the notion of counting integers as products of geometry.

For the sake of the policy-influencer who is a layman in these matters, we include here a few essential points of explanation. (The reader who is already familiar with this material as his or her basic knowledge, will we trust be patient for the sake of the other readers.)

How do counting-numbers arise in geometry? The most rudimentary features of topology show us the beginning of the answer.

Points, lines, surfaces, and solids, as they occur in visual space, are not self-evident existences. They do not exist independently of higher-order geometrical existences. They are *boundary-conditions,* or *zones of ambiguity,* ambiguously shared by the higher-order geometrical existences which either intersect at that junction, or as the inner surface or, some order of hyper-surface of a self-bounded domain. The alternate name for such boundary-conditions, or zones of ambiguity is *singularity.*

To emphasize what we have just stated, two successive points of rigor must be underlined.

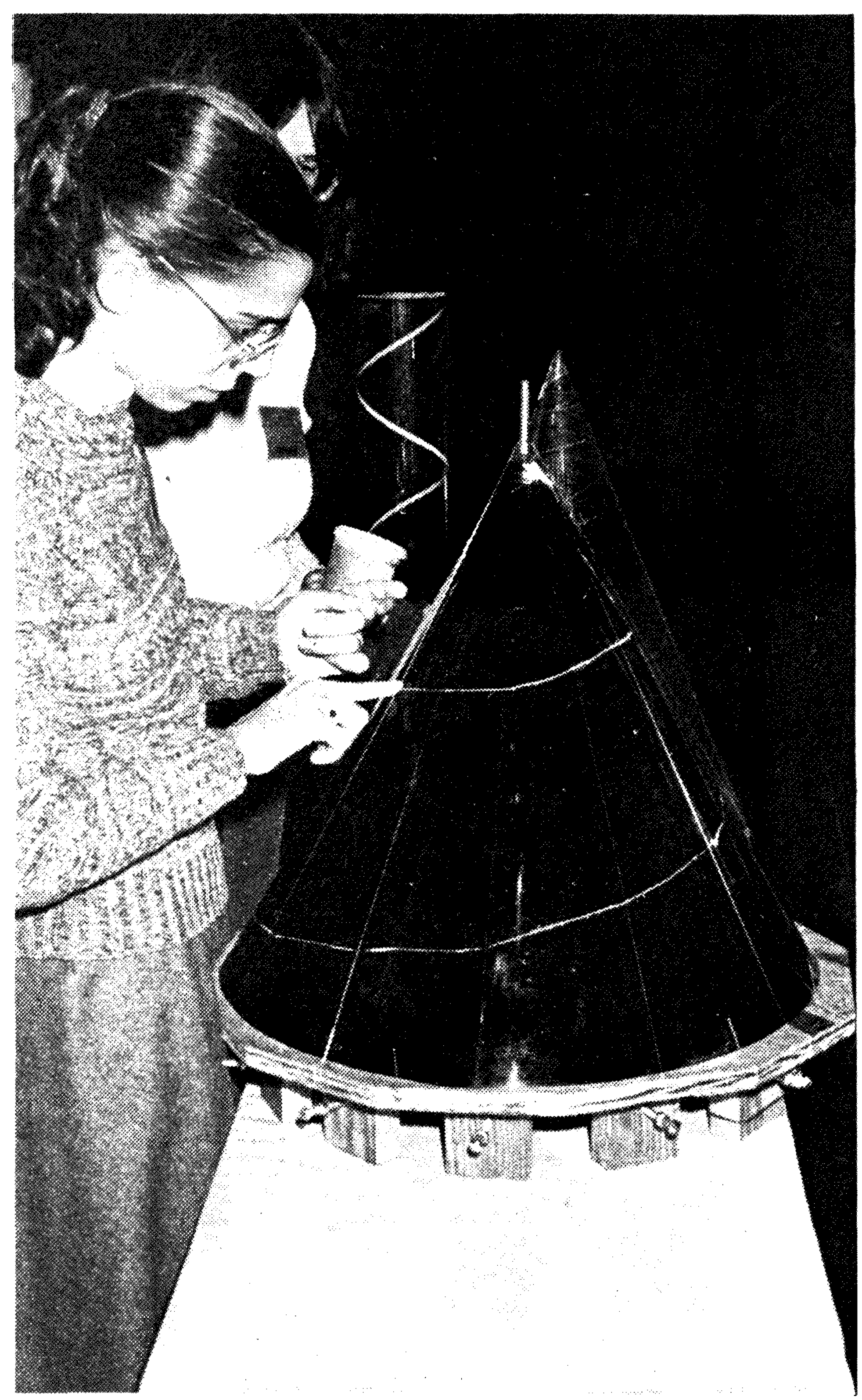
Just as singularities are not independent (self-evident) existences in visual space, so no existence in physical space which can be represented as a singularity in visual space can be an independent existence in physical space. *Otherwise, there could be no correspondence adequate for a mathematical physics between mathematics and physical space.* Everything which can be rigorously mapped as a singularity in visual space must correspond to something in physical space, which latter is an existence dependent upon some relatively higher-order relationship in physical space. To emphasize: to the extent we can competently represent anything from physical space as a point-particle (for example) in visual space, that existence in physical space is not elementary (not primary, not self-evident). Attempting to divide sub-atomic particles into ever-finer components leads only to a finer discrimination of singularities, or to clinical insanity. *The universe is not an assembly of component parts.*

Furthermore, infinitesimal points do not exist, nor do infinitely-thin lines. We ought to know to what institution to refer any person who is prepared to swear to the existence of infinitely small points or infinitely narrow lines. There are no infinitely-thin surfaces, either.

A singularity is a zone of ambiguity, which—contrary to Descartes, Cauchy, et al., cannot be indefinitely subdivided to any physically meaningful end-result. The work of Riemann, Weierstrass, and Cantor, among others, has proven this fact conclusively for mathematics and physics. The area of a point, the thickness of a line, the thickness of a surface, etc., are of some magnitude. This magnitude is not an expression of any ontological properties of the point, line, surface as such, but of the higher-order geometrical functions which define that singularity-junction as a boundary-condition.

No, Katy, there are no little green men from the astral plane under your bed.

Kepler implicitly proved this, by showing that the separation of possible planetary and lunar orbits is determined by principles of lawful composition of space determined relative to the divine proportion. Kepler's successors of "continental science," merely



refined this discovery, carried it further and deeper.

So, on that basis, to the business of the counting-numbers.

Although a point has magnitude, one cannot cut it in half as long as we view that magnitude as corresponding to the existence of the point. We may cut a line in half (with compass and straight-edge), but we cannot cut its *existence as a line* in half. Each singularity, as it is identifiable geometrically-functionally as a singularity in a geometrical construction, has the precise value of the integer-number "1." We count singularities in geometry in terms of integers, and only in terms of integers. Hence, the counting-numbers. Singularities are the form of existence on which the existence of the counting-numbers (beyond "1") is solely premised.

That fact is key to understanding more adequately Leibniz's creation of the calculus of differences.

What are we doing when we specify either integers, or fractional numbers generated by triangular series of integer-functions, for the powers and coefficients of the terms of an algebraic equation? Are we to accept the explicitly Jesuitical doctrine of Augustin Cauchy or the theosophical lunacy of Bertrand Russell or Leopold Kronecker in this matter? Are we to fall into cabalistic mysticism, numerology? Is the process of formal analysis of a simple difference-function valid "because it seems to work" in respect to real transformations of physics-research, or, as Kronecker and Russell somewhat differently argue, because of some primordially magical quality cabalistically peculiar to integers as such?

If the numerical aspects of the calculus of differences have efficient bearing on the geometry of visual space, then geometry and number must have a common origin. This origin cannot be "pure" number as such. However, since numbers arise by necessity from counting the determined singularities of geometry, we are obliged to recognize that the numbers must have a geometric basis, *and only a geometric basis.*

That fact is the "deep secret" behind the power of Leibniz's calculus, and also behind the advanced development of physical topology developed by Bernhard Riemann. The work of Karl Weierstrass and Cantor's 1871-1883 work most emphatically complement Riemann's work in topology with respect to the topological determination of numbers in general. It happens, as Weierstrass and Cantor have successively established the preliminary basis for a fundamental proof of this, that all fundamental numbers in the universe are complex numbers, and it is only from the standpoint of such a view of complex numbers as the only fundamental numbers that we can uncover the deeper implications of the origins of the integers.

This is a "cousin" of the fact, that to compare the radius of a circle with *the fundamental unit of geometric existence,* the circle, we must divide the circumference of the semi-circle (the folded circle) by the number *pi.* It is closed perfect geometric existences (circle, sphere, hyperspheres) which are self-evidently *nameable* geometrical existences. To arrive at a measurement of the properly determined magnitude of a straight line, we require a transcendental number.

For related reasons, the study of elementary topology is the key to demystifying the calculus. Similarly, beginning with the work of Gaspard Monge and Lazare Carnot, the calculus was transformed into the theory of functions, a transformation brought to an intermediate point of completion by the work of Fourier and Legendre. It is principally (at least most extensively) the work of Legendre, accommodating the crucial contribution of Abel, upon which the modern theory of functions was established by Riemann. Riemannian physics is rightly named *physical*

Geometry and the Language of Hearing

Music is the primary overlap between the two subcategories of language, the language of hearing and the language of vision. The same logarithmic spiral principle which dominates the spacing of the planets, the form of sea shells, and of galaxies, also determines the pitches in the well-tempered musical system. If a logarithmic spiral is inscribed in a cone, such that each 360-turn upward on the spiral halves the distance to the apex, then each radial line from the apex of the cone will intersect the spiral in a sequence of points spaced with the constant proportion of 2.

If we think of such a radial line as corresponding to the string on a string instrument, then these points will correspond to octaves of musical tone. If the apex of the cone is connected by radial lines down to twelve equally spaced points on the base circle of the cone, then the corresponding intersection points with the spiral determine a succession of twelve tones in each octave, such that the interval between any two successive tones is always the same and is always a well-tempered semitone.

This principle was demonstrated using the model "conophone" instrument shown here, which was on display at the LaRouche Pedagogical Museum at the December 30-January 3 conference of the International Caucus of Labor Committees in New York City.

topology, a name to be preferred because it points the student's mind to Riemann's work in the way which is most fruitful for understanding and related physics practice.

If the work of Riemann's collaborators and successors is regarded from the standpoint of such a physical topology, a great deal of nonsense-interpretation of mathematical physics is avoided.

Toward the Standpoint Of Physics

Some of the implications of what has been reported thus far cannot be adequately understood except from the standpoint of this writer's own special contribution to scientific method.

What this writer has accomplished in that connection is scarcely original in its essential features; it is already elaborated in the dialogues of Plato, and was the stated or clearly implicit approach of the Platonic and Neoplatonic currents leading into the birth of modern science with Cusa, da Vinci, Pacioli, and the School of Raphael during the Golden Renaissance. What this writer has accomplished, as distinct from his predecessors, is to put the conception of fundamentals of scientific method into a more powerful and efficient form of argument. The included advantage of that innovation is that it permits a simpler and more direct approach to related problems than was previously available.

The writer's special discovery, as so qualified as a discovery, is elementary, but not trivial. It is almost simple, yet all important solutions to fundamental problems of knowledge are really solutions only when they have been simplified to a similar degree. This proof has been given in varying degree of elaboration in a number of published locations, yet the relevance of the proof to matters at hand in this report is so important that we must at least summarize here, again, what we have reported before.

The question of knowledge is posed to individuals and to society in the following elementary fashion.

Every moral person is governed in conscience by the certainty that his or her mortal existence is both ephemeral in duration and a mere speck with respect to the breadth and duration of human existence, and smaller still with respect to the universe as a whole. Therefore, in abhorrence of philosophical anarchism, existentialism, and other forms of irrational cultisms, the moral individual's conscience is dominated by a determination to make his or her life of some consequence for society, beyond the pitiably small scope of a brief existence devoted to stuffing mashed potatoes and ice cream into his or her mortal maw. The individual who is moral is determined to develop his or her mind, and to act on that development, to the purpose of contributing something of enduring benefit to mankind in the greater breadth and duration of human existence as a whole.

This moral commitment is the foundation upon which science is established. The fundamental question of science is the discovery of the lawful composition and purpose (direction) of the universe, to the effect that we, so informed, may govern our actions and self-development of our potentialities accordingly. In this way, and only in this manner, is it possible for any person to say honestly of his or her life: *I do Good.* Only persons so informed can determine what the consequences of their actions will be. Only persons so informed can predetermine whether such predictable consequences will be Good by standards to be tested among generations yet to come.

Yet, although this is irrefutable, as we have summarized it so far, the more firmly and profoundly we address that discovery, the more mankind is terrified by a new question. How is it possible for mankind to determine with certainty, what the lawful composition of the universe is, and to adduce from that discovery the purpose reflected in that lawful ordering?

This is not a religious question, although Philo of Alexandria and the Islamic renaissance's ibn Sina (Avicenna), as well as the Nicene doctrine and the commentaries of St. Augustine, coincide in essentials with the answer to the question. This is a religious question only in the sense that we can associate it with such Neoplatonic varieties of rationalism as fifteenth-century *Christian humanism* (e.g., Cardinal Nicholas of Cusa), or what the Humboldt reforms of education in Prussia associate with *classical humanism.*

There is no difference as to principles of society and science between *classical humanism* and *Christian humanism.* The term "classical" emphasizes the common Judaic (e.g., Philo), Christian (Nicene doctrine), and Islamic (e.g., ibn Sina, *not al-Ghazali*) sharing of the principles of morality and knowledge expressed by Christian humanism.

An acceptable substitute for "classical" would be "ecumenical," in the sense of ecumenical principles typified by such works as the *De Non Aliud* (*The Non-Other*) and the *De Pace Fidei* of Cusa. Insofar as we identify what is common among the participants in that ecumenical heritage, we speak of *natural law,* "classical humanism," and of *natural science,* or *natural philosophy.*

If it is possible for science to adduce the lawful composition of the universe, then we must be able to accomplish with aid of our senses, and without depending upon any evidence which is not demonstrable to our senses. (This is empirical, *but not empricism.*) How can we, then, adduce the consequences of human behavior's results over successive generations, and in respect to the breadth of human existence over those generations? How can we examine this rigorously with aid only of evidence available to our senses?

It is by posing the question of science in that way, and in no different fashion, that we are situated to discover and to prove the lawful composition of the universe as a whole.

We have available to us, most immediately, a fair literary record of approximately 2,500 years of the course of Mediterranean-centered civilization. This is the beginning, in respect to evidence available to mankind's senses, of a data-base. With that body of evidence, we can adduce how the policies of practice of particular generations have affected subsequent generations on a broad scale of consequences.

With aid of the tools of analysis developed through study of this 2,500 span of evidence, we are situated to test provisional conclusions against other evidence. We can take additionally into account archaeological evidence, and whatever bits of literary and other records correlate with archaeological history. Architecture exemplifies the complement, from the language of vision as "spoken" by an ancient people, to the literary records in the language of hearing. In this way, and in other ways, we can test our provisional judgments against all that we know respecting human existence on this planet.

To examine this evidence we must begin more or less as a child begins to master Euclidean geometry. We must begin with simpler kinds of questions we have the means to answer with the proven postulates available to us at the beginning. Once we have tested those postulates, we can develop more refined tools, and proceed to the equivalent in the science of history of the Thirteenth Book of Euclid for geometry.

The basic measure of human existence over successive generations of a society is a datum best named *potential relative population-density.* What density of population can be sustained by its own efforts per average square mile of habitable area? The parameter for this must be potential relative population-density, and not *simple population-density,* or even *relative population-density.* Examining and refining this conception leads rigorously to the fundamental proof of scientific knowledge which we have required.

Every society, at a given instant (generation) is typified by modes of production of goods which we can meaningfully distinguish as representing a distinct *technology.* Such a technology, in turn, defines certain aspects of man-altered nature as "natural resources." Although there is no absolute limit to the extent of necessary natural resources for mankind's existence, to any level of increase of the human population, natural resources are *relatively* limited with respect to any specific, fixed mode of technology.

This limitation of "natural resources" is expressed most essentially as *a limitation of cost.* A society *as a whole* produces the material preconditions for its continued existence *as a whole* by means of the output of the production of goods by its labor force *as a whole.* That *labor force as a whole* must produce the full range of needs for goods of the population as a whole, and at the per-capita level of consumption required to maintain the society at the level of technological culture and social organization required to perpetuate the existing technology. Therefore, if the technology of the society is fixed, and if the amount of effort required for any one need increases, less of the labor-force as a whole is available to meet required production for other needs. If the social cost of exploitation of a necessary "natural resource" rises considerably under such conditions, this implies a consequent downward-spiraling of the per-capita wealth of the society, portending a genocidal collapse of the sort intrinsic to the bestial mandarin cultural tradition of both Old Han China and under the Peking regime today.

Society overcomes such danger of yin-yang collapse by progressing in technology. This progress is measured for history as a reduction in the average social cost of exploitation of natural resources, together with technological changes which expand beneficially the range of kinds of usable natural resources. *If a society does not have an efficient, built-in commitment to technological progress in this sense, that society has demonstrated itself to lack the moral fitness to survive,* like Peking China today.

From the standpoint of thermodynamics, human existence over the millennia to date offers an interesting and provocative insight into underlying features of the process of technological progress. The reproduction of the human species correlates with not only a rising consumption of usable energy per capita, but with an exponential growth in the increase of such consumption. Examining effective progress in technology more closely, we discover that not only does the energy-density per-capita increase, but that the energy-flux density of sources of heat applied to production increases as a correlative of progress. *In thermodynamics' language, the reducing power of society per capita increases in this twofold respect.*

Through this process the potential relative population-density of society is either simply maintained in opposition to depletion of "natural resources," or that potential relative population-density is absolutely increased.

Let us now restate what we have outlined thus far. These forms of progress in the characteristic productive technology of societies express an increase in man's power over nature. When man proves a systematic capacity to increase successively his power over nature, man proves—in terms of evidence available to his senses—that *the process of discovery associated with such progress is a process of increasing agreement between man's knowledge for practice and the lawful ordering of the universe.*

In theological terms appropriate to Philo, Avicenna, and Apostolic Christianity, man's technological progress to the effect we have indicated, proves that the *direction* of man's successive improvements in knowledge for productive practice is bringing man into greater agreement with the driving, lawful principles ordering the unfolding composition of the universe (the *Logos*). In other words, man is acting according to the principle of *imago viva Dei,* in the living image of God, and is directed to a state of *atonement* with the Logos. (The September 1981 Papal Encyclical, *Laborem Exercens,* is properly and fruitfully examined from the standpoint of reference we have just identified.)

This religious view of the matter must be mentioned here, not for the sake of religion, but in order to stress the distinction between our viewpoint and that of hedonistic-materialist dogmas. The end-result and goal of technological progress is the process of developing the human individual personality to a state of greater atonement of conscience and practice with the lawful composition of the universe (Logos), to develop that personality's divine potentialities more perfectly. The process of labor to produce the goods needed for progress in human existence is the necessary *mediation* of the development of the individual personality in society.

If one means by material progress, material progress subservient to self-contained hedonistic goals of individual mortal appetites for animal-like pleasure, then one must abhor and reject such materialism. If one means material progress as man's indispensable progress in mastery of the universe, then everyone but superstitious cultists is a "materialist" in that sense. In the latter sense, the technological advancement of labor in the production of goods is the indispensable means through which man perfects his agreement of conscience and practice with the lawful composition of the universe as a whole, and thus the individual personality of society is advanced in quality as a human individuality.

It is that advancement of the quality of the individual human personality in the breadth of society over generations yet to come which is the scientific definition of Good, the measure of what it is to do Good. In that sense, the principle of scientific progress is morality, such that whoever rejects that principle of practice is an immoral beast, self-degraded toward the ethic of mere beasts.

What we have identified thus far brings us to the verge of those matters bearing upon the teaching of geometry, but we have not so far quite reached the equivalent of the Thirteenth Book of Euclid. We have simply established the groundwork for now attacking the crucial points to be made in this report.

The Content of Science

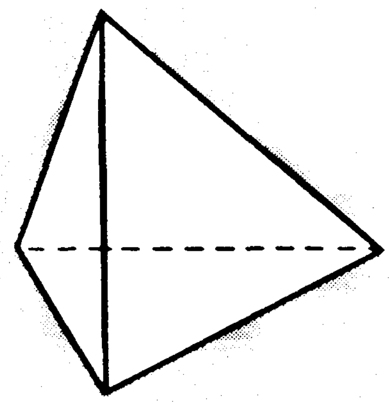
Although scientific progress is empirically proven to be in correspondence with the lawful composition of the universe, the science of any particular moment of mankind's technological progress has no such internal authority. We must distinguish between *science as we know science today,* and a concurrent higher body of knowledge, *scientific progress.* We shall now identify the method by which that distinction is proven to exist, and then we shall be situated to justify Riemannian physical topology as the only reference-point of competent scientific practice today.

The history of science in particular is a history of successive revolutions within science. The algebraic formulations held in awe in the classrooms of today are foredoomed to become the professor's favorite jokes in the classrooms of tomorrow. Yet, insofar as changes in science do represent technological progress, the science of today is superior to the science of yesterday. Yet, once again, the best knowledge of science in particular today is waiting to be discarded tomorrow.

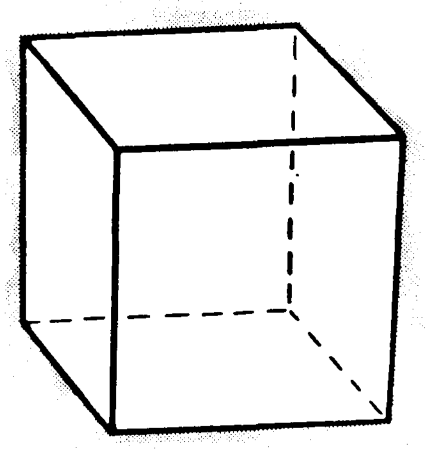
Wherein then, does the authority of science concretely lie?

Let us imagine that we have arranged successive phases of progress in science in their proper sequenced. Let us label the first of these with the subscript n, the next by the subscript $n+1$, the next $n+2$, and so forth and so on. On condition that this sequence corresponds to an actual sequence of discoveries, the sequence permits us to abstract something of the greatest importance. To accomplish this, we require that scientific discovery acting upon the science we labeled with the subscript n led to the development of the science we labeled with the subscript $n+1$.

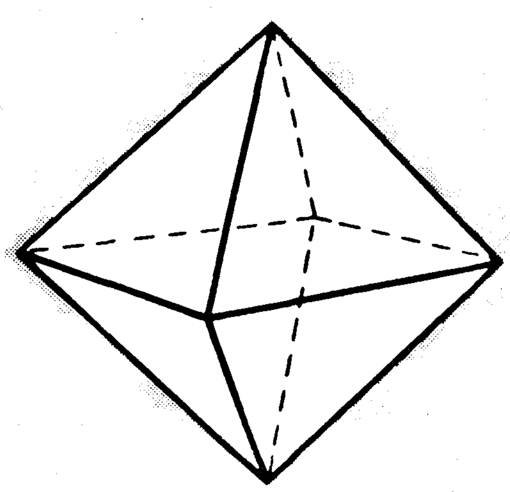
In that case, our next action must be to examine



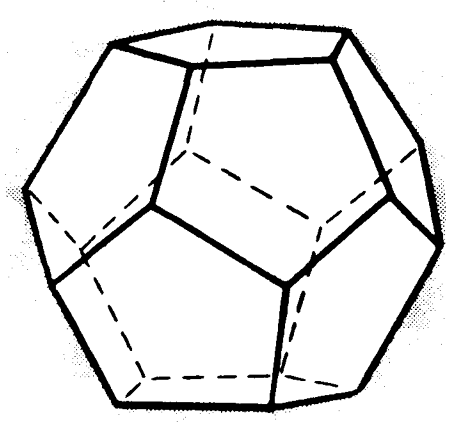
Tetrahedron



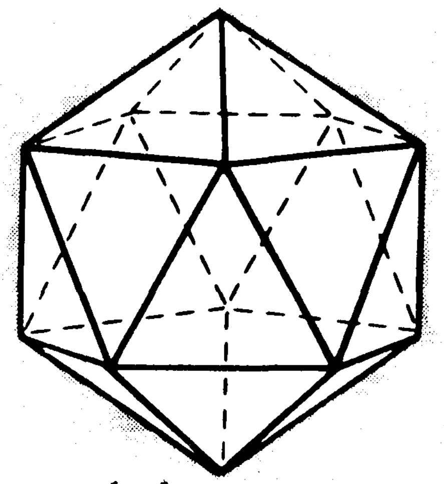
Cube



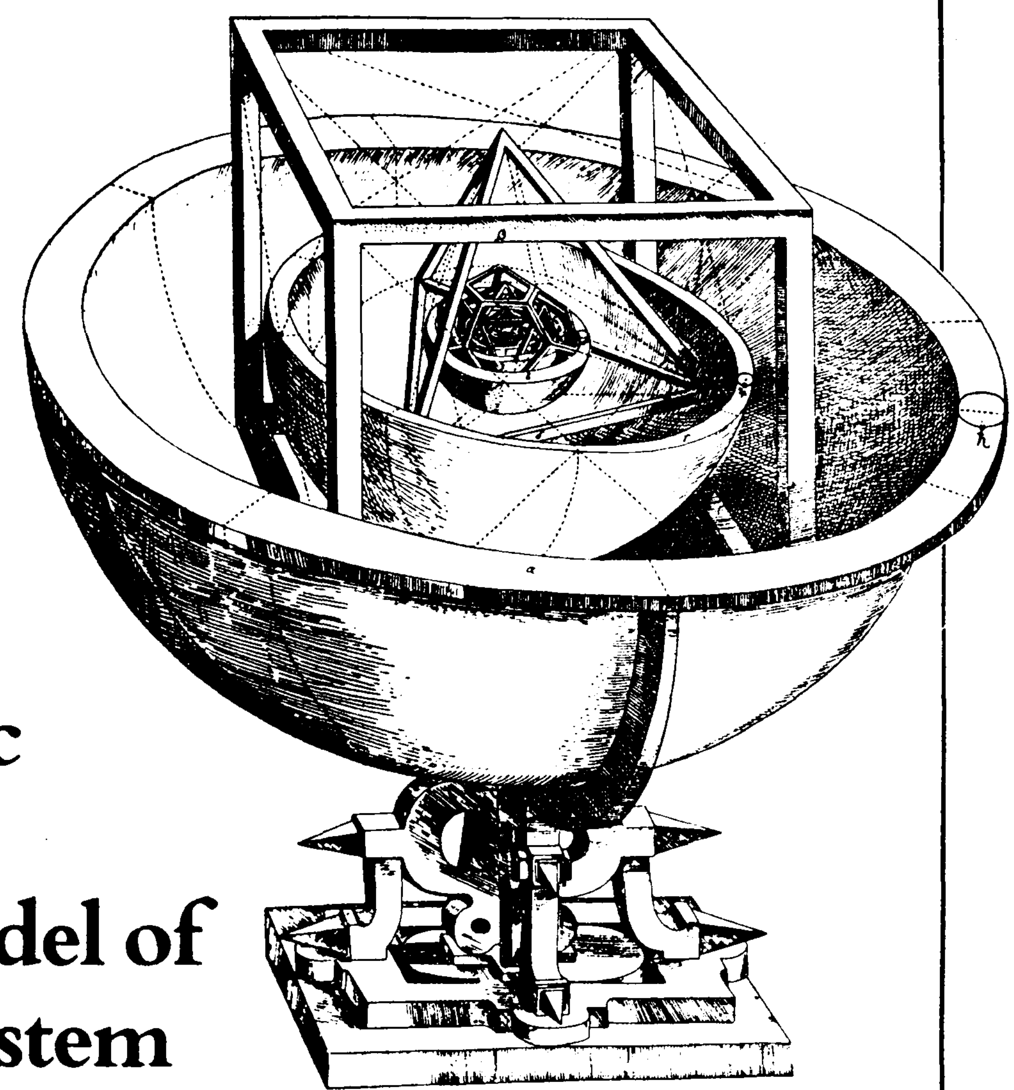
Octahedron



Dodecahedron



Icosahedron



The Platonic Solids and Kepler's Model of the Solar System

Just as the golden mean reflects into visual space a measure of the way the universe accomplishes work, there are also unique features to the structure of visual space that give some clues to the ordering behind it. Of these, the most important were discovered in the 5th century B.C. by the Egyptian priests of Amon, and are known today as the Platonic or regular solids.

There are only five such solids that can be built, meeting these specifications: each face is a regular polygon and the faces meet to form equal solid angles. The five Platonic solids are:

Figure	# of Faces	Composition of Face	# of Edges	# of Vertices
Tetrahedron	4	Triangle	6	4
Cube	6	Square	12	8
Octahedron	8	Triangle	12	6
Dodecahedron	12	Pentagon	30	20
Icosahedron	20	Triangle	30	12

Using a notion of the necessary coherence of visual and physical space, Johannes Kepler (1571-1630) hypothesized a model of the solar system based on an ordering of the Platonic solids inscribed and circumscribed by spheres to establish the distance of the planets from the Sun (see 17th century rendering, above).

Kepler presumed circular orbits—determined by the radius of each sphere—with the Sun at the center, and produced a model with remarkably accurate results. The cube (with 6 faces, 12 edges, and 8 vertices) is the outermost figure, and its "inverse," the octahedron (with 8 faces, 12 edges, and 6 vertices), is closest to the Sun. Similarly, the inverse figures of dodecahedron and icosahedron respectively circumscribe and inscribe the Earth's orbit.

these steps of progress pairwise: (n, n+1), (n+1, n+2), (n+2, n+3), ... In that course of action, we label the transformation *n into n+1* as the *action of discovery* N_1. We label the next transformation N_2, the next N_3, and so forth and so on. Our concern now is to determine whether or not some coherent principle governs the sequence of terms N_1, N_2, N_3, ... It is not necessary that the content of N_1, N_2, and N_3, for example, be exactly the same, but only that there exist some principle F(N), which determines the different contents of N_1, N_2, N_3, . . . If so, that function, F(N), reflects a principle of ordered scientific discovery, a principle of scientific progress.

Such a function, F(N), is elaborated by Plato as the *notion of the hypothesis of the higher hypothesis.* This same principle is properly associated with both the terms "sufficient reason" and "principle of least action" in the development of "continental science" from Leibniz and beyond.

The comparisons we have just outlined are actually performable comparisons. The method for making such comparisons is premised on a distinction between two kinds of hypothesis.

The first, inferior kind of hypothesis is the ordinary sort of hypothesis used for design of experiments. The prevailing assumptions of the preexisting level of scientific development predominate in this case. On the presumption that the universe must be lawfully composed in a manner coherent with such preexisting presumptions.

The second, higher form of hypothesis is of the variety by which preexisting presumptions are challenged and discredited. Some unique experiment is selected to prove that the entirety of some aspect of preexisting general presumptions is wrong, to prove the error of what was previously viewed as an axiomatic principle of either existing science as a whole or some entire aspect of that scientific practice.

It is the consistency among groups of hypotheses of the inferior class which defines each among the members of the series n, n+1, n+2, n+3, ... , N_1, N_2, N_3, . . . represent hypotheses of the higher order. If we view the fundamental contributions of Kepler to mathematical physics as N_1, those advancements, on the basis defined by Kepler, effected by Leibniz's development of the calculus are viewed as N_2, Euler's and Monge's complementary work is viewed as N_3, the work of Monge's and Carnot's Ecole Polytechnique and the complementary work of Karl Gauss as N_4, and the work of Berlin and Göttingen under the patronage of Alexander von Humboldt (including Riemann's contributions) as N_5. we have thus the kind of picture we wish to communicate to the reader here.

The task is to adduce the higher functional notions subsuming such a series of N_1, N_2, N_3, . . . For this we are forced to focus on the notion of the divine proportion, extended from Plato, through Archimedes, Cusa, et al., into the work of Kepler and beyond. The conception of the relationship between visual space and physical space we have summarized earlier, as mediated in terms of relations relative to the golden mean, is the exemplification of the principle of discovery, F(N), we have prescribed.

How to View Mathematical Physics' Issues of Method

To reach the point for physics which we have compared to the Tenth Book of Euclid for geometry, we must linger briefly to summarize several indispensable background-points.

The conception of the universe which is both implicit and implictly proven in Kepler's discoveries, is that *the universe is not composed of a fixed amount of particlelike matter,* but that *the universe composes particlelike matter.* This statement must not be interpreted in a simple-minded, literal sense: the dangerous errors of Spinoza and Schelling ought to warn us on this point, errors which Leibniz traced largely to the wicked (Jesuitical) influence upon the work of René Descartes. We must understand both what we do mean, and what we must not imply, by the report that *the universe composes particles, like notes of polyphonic music.*

The first image of such a conception is provided to the student through aid of the three published texts of Kepler. The solar system was not created by any sort of mechanical action among particles. "First," the predetermined available orbits of the planets were established, "and then" the individual planets and their moons assembled to fit into those available orbits.

Kepler's proof is of greater authority, empirically, today than it was at the beginning of the seventeenth century. The scandal against the explicit and implicit astrophysics of Newton, Cauchy, et al., which has been forced once again into the open by radioed reports from the Voyagers' fly-bys of Saturn, merely illustrates this point. The spiral nebulae stare relentlessly at the consciences of the astronomers. In the very small, the work of Arthur Sommerfeld et al. on quantum spectroscopy during the 1920s, obliges us to reject N. Bohr's physics of the atom in preference for Keplerian physics. Erwin Schrödinger's application of the work of Karl Gauss (in Gauss's applying the work of Kepler to the orbit of Pallas) and of Riemann's physics, gave us what Schrödinger attempted to concretize as the image of the small-particle "wavicle." Between such two sets of proven empirical data, micro- and macro-physics, the modern physicist is properly boxed in, with no honest choice but to accept the standpoint coherent with Kepler's work.

The great problem of the physicist—and the student—in connection with phenomena, such as Kepler's orbits, broadly subsumed under the notion of "quantum of least action," is the *psychological* difficulty of recognizing the ontological distinction between visual and physical space in the same breath of mental exertion, as the notion of the efficient projective correspondence between physical space and visual space rigorously examined. The physicist or student suffering that *psychological difficulty* commits the elementary fallacy of attempting to locate the substantiality of the universe within the delusion of an axiomatically self-contained visual space. It is that psychological pathology which is the root of most of the manifested principal conceptual failures of honest professionals and students. It is to that psychological pathology that we must preeminently address our efforts.

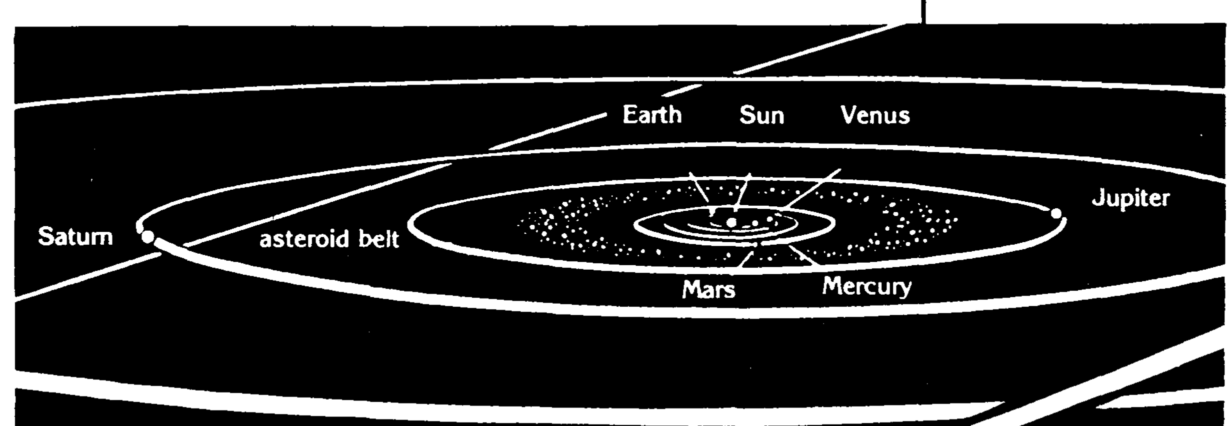
To attack that problem most efficiently, there is no visible alternative to giving an even greater offense to popular prejudice than we have caused already: by reporting that the universe composes particles, rather than the reverse. We must insist, continuing our emphasis upon the implications of potential relative population-density, that *modern physics cannot be competently grasped except from the standpoint of economic science.* With the utterance of that egregious, but entirely provable statement, it rains cats and dogs again on the Princeton and Johns Hopkins campuses.

By "economic science," we do not mean Marxism, or British economic cult-dogmas or their Viennese neopositivist offshoots.

No known version of British or Viennese "economics" is either scientific or economics, as David Goldman and I have conclusively proven this point in our *The Ugly Truth About Milton Friedman.* As Bentham, J.S. Mill, William Jevons, and von Neumann and Morgenstern have demonstrated, among others, British-Viennese "free-market economics" has no relationship to economic science; it is, as Bentham proposes, and as von Neumann and Morgenstern carried Bentham's doctrine to a limit, purely a doctrine of hedonistic sociology. British political-economy axiomatically excludes from systematic consideration either the development of the productive powers of labor, or the relationship between technology and increases in per-capita productivity (and profitability) of economies.

Kepler's Music of the Spheres

In his later work, *Harmonies of the World,* Kepler elaborated his conception of a universal coherence with the notion of the Music of the Spheres. Kepler discovered that the ratio of arc lengths the planets traverse in a fixed time on an imaginary circle around the Sun correspond to the consonant intervals of the diatonic scale. After the early nineteenth century sighting of several asteroids in a belt between Mars and Jupiter, application of Kepler's theory of harmonies showed that the asteroids, though of greatly varying orbits, obeyed the musical ordering principle by fitting into an elliptical pattern that, in relation to the other planets, described what musicians call the Devil's Interval, the diminished fifth.



In fact, British (and Viennese) political-economy first appeared a century after the establishment of a rigorous economic science.

Our reference to the book by Goldman and this writer permits us to limit our remarks on British political-economy to a few points of the most direct bearing upon our argument concerning mathematical physics.

To exclude from this consideration such ancient models as the developmental policies which Alexander the Great adopted from his mentors at the Cyrenaic temple of Amon, modern economic science began in Europe during the first half of the fifteenth century, with the writings of the great Byzantine Neoplatonist and statesman, George Gemisthos Plethon, the teacher of Cosimo de' Medici and that circle. Through the work of Leonardo da Vinci and the influence of the School of Raphael, by the beginning of the seventeenth century, economic science was well established under two rubrics, *mercantilism* and *cameralism.* The former is identified with France and, later, with the American System of political-economy established with the first administration of President George Washington. The latter is directly (chiefly) a product of the Neapolitan continuation of the School of Raphael, associated around the beginning of the seventeenth century with such names as Giordano Bruno and Tommaso Campanella.

England's greatest scientist since Roger Bacon, William Gilbert, is a product of those schools of economic science. (This is the Gilbert who, among other accomplishments, discovered the thermonuclear magnetic plasma in the flame of a candle, and whose method was the chief target of denunciation by the Jesuits' accomplice, Francis Bacon.) Kepler and Galileo Galilei were also part of the Bruno-Campanella networks, and worked in physics from the methodological standpoint of cameralist economic science. Leibniz was a cameralist, first trained in this by the cameralist center at Mainz, and then under C. Huyghens and the circle of the great French mercantilist Jean-Baptiste Colbert.

The point to be emphasized in this report is that Leibniz effected, beginning the 1670s, the revolution in economic science (cameralism) which is directly embodied in U.S. Treasury Secretary Alexander Hamilton's 1791 *Report to the U.S. Congress On The Subject of Manufactures.* It is Leibniz's rigorous construction of the concepts of *work, power,* and *technology* which revolutionized cameralism and mercantilism from within, and which provide the entire basis, after Kepler's work, for all competent modern mathematical physics.

It is by fitting Leibniz's notions of work, power, and technology into the lawful composition of the universe, as that composition was conclusively proven by the work of Kepler, that the psychological problem we have identified here is most directly challenged.

Once we understand economic science in terms of potential relative population-density, we establish thereby the science of the development of the practice of entire societies—not a silly political-economy in the narrow, superstitious form economics is taught in U.S. universities today. In this manner, we free scientific inquiry from the fallacy of composition of isolated particular experiments (which prove nothing in themselves respecting the lawful composition of the universe). We prove, as we have indicated in preceding paragraphs, which approach to the method of discovery of scientific revolutions is congruent with man's increased per-capita power over the universe, and therefore which principles of ordered scientific discovery represent increasing mastery of the lawful composition of the universe.

This insight into the fundamental principles of a competent physics, developed on the basis of economic science, obliges us to interpret geometry (visual space) in light of what is proven to be the principles of ordered successive scientific revolutions. In this way, and in only this way, can mankind learn how to think about visual space in terms of reference which correspond for practice to the actual ordering of physical space.

The crucial result of such a rigorous approach to physics (and to geometry) is that we are obliged to recognize that *substance* in physical space does not occur in the form of self-evident "material particles." Once we rid ourselves of the delusion that singularities as they appear in visual space are self-evidently representations of elementary substance in physical space, we have cleared the mind of the student of that sort of delusionary rubbish which prevents the student from thinking of a space-time continuum as substance, and to think so without superimposing infantile superstitions respecting "ether" or "astral planes" upon the images of visual space.

The proof of what substance (in physical space) is is very simple, as we shall show here. However, the psychological pathologies which block comprehension of so simple, and so conclusive a proof, are very stubborn pathologies.

Sometimes, the kind of substantiality to which we refer is named "the ontologically transfinite," a conception associated in the history of science with (chiefly) the work of Riemann as viewed with aid of the 1871-1883 accomplishments of Georg Cantor.

Before proceeding directly toward that simple demonstration, we must remove from the reader's mind some of the distracting noise we have stirred up with our references to economic science and the name of Giordano Bruno.

Let members of the Roman Catholic confession be at peace. Giordano Bruno was no heretic, and it was not the Christian Church which instigated either Bruno's arrest and trial or his murder by burning. Bruno's murder was prompted entirely by *political motives* of an evil crowd of Jesuits and others, acting with military backing of the Venice-owned Hapsburgs, and on behalf of the pagan cult-gods of the powerful Venetian family funds.

The charge of heresy which the Jesuits publicized against Bruno was based centrally on Bruno's depicting Aristotle as an ass. Theologically, philosophically, Bruno argued nothing that had not been argued emphatically by the leading Roman Catholic canon of the middle fifteenth century, Cardinal Nicholas of Cusa, and nothing different than Tommaso Campanella documented so plainly afterwards. Nor was there anything in Bruno's argument which was not in total concurrence with the Nicene doctrine and the theology of St. Augustine. Theologically, it was the Nicene fathers and St. Augustine, together with Cusa, that the Jesuits murdered by burning Bruno alive in 1600.

The problem for the Vatican then was that, from the Hapsburg sack of Rome in 1527 until Cardinal Mazarin's defeat of the Hapsburgs in 1653, the latter on behalf of the Pope and France alike, the Vatican was at the mercy of the Venetians and the Venetians' Hapsburg puppets. It was the Venetians and Hapsburgs who fomented the Protestant-Catholic schism of the early sixteenth century, and who conducted a Counter-Reformation aimed chiefly at uprooting the fifteenth-century resurgence of Nicene Christianity (from the monstrous gnostic (Aristotelean) heresies of the late thirteenth and fourteenth centuries). The Apollo-Lucifer cultist Aristotle was the Jesuit "saint" of the Counter-Reformational Inquisition, as well as of the Swiss and other among those Protestant sects also controlled by Genoa and Venice. The Vatican was obliged, by political blackmail, to submit to the lying Jesuit argument that to attack Aristotle was to commit heretical sacrilege. This charge was made not for theological, but political reasons—the political reasons, from the Vatican's side, being the threat of Venetian-Hapsburg reprisals against the Papacy and central body of defense of the Apostolic doctrine itself.

The obvious problem respecting Bruno's case for the Vatican today, is that to officially rehabilitate Bruno from the sentence of death imposed by a joint force of Genoese, Protestants, and Jesuits, is a declaration of war against the Jesuits and the Jesuits' front-organizations within the Church itself. Unless the Jesuits force the Vatican on the issue, as with the present Jesuit threat to join the Anglicans in organizing a great gnostic schism, Vatican fears of dividing the body of the confession as a whole are probably a powerful reason for leaving post-mortem justice for Bruno to a higher authority than the Papacy itself.

So, we have the anomalous situation, that the image of Giordano Bruno continued to be a fearful subject, as it was most fearful throughout Europe after 1600, the fear that terrorized Galileo into recanting. The seventeenth century of Europe, barring a courageous outburst of candor by Kepler, avoided identification with Bruno, and instead employed the ideas associated with Bruno under the rubric of the work of Campanella's circle. Hence, the seventeenth and eighteenth centuries' tracing of the cameralistic science from the Campanella-led heirs of the Neapolitan branch of the School of Raphael.

It is not necessary to defend martyrs for the sake of the martyrs themselves. They have securely fulfilled their mortal lives, and need nothing from us to their personal advantage. The only issue of practical importance posed by continued defamation of a martyr is the deprivation and relative degradation, the which such lies impose upon the living. The Vatican does not injure Bruno by delaying post-mortem repudiation of the Jesuits' murder of the great Dominican. The proper concern of the Vatican in this matter and its contingencies is the welfare of the living. *So let the matter rest here in those terms of policy-making reference.*

The first chair of political-economy to exist in Britain was the chair established for the evil genocidalist Thomas Malthus by the British East India Company after the earlier establishment of the American System of politcal-economy by that name in Hamilton's *On The Subject of Manufactures.* Discounting rentier-financier babblings of insane sentimentalities by William Petty and other earlier British scoundrels of that ilk, the first text on political-economy published in Britain was a lying propaganda-tract against the emerging United States of the early 1770s, by David Hume's subordinate in the service of the British East India Company, Adam Smith's apology for genocidal colonialist practices, *Wealth of Nations.*

Every prominent figure of British political-economy, from Smith through John Stuart Mill, was a paid agent of the British East India Company: Smith, Malthus, Bentham, Ricardo, Mill, Jevons, Marshall, et al. Each of the writings of these figures was produced as disinformational propaganda on behalf of the immoral practices of the British East India Company, and written on the basis of ideas dictated to Britain by the ultimate owners of the British East India Company, the family funds of Venice and Genoa, in concert with Venice and Genoa's Geneva and Netherlands subsidiaries.

Smith's lying propaganda-tract was written a century after Leibniz had published his *Society and Economy,* the founding work of all modern economic science. The latter was the work which founded the policies of Hamilton's American System, the work directly and indirectly responsible for the successful industrial development of the United States, Germany, northern Italy under Cavour, France under Monge and Carnot's influence, modern Japan, and nineteenth-century Germany. By the time Malthus occupied the first chair of political-economy to be established in Britain, all of the fundamental work in economic science had been completed on the continent of Europe and in the United States.

British political-economy, and its Viennese offshoots, was and is a lying hoax from the beginning. Its influence has been the direct cause for every important economic depression western civilization has experienced since 1788-1789, and the sole cause for

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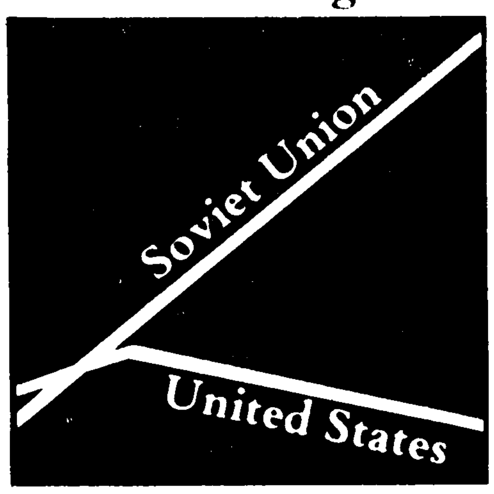

The U.S. Could Still Surpass The Soviets in Science

by Lyndon H. LaRouche, Jr.

On the cover
Artist's rendition of dodecahedron showing golden mean relationships.
Cover design and illustration: Virginia Baier

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every brutality endured by peoples under the rubrics of colonialism and British-modeled imperialism during the nineteenth century, and under the imperial and Commonwealth forms of British imperialism during the twentieth century to date. It was also the cause for two world wars during this century, for Adolf Hitler's being put into power by Schacht, on orders from Switzerland, London, and Manhattan anglophile bankers, and is the direct cause for the threat of a Malthusian, genocidal collapse of all of western civilization *from within* today. Anyone who confuses the refuse taught as "economics" in any U.S. university today with "science" must be several kinds of a poor, credulous fool.

The Venetian-Jesuit influence over Britain and other nations in political-economy is not only paralleled by, but integral to the British-Jesuit efforts to destroy science otherwise. The key to the Jesuit (and British) inquisition against "continental science" is revealed by the character of the Jesuits themselves.

The Jesuit order was created at and on orders of the leading gnostics (family funds) of Venice. The order, intended to become a new form for the political-inelligence service of Venice, was given a religious disguise, and the parallel authority of the Jesuits' "Black Pope" was imposed upon the sixteenth-century Vatican under the aura of Hapsburg military force.

The order, from the beginning, was fanatically anti-Christian. It was, like Venice itself, the product of gnostic cults earlier based in the Justianian patriarchate of the Eastern Orthodox Rite, and thus a pseudo-Christian guise for the Isis and Apollo-Lucifer cults of the pagan Roman imperial pantheon. More exactly, the Venetians created the Jesuit order on the model of the ancient Peripatetics and Stoics, which was the intelligence arm of the Delphi cult of Apollo in ancient times. A blend of Aristotle's formalism and the mystical cabalism of Taoism and Middle Eastern Magi cults was the core ideology of the Jesuit order then, and now.

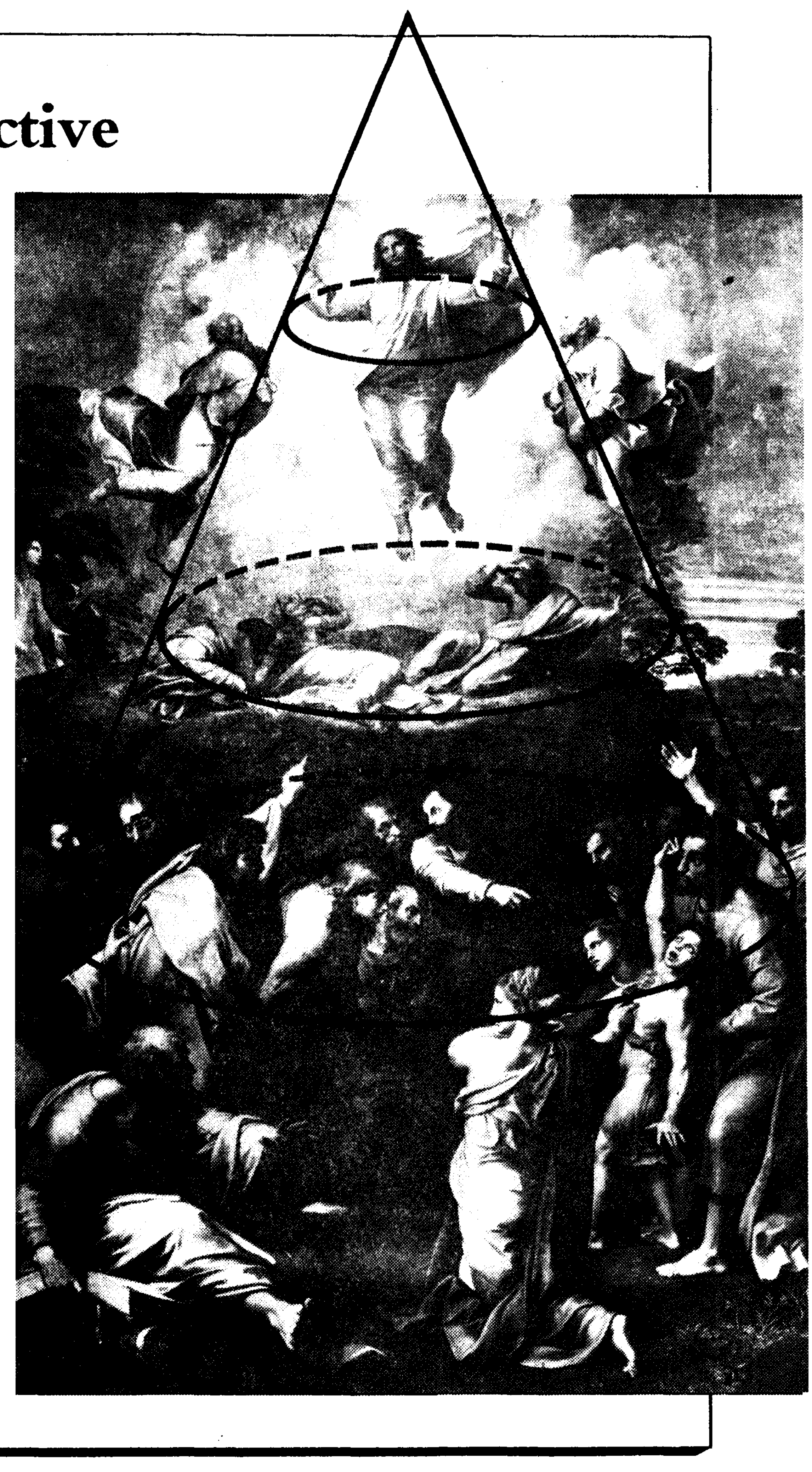
The Jesuits themselves shamelessly insist upon the accuracy of this reported fact, by insisting that the Jesuit method is the "delphic method," known during the fourth century B.C. in Athens as *sophistry* or, alternately, by reference to Aristotle's teachers at Isocrates' school of *rhetoric* (*nominalism*), the opponent of Plato's Academy at Athens.

It must be added, to make the internal political issues within mathematical physics clear empirically, that the Cecils and their family's famous operative, Francis Bacon, were Jesuit agents, as was Lord Acton and his Venetian-trained influence in promoting Lucifer-worshipping theosophical cults (e.g., Blavatsky, Besant, Rudolf Steiner) in Britain and on the continent of Europe during the nineteenth century. The Anglican church hierarchy (the Established, or Episcopal Church of England) and the Jesuits are one and the same force, and have been since the beginning of the seventeenth century in Britain.

What is called *British empiricism,* together with its Viennese neo-positivist partners, is nothing but the poisonous intrusion of the delphic method into the community of scientific work. From that standpoint, and only from that standpoint, can the principal methodological issues of the history of modern science to date be competently identified and analyzed. If one has mastered comprehension of the delphic method, one understands everything essential concerning empiricism, positivism, and the political struggles which have *politically* determined the internal history of modern science to the present date. (Anyone who argues that the issues of scientific method are not primarily and explicitly *political* issues to be treated *politically,* must be a half-educated sort of credulous fellow.)

The exemplification of the Jesuits' direct roles in destroying European science is the interlinked cases

The Geometry of Perspective



In Raphael's *Transfiguration* the art of the Golden Renaissance reaches its highest development in representing the nature of the universe and using the geometry of perspective to educate the morality of the mass of the population. As in Dante's *Divine Comedy,* Raphael shows the universe divided into three domains: the anarchy of the Inferno, the Purgatory of understanding, and the perfection of Heaven. He does so by combining two separate but simultaneous events, the transfiguration of Christ above Mt. Tabor accompanied by Moses and Elijah and the apostles, with the event of the boy afflicted with epilepsy.

The dimensions of the altarpiece are 13′ X 9′, a fair approximation of a golden-section ratio. The internal divisions also approximate such a ratio. The realm of Inferno plus the realm of Purgatory together equal about 8′, whereas the realm of Heaven plus the realm of Purgatory equal about 5′. Hence Purgatory—the top of Mt. Tabor—is an ambiguous realm completing on the one hand the Inferno, and the other hand introducing Heaven.

It is the case that this particular composition is organized geometrically according to the figure of a cone as seen looking down from the apex of the cone to its base. Taking this point of observation corrects for the visual distortions—the small size of Christ and his indeterminate relation in space to the other figures—apparently perceived by the viewer when the painting is viewed simply straight-on, by raising his mind's eye from the foreground to the point of view of Christ. This permits him to explain the outsize of the foreground figures as the natural way images will appear blurred when they are near to the focal plane of the eye.

of Augustin Cauchy's successful destruction of French science and the Jesuit *pogrom* against Georg Cantor. Cantor, a Catholic, appealed for help from explicit Jesuit persecution in a letter to Pope Leo XIII.

Augustin Cauchy was a Jesuit under the control of Abbot Moigno, the latter then based at Rome under the immediate direction of the "Black Pope." Moigno's writings outline in every crucial feature the program for destruction of science which Cauchy carried out to the letter in France, and which Cauchy's Jesuit cothinkers and their accomplices (such as Leopold Kronecker) carried from France into late nineteenth-century Germany.

Essentially, Cauchy was a totally immoral political thug, a thief (as the case of Abel illustrates), and a shameless Jesuit political agent in the internal life of France. Cauchy succeeded in destroying science in France (barring such persecuted later exceptions as Louis Pasteur) not by any mere skill of his own. He had not only the full backing of the Jesuit order in France, as well as Metternich's sector-intelligence service, but direct backing from the Duke of Orleans (the King) and of the British Royal Society and British Secret Intelligence Service. In this report we are less concerned with the powerful forces behind Cauchy's criminal activities than with the internal features of the method he employed to destroy scientific methods of thinking in French mathematics.

The heritage of Leibniz was maintained in eighteenth-century France chiefly by an anti-Jesuit Italian-French Roman Catholic teaching-order known as the Oratorians. Gaspard Monge was the most important teacher of Lazare Carnot during Carnot's education by that order. The mercantilists associated with the Oratorians were Benjamin Franklin's key allies within France, and the influence of the Oratorians in Italy was key to Riemann's work in developing the circle around Betti and Brioschi which produced the scientific and industrial revolution in northern Italy under the auspices of Cavour's republican faction.

In the midst of the British-Jesuit-directed Jacobin Terror, Lazare Carnot moved into command of French military forces, from which vantage-point he destroyed Jacobin power in the famous Ninth Thermidor. In addition to creating modern military science, as emulated by General Gerhart von Scharnhorst for Prussia, Carnot, together with his former teacher, Monge, oganized the world's greatest scientific institution of that period, the Ecole Polytechnique.

It was against this institution and its influences that the Jesuits directly deployed Cauchy.

At that time, the term "polytechnique" was the French synonym for the German use of Leibniz's term *technology. Polytechnique* meant mercantilism, or, synonymously, cameralism. It was to effect the forced-draft technological transformation of the economy of France, that the Ecole Polytechnique was directed. The effort succeeded brilliantly, establishing as a byproduct such sciences as thermodynamics and the modern theory of physical functions. The work of Fourier and Louis Legendre epitomizes the establishment of the theory of functions.

At the 1815 Treaty of Vienna, the Venetian-appointed, Venetian-citizen foreign minister of the Russian Czar, Capodistria, dictated the terms of that treaty, exiling leading architects of the Prussian defeat of Napoleon from political life in Germany, and directly Lazare Carnot's exile from France into Madgeburg, Germany.

However, Carnot did not remain within Madgeburg. He spent more of the remaining years of his life at Berlin, collaborating with Alexander von Humboldt to bring the Ecole Polytechnique, "lock, stock, and barrel," into Prussian refuge. It was this movement of French science from persecution in France, into refuge in Prussia, which established the decisive margin of worldwide supremacy of German science into and past World War I.

Immediately, science was also under attack within Germany. During the period 1815-1830, the Jesuits' principal agent against Alexander von Humboldt at the University of Berlin was G. W. F. Hegel. Hegel was a Jesuit-controlled proto-theosophist from the region of present-day Baden-Württemberg, classed by Prussian archives as a "Metternich agent." It is relevant that the chief feature of Hegel's *The Phenomenology of Mind* is his revival of the most crucial of the Jesuit fallacies of René Descartes, those earlier exposed by Leibniz. This should be considered together with Hegel's wittingly fraudulent representation of the history of philosophy and political history.

Much can be better understood about the desruction of German science and culture from within by examining the Jesuit-theosophist nest in Baden-Würtemberg and allied forces within Switzerland. Geneva was a Venice-Genoa colony from the time of Charles the Bold of Burgundy. At the close of the Napoleonic wars, the Venetian, Capodistria, while then foreign minister of Russia, dictated the present constitution of Switzerland. Switzerland's freedom from the ravages of two world wars in Europe is no accident. Switzerland is the "piggy bank" for those Venetian circles which organize world wars.

The universities at Freiburg and Tübingen have a long, and very dirty history in connection with most of the evils Germany has suffered over more than a century to date, including Max Weber's influence and the process of bringing down the constitutional government of Weimer Germany, and liberals' activities in bringing both the Brüning and Hitler dictatorships into power. To understand the evil conduited through German theosophy and through Jesuit and Swiss channels into German life, one must understand such matters as the truth about the Lucifer-worshipping pagan Rudolf Steiner, the protégé of the Hitler-loving Astor family of Manhattan and Britain. One must look into Switzerland to learn how this continuing corruption operates. To trace out adequately continuing efforts to defame and destroy science today, one must be alert to the existence of new swindlers among the Swiss cronies of Johns Hopkins Professor C. Truesdell.

By the middle of the 1850s, the Cauchyites, typified later by the Jesuit accomplice Leopold Kronecker, were working to destroy science at Berlin's Humboldt University. By the middle of the 1860s—not overlooking the counteroffensive for science led later by Felix Klein—Göttingen University was no longer a safe refuge for science. As Cantor and other documentation from that period note, the Jesuits allied to the cause of Cauchy, were destroying Germany's science, with much help in this from Britain.

Bertrand Russell's trip to Göttingen, on behalf of British secret intelligence's Apostles cult, is exemplary of the attempts to destroy German science during the 1890s, during the 1920s (e.g., the Solvay conference's hooliganism), and again during the postwar period. Russell, directed by Alfred North Whitehead at that time, attacked three figures of German science most viciously and most fraudulently: Bernhard Riemann, Georg Cantor, and Felix Klein.

The Viennese cultists' Ernst Mach's, dirty *pogrom* against Max Planck early during this century, is part of the same pattern.

This is the political background to competent understanding of the issues of modern physics. Anyone who protests against a *strictly political* analysis of the methodological issues between the algebraicists and geometrists is either singularly uninformed of the history of science, or, if he is one from such circles as the cronies of Professor C. Truesdell, outrightly a shameless liar. Truesdell and his ilk may fool many scientists with their published attacks on the scientific work of the author's immediate collaborators, but this writer and his collaborators are not deceived at all. We know "where the body is buried," and we have now collected crates-full of documentary evidence from primary sources to prove our case.

Truesdell and his like are not persons possessed of "sincere differences" with this writer's views as presented here; they are wittingly nothing but *political thugs* dressed out in the trappings of the ivory tower. Creatures of such ilk should be viewed and treated accordingly; too much blood of great scientists has been spilled in the inquisition conducted over centuries by Truesdell and his cothinkers of the Anglo-Jesuit cabal. *This is a political issue, pure and simple,* as it has been continuously since the heyday of that miserable creature Aristotle.

Substance and Geometry: Leibniz

Leibniz's physics flows both from his continuation of Kepler's thrusts and his own discoveries in economic science. The concepts of *work, power,* and *technology,* which we have already identified in this connection, are key.

Although Leibniz's predecessors in economic science had defined, up to a certain limit, the role of the machine, Leibniz revolutionized this conception in a manner of crucial importance for the subject of this report. The circles of Campanella had already defined several things of presently-continuing validity for economic science. Leibniz introduced to this the added conception of the theory of *the heat-powered machine.*

The circles of Campanella, echoing Plethon's economic policy-outlines nearly two centuries earlier, insisted that the wealth of a nation must not be attributed to such mere accidents of geography as "raw materials." The wealth of nations comes, they rightly insisted, from the development of the productive powers of the people as a whole. Key to development of such powers, they rightly insisted, is the pefection of "artificial labor," what we term today generically "the machine." This is the conception of "artificial labor" appearing in Hamliton's *On The Subject of Manufactures.* As we have indicated, Hamilton employs not the original Neapolitan interpretation of "artificial labor," but the transformed interpretation discovered by Leibniz.

Although Leibniz's development of the conception of work was prompted in part by his collaboration with Huyghens and Papin in developing the first successful steam engine, Leibniz's genius in the matter was to view this application as exemplifying a far more general principle. The development of heat-sources of power for the development of machines must enable "one man to do the work of a hundred." This, he envisaged as a general principle of production for the ensuing period of society.

The man laboring without the heat-powered machine, must be compared with the man using either his own muscle-labor or animal muscle-power. The comparison of the two modes of production for the same result implies the root-conception of *work,* or *productive power of labor.* The ratio of two kinds of work implies the root-conception of *power.* The ordering of development of modes of production in a progressive series leading into and through progressive development of heat-powered machines is the root-conception of *technology,* or, in its eighteenth-century French synonym, *polytechnique.*

It is by situating these considerations of economic science in the context of our preceding summary of the implications of potential relative population-density, that a rigorous basis for mathematical physics is developed through a rigorous, coordinated development of geometry. It is from that vantage-point, and no other alternative, that mankind is presently qualified to judge what is the lawful composition of the universe, and to judge what is substance, and what are simply determined ephemeralities among the processes displayed to human perception through the projective medium of visual space.

The rigorous definition of the conception *work* must be developed from the standpoint of potential relative population-density. Only that output of human effort and ingenuity which effects positive change in the potential relative population-density of entire cultures correlates with a rigorously defined notion of *work.* Work which effects positively the potential relative population-density of entire societies is the only admissible definition of *actual work,* or, if you prefer *net work.*

Only such actual work represents a change in the ordering of human practice consistent with the lawful composition of the universe. That is the crucial, decisive, and simple pivotal conception upon which the proper authority of empirical science entirely depends. *Only actions corresponding to such a definition of actual work are empirically congruent as sense-phenomena with the lawful composition of the universe, with the principles which must inform scientific thinking.*

To reach the needed definitions, we must consider those activities in society which have the form of work, but which do not aggregate to positive effects on the characteristic potential relative population-density of the society being considered. Such forms of work are like the extensive molecular and other activity occurring within a three-legged stool standing quietly in the corner of a room. It is useful to acknowledge the work-likeness of such activity by the conventional term, *virtual work.*

We must prepare to measure the two kinds of work *quantitatively,* but to do so rigorously, we must establish *qualitative* reference-distinctions between the two.

Activity which is merely a perpetuation of a fixed mode of productive technology on the same scale as during a preceding epoch of production is *intrinsically* virtual work in *quality.* Activity which involves any advancement in the average per-capita productive powers of an entire society is intrinsically actual, or net work *in the quality of the process by which it is realized.*

It must be stressed that the two qualitative definitions are not completely symmetrical. In the first case, it is the quality of the work-activity itself which is primary. In the second case, it is the *process* of transforming the average productivity (per capita) of the entire society which is primary. The difference is analogous (in reverse order) to the difference between the primary geometrical reality, the circle, and the lower-order, derived, or "degenerate" form of the circle, the straight-line diameter. The two conceptions are functionally interrelated but qualitatively distinct.

Illustration is helpful, and perhaps indispensable at this juncture.

Let us imagine a typical case, in which the mode of production in one part of an economy is characterized by relatively more backward methods and machines than in the advanced core of the economy. We can add, and should, the least-productive form of labor to this: unemployed or wastefully employed portions of the labor-force.

Let us presume that the economy grows both in scale and per-capita productivity by no other means than replacement of backward methods and unemployment with heat-powered technologies already established in use in the relatively more-advanced kernel of the whole economy. Naturally, this can not continue indefinitely. Unless there is qualitative progress in technology, beyond the most advanced modes previously in use, the society's progress will dry out, and the cruel logic of relatively-marginal costs of natural resources, defined by a fixed level of advancement of technology, will push the economy as a whole into retrogression and toward collapse.

The illustration suffices to premise the key point to be made here. The development of an economy is a twofold process. Simultaneously, the relatively most-advanced technologies previously in use must supplant relatively more backward technologies and absorb increasing portions of the unemployed and misemployed, while, concurrently, new technologies more advanced than any previously in use are added to the repertoire of extended development of the society as a whole. It is such a process, such a twofold process, which defines the way in which actual societies combat ecological retrogression and go further than merely that, to increase the potential relative population-density of society.

Implicitly, and fundamentally, the transformations in division of labor, in development of heat-sources of high energy-flux density, and in the structure of productive capital-goods and transportation-modes, are all subject to topological interpretation.

To explain to the layman: we can, and properly do, compare different structured processes in terms of their relative heights of organization as processes. This is somewhat analogous to increasing the number of dimensions of a geometry of visual space. In this way, we can say meaningfully, that if an existing state of development of the economy represents a number of degrees of complexity we may arbitrarily denote by the symbol n, that technological progress has the significance of progress to an economy of a higher degree of such organization, denotable symbolically as of order $n+m$.

From this vantage-point, all actual, or net work accomplished by an economy is of the content of a transformation from n to $n+m$.

Granted, not all increases in complexity result in positive contributions to potential relative population-density. *Covering the world with computers, while contracting basic industry, means a genocidal disaster for mankind. It is only those increases in complexity which correlate with advances in potential relative population-density which correspond to the lawful composition of the universe.*

In this very specific sense, those geometrical transformations, of the form $F((n+m)/n)$, which correlate with positive contributions to potential relative population-density, are geometrical transformations which reflect the lawful composition of the universe.

Such geometrical transformations we term *negentropic.* That notion of negentropoy, premised in this manner upon the crucial evidence of economic science, is the foundation of a competently ordered mathematical physics.

Such a conception of negentropy is congruent with the possibility of continued existence of the universe, and therefore reflects the fundamental ordering-principle of the universe. Any contrary view is necessarily false, for reasons clearly implicit in what we have stated leading into this point.

For reasons noted and emphasized by Kepler, all processes which are negentropically ordered, including the processes of life, are geometrically in correspondence with the principle of the divine proportion. The spiral nebulae and the composition of the solar system nod in agreement. This is the principle at the center of Bernhard Riemann's 1854 habilitation dissertation, *On The Hypotheses Which Underlie Geometry.* The entirety of Riemann's work in mathematical physics hangs upon and is determined from that vantage-point, as do related notions of the transfinite, elaborated from Weierstrass's approach to mastery of trigonometric series, by Georg Cantor during his work of the 1871-1883 period. This is the view of physics which Leopold Kronecker, his accomplices Richard Dedekind, that filthy swine, Bertrand Russell, and the crew around C. Truesdell's *History of the Exact Sciences* swindle, have tried to destroy and supress with their lying thuggery.

It should be registered here, that all of this writer's principal contributions to modern thought have flown chiefly from an early-adolescent study of some key writings of Leibniz, and a 1952 conversion of Riemann's point of view facilitated by study of the work of Georg Cantor.

This brings us to the matter of *substance.*

Substance, as we have repeatedly emphasized that point through this report so far, does not exist within the field of visual space, but within the physical space which is projected into visual space. This, we stress again, is the crucial point of rigor which must be mastered to overcome the deadly psychological pathology spoiling scientific work today.

To bring the images of visual space into congruence with the realities of physical space, it is indispensable that the empirical materials of visual space be interpreted *not as relationships among objects,* but as *processes* through which objects are composed and destroyed. Since those objects in visual space which appear to be indivisible objects are merely singularities of the process of composition of visual space, it is only in terms of the process-relationships of visual space that projective congruence with physical space is located.

Again, Kepler's solution to the lawful composition of the solar system, Sommerfeld's work of the 1920s, Planck's quantum of least action, and so forth, all warn us that this must be so. If physical space is functionally defined for the visual field in terms of proportions pivoted on the divine proportion, then the notion of action of objects across a prioristic visual space is clearly an absurdity. Only a geometric interpretation of processes, an interpretation itself referenced to the implications and ground of the notion of the divine proportion, can be a competent visual-space representation of processes in physical space.

From this vantage-point, we are obliged to locate the substantiality of physical space not in objects, but in the lawful principle of composition governing reality empirically accessible through visual space: *through a "geometrical" conception of negentropy.*

The law of the universe is statable: *That which is not negentropic must die.* This includes any society so morally unfit to exist that it adopts a Malthusian or British political-economic policy of practice.

In other words, *substance in physical space is primarily transfinite,* in the sense we have just outlined.

Depreciating Egypt's Pyramids

Before turning to the concluding points of this report, we should clear away another among the cats and dogs we have stirred up. How do we evaluate *virtual work?* The sphinxlike answer to that question is: What is the current depreciation-allowance on an Egyptian pyramid?

If we compare the social cost of constructing the pyramids then, with the social cost of constructing and maintaining such pyramids with modern technology, the direction of the required answer is clear enough. The cost of maintaining an old technology is not determined by the historical-accounting costs of the original technology. It is the cost determined in respect to the present level of technology.

The productive power of a nation, correlated with its potential relative population-density, is embodied implicitly in the goods produced by its industry and agriculture. Every other activity is of positive economic value only as such other activity contributes in some necessary fashion to maintaining and improving the productivity of the goods-producing laborforce of that nation as a whole. So, all costs of society are paid out of current actual work. However, some of that actual work is sucked away to maintain old technologies still necessary to the society. This cost is not a cost of virtual work as an activity, but a current cost consumed "entropically" by virtual work.

The most important function in economic science is therefore associated with the ratio of net work to virtual work.

Functions associated with positive values for increase in that ratio are negentropic functions, which correlate with the corresponding geometric function, $F((n+m)/n)$. The first function is implicitly reducable to the second, although such implicit analysis is not yet a practicable undertaking in current economies. However, when we measure quantitative relationships of input-output in terms of the ratios of net work to virtual work, we must know and keep in mind that what we are implicitly measuring is $F((n+m)/n)$.

The function so described is a function of technological progress, which subsumes increasing energy-throughput per capita and directedness for increase in energy-flux-density of heat-sources developed to power society.

Similarly, the potential rate of economic growth of a nation, such as the United States or Soviet Union today, is the rate of realized scientific progress in production of goods by industry and agriculture.

The rest of the economics aspect of the matter can be relegated to publications dealing explicitly and chiefly with economic science.

The powerful relevance of this point we have just outlined is its effect on the popularized delusion that energy can be measured in such scalar units as calories or watts. Granted, we employ such measures without damage to the economy for many crude and useful purposes, such as the billing-practices of public utilities. The point is, that we must not assume from such utility that the universe is operated by the accounting department of a gigantic public utility.

Everything which is of crucial bearing on the organization of the universe, including the composition of the solar system and spiral nebulae, demonstrates conclusively that the universe is composed negentropically. Therefore, if we find ourselves encumbered by a curious physics-doctrine, whose algebraic organization demands a dogma that the universe is organized *entropically,* we must assume that some Luciferian sort of fox has been visiting our scientific hen-yard by night. Who has been stealing our chickens? Who dragged the entropy cult-doctrine in from the Delpi temple of Apollo-Lucifer. In what fashion has Aristotle-the-poisoner sabotaged our science?

Albert Einstein helps us in locating the chicken-thief. What poisoned Einstein's noble efforts? The fatal paradox of Einstein's effort is the assumption that the Pythagorean tiles of Hermann Weyl's scheme are measured both by a constant speed of light *and a scalar measure of energy.* Now, in Einstein's scientific hen-coop, we have located the spoor of our chicken-thieving, Ptolemaic accountant.

Insofar as we attack fundamental questions in science, we must reject the insistence of Helmholtz, Kelvin, and others to drag into physics that Luciferian relic, Aristotle's fiction of *energeia.* It were sounder to eliminate such notions of "energy" altogether, at least to rid mathematical physics of the delusion that the universe is characterized by an actually or implicitly fixed quantity of such scalar magnitudes of "energy." Return to fundamentals: restate these matters exclusively from Leibniz's standpoint in respect to notions of work and power.

What we must do, is to define all processes in the universe negentropically. This must correlate in visual space with the reference-principle of the divine proportion. Then, and only then, we begin to put things in the right light for solving problems which presently appear more or less insoluble.

Constituting the Curriculum

It is useful, and perhaps indispensable, to emphasize once again Wilhelm von Humboldt's educational policy. The fundamental and properly governing purpose of primary and secondary public education is not—we repeat, *is not*—to prepare the student in "some relevant fashion" for the student's probable adult occupation. The primary purpose of public education is to develop the child and youth into an adult who is morally and intellectually fit to be treated as the citizen of a republic.

This is not sentimental "idealism." Those who insist it is such idealism are behaving as fools, who ignore the most fundamental things, and do so principally because of their obscene distraction by such matters as the stuffing of mashed potatoes and ice cream into their greedy little maws.

Humboldt's motivation is perhaps best identified by citing a famous remark of one of Humboldt's principal teachers, Friedrich Schiller. Schiller reacted to the gruesome degradation by the Jacobin upsurge in France of the early 1790s. "The century has produced a great moment" (referring most emphatically to developments centered around the American Revolution), "but," (referring most emphatically to Jacobinism) "the great moment has found a little people."

The "little" people, as Hans Fallada wrote of Germans who tolerated Hitler's regime in his *Little Man, What Now?*, do not intend to be immoral. The little man intends to be a decent, moral fellow in actions he takes on his own immediate initiative. The abyss of immorality into which such "little" people are so often prone to plunge, as with Jacobin France or early Nazi Germany, is a predisposition arising from what the pathetic "little" ordinary citizen calls, in current U.S.A. vernacular, "taking an effectively practical approach to problems of life": "getting ahead," "getting by," learning to "progress by small, patient, practical steps, one at a time."

Such a "little" fellow will adapt to any monstrous policy of his society, if he can only see some way in which to "make a deal" through which he can at least save some of his personal assets from the full destructive force of that monstrous policy.

This well-meaning, but very foolish "little," "practical" fellow is not evil by nature. He is not a philosophical anarchist, he is not an "evironmentalist," a "compulsive thief," a "homicidal lunatic," a "left-wing Democrat," or any of those or other truly evil dispositions. The "little" fellow, of the sort who attempted to "make the best of the Hitler regime," is not a degenerate from Dante's "Inferno" canticle. He is from the "Purgatory" canticle of Dante's *Commedia.* He is a poor little fellow with a somewhat tarnished "silver soul," to employ Socrates' metaphor from Plato's *Republic.*

Yet, such well-meaning little fellows have contributed to the death of civilized society, through their immoral obsession with "practical" concern for what they perceive to be immediate self-interests over the short term.

The other feature of such moral and intellectual "littleness" is the poor fellow's anti-intellectual disposition. He resists imparting and receiving profound and impassioned conceptions respecting man and nature. "That's too abstract for my poor head," he resists any important ideas; "I'm only a practical man." He may add: "Come down to earth when you're dealing with me, friend."

He is disposed not to respond to or understand any of the policy-issues or related developments which actually determine whether depressions or prosperity prevail, or whether his nation itself will even survive a few years ahead. *He is not morally and intellectually qualified to vote, or to make any other policy-decisions affecting the vital interests of whole nations.*

The little fellow deludes himself that he has a fierce independence of will. History says not. History says such little fellows can be made to do almost anything the most wicked forces of the world might desire, if only such forces command and use the right combination of "carrot and stick" to guide the little fellow, of his "own free will," in whatever directions the wicked forces select for him to go. Worse, under most circumstances, the little fellow "proudly" resists learning anything which might guide him to true independence of judgment.

This writer has watched close friends and other fellow-countrymen manipulated so easily, so quickly, so many times over the decades, and they never realizing that they are so manipulated, that he has lost the capacity to weep at the sight of new tragic spectacles of this variety.

That is the problem which Wilhelm von Humboldt addressed in his *Bildungsideal* policy for educational reform. The development of the moral and intellectual potentialities of personal character of the future citizen are the fundamental purpose of the educational policy of a republic, to which all other kinds of purposes must be subordinated.

The children and youth of a nation must be, first and foremost, taught to think and to communicate with a capacity for rigorous judgment in matters respecting the most profound and impassioned conceptions respcting man and nature. To this end, we subordinate all else, to teach them a literate command of the whole of the languages of hearing and vision, and to ground the development of the command of such language on their assimilation of the great classical literature (only the greatest, the best), and in that same sense, in classical philosophy, and in a grasp of the universality of the history of civilization—of which they are a part—as a process.

With that educational policy, much is subordinated, but nothing of value is sacrificed.

Throw out the "modern classics" from the schoolrooms; they are all trash, anyway; Henry James, H. L. Mencken, Hemingway, and so forth, are all sentimental trash, with no merit from the standpoint of standards of classical prose, poetic and dramatic composition. Throw out all of the muck spawned by "social work," together with everything crammed into the classroom as "of contemporary relevance." Why should I, a citizen, pay taxes to the purpose of turning my neighbor's child into a babbling "modernist" idiot through aid of such schoolroom obscenities? Throw out "modern music;" it is not music, contrary to whatever Adorno, Babbitt, or trolley-car conductor Leonard Bernstein argues.

We subordinate much, but sacrifice nothing by following the policy modeled upon the Humboldt reforms.

The youth who, at the age of eighteen, has assimilated what we have prescribed, and even nothing else in classroom work, has developed the highest degree of potential for any field of specialized achievement which any form of education might provide. That youth is—much more important—developed in the moral and intellectual potentialities to become a fit citizen of a republic, and to grow out of becoming yet another of those pathetic "little people."

Give me a nation of a generation of graduates of such a curriculum, and I will show you wonders achieved by that generation which would dwarf to relative puniness all the greatest earlier periods of efflorescence in the history of mankind. With such graduates, we would move quickly to master the nearby planets and then the stars.

I propose that the public-school period be from the ages of six through eighteen years of age.

I propose, in respect to geometry and science, that the mastery of the principal features of Kepler's work be the topics of emphasis during the thirteenth and part of the fourteenth age-years of the student's education. I propose that the remaining secondary-school years' work in mathematical science progress through the calculus and topology, and into the notion of Riemann's view of what he termed "Dirichlet's Principle." I propose that those be the reference benchmarks for constituting the geometry-science curriculum as a whole.

I propose that formal work in geometry begin, with emphasis on systematic progress in constructions, at the age of eight, and that this be preceded by pre-geometry emphasis on geometric constructions within the primary curricula. The age of eight is the proper year for the child to begin study of the classical Greek (from Homer through Plato).

Algebra should be taught as a derivative of geometry, and not as a separate course. The same must be true for trigonometry. Similarly, secondary topics, including biology, physics, chemistry, and geology, should be taught under the geometry-science program as we have outlined that, and not as independently-defined subject-matters.

Experience suggests most strongly that a curriculum of approximately thirty hours is optimal. These thirty hours must include Languages, Philosophy, and History. If we examine the content of those three categories of topics, there is room for nothing more—if those categories are to be competently taught.

By language, we mean both the language of hearing and the language of vision. Under the language of hearing we include literate command of prose of one's native language. plus classical poetry and classical well-tempered polyphony. We include a literate command of contemporary foreign languages and classical languages, with strong preference for the classical Greek and Sanskrit. By language of vision, we mean to include the topics emphasized in this report, plus painting (drawing) according to geometric (divine proportion) principles, sculpture (by the same standards), and architecture (by the same standards). By philosophy, we mean classical Greek philosophy, Leibniz, and knowledge of classical modern philosophers from the vantage-point of classical Greek philosophy. By history, we mean ancient, medieval, and modern history, and geography (physical geography, political geography, economic geography, paleozoic and climate geography).

I propose the immediate establishment of collaboration among concerned individuals and groups, and the establishment of new teaching centers within existing or new educational facilities, comparable to the functions Felix Klein performed for public science education in pre-World War I Germany.

We must produce with such source-centers, the curricula, the textbooks, the pedagogical exhibits and model experiments, and the teachers qualified for this work.

If we do this, and quickly enough, doing this for our children and youth, we as a nation will become unsurpassed in anything.

NOTES

1. Kepler's major works, still unavailable in English, include: *Harmonies of the World*, Books 1-4, *Commentaries on Mars*, and *The New Astronomy*. *Harmonies of the World* is now in translation by an International Caucus of Labor Committees team under the direction of Christopher White. Kepler's crucial *Mysterium Cosmigraphicum* was published in English, 1981, by Abaris Books, Inc., New York.

2. See Lyndon H. LaRouche, Jr., *Reform of Public Education: The New Standard American English Curriculum for Effective U.S. Schools*, National Democratic Policy Committee, New York, 1982.

3. See "How to Introduce Beethoven to the Layman" and "The Principle of Composition," both by Lyndon H. LaRouche, Jr., *The Campaigner*, Vol. 12, No. 1, September 1979.