21st CENTURY SCIENCE & TECHNOLOGY

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WINTERBERG'S NEW FUSION MACHINE

LaRouche on 'Visualizing The Complex Domain'

- Science in the American Parlor
- How the Wright Brothers Began It All

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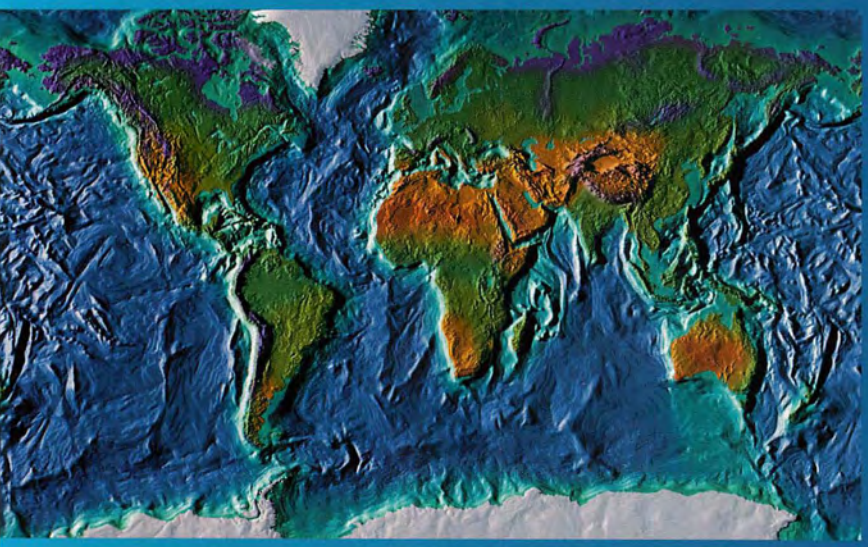
INTERNATIONAL CONFERENCE



Science and Our Future: Ideas to Change The World

April 14-16, 2004

Vernadsky State Geological Museum of the Russian Academy of Sciences

Moscow

Sponsored by **the Vernadsky State Geological Museum** (Russia), **Nordeco Eurasia** (Russia), **Schiller Institute** (Germany) **Executive Intelligence Review** (USA), **BDA Technologies Group, Inc.** (USA)

Dear Colleagues:

In the course of the last century, fundamental scientific research gained an increasingly dominant influence on human affairs, changing the course of history. The crucial technological revolutions of the 20th Century, such as aviation and space exploration, nuclear energy, lasers, and microelectronics, have been intimately bound up with fundamental progress in science. Without any doubt, the impact of fundamental research on the development of human society will continue to grow over the coming decades.

History provides many examples of discoveries that were at first rejected, ignored, underestimated, or even suppressed, but without which modern life would hardly be imaginable today. In our times, the task of gauging new ideas has become more complicated, owing to a whole range of factors, such as:

- The tendency toward narrow specialization in science, in contrast to the wide scope of knowledge and thinking, needed to appreciate the significance of revolutionary new ideas.
- The growth of "informational noise," including prejudiced and misleading information, as a result of which important ideas tend increasingly to be overlooked.
- The growth of influence of commercial special interests, supplanting the interests of society as a whole, and lobbying for ideas that are often not the best.

This international conference is devoted to searching out and propagating scientific ideas, which have thus far been either overlooked or insufficiently recognized, but which have the potential to significantly change the future of humanity. A high priority of the conference organizers is to attract participation from the new, young generation of students and scientists, who will play a decisive role in building our future.

In the past, the generation and transmission of power, and the production and use of materials and natural resources, have been two key areas, through which fundamental scientific breakthroughs have transformed the life of society. No doubt they will continue to play a decisive role in the 21st Century. Accordingly, the Program Committee will give priority attention, in the selection of papers, to these two main areas.

Call for Papers

In accordance with the goals of the conference, papers for presentation must contain proven scientific ideas, whose elaboration and application can have a significant impact on the future of mankind.

Abstracts in electronic or printed form should be submitted to the Organizing Committee of the Conference by no later than December 31, 2003. Expanded summaries of presentations will be published in a conference volume (in book form as well as compact disc). The length of the written summaries should be limited to approximately 8,000 characters and 3 diagrams. After consideration by the Program Committee, but no later than March 1, 2004, the Organizing Committee will inform authors concerning the acceptance of papers for publication, invitations for participation in the conference, and honoraria. Selected presentations will be published in full length in the above-mentioned publications in Russia, USA, France and Germany. Participants, whose papers are not chosen for oral presentation, have the option to present them as poster papers. Papers can be submitted in both Russian and English.

Organizing Committee

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21st CENTURY SCIENCE & TECHNOLOGY

Vol. 16, No. 3 Fall 2003

Science and the Youth Movement

Features

Philip Ulanowsky/EIRNS

Lyndon H. LaRouche, Jr. with youth organizers in September 2002. He has challenged the youth movement to master the complex domain (see p. 24).

News

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On the Cover: A 19th Century illustration of Benjamin Franklin and his lightning experiment. Illustration courtesy of The Granger Collection; cover design by Alan Yue.

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The ABC of Cosmic Humbuggery

Alpher, Bethe, and Gamow were the whimsically conceived trio of authors of a 1948 letter to *The Physical Review,* which reshaped modern thinking on the origin of the elements, and also played an important part in the formulation of the grand conjecture known as The Big Bang. The famous 1948 letter is a work of scientific flim-flammery.

Aside from a lack of epistemological rigor typical of nearly all modern cosmology, Alpher, Bethe, and Gamow's piece had the added feature of being a direct attack on the leading school of experimental physical chemistry associated with William Draper Harkins, Walter and Ida Noddack, and others. Because it might not be recognized as such today, it is worthwhile to review that aspect of the matter, and hope that in doing so we may cast some needed light into one of the deep, dark holes of the cosmological mythmakers.

I came upon the Alpher, Bethe, Gamow piece in the course of pursuing the trail of the nuclear hypothesis developed by my dear friend and former collaborator, University of Chicago physical chemist and physicist Dr. Robert J. Moon. Moon was the brilliant student of that same Harkins who, for several decades, beginning about the time of World War I, took the point against the reductionist school of atomic and nuclear physics led by Rutherford and Bohr. We shall return to that healthy tradition shortly. We first briefly review the story of the overpriced letter.

In early 1948, George Gamow, the well-known physicist and writer then at George Washington University, and R.A. Alpher launched their attack on Harkins, et al., in the form of a new theory of the origin of the chemical elements. Gamow, ever the merry prankster, asked Hans Bethe to join in endorsing the effort, which was published as a letter to *The Physical Review* in April 1948.[1] Bethe (who as recently as 1990, told *21st Century* Associate Editor Charles B. Stevens that "the only thing worse than cold fusion is Harkins") was glad to join in, giving the paper's authorship its alphabeticality. We shall thus, henceforth, refer to it as ABC Humbug.

The harmless part of ABC Humbug is the authors' conjecture that the heavy elements, whose origin could not be explained by natural fusion of lighter ones, *might* have arisen by neutron-capture transmutations occurring from exposure to a neutron flux. The flim-flammery begins when the authors attempt to prove the conjecture by trying to correlate the curve of the abundance of the elements to neutron capture cross-sections, which were concocted out of thin air.

The gist of the argument was that one could explain the abundancy curve by showing that those atomic species of higher capture cross-section would, upon neutron-capture, become unstable. Then, by such processes as beta decay (emission of an electron), the neutron would be transformed into a nuclear proton, creating a new species of higher atomic number. But a close reading of ABC Humbug and a supporting article by Alpher[2] demonstrates that the capture cross-sections for high-energy neutrons were merely guessed at; in fact, their determination remains a difficult matter, especially as cross-sections may vary greatly according to energy levels. The entire idea of determining abundance by capture cross-sections was pure conjecture, for the high-energy capture cross sections were not known. They were only estimated by extrapolation from the 1/v law, which was only true in a limited range. Alpher was not even shy about admitting such defects. Indeed, the capture cross-section concept itself is only a working hypothesis, lacking any clear understanding of nuclear structure.

The paper had an effect much beyond its worth. As a piece of science it was probably not worthy of a passing grade. There is not even a sliver of a firm foundation for the assertion that transmutation by neutron capture *is* the basis for the origin of the heavy elements. All is conjecture.

From this piece of fantasy, we are supposed to conclude that the elements originated somewhere afar off from our solar system, in the presence of a neutron source, which later came to be identified with a neutron star. ABC Humbug tells us it all began with a highly compressed neutron gas, which started decaying into protons and electrons when the conjectured gas pressure fell, as a result of the conjectured universal expansion.

This was Gamow's version of the Big Bang, the predecessor of the modern accepted brand. One of its worst byproducts was the placing into general circulation of the really unproven assumption that the composition of matter in the universe as a whole is now known. It would surprise most people today to learn that at the time of ABC Humbug, and for some years after, almost all astronomers thought that the core of the Sun, and of most stars, was iron. Although the truth of this matter seems unknowable at this time—for we cannot get to the core of our Earth, not to speak of stars—there is not really sound proof otherwise. The accepted view of solar composition rests on a peculiar construct known as the neutrino, conceived in 1930 by the Robert Fludd-admiring mystic Wolfgang Pauli. In million-gallon vats of carbon tetrachloride, buried deep underground, a minute number of phenomena supposed to correspond to this little reaction-particle are observed. Is it the neutrino, or are we merely being taken to the cleaners?

The Harkins School

ABC Humbug was an assault on that very productive tradition of physical chemistry associated with Harkins and his student Moon. Its high-flying fancy typifies the methodological sloppiness of much that came later, a point which becomes clearest by contrasting it to the hardworking approach of the physical chemists.

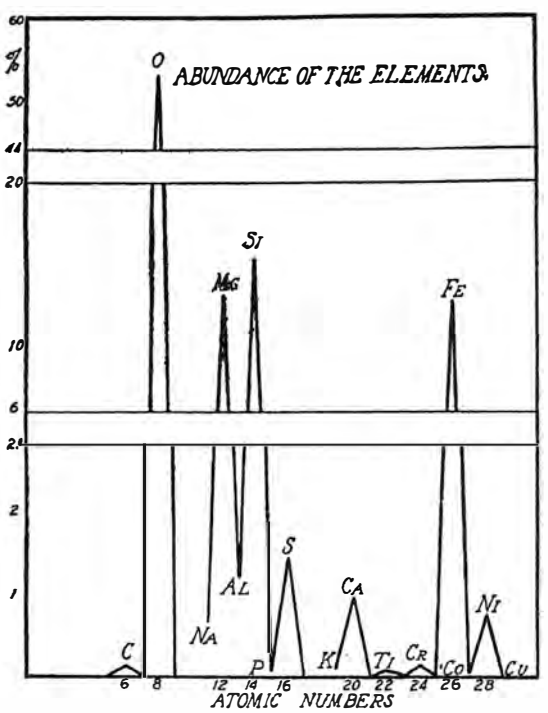
Recognizing that the elements in the crust of the Earth, the only ones accessible to mining technology, might provide only a skewed picture of the total distribution in the solar system, Harkins set out to examine the composition of meteorites. These objects, presumed to have originated in the asteroid belt, might, it was thought, provide a more representative sample of the elemental composition of matter in the solar system, especially if they represented exploded fragments of a larger body.

Harkins and his collaborators carried out painstaking analyses of samples from more than 300 iron and stony meteorites. The results, published beginning in 1916, showed that only a very small number of the 92 elements made up the great bulk of their matter. In an analysis of 350 stone and 10 iron meteorites, oxygen, silicon, iron, and magnesium made up more than 90 percent of the atomic composition. The first three of these elements alone made up over 80 percent. The distribution was not so different in the Earth's crust. What should favor these few elements over the others?

Another notable feature of the abundance tables developed by Harkins and others, was what came to be known as the odd-even rule. While there is a general tendency for the abundance to decline as one moves up the periodic table, the abundance of the even-numbered elements nearly always exceeds that of the nearby odd ones. These and other facts led to the hypothesis of a correspondence between abundancy and nuclear stability. It was generally supposed that the nuclear structure, once understood, would explain the reason for the favored elements.

Another line of Harkins's researches led in the direction of nuclear fusion. In writings as early as 1915, he noted the discrepancy between the sum of the weights of four hydrogen atoms, or of two protons and two neutrons (Harkins had conceived the neutron more than a decade before Chadwick, who is credited with its discovery), and the measured atomic weight of the second element, helium. The conversion of that missing mass to energy, according to the famous equation derived by Einstein, would lead to enormous release of energy. The existence of the spectral lines for hydrogen and helium in the Sun and stars suggested that it was fusion that powered the stars. However, the same reasoning showed that the production by fusion of elements much beyond iron would not lead to energy release, for the mass defect in such combinations dwindled and disappeared for combinations of the heavier elements.

If one were to take the simplistic view that the production of the elements must have occurred by the fusion of pre-existing lighter elements, themselves perhaps originating from the fusion of pre-existing hydrogen, this fact would present a problem. But only for such a simplistic view. The



Source: Harkins "The Building of Atoms and the New Periodic System," *Science*, Dec. 26, 1919, p. 581

Harkins noted that three elements—Oxygen (O), Silicon (Si), and Iron (Fe)—make up more than 80 percent of the atomic composition of meteorites. Ten elements of even number make up 97.59 perent of the meteorites. The extraordinary abundance of just a few of the 92 elements must be a clue to the stability of their nuclear structure. The data are given for 350 stone and 10 iron meteorites.

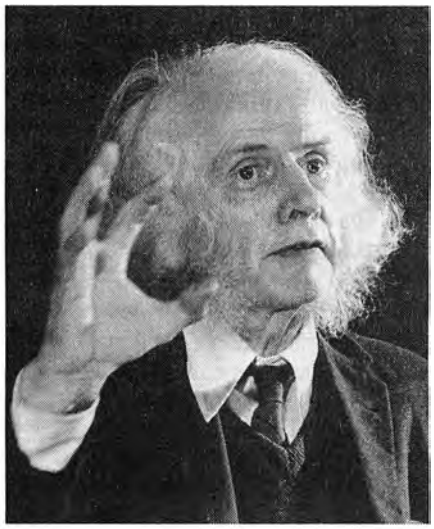
idea that the existing state of the world can be explained by assembly of presumed pre-existing parts, as in Aristotle's *hyle* or *protyles,* is one of the characteristic features of reductionism.

Moon's Concept

Harkins's student, Dr. Robert J. Moon, was one of a number of leading non-conventional scientific thinkers who used to gather periodically for seminars with Lyndon H. LaRouche in the 1983-1989 period. In the summer of 1986, Moon conceived a new model of the atomic nucleus which drew upon his lifelong work in nuclear physics and chemistry, as seasoned by the influence of LaRouche's seminal mind and Johannes Kepler's *Mysterium Cosmographicum.*

The most proximate influence on Moon's thinking was the then-recent experiment of Klaus von Klitzing, showing a stepwise set of plateaus in the Hall resistance of a thin, super-cooled semiconducting layer. Moon saw that in von Klitzing's apparatus, the electrons were limited to a plane, and thus, after five steps, the plateaus become less distinct, but that in three dimensions this might not be so. From such thoughts, Moon adduced that the stepwise reduction from the maximum Hall resistance (25,812 ohms) down to the impedance of free space (376 ohms), could be looked at as caused by the formation of electron pairs. To explain the ratio of the maximum over minimum resistance, which coincides with one-half the inverse of the fine structure constant, or 137, Moon envisioned putting together 68 electron pairs plus one single electron, in three-dimensional space.

This now touched on a paradox in the theory of electricity which had intrigued Moon for his whole life, from early childhood experiments. to his building of the cyclotron which supplied the first atomic pile, to his design and construction of the first scanning X-ray microscope. Namely, if free space is a vacuum, how is it possible that it exhibits impedance, which is a kind of resistance to the passage of waves that does not dissipate energy? His answer was that there is no vacuum, and that what is called *free space* has a structure. Thus space must be quantized.[3] When these thoughts were put together in his mind with the paradox of nuclear stability, which had been raised by Harkins's work on the meteorites, the Moon model of the nucleus was born.



William Draper Harkins (1873-1951, left) and his brilliant student Robert J. Moon, Jr. (1911-1989) carried on the tradition of experimental physical chemistry pioneered by Lavoisier and Mendeleev. Alpher, Bethe, and Gamow's humbuggery was an attack from the direction of the Rutherford-Bohr school of reductionist physics.

The structure for the quantization of space turned out to be an assemblage of four of the five Platonic solids nested within one another, the sum of whose vertices equal 46. Two such assemblages together form the 92 elements of the periodic table. Three of them placed together, with one position lost at the juncture, form the places for 137 electrons as they may be found in *free space.*

The building up of the nested solids corresponds to the building-up (*aufbau*) principle of the periodic table. The first solid is the cube, whose eight vertices correspond to the eight protons of the oxygen nucleus. This is the most stable nucleus as attested by the abundancy of oxygen, which makes up about 53 percent of the atoms in the meteorite samples. The cube may be thought of as fitting within a sphere, around which is circumscribed an octahedron, whose six additional vertices take us to the next most stable element, silicon (atomic number 14), which comprises about 16 percent of all the atoms in the meteorites. An icosahedron is circumscribed upon the sphere which surrounds the octahedron. Its 12 additional vertices take us to iron (atomic number 26), which is the next in abundancy, making up another 12 percent of the atoms in the meteorite samples.

There, in the broadest outline, is the strong hypothesis of Moon, concerning the nuclear structure. An elaboration of the correspondences to the chemical properties of the elements may be found elsewhere.[4] Moon did not speculate, to my knowledge, on the origin of the elements, except to point out that the steady flux of protons known as cosmic rays, taken together with his concept of space quantization, give good grounds for supposing the creation of the elements within the solar system.

Moon's model finds little audience today, while humbuggery of the most speculative sort dominates our scientific literature and teaching. Such must be the way of a world where men's minds remain in such confusion. Yet, we have good reason to hope that we may soon change it.

—Laurence Hecht

Notes

1. R.A. Alpher, H. Bethe, G. Gamow, "The Origin of Chemical Elements," *Physical Review,* Vol. 73, No. 7, p. 803 (April 1, 1948).
2. R.A. Alpher "A Neutron-Capture Theory of the Formation and Relative Abundance of the Elements," *Physical Review,* Vol. 74, No. 11, p. 1577 ff. (Dec. 1, 1948).
3. R.J. Moon, " 'Space Must Be Quantized' " *21st Century Science,* May-June 1988, pp. 26-27.
4. Laurence Hecht, "The Geometric Basis for the Periodicity of the Elements," *21st Century Science,* May-June 1988, pp. 18-30; "Advances in Developing the Moon Nuclear Model," *21st Century,* Fall 2000, p. 5.

LAROUCHE YOUTH MOVEMENT GUEST EDITORIAL

The Best Young Scientists In the World Work with LaRouche

Aren't you tired of waiting to die? Wallowing, wasting away here on Earth, until you run out of breath? That's how Baby Boomers now live.

And the youth generation today, will we imitate our bored, shrivelling parents, following in their stinky, pleasure-fouled path? Awake! Pleasure can be entertaining, momentarily, but look around. A muscle-bound monkey-man, speaking English in the style of a professional wrestler, directed by a stable of financier criminals, threatens to become Governor of California. The President can't read, and his Minister of Vice Dick Cheney wants to murder human beings with nuclear weapons. There's no economy. There are no jobs. Rave dances and pot-parties spatter the social environment. People don't read. There's no technological progress, no discovery, no culture. Is this the result of the "I'm so free because I do whatever I want" Baby Boomer counterculture?

Why don't we stop lying to ourselves and admit, this culture stinks. We need a renaissance, a rebirth of creative discovery in the social process, which makes us human—not animals, but human beings, much superior to any beast on the planet.

The Crab Nebula

Okay, but how do we do it? Well, look at the youth panel Sunday night, Aug. 31, at the LaRouche movement's Labor Day Conference. (View it archived on www.larouchein2004.com.) This panel was done by five members of the LaRouche Youth Movement—Sky Shields, Rianna St. Classis, Jason Ross, Adam Sturman, and Merv Fansler—and broadcast at two conference sites simultaneously, via video-audio connection, at Burbank, Calif., and Reston, Va. What the five presented was one of the scientific babies Lyndon LaRouche has been rearing his entire life as a statesman, philosopher, and scientist—an investigation into the Crab Nebula.

This Crab Nebula is an awesome phenomenon, of vast size, in outer space. And, it is not some process out in space, rotting away slowly, like the minds of many adults in our population. Instead, this Crab Nebula has been seen to be growing, and becomimg more organized as it grows. It seems to be developing, becoming something, with an intention. What is it? What is the cause of its amazing properties? (For example, it appears to be growing at a speed 0.4% the speed of light!)

An optical view of the Crab Nebula in the constellation Taurus.

What kind of universe are we actually living in? Or, what allows for the inexplicable levels of activity, or "energy," to be generated and coherently expressed throughout the nebula?

Now, here's the most beautiful part: If you want to know the answers to these questions, you must first realize that no human being can know anything, without realizing sense experience deceives. Since the universe is alive, and growing, and becoming more organized, the reason for these processes is invisible to the extremely limited senses of the human being. How does the mind, then, know anything?

Well, one part of the panel was on tel-

Continued on page 18

Letters

Dialogue with Author Of Sea Drift

To the Editor:

I just happened upon Mr. Richard Sanders's brief review of my book *Sea Drift* in your Fall 2002 issue. It is a curious piece, inasmuch as it implies that *Sea Drift* misunderstands the research of the late Dr. Thor Heyerdahl, when, in fact, it is both a comprehensive examination of his pioneering experimental archaeology research, as well as a celebration of his continuing influence on new generations of scholar-sailors who continue in his manner to challenge accepted dogma.

Praising Dr. H., while burying those "evil . . . weirdos" who continue to use and evaluate his pioneering methods is a bit of a strange argument. But, as a pinhead "fantasy-ridden academic," I am probably too far gone to appreciate this subtlety.

P.J. Capelotti, Ph.D.
Lecturer in Anthropology and American Studies
Penn State Abington College
Abington, Penna.

Rick Sanders Replies

I have to give your book *Sea Drift* full credit for promoting the methods (certainly anti-academic) of Thor Heyerdahl. It is also useful (but we could have done without the detail!) to have a summary of the post-Heyerdahl drift voyages. I have found more than one occasion to refer to your book.

But I do not think *Seadrift* is the book you really wanted to write: Somehow academia crossed you up. You say that you are less than enamored of academia, their attitude towards Heyerdahl, whom they regarded as an interloper . . . who crossed too many conflicting lines of evidence from widely separated prehistoric events that had taken place across mil-

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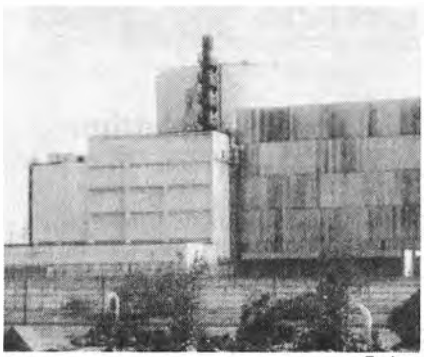


Fusione

The closed Caorso Nuclear Plant in Italy, a victim of the post-Chernobyl anti-nuclear hysteria.

ITALIAN BLACKOUT IS RESULT OF DE-REG AND ANTI-NUKE POLICIES

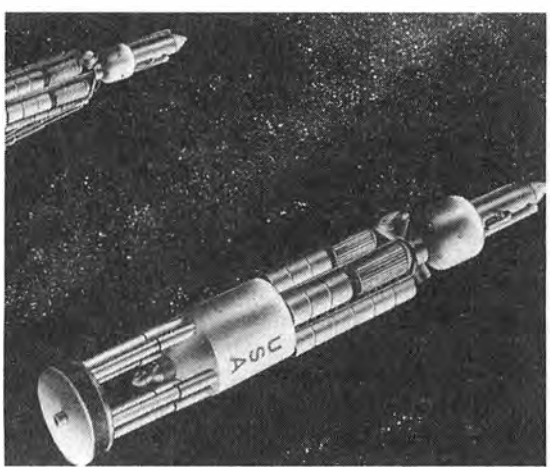
Nuclear scientist Paolo Fornaciari, writing in the daily *Il Giornale,* explained how deregulation and the shutdown of nuclear plants were the cause of Italy's energy crisis. Fornaciari, who is deputy chairman of the Italian Nuclear Association, wrote that the problem comes from Italy's "having adopted the most radical solutions in the liberalization models, sacrificing reliability of supplies to the altar of competition. . . . [M]arket and competition are not appropriate in the energy sector."

The unprecedented blackout in Italy Sept. 28, which shut down the national electric grid, affecting 56 million Italians, was technically attributed to a tree that fell on an electric wire in Switzerland, cutting off French supplies to Italy. Italy now imports 16 percent of its electricity from foreign sources during the day, 25 percent at night. (The amount is higher at night, because it is cheaper for Italy to import surplus nuclear-generated electricity from France, than to use its own oil- and gas-fired plants!) Italy abandoned nuclear power in 1987, after an anti-nuclear referendum was passed under greenie pressure. Fornaciari has proposed the immediate reopening of two nuclear plants, which would cost 125 million euros—compared to the ongoing 3.7-billion euro program to demolish the plants. Fornaciari called for the development of nuclear energy "to reduce the intolerable differences existing today in the living standards between rich countries in the North and poor countries in the South. . . . We need therefore to consume much more energy and to launch a new Marshall Plan in favor of developing countries."

RUSSIAN PROGRAM TO DEVELOP A NUCLEAR ROCKET REVIEWED

In the context of reporting the Russian unveiling of preliminary plans for a manned mission to Mars, with a 2018 tentative launch date, *Science* magazine reprises the Soviet-era effort to develop a nuclear-powered rocket engine called the IRGIT. The peculiar report in the Aug. 15, 2003 issue, treats with skepticism the unveiling of the Russian manned Mars program at a June 9-11 meeting in Moscow: "Gorshkov [of the Moscow aerospace firm, Energeia] and his Russian colleagues claim that such a mission could be pulled off for anywhere from $14 billion to $20 billion. But many Western experts think that's pure fantasy." The bulk of the article, however, reviews the secret, Soviet Cold War program to develop a nuclear rocket, concluding that the Soviet effort, which was still going strong in 1987, got much further than its U.S. counterparts, which were all shelved by the 1970s. The heart of the Russian progam was an advanced nuclear reactor facility Baikal-1, which involved testing new forms of nuclear fuel such as carbides of plutonium and uranium. Although barely funded since 1992, Baikal-1 is still operational, and its nuclear-powered IRGIT rocket engine is being considered as an option for powering the Russian Mars launch in 2018.

All space missions to date have relied on chemical-powered rockets, which use up most of their fuel in leaving Earth, and coast the rest of the way to their target. A more energy-dense source, such as nuclear fission, could allow a rocket to be powered the whole way to Mars and back, cutting the round trip time from two years to a few weeks. A continuous acceleration and deceleration at the g-force, would also eliminate the stressful physiological and neurological effects of prolonged exposure to weightlessness. A U.S. program to develop a nuclear-powered aircraft by Hughes Aircraft began before the end of World War II, according to one of the veterans of this secret program, Dr. Robert J. Moon. This was followed by the 1950s Project Orion to build a rocket engine using pulsed nuclear explosions, which was killed in the 1960s (see article by Marsha Freeman in *21st Century,* Fall 2002, pp. 60-63), and Project Rover/NERVA to build a rocket-carried reactor, killed in 1973.

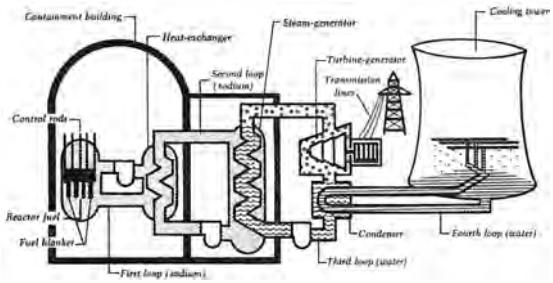


Artist's rendition of U.S. Project Orion nuclear-powered spacecraft on the way to Mars, a program the United States dropped in the 1960s. Russia is now considering a nuclear-powered, manned Mars launch for the year 2018.

INDIA GIVES GO-AHEAD FOR BUILDING A 500-MW FAST BREEDER REACTOR

The Vajpayee government has approved an eight-year project to build a fast breeder reactor at Kalpakkam, in the southern Indian state of Tamil Nadu, according to *The Hindu,* Sept. 22. The project will cost close to $800 million, and is one of the largest technology development projects India has taken up, comparable to the Integrated Guided Missile Development Program, the Light Combat Aircraft, and the Nuclear Submarine project. The decision is also a vindication of 25 years of indigenous research and development of fast breeder technology by the Indian nuclear establishment.

It was almost 50 years ago, that India's leading nuclear physicist, Dr. Homi Bhabha, visualized a three-stage nuclear energy program for utilizing the energy potential of fissionable thorium, which India possesses in abundance. The breeder reactor occupies the second stage. It will use plutonium—formed in the uranium fuel elements of the first-stage nuclear power plants—as fuel, and as a neutron-source to convert thorium placed around the breeder reactor core into uranium-233. U-233, a fissile material, can then be used as fuel combined with natural thorium-232, thus deriving energy from thorium. India is the only country planning to use thorium as fuel.



DOE

The core of a breeder reactor is surrounded by a "blanket" of fuel assemblies that contain unfissionable thorium. This layer of thorium absorbs the neutrons from the fission process, creating fissile uranium-233, which can then be used as fuel.

FIRST TRACE OF ARCHIVE OF RAMSES II FOUND IN EGYPT

German archaeologist Edgar Pusch found the first trace of the Ramses II archive in the mud along the eastern delta of the Nile. As reported in the German press, a cuneiform fragment, 5 centimeters square, was found 15 centimeters under the und. It has 15 lines in cuneiform, in the Babylonian language, which was the diplomatic language of the time. "This 5-by-5 centimeters change the world," said Pusch, "because they are the corner of an archive—not an archive with books, but a diplomatic correspondence from the period of 1200 B.C., between the two major great powers, Egypt and the Hittites." Ramses is reported to have amassed a huge archive, which included reports of various aspects of life in the oriental world. The archive was destroyed in a storm at sea, after the pharoah's death.

NUCLEAR PHYSICIST EDWARD TELLER DIES AT 95

Dr. Edward Teller, an innovative and controversial figure in science, died at his home in California on Sept. 9. Teller, who worked in the Manhattan Project to develop the atomic (fission) bomb during World War II, helped design the hydrogen (fusion) bomb after the war. He was a strong promoter of the civilian uses of nuclear energy: for electricity production, underground explosions for excavation for great projects, and propulsion for space. Teller also campaigned for decades against the imposition of government secrecy in science. On July 23, 2003, Edward Teller was awarded the Presidential Medal of Freedom, the nation's highest civilian award.

Teller became well known (and much maligned in some scientific circles) for his promotion of the Strategic Defense Initiative (SDI) program that President Reagan announced on March 23, 1983. When Teller's *Memoirs* were published last year, there were many nasty reviews by writers who claimed to know more about Teller's life than Teller did, but chose to ignore Teller's sense of humor and engaging wit, and demean his scientific contributions.

In a reply to one such review in the *Daily Telegraph,* Lyndon H. LaRouche, Jr. stated: "Dr. Edward Teller and I never got along well personally, after my mid-1970s attack on his role in promoting the energy policies of Nelson A. Rockefeller's Commission on Critical Choices. Nonetheless, on some issues, including what became known as President Ronald Reagan's SDI, Teller and I came to a degree of agreement on the issues which brought us into common cause against both Soviet General Secretary Yuri Andropov and nuclear madmen such as Zbigniew Brzezinski, Samuel P. Huntington, and the ultra-utopian nest around Lt. Gen. (ret.) Daniel P. Graham's Heritage Foundation."

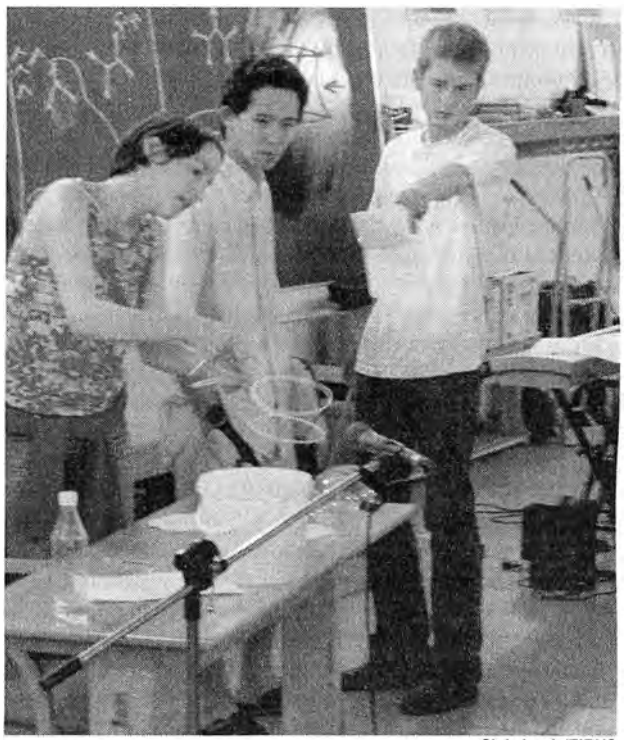
Stuart K. Lewis/EIRNS

"Read 21st Century *magazine," Dr. Teller told an American Nuclear Society audience at the 50th anniversary of fission meeting in 1992.*

THE LAROUCHE YOUTH MOVEMENT TAKES OFF IN EUROPE

Burn the Textbooks! Re-create the Original Discoveries!

by Jason Ross



Chris Lewis/EIRNS

French members of the LaRouche Youth Movement produce the minimal surface known as the catenoid by forming a soap film between two parallel rings, at the Wiesbaden, Germany, pedagogical festival May 31, 2003.

"Can you say that again? We're having trouble holding our sugar cubes."

"I'm telling you, we can't see Mars: it never gets dark here!"

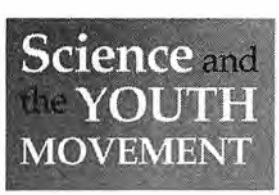
"Wait, doesn't that lead to the inevitability of entropy?"

"Ah, *that* is the significance of the calculus!"

These are youth speaking, but the conversations are not taking place in university halls, or in the philosophy chatroom of an internet website. These are the voices of collaboration among the international offices of LaRouche's "Combat University on Wheels."

Over the past year, the self-conception and political actions of the LaRouche Youth Movement internationally have transformed from movements in particular regions or countries, into an international force dedicated to LaRouche's election in 2004, and to banishing Euler and Lagrange from classrooms worldwide.

We started our international interchange of ideas around a year ago, intending to get a more sensuous conception of the global nature of our political fight and to collaborate on organizing projects. This had a true effect in producing a sense of our international mission, particularly in some of the more isolated offices. Beginning with the crucial role of American members of the LaRouche Youth Movement around the March 2003 European conference in Bad Schwalbach, Germany, this collaboration has moved forward on the scientific and pedagogical front, and over the past half-year the European offices of the International LaRouche Youth Movement have exploded in recruitment and potential. Over a period of just a few months the following remarkable developments have taken place: Sweden grew from zero to eight full-time youth members; Denmark now has half-a-dozen youth organizers; in France, more than a dozen, from a larger group of full-time youth, are spreading LaRouche's ideas on a six-week long summer *Tour de France;* a dozen young Germans are dedicated to the hegemony of LaRouche's method; and, a youth movement is taking off in Italy. A measure of their success so far was the attendance of more than 120 serious youth from across Europe at the August 16-17 conference in Frankfurt, Germany, where about a dozen science pedagogies by the youth were among the presentations.



So what does scientific epistemology have to do with this recruitment? Illustrative is one discussion, in which this author participated, sparked by an evening's work on mathematics and geometry in Rennes, France, last April. Taking our cue from LaRouche, we were examining square and cube numbers in the context of working on the concept of powers as a crucial element for understanding Gauss's 1799 "Fundamental Theorem of Algebra" report. Our path to the discoveries we made that day, demonstrated that you can only *know* by personally re-working a discovery; no amount of description will do. On this particular question, we began by first examining square numbers as simply numbers multiplied by themselves, and cube numbers as another multiplication. We came up with these numerical results:

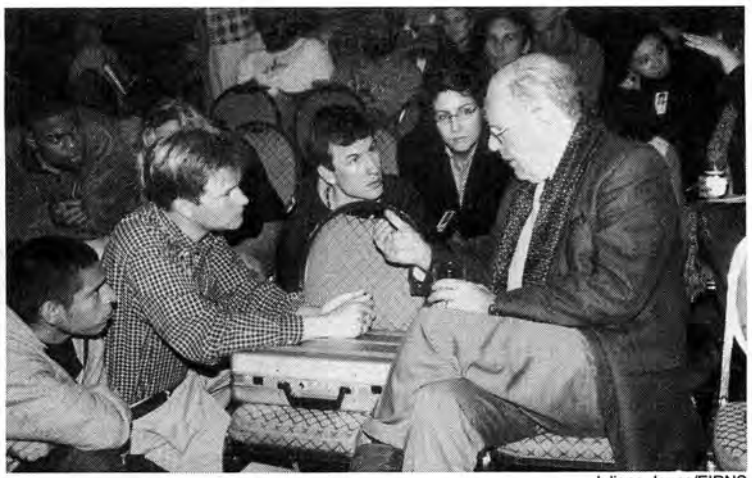
Square numbers:

Number	1	4	9	16	25	36
diff.		3	5	7	9	11
2nd diff.			2	2	2	2

Cube numbers:

Number	1	8	27	64	125	216
diff.		7	19	37	61	91
2nd diff.			12	18	24	30
3rd diff.				6	6	6

From this we came to the provocative, but incomplete conclusion that the difference between square numbers differs by 2, and the difference of the difference between the cube numbers differs by 6. This descriptive approach from a textbook number-line, Euler-LaGrange standpoint led us to numerical conclusions. But what do these numerical values *actually mean?* Approaching geometry with equations is like designing a car on a computer—you do not know what is really happening.



Juliana Jones/EIRNS

The author (checked shirt) in discussion with Lyndon LaRouche, after a conference in Reston, Virginia, Feb. 17, 2003, and presenting the Archytas solution to the doubling of the the cube at a pedagogical evening in Wiesbaden, Germany, April 2003.

Next, the Whiteboard

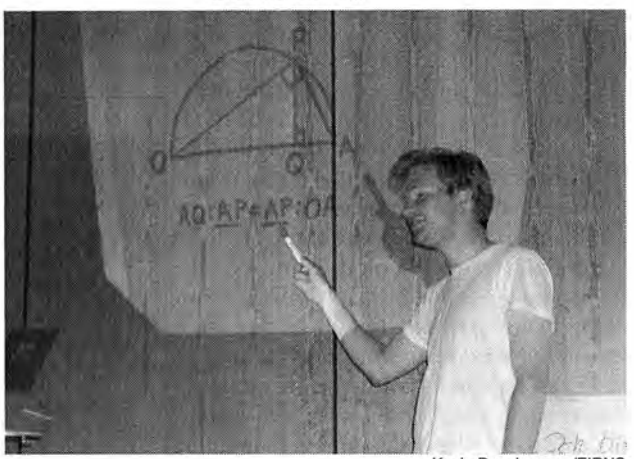
Time to look at the geometry involved! So, we pulled out a whiteboard and began to look at actual squares. When we draw the sequence of the square numbers, such that each square number has the previous square number hatched out of it, this leaves us with the difference between the numbers (Figure 1).

We saw that the differences were 1, 3, 5, 7, and so on, giving a difference of differences of 2. But where does this 2 exist *physically?* Let's do the same thing again, this time looking only at the differences, and hatching out the previous difference (Figure 2). This leaves us each time with the two opposite corner squares remaining—aha, here is our 2!

So far, so good, for the squares. But what about explaining our cube numbers? Stuck with a flat whiteboard, one might just give up after making a few messy drawings of cubes, saying, "well, the numbers just work out to give us that 6." Fortunately, we were armed with wooden cubes.

Cubes

With our supply of small wooden cubes in hand, we re-examined the problem. First, we made square numbers again, discovering that instead of looking at the sequence of numbers as given, we had to actually *determine* the numbers of blocks that form squares. Taking one square's worth of blocks out of the next larger square left us with the L-shapes we found earlier on the whiteboard. Try it yourself. No, really, get some sugar cubes or play blocks and do it right now (we'll wait); you will discover things that you would not by trying to imagine in your head.



Kevin Desplanques/EIRNS

Next, we investigated cubes, first making a sequence of cube numbers out of our blocks. When it came to finding the differences between the cube numbers, we removed the smaller cube from the larger, not as a *number* of blocks, but as an actual *cube,* so that we could see the process of growth among the cubes. We were left with a series of cube-shells (Figure 3), which we saw were growing

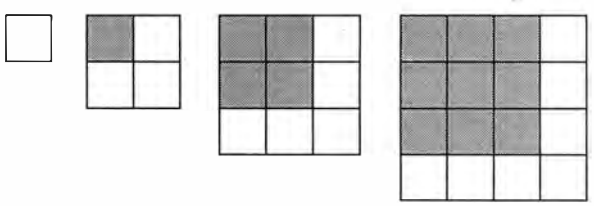


Figure 1
A SEQUENCE OF SQUARE NUMBERS
The square numbers 1, 4, 9, 16. The area of the previous square is indicated by shading, leaving the square excess in white.

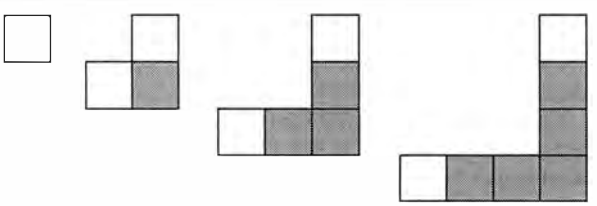


Figure 2
THE SQUARE EXCESSES
The excess, or first-order difference between the square numbers 1, 3, 5, and 7 is shown; the area of the previous excess is indicated by shading, leaving the constant second order difference of 2.

similarly. But where was the growth? Another layer of discovery was necessary.

With the cube numbers you have built, try to find the shape of the change from one cube-shell to the next, without looking at the figure. You may need the help of a friend for this one, and you certainly cannot do it without physically building cubes, so get some if you have not yet done so. What you find is the interesting frame shape shown taped together here (Figure 4). Here is our six!—a six-sided frame that increases by six between each set of cube numbers, as we see illustrated, and broken down into its six components in Figure 5.

Now we had a clear idea of the actual process of growth occurring in the cubes, as a physical generative process, instead of an after-the-fact description. We also recognized, in the distinction between the two approaches to the problem, a clear demonstration of the essential fraud behind the New Economy: the same principle which lies behind the widespread substitution of computer-modelling for field testing, such as happened with the disastrous Mercedes A-Class design of a few years ago. The error lies in assuming that you actually "know" something, because you can write a formula, or make some other abstract description that appears to match a process.

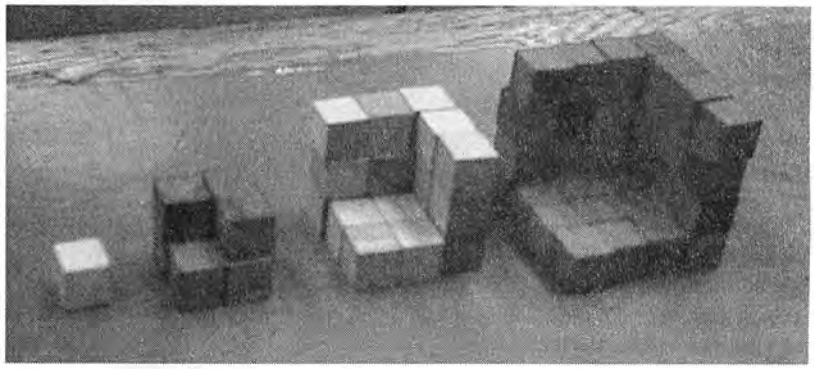


Figure 3
THE CUBIC EXCESSES
The sequence of cubic numbers 1, 8, 27, 64 is pictured., with the volume of the previous cube removed from each.

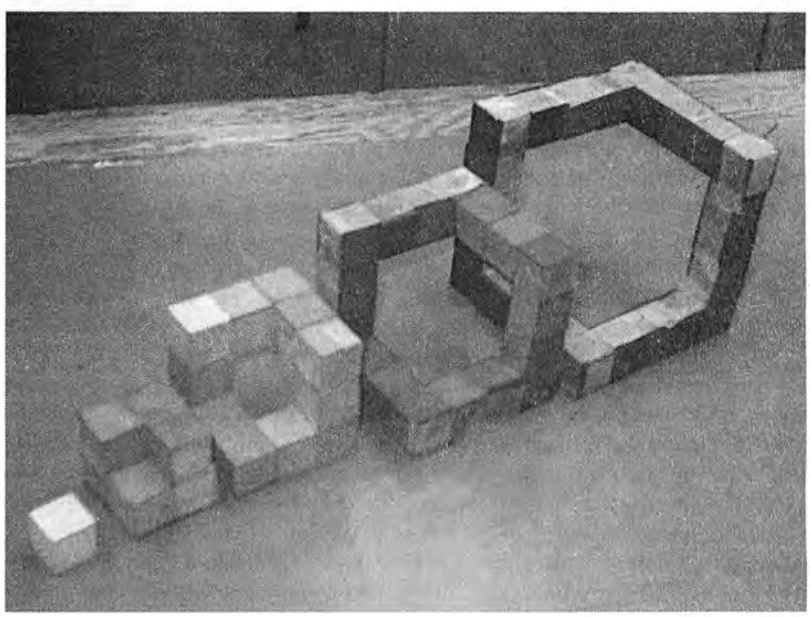


Figure 4
THE SIX-SIDED CUBIC 'FRAME'
The cubic frames illustrate what is left after the difference of the difference is subtracted from the sequence of cubic numbers.

Science and the YOUTH MOVEMENT

Knowing something is not a matter of saying in your head that you "see" it; you must understand how to *generate* it. If you are trying to understand this, without pulling out some cubes and doing the actual work, your mentality is no different than those greedy Enron day traders, trying to make money with nothing to back it up, or those still stubbornly, foolishly imagining there is some way to make it without getting LaRouche elected:

"I see food in the supermarket every day; what do you mean we are facing an economic crisis?"

"Oh, we must be in a recovery by now. The economy goes in cycles." —Why? "Well, it just works that way."

"Yeah, sure Saddam had WMDs. How dare you suggest a need to know anything about the infrastructure and industrial prerequisites for a weapons program before making that assertion. It's just true! You don't want to wait till you see a mushroom cloud, do you?"

"Yeah, put the suture there, that's what *medicine.com* said."

If you do not know the process that generates the objects we encounter in our sensed universe, you do not really *know* anything about them. You cannot see an economy; you must know how to generate it.

Science in the LaRouche Youth Movement

So, what do we do with a discovery? Well, tell everyone else, of course! Our international movement has been intensifying its work on epistemology and pedagogical method, and we have been having discussions on Nicholas of Cusa, the father of modern science, powers

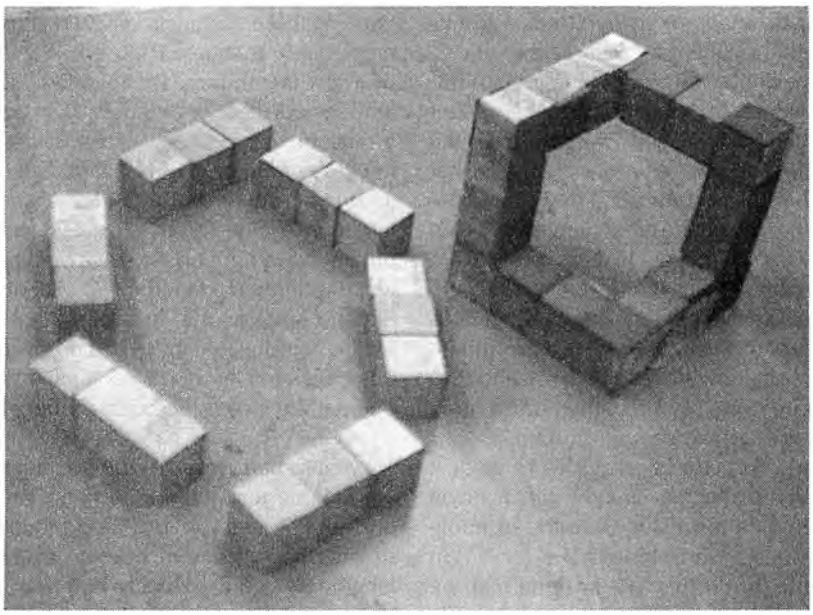


Figure 5
EXPLODED VIEW OF THE SIX-SIDED CUBIC FRAME
Here one can see how each cubic "frame" is made up of six sides. Each side increases by 1 from one cubic number to the next, giving 6 as the third-order difference of the cubic numbers.

and means, the curvature of the universe, what soap bubbles have to do with entropy, differentials from the standpoint of Pascal, Gauss's 1799 report on the "Fundamental Theorem of Algebra," Riemannian space, Abelian functions, the Pythagorean comma and the paradox of communicating ideas and talking with the universe, observations of our neighbor Mars, and the Carnot-Monge brigade system to rapidly expand the power of reason. These discussions have been used to give to youth new to our movement a sense of our international mission and the power of ideas to shape history. How else but through the power of the human mind will we reverse decades of a consumer outlook to products and ideas, and create a Renaissance dedicated to reviving the method of discovery?

Power

How *will* we, as a movement without overwhelming force of numbers, remove Vice President Cheney, and implement LaRouche's economic policy *before* LaRouche's election in 2004? It is not going to come through what we are told are the normal avenues of power. Having lots of money, a knack for graffiti, university degrees, gold teeth, mutant powers, a great ass, a basement full of canned food, or a team of highly trained secret agents are not going to improve the power of mankind in and over the universe.

What actually transforms human power is not *more* of anything—more money, more guns, or even more economic infrastructure *per se*. It is that flanking ability of a human mind to *change,* through a new discovery of principle, the domain of what is generatively *possible.* Instead of thinking "I am doing everything I can," think "how do I change what I am capable of?"

Plato addressed this political concept in his *Meno* dialogue, which will lead us into the Platonic conception of *power.* The part of the dialogue that we will discuss begins with a discussion Socrates is holding with Meno about the nature of knowledge. This question is of fundamental importance in determining the orbit of human culture: What defines humanity, as distinct from animals, besides our ability to know?

Socrates demonstrates the ability to know as inherent in every human being, through a discussion with an uneducated slave boy. Socrates takes up this question of knowing in a domain that, today, is considered by many to be opaque to general understanding: geometry. Drawing a square in the sand, Socrates asks this boy to double it—to make a square twice as big.

The boy's first idea is to double the length of each side of the square. A good first try, but wait, that gives a square four times as large as the original (Figure 6). The boy's next guess is to make each side one-and-a-half times as long, which gives us a shape (Figure 7) that includes the original square, two rectangles each half the area of the square (which brings us up to double the area already), and a smaller square as well—too big again.

Now, think about how we could cut the square of area four (Figure 6) in half. Well, we see that we can split a square to make

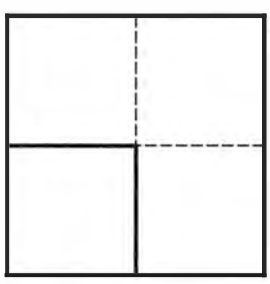


Figure 6
FIRST ATTEMPT TO DOUBLE THE SQUARE
Doubling each side of a square produces a square that is four times the original area.

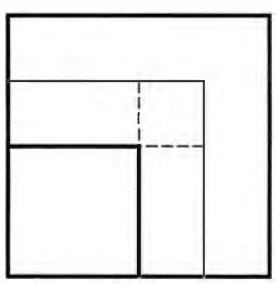


Figure 7
SECOND ATTEMPT TO DOUBLE THE SQUARE
Increasing each side by one-half, produces a square that is more than twice as large.

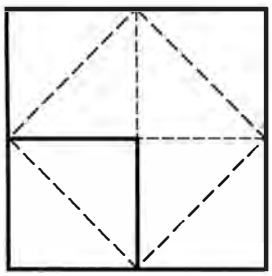


Figure 8
THE DOUBLED SQUARE
By cutting each of the four squares of Figure 6 in half on the diagonal, a new square is produced (dotted lines) which has area of 2.

two equal triangles, and if we do that for each of the four squares, we can make a new, "crooked" square (Figure 8). This crooked square contains half the area of the large, quadrupled square, making it twice as big as the original square. Ah! The boy *knows* that this is a successful doubling. By awakening this discovery in the mind of the slave, Socrates shows that the ability to know can be evoked in anyone, and that it can be demonstrated.

Finding the Square Root of 2

We have not fully understood everything about this doubled square, however. In his *Theaetetus* dialogue, Plato demonstrates that the side of this doubled square is very interesting indeed. Let's examine this length, not as crooked, but by bringing it down to lie on the straight line of the base of our original square (Figure 9).

So how long is this length? "The square root of 2," we hear. Hold on just a minute! That is a question, not an answer. We know that this length is the square root of 2, because we found it to be the root (foundation) for building a square of 2. But how long is it? "1.41421... something," is our next, more precise-sounding answer. That may be a close *approximation* to measure its length, but how long is it really?

We know we are looking for a number greater than one and less than 3/2. If we can find it exactly, we will have the side of the square whose area is 2, that is, the square root of 2. Do we have the means to create this length without drawing a diagonal? Let's try it out. Perhaps we can find a fraction (a ratio of two whole numbers) that will give us the desired value. There are an infinite number of fractions between 1 and 2 to choose from, so one of them must be it. Let us see if we can construct it.

First, to get a general idea of what it means to make a square with a given magnitude for a side, take the example of a square whose side is 1-⅖ (or 7/5) in length. To do this, we imagine that we take our original square, cut each side into five equal segments, and add two more of these segments on each side to make our new square (Figure 10). This is how any length increase operates. Now, think of our fractional length as making a ratio in size between two squares. In the case of Figure 10, we have a ratio of an original square with 25 blocks, and a larger one of 49—pretty close to double, but not quite right on. To solve our problem of finding the length needed to double the square (the square root of 2) means figuring out how to construct a ratio between two squares that makes one square precisely twice as large as another.

We can narrow down the fraction we are looking for by trying to figure out if our sought-after original and doubled squares have sides of odd or of even length in regard to each other. If we begin by posing that the larger square is odd on its side, then we arrive at a square that contains an odd number of blocks. (Figure out on your own, with blocks, coins, sugar cubes, and so on, why an odd-number square is odd.) But an odd number cannot be double anything, for then it would be even. This is impossible. So, our larger square must have even sides.

Now that we know that our larger square is even on each side, we now have to figure out the evenness or oddness of our smaller square. If it is also even on each side (for example 8/6, as in Figure 11), then we did not need to cut up the squares into so many pieces to make our ratio. In this example, we could look at the ratio as 4/3, just as 3/2 could have been called 6/4, while still being the same ratio. So if both squares are even, then we could reduce the number of divisions such that one or the other will be odd. We already discussed the large square being odd, so now we are left with the large square being even and the smaller

Wesley Irwin/EIRNS

Tarrajna Dorsey, joined by other exuberant members of the LaRouche Youth Movement, uses cubic blocks to investigate the principle of powers at a Seattle pedagogical event August 2, 2003.

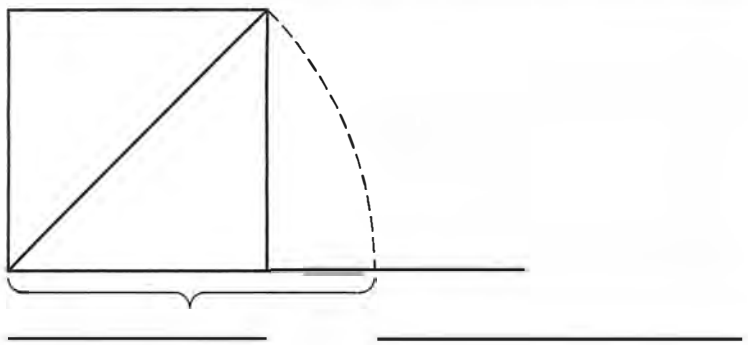


Figure 9
DETERMINING THE 'SQUARE ROOT OF 2'
We compare the length of the side of the doubled square (diagonal) to the side of the original square, by carrying its length down onto the extension of one of the sides.

odd—we are narrowing in on our sought-for fraction!

If we look at an even-sided large square and an odd-sided small square, with the large square twice the small square, then we can say that, cutting the large square in half (Figure 12), each half should have the *odd* area of the small, odd square. But the long side of these two rectangles is even, making the rectangles even, not odd. This cannot work either. Aha, but that is all the possibilities. If the length we are looking for can be expressed as a fraction or ratio of two whole numbers, they must each be either odd or even. But we are out of options!

We appear to have found something that lies beyond the infinite: all those fractions (an infinite number of them), and not one of them makes the magnitude we are looking for? This so-called "square root of 2," appears as a "hole" in our number line, a discontinuity in what we before thought to be completely continuous. Now you know what the synarchists are confronted with in LaRouche!

This magnitude we have found is a higher *power,* in Plato's sense of power. We are able, in space, to create magnitudes that cannot be expressed on the number line. This higher idea of power *expands the domain* of possible actions, in the same way that the incorporation of a newly discovered universal principle into our economy transforms the cardinality of potential effects we can generate. Just as our power over the universe is increased by the discovery and implementation of truthful universal principles, any individual's potential historic potency is determined by discovery and passionate adherence to truthful social principles.

Science and the YOUTH MOVEMENT

Looking at the world we find ourselves in, how can *you* increase the ability of mankind to survive this crisis? Will you pretend you do not know what to do, or will you act with LaRouche? **Time to join the International LaRouche Youth Movement!**

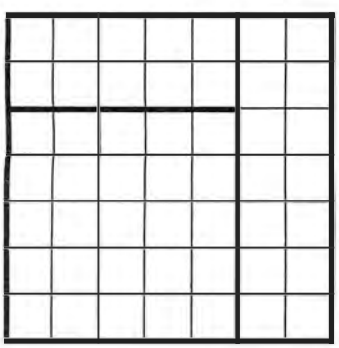


Figure 10
CAN THE SQUARE ROOT OF 2 BE A RATIO OF ODD NUMBERS?
Here the area of a square whose side is 7/5 is considered. Its area of 49/25 is close to, but not equal to 2. No odd square can be twice anything.

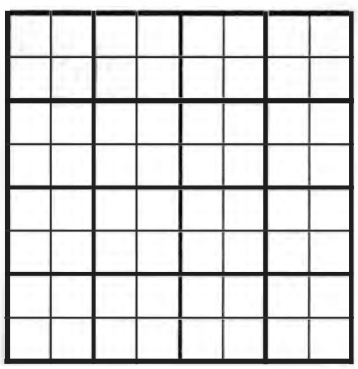


Figure 11
CAN THE SQUARE ROOT OF 2 BE A RATIO OF EVEN NUMBERS?
Suppose the even numbers are in the ratio 8/6. The small and large boxes in the diagram show us that the square of 8/6 (a ratio of even numbers) is equivalent to the square of 4/3 (a ratio of even over odd). Any even-number ratio will be reducible to a ratio containing either two odd numbers, or an odd and even number.

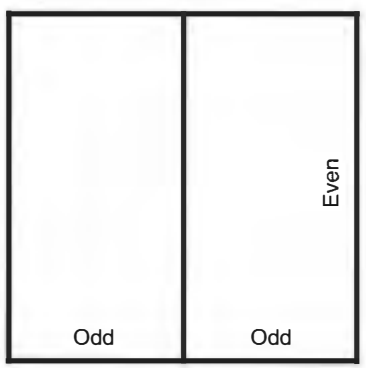


Figure 12
THE SQUARE ROOT OF AN EVEN-ODD RATIO DOESN'T WORK EITHER
Here, we take the large square and cut it in half, each half having the odd area of the small odd square. But the side of the square we created is even, so this won't work either.

OBSERVING MARS RETROGRADE MOTION

Astronomy As Political Philosophy

by Timothy Vance

Men at some time are masters of their fates: The fault, dear Brutus, is not in our stars, but in ourselves, that we are underlings.

—William Shakespeare,
Julius Caesar, Act I, Scene II

Mars does affect your love life . . . but it has nothing to do with the mystical view of Mars being in the constellation of Aquarius as an astrological symbol of male sexual potency. And don't try to use Mars's retrograde motion to explain the insanity of the current U.S. administration either! However, the investigation of this astronomical phenomenon by the LaRouche Youth Movement is demonstrated to have a definite steering effect on the outcome of future events.

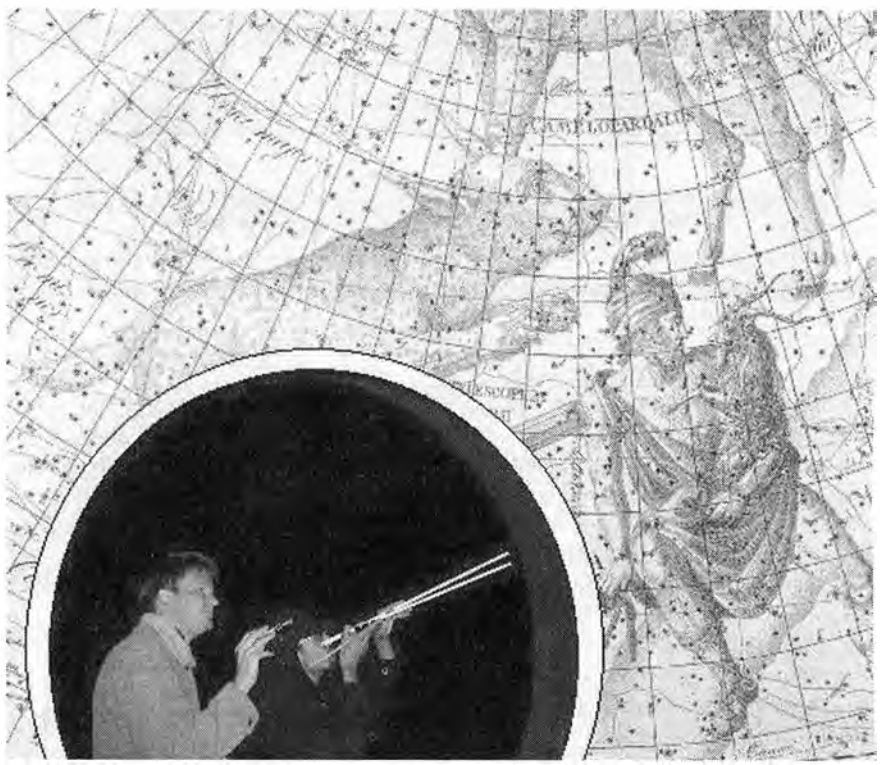
Science and the YOUTH MOVEMENT

Our project to observe and measure the retrograde motion of Mars began in mid-June 2003, following a suggestion made by Bruce Director, a close associate of LaRouche, while on a visit to Los Angeles June 12-16. This extended weekend, composed of student meetings, lectures, and informal discussion, was part of the ongoing process of intellectual development taking place internationally in the creation of a new generation of political and moral leadership. What else but the passion for the mastery of ideas could serve as a necessary focus and precondition for competent Statecraft that is so rarely found nowadays?

Moving Back on What?

Given the shape and placement of the orbits of both Earth and Mars around the Sun, our planet catches up with the "Red Planet" just about every 2 years and 1 to 2 months. These close encounters, or "oppositions," mean that both planets are on the same side of the Sun and will provide some of the best times for viewing Mars. From one opposition to the next, the Earth travels a little more than two times around the Sun, while Mars completes a little more than a single orbit. Interestingly enough, the distance between each rendezvous varies anywhere from 35 million miles to 63 million miles, thus hinting at what Johannes Kepler discovered as the elongated and elliptical nature of the orbit of Mars. This means that some oppositions are more favorable than others depending on how close they get to each other . . . and it just so happens that we took up this challenge on one of the best, as it is estimated by astronomers to be the closest encounter in about the last 60,000 years.

During this time, with Venus and Jupiter conveniently placed on the other side of the Sun, the brilliant reddish-orange object rising near sunset just around the 27th of August is unmistakably that of Mars. Now, besides appearing roughly 3.5 times brighter than Sirius (the brightest star in the nighttime sky), it traces out a very strange path indeed. Over the course of two and-a-half months, Mars, while



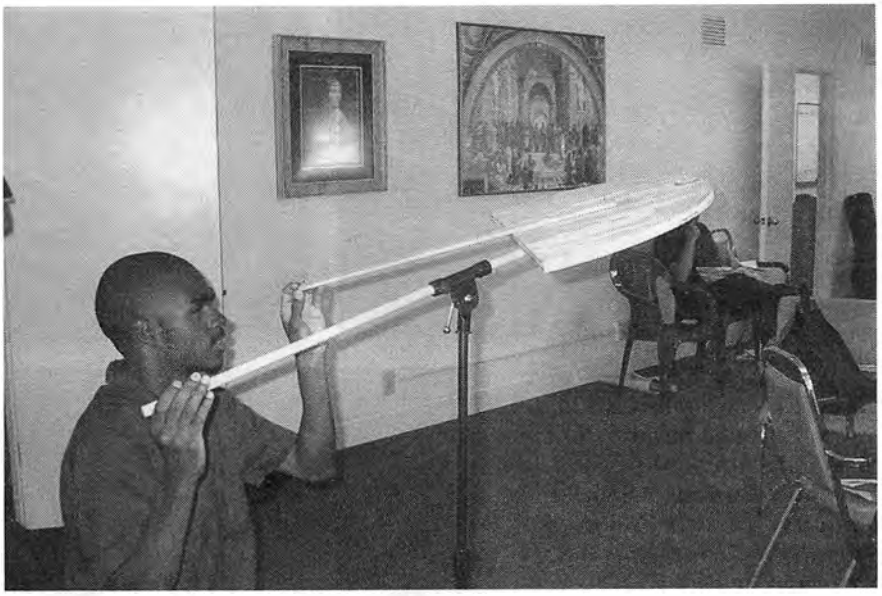
A view of the night sky as it appears to the observer. But what is really there? How do you measure something that's completely out of your reach? Well, you play an important part in creating that relationship . . . literally, by acting on what you see.

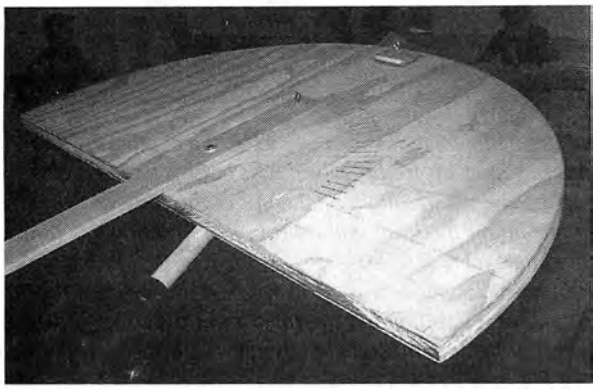
Fix your sight on any visible star above as your point of reference, for example, and then, with a single sweeping motion bring the gaze of your eyes to another object in the sky. This traces out an arc, which, when examined, takes the form of a great circle, bounded by the inner surface of the celestial sphere of your nighttime sensorium, which intersects the two just-observed objects. This action of turning your head creates a relationship, namely an angle, which can now be used to describe and communicate your perception of the heavenly bodies.

travelling in its typical "direct motion," appears to stop and, without explanation, reverse direction, only to stop again and return to its usual movement eastward across the fixed background of stars.

The generated image of a projected "loop-de-loop" is actually caused by a visual Doppler-like effect, as the Earth overtakes and passes by Mars on a curve, shifting angles of sight back and forth. This playful and provocative waltz across the heavens has driven the minds of many astronomers to seek a lawful cause for the necessarily perfect motions of the heavenly bodies above, in contrast to the seemingly irrational, apparent celestial motions, as seen from down below.

This question of the retrograde motion of Mars has naturally been, most notably in the case of Kepler, the driving force in advancing not only astronomy, but also science and mathematics in general. As the *avant garde* political organizers of a new global renaissance, we decided to take up this question as well. We wanted to get a real sense of what it takes, so to speak . . . not so much for the particular discoveries made, but for a sense of the method which produced those discoveries —that is, what's the physical process that leads to a discovery? What's necessary for a revolution?





Jermaine Hughes demonstrates the use of one piece of apparatus used for Mars measurement in Los Angeles over the past summer. The close-up helps to show some of the technique and technology used. The instrument is essentially an oversized protractor, which in this instance was mounted onto a microphone stand with a universal joint, using a wooden dowel which made it easy to align and adjust the whole contraption to the nighttime sky.

The whole flat surface of the semi-disc is to be aligned exactly with the plane of the great circle intersecting the two objects to be measured. This nicely establishes the arc on which the angle will be generated. A piece of wood acting as the equivalent of a rifle-sight was attached to the semi-disc, and pivoted around the inside of a circle marked off with angles. Three eye-hook screws provided the aim. One eye-hook was fixed to the surface, and two of them were attached and aligned on the pivoting arm.

To make a measurement: Simply line up all three of the eye-screws around your first object; this will provide your point of reference (0 degrees). Now, with the semi-disc adjusted as previously mentioned, pivot the arm with the remaining two eye-screws over to sight the second object. This very action has generated an angle with which you can now relate objects in the sky to one another.

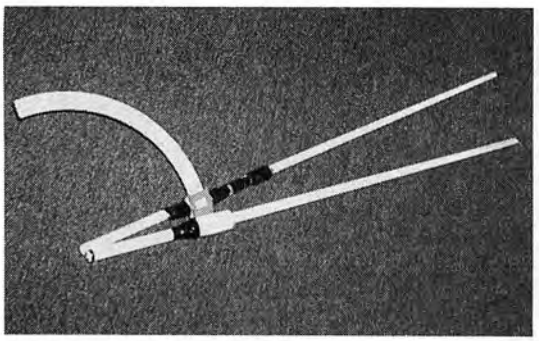
Well, from a preliminary assessment of the various efforts made over this past summer on this particular project, it takes *work*. For starters, we had to place ourselves in a position to make the observations, which meant for those in Los Angeles, many late nights on top of the famous Mt. Wilson, just outside of the metropolitan area, and fortunately above the notorious layers of smog.

The Celestial Sphere

Before we could begin conducting measurements however, we first had to ask ourselves a few questions. More immediate, and perhaps more philosophically significant, was getting a working understanding of *the domain in which the observations were taking place!* What are the characteristics of such a domain, sometimes referred to as your celestial *sensorium?* What actions are possible and how would it affect your ability to measure anything shown in it? And if you really want to be rigorous (as we like to be), for that matter: What even *is* measurement?

Well, . . . as Abraham Gotthelf Kästner (supporter of the American Revolution as well as teacher of Carl Friedrich Gauss) stated in his *Introduction to Mathematics,*[1] while describing the concept of magnitude and measurement:

"How large a thing is, we discover either through the direct perception, which we have from the thing itself, or the comparison with another known magnitude. One who has travelled a mile, has an idea of the length of the distance, which is so called, obtained



Several measuring devices were designed, constructed and used by participating members of the LaRouche Youth Movement in several locations around the country, as well as internationally, during this Mars Retrograde project.

Here we show the simple device employed by the Bay Area group: (a) Dowel rods were inserted into the spherical protractor from a Lenart Sphere kit. (b) You must make sure the rods are the right length for your eye to be the center of the spherical compass. (c) The rods are put right up to the eye; if you hold it farther away you change the angle. Have someone shine a flashlight on the tips of the rods, to make it easier to see them when you are lining them up with two points in the sky between which you are trying to find the angle (c).

Although the instruments used in different locations varied in form and level of sophistication, each provided a good deal of reliability and operated from the same essential principle of generating a geometric, angular distance: circular rotation!

through the experience; and when he hears named a thousand miles, so he imagines this distance laid out after itself a thousand times."

But wait! Such an example of magnitude as Kästner just gave, doesn't work when trying to measure the geometric relationships of visible stars and planets to each other from the *sensorium* of the nighttime sky. Who among us has actually had the possibility of even "travelling a mile" to Mars, let alone 35 million miles at its current conjunction? And even if we were to, say, break free from the pull of Earth's gravity and walk the rest of the way by foot, such a pathway taken in counting the number of our steps to the Red Planet would certainly be a bit curved (because of the effects of gravity), and therefore, necessarily, much longer than the simple straight-line distance, measured from our current position on Earth to the immediate position of Mars in its orbit.

So then, what tools or unit of measurement did the first pioneering group of political organizers have access to, or experience with, when we drove up into the nearby mountains about half an hour outside of Los Angeles to begin the project? Probably, the same tools and methods given *a priori* to ancient Man, namely nothing—except his mind—when he was first inspired to investigate the harmonic beauty displayed by the curious motions of the heavens above.

Lacking any instructions, we began by taking a look around at what we saw above. Such a sight may prove to the inexperienced observer almost sensually overwhelming in its raw beauty, and so vast as to seem incapable of ever being figured out. Yet, upon further attentive observation over extended amounts of time, the human mind, by aid of memory, begins to slowly structure the images above; new patterns and visual relationships develop and repeat with almost unfailing consistency, only to be broken at some later point by strange exceptions found in observation that, alas, after more careful observation, tend even to repeat themselves, establishing surprisingly more order rather than less by the break in pattern, thus giving rise to ordered cycles, and of a generated rather than self-evident sense of number.

Now, let us take time to situate various aspects of the sky, with its parade of celestial bodies, as it appears from Earth with the unaided eye.

The Universe of Appearances

The representation of the sky known as the *celestial sphere,* and its subsequent divisions, is useful not only for practical purposes of locating astronomical objects for observation, but also as a simple and poetic metaphor,[2] which can be effectively applied in fighting the philosophical and political battles one faces increasingly today. This domain, described below, is a *universe of appearances,* and is quite distinct from, but still relevant to, the *actual universe,* which is the real cause for everything displayed within it.

The Greeks, already 2,000 years ago, had systematized much of the area of the sky into 48 configurations of stars, associated with the names and forms of mythological heroes and animals, inherited probably as a whole set of already established forms originating thousands of years ago among so-called primitive peoples (who must have had a longer attention span than most people today). Less arbitrary divisions of the visual sphere, most likely accompanied their need for more formal measurements in making calendars and using sundials. Many of these imaginary divisions of the celestial sphere, can be traced out physically with our fingertips in the sweeping motion of arcs in all directions, and doing that sometimes helped the youth in visualizing such divisions in our mind. This process of ordering, in essence playing, proved crucial in making familiar and tangible the vast intimidating expanse of space above us.

The imagery employed is left over from the understanding of ancient peo-

ples, that held the Earth literally in the center of a hollow, transparent sphere, whose surface was a tangible one, on which all the heavenly bodies were fixed, and whose daily rotation caused them to rise and set. However foolish such an obviously faulty solar system may appear to the sophisticated and thoroughly educated Modern Man with access to any grade-school science textbook, this intuitive and false understanding of the heavens is what is empirically demonstrated to be the case, when anyone actually bothers to look. A person does actually observe at night, as if from the imagined center, what looks to be a somewhat flattened hollow sphere, encapsulating the Earth, with its circumference circling the horizon and the stars dispersed throughout the sky at an equal, though undetermined, radius. As a whole, everything observed moves steadily from East to West, rising and setting in graceful arcs, except for a few stars that are seen to ever circle the *celestial pole,* or an imaginary point in the sky, vertically above the northern point of the horizon.[3]

In the Sensorium

Now, let's work through placing ourselves in the *sensorium.* While standing outside, beneath a clear canopy of stars, point (with your fingertips) to the spot directly overhead, which is commonly referred to as the *zenith;* its opposite point on the celestial sphere, directly underfoot below the Earth, is known as the *nadir.* Anchored in reference to these two imaginary points, one can trace out a great circle on the celestial sphere, halfway between the zenith and nadir, to generate the astronomical *horizon.*[4]

We have now divided the sphere into two equal parts. We can then easily divide the sphere into four equal parts, by tracing another great circle with our fingertips, from the northernmost point on the horizon with a single arc up through the zenith, and down, intersecting the southernmost point on the horizon, continuing downward through the nonvisible nadir, and up to the original starting point. This second division is known as the *celestial meridian,* and is very useful for describing the placement of the stars.

All visual night-sky phenomenon can now be described and located within this geometry. The initial randomness of the night sky, gradually orders itself according to the movement of various heavenly bodies.[5] The planets, rather than being haphazardly dispersed throughout the sky, tend to follow the same apparent path taken by the Sun and Moon, each in its own way, of course.[6] Daily motions, are subsumed by seasonal motions, which are observed to repeat with some regularity over the years. We are then blessed with a sense of the universe as rather more ordered and comprehensible, and a little less arbitrary and overwhelming as is the *apparent* case sometimes. And, although these patterns of behavior alone do not explain the physical action which generated them, they do at least hint towards something which might explain it.

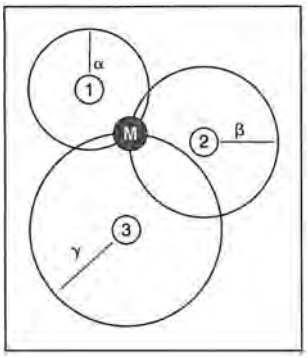
Mars Observation

How would you make these observations, not just for yourself, but communicate them to others too? Well, having a grasp on the shape of the domain in which the observations would be made, allowed us to better grasp the principle by which we could map the observed motions with the intention of socializing them with others.

Of course, we knew some kind of relationship had to be established between us and the observed objects so far out of reach. But how? And with what? Well, look at it . . . literally. Since we can't reach out and touch Mars with a yardstick, all we can do from within the confines of our *sensorium* is relate it to other objects by rotating our line of sight from it to another celestial object, measuring the angular degrees along the path of a great circle.

Okay, once we've decided on circular degrees, what do we relate Mars to? The horizon perhaps? Nope. This is what we tried with our first crude device, consisting of a plumb-bob and a protractor. It did give us an angular measurement, but one that was awfully hard to keep track of, because of the ever-changing relationship of the stars to the horizon as they rotate throughout the night. We desperately needed more stable and constant forms of relationships, (ahem) astronomical ones that is.

Luckily, there's a large fixed background of stars already provided from which to compare the path of Mars. Aha! If we were to take an angular measurement from Mars to a constellation, or fixed grouping of stars, and compare that with other measurements to the same stars over the course of weeks, we should be able to track and map out some of the motion. Single, simple measurements of the angular distance of Mars to each of its neighbors could be related through some process of triangulation (ever won-



Once we developed the instruments to make the angular measurements, we needed a method for mapping them out to show an elapsed retrograde motion of the planet Mars over the course of a month. We decided to measure and map the waltzing motion of Mars against the relatively fixed background of stars (which freed us from having to track subsequently superfluous, technical aspects of time, right ascension/declination, and so on). We were able to triangulate easily enough the position of Mars, relative to the position of three adjacent stars (which in our case included one star from the horn of the constellation of Capricorn from the Zodiac and the other two from the constellation of Aquarius). Such measurements could be mapped onto the inside of a hollow sphere, a blank sheet of paper, or an already constructed star-chart.

As the diagram here illustrates: Mars can be located by the intersection of three circles whose radii were generated from the three angles measured between the planet and its surrounding stars. (α represents the angle between Mars and the star designated by the number 1; β represents the angle between Mars and another star designated number 2; γ represents the angle between Mars and yet a third star designated by the number 3).

Science and the YOUTH MOVEMENT

dered where trigonometry came from?), and then mapped easily enough on to a flat piece of paper, or even the inside of a sphere, for reference.

Now, generating some angles could be done simply enough by placing a drawing compass on one's cheek, and sighting its two ends on a planet and another star. Of course, the fun of squinting and fumbling about for an accurate angle has its limitations. It's worth noting that these sometimes annoying hindrances, didn't stop the observations but only made them better, as the troubles encountered forced us to think more fundamentally on the principle of what we were measuring. These limitations, in fact, pushed us to invest in constructing more advanced technology for sighting and more stable and accurate measurements.

This process, of what LaRouche calls a science-driver, manifested itself quite nicely in the form of three successive evolutions of method, and four successive improvements on technology over the course of only two and-a-half weeks! Each new discovery, led to an entirely new set of problems, which, when approached with excitement, encouraged more discoveries of the same nature, thus leading to an improvement in both resources and capabilities. In effect, we had generated a sort of microcosm of physical economic activity, demonstrating what a normal, healthy, functioning economic process should be.

"Just what is the political relevance of your relationship to the nighttime sky?" Well, according to the relationships built out of the scientific astronomical investigations of a cadre of young political organizers, it means a revolution in approach . . . away from a universe whose complexity is described as mathematical systems in a textbook, to one whose apparent motions can be physically constructed according to principle, and known to the human mind. That subject is of the utmost strategic importance, whose political implications are revealed when revolutionary individuals cast off a dependence on their *sensorium* of perceptions when acting upon the stage of history, in exchange for a more truthful and higher geometry of mind dependent upon the more accurate and efficiently real, unseen principles which actually shape the loving universe around us.

Mars *does* affect your love life; it might just be the *reverse* of what you're thinking.

The author wishes to thank Aaron Halevy for help with this article.

Notes

1. Abraham Gotthelf Kästner, *Anfangsgründe der Arithmetik, Geometrie und Perspectiv* (Göttingen: Verlag der Witwe Vandenhoeck, 1758) (Unpublished English translation by the LaRouche Youth Movement).
2. A physical example along the lines of Plato's "Allegory of the Cave" (found in Book VII of the *Republic).*
3. Approximately the position of the North Star, or Polaris, as seen from any location in the Northern Hemisphere, with its angular altitude equalling the observer's latitude in degrees.
4. This astronomical horizon is distinguished from the visible horizon, which frequently tends to be irregular where the sky and Earth seem to meet.
5. These were historically divided into only a few known categories visible to the naked eye: the stars, the Sun, the Moon, Mercury, Venus, Mars, Jupiter, Saturn, and various "miraculous" comets and meteors.
6. This pathway known as the *ecliptic*, is about 16 degrees wide, and contains not only the paths of all the planets, but also all the constellations of the Zodiac.

Other Sources

Robert H. Baker, 1942. *Astronomy* (New York: D. Van Nostrand).

William J. Kaufmann and Roger A. Freedman, 1998. *Universe* (New York: W.H. Freeman and Company).

Guest Editorial

Continued from page 5

escopes. We, the human species, have constructed, in order to better observe this Crab Nebula, telescopes with the smoothest mirrors ever made. These mirrors are so smooth, their surfaces are comparable to smoothing out the Earth until the highest mountains were 78 cm high. These are mirrors in which atoms are bumps! Now, with this awesome level of technology, is it possible to see the explanation for the organization of the Crab Nebula? No!

For example, the youth presented four different photographic images of the same nebula, taken by these types of telescopes, each one completely different than the others, because one was an X-ray photo, another optical, another infrared, and another radio. So, although the camera took pictures of exactly the same thing, each image looks completely different, one with no sensual resemblance to the next. So how do we understand it?

Reviving Minds

LaRouche wants to launch science driver economic development projects to revive, at the forefront of the population's mind, a sense of scientific liveliness and investigation. We have to know the mind, not the answers, but the living, active minds of Archytas, Plato, Kepler, Eratosthenes, Homer, Shakespeare, Keats, Kepler, Cusa, and many other awesome scientific/artistic human geniuses who give mankind the power to increase our mental power, more, over nature. Keats's poem "On First Looking into Chapman's Homer," is the crucial type of idea needed to understand the Crab. In this poem—you'll have to read it yourself—Keats works to transport the reader beyond the confusing domain of sense perception, and into the domain of action of the mind, "silent, upon a peak in Darien."

So, as the evil, stupid Aristotle is portrayed in Rembrandt's "Aristotle Contemplating the Bust of Homer," Aristotle blindly gropes Homer's head, while blind Homer sees truly. The universe we are a part of is whole and alive. The potential which lies ahead of the human race, potential for social breakthroughs, new music, great art, and scientific exploration, is inexhaustible. But we've got to understand the simple point Plato made 2,500 years ago: The human can't base his knowledge on any previously assumed sense experience. The human experience is creative, revolutionary, and non-linear.

Now, just because we can't "see" reality, does that mean that creativity is whatever we want it to be, or unknowable? No! Study Lyndon LaRouche, and watch the youth panel on the Crab Nebula. There is a complex domain available to us today, as an alternative culture, which gives human beings power to live in a true relationship between creative mind and sense experience. We're going to go there (one thing LaRouche will do as President is launch a Mars colonization program).

This youth movement is creating the renaissance now, which will revive human social processes, and therefore, science. It has to be done. Everything else is boring, routine, and false.

—Nick Walsh
LaRouche Youth Movement

Reprinted from The New Federalist, *Sept. 8, 2003.*

Letters

Continued from page 5

lennia. You also say that some of the other drift voyages are rather "bizarre." But then you write a book, somehow against your better judgment, that will not offend academia, the bizarre getting equal time with the scientific.

I think what you wanted to write, and should write, is something about man's earliest navigation, as far back as we can find. Man was never primitive; as soon as we were man, we were cognitive. Heyerdahl did not know much about sailing, but he did know enough to believe in science, the science developed by human beings along the Pacific coast of South America, that allowed them to travel and transport huge quantities of goods on rafts, as reported by the earliest European explorers.

But man was not, nor was Thor, flotsam and jetsam. Thor and his friends did not just grab some logs, tie them together, and jump in the ocean. They had a whole science and technology to re-discover: from the kind of ropes used, the science of cutting down balsa trees at the right time, and the science of *not* letting them dry out before fashioning them into a raft (as common sense would have had them do). He had to hypothesize the current which would take him to the Pacific islands. And the outcome of the science and the courage of those young men was beautiful, wrecking the ugly, self-serving myths of academic isolationists.

I challenge you, Dr. Capelotti, to make your own beautiful contribution to the youth movement of today—youth who are mastering science by re-living the discoveries, not by "learning" them or learning about them. Write the book you wanted to write, a book that a kid in Martha's Vineyard who hoped to escape from everyday American banality by being blown out to some remote shore, would be thrilled to read: about man as scientist, navigating using the stars, the winds, the clouds, the currents, the paths of migrating birds—how long ago? When man crossed to Australia in 40,000 B.C.? Or long before that? That man had to explore, not because there was "population pressure" as academia will have it (by the way, that's just English for the Nazi *Lebensraum*), but because that is our nature, because discovery is part of creation.

The Start of the Maoris

To the Editor:

Since your publication of my thoughts about the petroglyphs on Pitcairn Island, which appear to record an Egyptian citizen's record of observation of the lunar eclipse of December 14, 233 B.C., I have had cause to ponder on the apparent conflict between the dates of the visits to the three Pacific locations of the fleet of Maui and Rata.

The writings on the cave walls at the "cave of the navigators" in northwest New Guinea (now Irian Jaya) have been timed to the annular solar eclipse of Nov. 19, 232 B.C. It has been also dated as the 15th year of the reign of Ptolemy III. The fleet had, by this time, according to the translation, been journeying for eight years.

The writings on the cave near Santiago, Chile, are evidently signed by Maui and dated 16th reign of Ptolemy III. This has been dated as August 5, 231 B.C.

The petroglyphs of Pitcairn Island are also dated to the 16th reign of Ptolemy III. They are not signed, but one can assume it was Maui or one of his companions. Ross Perfect explains in his article published in the Winter 2001-2002 *21st Century* (page 54), that the start of the reign of Ptolemy III includes his co-regency with his father, and puts his 16th year at 233 B.C. (not 231 B.C.).

The previously deduced Pacific crossing by Maui and Rata started from West New Guinea in 232 B.C., and ended at Santiago in 231 B.C. This would have meant a journey of some 13,000 miles against the prevailing winds. and down the South American coast, against the ocean currents in eight months. And that with sailing ships without keels!

It seems evident that the fleet battled on for some six years across the Pacific and up and down the coasts of the Americas, until they finally gave up and headed for home from Santiago. Scudding downwind on the southeast trade winds from Santiago, the fleet would reach Pitcairn Island easily in two or three months. Still scientists, they took the opportunity to prove how far east they had reached by making an accurate lunar eclipse observation. And no doubt to stock up on food supplies (salt fish?). I believe there is also a record of a ship coming to grief.

Now, one can conjecture that they later landed on islands with friendly natives and took wives. Reaching the western tip of New Guinea on the way home to Egypt. two things happened. They saw a partial solar eclipse, probably just luck for us, and the women started to reach the end of their pregnancies. What to do? Some five or six days sail to the east, they probably had recently found two small isolated and uninhabited islands. Today these are known as the most westerly of the Bismark Group, by name Wuvulu and Aua—an excellent place for the women to give birth.

Still today, the occupants are "Polynesians," isolated by some 1,300 km from the nearest of their kin in the Pacific. I am indebted to Stephen Oppenheimer for this information, given in his book *Eden in the East,* page 174. There is little doubt that the exploring group decided at that stage never to return home to Egypt, but to go back to some of the pristine uninhabited islands they had found on their journeys and start a new life. One can pinpoint when the first of the Maoris were born, November or December 232 B.C. almost certainly.

Now everything fits. What a magnificent basis for a novel to put the human interest on a bare-bones story.

I am not sure what to do with my insight, so I have written to you. Perhaps you could pass it on to Julian Fell. Or even publish!

Henry Broadbent,
Somers, Victoria, Australia
henry@peninsula.hotkey. net.au

The Lesson of the Blackout: Rebuild the Transmission Grid

by Marsha Freeman

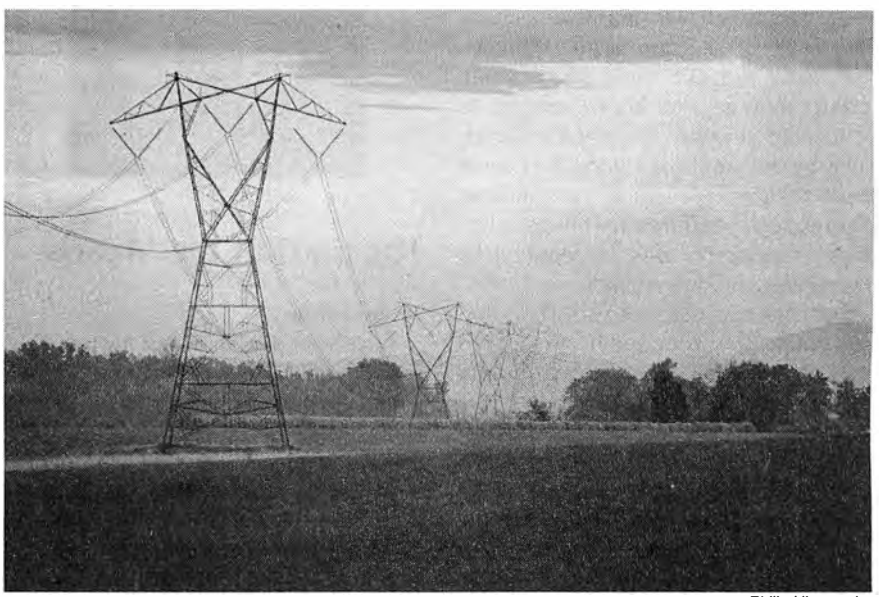
The Great Blackout of 2003 has finally made many millions aware of what had been known by the electric utility industry, regulators, and other professionals for more than a decade: Underinvestment in the nation's transmission infrastructure, while stress on the system was rising because of "electricity deregulation" policies, has dramatically increased the risk of catastrophic failures. Like the California energy crisis three years ago—where deregulation on top of inadequate capacity, plus manipulation and stealing, led to blackouts and bankruptcy—the Great Blackout of 2003 was also the result of decades of failed "free-market" policies.

For nearly 20 years, the construction of new high-voltage electricity transmission wires has been sabotaged.

David Cook, General Counsel for the North American Reliability Council (NERC), testifying before Congress in May 2001, remarked that: "In North America 10 years ago, we had a little less than 200,000 circuit-miles of high-voltage transmission lines. Right now, we have about 200,000 circuit-miles of those lines." In other words, zero progress!

Short-distance wires have been added, to connect new power plants to the local grid, but no investment has been vectored toward expanding the capacity, or toward increasing the reliability or efficiency of the interconnected grid system as a whole. The London *Financial Times* made an interesting comparison on Aug. 18: Over the past year, Great Britain and the United States each invested roughly $800 million in electricity transmission; but the American grid is 15 times larger than the British one.

Electricity is the life-blood of a modern economy. Transmission is the system of arteries delivering the power. It was only a matter of time before the clogged and damaged transmission arteries would give the patient a major heart attack.



Philip Ulanowsky

High voltage transmission lines near the Blue Ridge Mountains of Virginia.

While Congress and the White House are engaged in a competition to see who can convince the American people that they are doing the most to solve the problem, the prescriptions they are proposing—more deregulation—will kill the patient. The only national leadership has come from Democratic Presidential candidate Lyndon H LaRouche, Jr. with his call for immediate re-regulation and a massive public infrastructure building policy, which he calls the "Super-TVA."

When the System Worked

To understand how deregulation is wrecking the U.S. electric grid, it is first necessary to get an overview of how the system once worked, efficiently and cheaply.

The electrical industry is divided into three necessary parts. First, a company generates electricity, in fossil fuel, hydroelectric, or nuclear power plants. Then, the power, in bulk amounts, is shipped to where the load is, a city or town, via high-voltage transmission lines. Finally, the high-voltage electricity is stepped down to low voltages through transformers at substations near where it is needed, and is distributed to individual homes and places of business.

Until the 1960s, it was rare for a utility to transport power any farther than from its generating plant to the nearby city or town. But during the 1960s, the increasing rate of economic growth—spurred by the Kennedy lunar landing effort, investment tax credits, and other dirigist economic measures—electricity consumption was growing at 7 percent per year, a 10-year doubling time. Through the 1980s, the transmission system grew rapidly to keep pace.

Adapted from Executive Intelligence Review, *Aug. 29, 2003.*

To accommodate this rapidly changing network, neighboring utility companies entered into arrangements, whereby they could buy power from each other when there was a shortage in one area, increasing the reliability of the entire system by preventing local outages, and also increasing operating efficiencies.

The overall management of the electric utility industry also saw changes in the 1960s, after 30 million people on the East Coast suffered a crippling blackout in 1965. In 1968, the industry—private and public—formed the National (now, North American) Electric Reliability Council. Its job, through 10 regional reliability councils that span the United States, Canada, and northern Mexico, is to ensure reliability through the coordination of electricity producers, and to set "rules of the road" to keep the lights on. NERC collects and houses all of the data from the industry on their plans for adding capacity for generating and transmission; makes projections on decadal, as well as seasonal demand and capacity; and publishes annual reports which include the potential threats to reliable operation of the grid.

Electricity, unlike other commodities in the economy, can not be stored, but must be produced in real-time to meet demand. The transmission system must, at all times, carry just the amount of power for which there is a demand—no more and no less. In addition, from the standpoint of physics, electricity does not move in a straight path from where it is produced to where it is consumed. It flows over the path of least resistance. So the flow over every company's transmission line affects the flow over lines with which it is interconnected. Therefore, the careful and continuous monitoring of a regional grid is necessary, to either solve or isolate problems.

NERC developed the "rules of the road" for operations to which all of its members adhered. It was in their interest to preserve and enhance the integrity of the transmission grid, to the benefit of all—even if, at times, it was necessary for a member company to keep generation ready to use, or contribute other resources, at an additional cost. The private utilities functioned under a regulatory "compact," in which they were given exclusive rights to serve local customers, and were assured a set return on their investment. In return, they cooperated with state regulatory agencies to build the generating and transmission capacity to meet demand.

But in the mid-1980s, transmission additions began to lag badly behind new generation. Environmentalists invented scare stories that children near power lines were at a higher risk for cancer. The countercultural "not-in-my-backyard" mentality, where personal "feelings" replaced concern for the general welfare, stymied transmission projects. Some companies fought legal battles for 15 years to site new transmission lines, but most gave up. This increasingly untenable situation opened the door for all manner of snake oil salesman, like Enron and its ilk, to propose that the bottlenecks would be relieved if the "magic of the marketplace" were allowed to introduce "competition."

How the System Was Wrecked

The first part of the electricity triad (generation, transmission, and distribution) that was targetted for deregulation, was transmission. The justification for Federal meddling in what was historically a state responsibility, was that all transmission is interstate, because even if the wires are within state boundaries, the electricity from the local generators is co-mingled with power carried on out-of-state transmission lines—as a result of the path-of-least-resistance principle—with which it is interconnected. This gave the Federal Energy Regulatory Commission (FERC) the authority to start tearing down state regulation of transmission.

Deregulation has destabilized the transmission system in four ways.

First, in the 1990s, FERC, often acting to carry out the foolhardy requirements legislated by the Congress, began the destruction of state regulation, by making it mandatory for utilities that built and owned their transmission wires, to open them for use by other producers. Further, FERC mandated that they must charge the same price for the use of their wires to other producers and to their own customers. No longer could state planners and grid operators project what the demands on the transmission system would be—adding uncertainty to the delicate grid. No higher charges to out-of-state users of the grid were allowed, even though this put strain on the existing system.

Second, under deregulation, the grid has been turned into a superhighway of quick-buck energy trades and transactions. When Federal protections against monopolization of power by large financial holding companies were waived by FERC, huge mega-corporations, such as Duke Power, Southern Company, Mirant, and so on, were formed. As states deregulated and forced their local utilities to sell their generating capacity, these power pirates bought up generating capacity in states all around the country. The result became painfully clear in California, when people realized that most of the generating plants in the state were owned by out-of-state megalopolies, most based in Texas.

Owning generating plants from coast to coast, these unregulated companies were out to sell the cheapest power possible to any customers anywhere, which often meant shipping it hundreds or even thousands of miles, in a process called "wheeling." These so-called "economy transfers" involve the transport of power between two utilities that are not contiguous, with power flowing through the transmission wires of all of the utilities in between. Unlike the early days of transferring power, which allowed sharing to increase the reliability of the grid, these economy transfers have congested power lines, to the point that local utilities may not be able to deliver power in an emergency, because transmission wires are clogged to capacity thanks to the wheeling (and dealing).

NERC has been warning for years that the increase in these "economy transfers" was adding to the overload of the transmission system. In its Reliability Assessment for the Summer of 1998, for example, NERC's staff wrote: "Throughout the regions, parallel path flows from increased electricity transfers are stressing the transmission systems. These flows are at magnitudes and in directions not anticipated at the time the systems were designed."

Third, while these "economy transfers" have been clogging the lines, removing the margin of safety and flexibility in the system, deregulation has militated against new investments to expand and modernize the grid. When companies realized that they could make a financial killing by manipulating the deregulated California and other markets, that is where the "investment" money went. The price of electricity in the West finally settled at the Federal cap of $100 per megawatt-hour (MWh), which was a very lucrative threefold increase from the pre-deregulation price of $30 MWh. Companies stampeded to build more power plants, to get in on the rip-off. Comparatively, private companies have invested nothing in transmission, because the rates that can be charged are still regulated by states, and no one can get rich quick on regulated rates.

Fourth, with the stampede into building new power plants, companies are throwing up new capacity, but only building enough wires needed to connect them to the *local* distribution grid. This is like adding more and more on-ramps to a highway, to carry thousands of additional commuters from new suburbs to the cities, without ever widening the highway itself.

NERC projects that, over the next 10 years, about 10,000 new circuit-miles of high-voltage lines (230 kilovolt and higher) are planned for construction throughout North America. This represents a mere 5 percent increase in total installed capacity over a decade; meanwhile, consumption, even in this depression-wracked economy, will continue to grow at a minimal 2 percent per year. NERC explains in its "Reliability Assessment 2002-2011" report that "most of these additions are intended to address local transmission concerns or to connect proposed new generators to the transmission grid, and will not have a significant impact on its capability to transfer electricity over long distances."

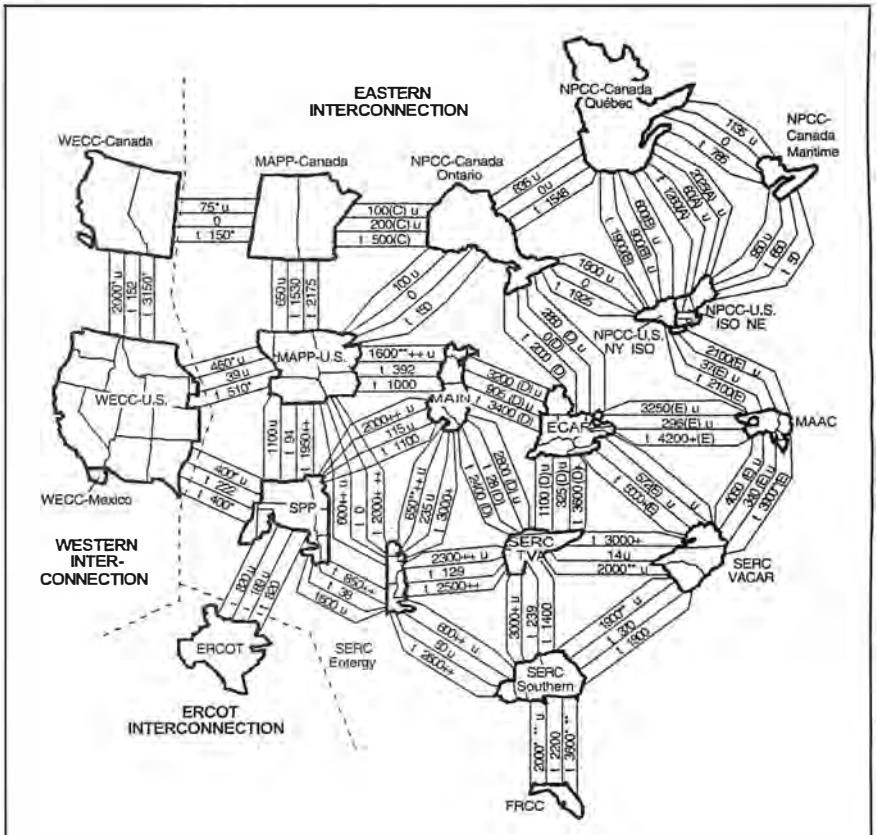
So, now the nation faces a projected need of $50 billion to $100 billion over the next decade to expand, upgrade, and modernize the high-voltage electricity transmission system. How are Congress and the White House proposing to deal with this national emergency?

Medicine to Kill the Patient

Soon after George W. Bush entered the White House, it was made public that Vice President and energy magnate Dick Cheney would head an executive task force to "solve" the energy crisis. Interviewed on "Fox News Sunday" on Jan. 28, 2001, Cheney was asked by interviewer Tony Snow what his solution would be in California. Cheney replied, "I'm a believer in markets, and I think the notion of deregulation is basically sound."

The next day, President Bush convened a meeting in the White House and established the Energy Policy Development Group chaired by Cheney, to come up with a short-term plan for the energy crisis, and produce a report recommending a national energy policy. Over the next two years, the "Cheney Group" held secret meetings with Enron and other "energy" executives, which would become the subject of a lawsuit. *The New York Times* reported on May 16, 2001, that on the day the National Energy Plan was released, questions were being raised about the group's "mysterious ways," amid accusations that it had met in secret mainly with energy industry moguls who would benefit from its recommendations.

Cheney's energy plan centered on controversial proposals such as oil and gas drilling in the Alaska National Wildlife Reserve and offshore, which garnered most of the headlines. These have been vigorously opposed by many, including Democrats, environmentalists, and the President's brother, Gov. Jeb Bush of Florida. Few really thought the



THE THREE REGIONAL INTERCONNECTIONS

The U.S. electricity transmission grid is organized into three regional Interconnections: the Eastern (from the Atlantic Ocean to the Rocky Mountains); the Western (west of the Rockies); and the Ercot (Texas). This intricate network of 200,000 miles of high-voltage lines operates under the coordination of the North American Electric Reliability Council.

Source: *2003 Summer Assessment*, North American Electric Reliability Council

drilling was necessary, or that there would be an "oil crisis." Of course, few knew then we would be going to war with Iraq, and potentially with other oil-producing states.

The first Cheney Group proposal concerning electricity, contained in both the House and Senate energy bills that finally passed just this spring, is to repeal the Public Utility Holding Company Act. FERC has already weakened the 1935 Act, by granting waivers of its anti-trust provisions, so that new mega-corporations to control energy supplies could be created. With repeal, all protections against financial manipulation, pyramiding, and speculation would be gone.

Second, Cheney proposes that to "increase reliability" of the transmission grid, FERC should take control from the existing state and regional regulatory bodies, and create one big nationally integrated transmission grid. The report describes the transmission system, not as the lifeline for delivering power, but as the "interstate highway for commerce in electricity"! The drafters of the policy were certainly aware of the need for investments in the transmission system, demonstrated by the California blackouts because of congestion on transmission Path 15. Within the FERC-controlled national grid, they proposed "incentives" for investments, which FERC can implement through "innovative transmission pricing proposals." "The market" replaces government's responsibility for investment.

U.S. Atomic Eenrgy Commission

What we need to combat blackouts, is more of this! The Rancho Seco nuclear station under construction southeast of Sacramento, Calif. in 1974.

The RTO Scam

Since 1999, FERC has proposed that the next phase of deregulation (actually, transfer from state oversight to Federal control) of the power grid is to get the utilities and statewide grid operators to form Regional Transmission Organizations (RTOs). The ostensible reason is to improve efficiency, by integrating the three regional transmission systems (see map, page 22), and introducing "competition" to lower prices. (Remember Enron's promise that California's deregulation would lower prices by 50 percent?)

RTOs would be responsible for operational control of this super-grid; would administer their own transmission tariffs, or charges for use; develop market mechanisms to manage congestion; etc. What gives teeth to this proposed structure is FERC's so-called Standard Market Design (SMD). This would allow national transmission assets to be doled out by "competitive bidding." So, if a local community does not bid high enough to use *its own transmission lines* during a period of congestion, it will not be able to bring power to its own local customers, while national power marketers use its lines to wheel electricity around the country.

The RTOs would run the market for electricity transmission, which would not only reflect the production and transmission cost, but the "cost of congestion" on the grid. Retail wheeling, from utilities to faraway customers, would be the mechanism to supposedly "lower prices." It has been described by the Edison Electric Institute as "wheeling money." This gameplan would raise electric rates in parts of the nation, such as the Northwest and Southeast, where rates are low; and, therefore, it is opposed by Congressional delegations from those regions, both Democrat and Republican.

Instead of providing emergency large-scale funding to expand capacity, this setup will, no doubt, spawn a derivatives market to take bets on when and where the grid would be congested. Enron had made an art out of manipulating the congested transmission grid in California: It faked electricity transaction sales that would have increased congestion if placed on the grid, thus allowing it to get paid by the Independent System Operator to *withhold* the (imaginary) power, in order to avoid the congestion. The possibilities for looting are limitless.

The House and Senate have passed different versions of the energy bill. When Congress returns from its summer recess, it will have to go to conference and produce a negotiated compromise. But Democrats are opposed to the Alaska National Wildlife Reserve proposal; Republicans are opposed to more conservation measures; and there is a bipartisan battle over RTOs and other measures. President Bush has said that he hopes to have a conference energy bill on his desk 20 days after Congress reconvenes.

It would be best if the entire energy bill were tossed in the trash, and LaRouche's Super-TVA implemented, before the next blackout.

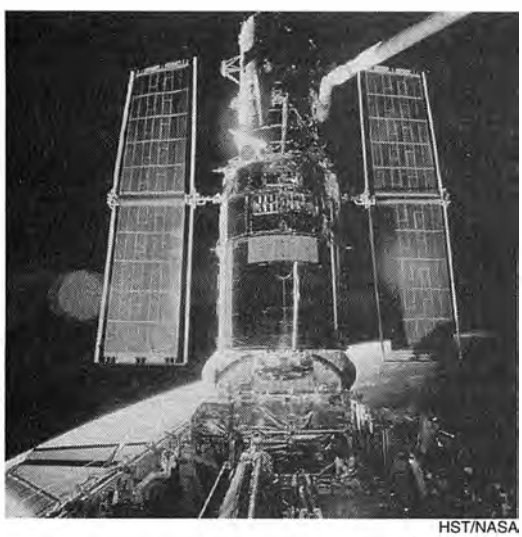
SCIENCE FOR TEACHERS

Dr. Michael Rappenglueck

Visualizing The Complex Domain

by Lyndon H. LaRouche, Jr.

May 30, 2003



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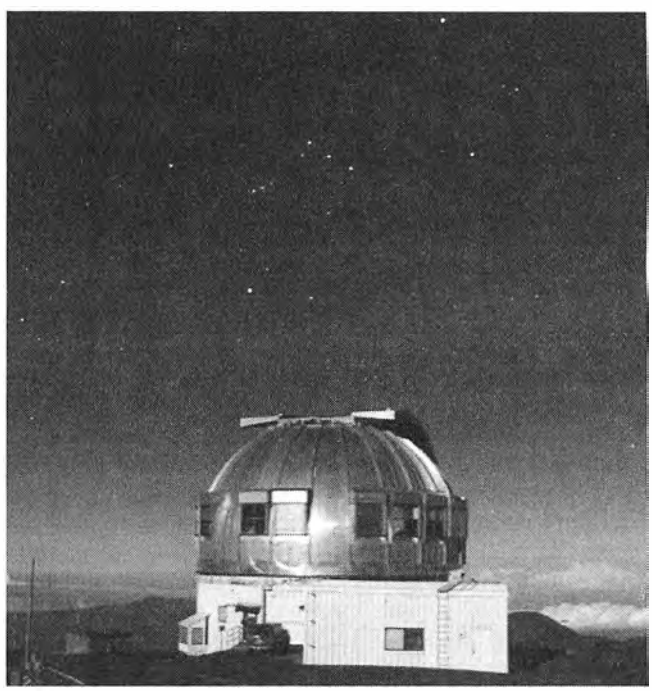

Robin Phillips/UKIRT, Mauna Kea Observatory, Hawaii

"The oldest known precedent for what we call 'physical science' today, is reflected in ancient astronomical calendars."

Clockwise from top left: (A) Cave drawing at Lascaux, France, ca. 14,500 B.C., thought to depict the constellation of Taurus the bull, with a map of the Pleides over its shoulder; (B) Stonehenge in England, ca. 2800 B.C., an ancient astronomical site; (C) remnant of Ulugh Beg's observatory in Samarkand, ca. 1420, where this large marble sextant was used for astronomy measurements; (D) one of five astronomical observatories built by Indian astronomer-king Maharaja Jai Singh II of Jaipur, ca. early 1700s to measure celestial positions; (E) Carl F. Gauss with his telescope, ca. 1800; (F) the U.K. Infrared Telescope, one of many different telescopes at the Mauna Kea Observatory in Hawaii, with Orion in the background; (G) The Hubble Space Telescope, photographed from the Shuttle during a servicing mission.

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I shall show here, that the unstated, but implied aspect of the charge which Carl Gauss delivered in 1799, against D'Alembert, Euler, and Lagrange, lies in the implication, that the latter were virtually Satanists, that in the sense of the philosophical tradition of both the medieval William of Ockham and those founders of modern empiricism, Venice's Paolo Sarpi and his personal lackey, Thomas Hobbes's teacher Galileo Galilei. I shall show here, without exaggeration of any kind, that that charge of Satanism is not merely relevant, but must be emphasized, to bring into focus the implicit, most essential features, and political importance, of Gauss's argument respecting mathematics itself. I shall also focus some exemplary attention on the leading role of empiricism in producing those widely accepted, incompetent doctrines of economy, such as contemporary monetarism, which have played a leading role in bringing about the 1971-2003 collapse of the economies of the Americas, Europe, Japan, and elsewhere.

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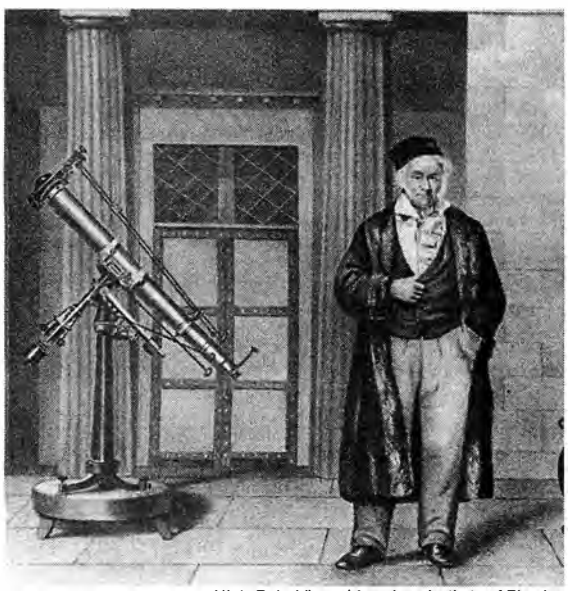


Niels Bohr Library/ American Institute of Physics

As I have shown in locations published earlier, the crucial quality of functional significance of philosophical reductionism, such as empiricism, for physical science, is that it attempts to uproot knowledge of the existence of what the celebrated geobiochemist V.I. Vernadsky identified as those *noetic* powers of the human mind which distinguish human beings from beasts.[1] Within the realm of political science and law, that denial of the distinction between man and beast, is the philosophical basis for Satanism.[2] Typical are the Synarchist and kindred followers of G.W.F. Hegel and Friedrich Nietzsche.[3] In a narrower aspect of that specific issue, as implied by Gauss's devastating exposure of a fraud in the work of Euler and Lagrange, the specific philosophical expression of Satanism called empiricism, is the axiomatic basis for not only that radical positivists' aberration which is known as the so-called "new math," but what has been usually recognized, even earlier, as today's generally accepted classroom mathematics, and the economic fads of the positivists.[4]

Within the bounds of a narrowly defined physical science, the corrupting influence of empiricism, is its role as the doctrine of today's politically powerful echo of the "ancient Babylonian high priesthood." That priesthood's tradition's modern role in science is such, that even many presumably sophisticated students and experts in physical science, are often victims of their own fearful sense, that no argument by them on mathematical-physics subjects, will be tolerated among their so-called community of professionals, unless the submitted argument confines itself within the axiomatically aprioristic, soulless bounds of the currently prevalent, reductionist (e.g., empiricist) notions of classroom mathematics. The same perversion is at the root of today's widespread "two cultures" syndrome of academic life: the categorical separation of the usually taught practice of the so-called mathematical sciences from the so-called liberal arts.[5] That commonplace folly of both academic mathematics and so-called liberal arts today, is the widely accepted, and intellectually crippling premise of the victim's propitiatory effort to secure either academic, or popular acceptance for the social expression of his, or her views.[6]

In mathematical physics, for example, submission to that kind of popularized classroom and textbook convention, is the common source of the failures of attempted academic "de-mystifications" of the complex domain, as the latter domain was properly defined by Gauss, Riemann, et al. I have made reference to the specifically pro-satanic roots of empiricism here, to force the reader's attention to the usually unsuspected moral effect of the efficiently corrupting, false principle underlying the empiricist mystification still prevalent in the university classroom, as elsewhere, today. This mind-numbing influence spills over from mathematics, into such forms as the evil done to the 1965-2003, growing influence of the "free trade" fads of such centers of gnostic sophistry as the American Enterprise Institute. It is commonly expressed as today's customary misapplication of statistical financial accounting to economics generally. The pernicious effect of carrying those statistical fads to their limit, is notably widespread, as expressed by the Enron and other examples of the proliferating effects of empiricism on social and political practice today.

As I shall show here, the influence of such reductionist currents of popular opinion is such, that the attempt to teach Carl Gauss's 1799 treatment of the fundamental principle of algebra, would often fail, simply because the teacher were lured into attempting to prove the existence of the ontologically complex domain within the bounds of the presumptions which bow to the currently most widespread classroom and related opinion. Classroom opinion on many topics is widely polluted, still today, by the prejudice, that all must be proven according to the popular presumption that truth lies ultimately, axiomatically, in the domain of the so-called "real" counting numbers of simple sense-perception, as distinct from the

1. Lyndon H. LaRouche, Jr., *The Economics of the Noösphere* (Washington, D.C.: EIR News Service, 2001).
2. As I shall show in the course of unfolding this report, this use of the term "Satanism," is not a matter of any one variety of religious belief. It is also a category of political, and, as I show here, also physical science. Otherwise, apart from the matters I address in this report, its expression in various forms is among the topics of the political practice of law, or, as in the case of cults associated with Britain's Aleister Crowley or Synarchist occultism, may pop up as a subject of public safety or even national security concerns.
3. Cf. Lyndon H. LaRouche, Jr., et al., *The Children of Satan* (Washington, D.C.: LaRouche in 2004, 2003).
4. The Bertrand Russell who was usually in error on matters of actual science, was nonetheless correct in stating that positivism, such as that of Ernst Mach, was merely another name for radical empiricism. The same should be said of reductionism generally. The function which empiricist thinking generated as the evil of the utopian social doctrines of Bertrand Russell, Norbert Wiener, John von Neumann, and MIT's Marvin Minsky, expresses the connection between empiricist thinking in mathematical physics and satanic qualities of wickedness which that mathematical mind-set generates in the domains of art and social practice. The presently continuing influence of the systemically pathological economic dogmas of Wiener and von Neumann, is typical of the worst effects on world and national economies today.
5. The allusion is to C.P. Snow's *Two Cultures* (*Two Cultures and the Scientific Revolution*, London and New York: Cambridge University Press, 1993 reprint.
6. For example, many brilliant, original discoverers among experimentalists spend years of their life seeking to secure "peer review" acceptance of their experimental successes, by distorting their discoveries in ways which are intended to make such opinions acceptable to the sterile Babylonian priesthood of the contemporary, reductionist, "peer review" mafia. The case of the hounding to which the friend of Albert Einstein, the brilliant Kurt Gödel, was subjected, at the Princeton Institute of Advanced Studies, by the hyena-pack of Bertrand Russell's ideologues, is representative of the general pattern.

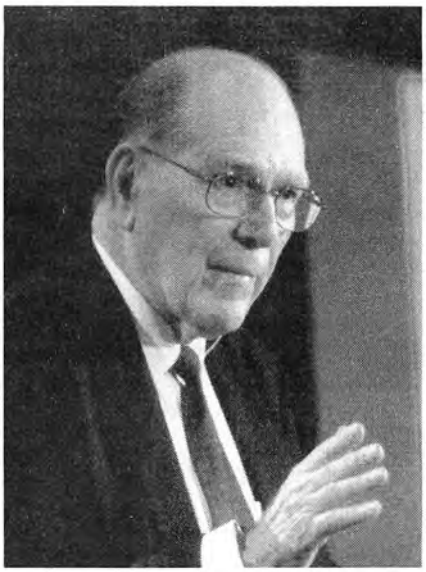
AUTHOR'S NOTE

A discussion during the question period of a Hannover, [Germany] event, prompted me to recognize the importance of adding explicit emphasis on what I wrote in the original publication (*Executive Intelligence Review,* July 11, 2003) of this item on the power/passion function, respecting the actual conception of thought-objects as recognizable ideas. I have now added a few relevant interpolations in the originally published text, *and appended a supplement on this point at the close.* I have also restored some edited-out paragraphing, where this was required to convey meaning.

—Lyndon H. LaRouche, Jr., July 21, 2003

higher standpoint which Euler and Lagrange maliciously libelled as the domain of "imaginary" numbers.

The point emphasized here, is that it would be an intellectually fatal tactical mistake, to attempt to show a devout reductionist an argument for the Gaussian complex domain "in terms he is willing to accept": terms which are bounded by the essentially linear, axiomatic assumptions of arithmetic reductionists such as Euler and Lagrange. Therefore, for such an errant discussion partner as one of the latter ideologues, only that kind of Classically Socratic argument for the relevant hypothesis, which would blow his beliefs apart *emotionally,* could actually show him the incurable folly of Euler's, and his own argument, as I do in this report. The use of this method of hypothesis means attacking the falseness of the reductionist's fixed ontological assumptions, not in his choice of method, deductively, [7] but *epistemologically: emotionally, rather than merely deductively.*



Stuart Lewis

Lyndon H. LaRouche addressing a Washington, D.C. audience in a live webcast.

On this account, *epistemology,* it was the relevant specific virtue of that 1799 Gauss piece, which had prompted me to situate it as the cornerstone of the initial educational program of the youth movement. The immediate issue of the dispute over that piece, from the close of the Eighteenth Century to the present day, has been, as Gauss's enemies themselves emphasized at that time, Gauss's insistence on viewing problems of modern mathematical physics from the standpoint of a Classical pre-Euclidean, *geometric* treatment of those same errors which Gauss exposed as the products of the "ivory tower" mysticism of Euler and Lagrange.[8]

For an example of the same mysticism I am attacking here, I point to the errant argument which was made, by Felix Klein, and others, Klein's false claim, that crucial features of Kepler's, Leibniz's, or Gauss's discoveries could be replicated by the errant methods of such followers of the Enlightenment philosophers Lagrange, Kant, and Laplace as Cauchy, Hermite, Lindemann, et al. The fraud implicit in the latters' attempts, is their vicious exclusion of the physical geometries of Leibniz, Gauss, and Riemann; so, the celebrated Maxwell confessed his politically motivated complicity in this matter of suppressing what he knew had been the crucial contributions of Ampère, Weber, Gauss, and Riemann to electrodynamics. This ethereal fraud by Maxwell et al., is typical of widely accepted hoaxes still presented, on record, in today's classrooms, reference works, and textbooks.[9]

That fraudulent mathematics of the reductionists is avoided, only when the underlying epistemological issues of counting numbers, such as those issues posed by Gauss's *Disquisitiones,* are situated within the realm of an essentially constructive, "synthetic" anti-Euclidean geometry. So, Gauss's work, employing his teacher Kaestner's anti-Euclidean geometry in this case, is the most crucial, make-or-break issue of modern mathematics to be posed for the student's competent introduction to modern mathematical physics. The exclusion of critical consideration of the axiomatically geometric roots of the orderings of numbers, was the premise of the relevant essential fraud perpetrated by Euler et al., and the common mistake of the credulous imitators of Euler's error today.

Such was the sad state of affairs in that education which had been made available to me prior to my own suspicions concerning some of what was taught to me in classrooms and related kinds of sources on these topics. My own contrary views, as I developed them within that relatively hostile intellectual environment, proceeded along the lines I present in these pages. Therefore, I insist today, that competent teaching requires that the teacher not rely on the putative authority of textbook material, but, rather, aid the student in reliving the successes of the original (source) discoverer's experience in making, or reliving the relevant physical discoveries being presented. I explain this point from my youthful experience as follows.

On account of what was, for me, initially a much simpler, adolescent's mere approximation of that same core issue

7. On another of those rare occasions when Bertrand Russell did not misspeak, he emphasized that reductionist inductive method is only borrowing against the presumed fruits of future deduction. So much for the delusion of "the inductive sciences."

8. The complementary terms, "pre-Euclidean" and "anti-Euclidean" geometry, represent a conception introduced to modern European science by a leading Eighteenth-Century mathematician, Gauss's teacher Abraham Kästner. "Anti-Euclidean" geometry in the sense of the geometries of Gauss, Riemann, et al., is defined at the opening of Riemann's 1854 habilitation dissertation. "Anti-Euclidean" geometries are specifically contrary to so-called "non-Euclidean geometries," such as those of Lobatchevski and Jonas Bolyai, which latter are reforms within the bounds of the principles of Euclidean *a priori* geometries. Cf. Foreword, by Joseph Ehrenfried Hofmann, to Abraham Gotthelf Kästner, *Geschichte der Mathematik* (reprint edition), (Hildesheim-New York: Georg Olms Verlag, 1970) pp. XIII-XVI. Hofmann's praise for Euler, D'Alembert, Lagrange, and Laplace, typifies the fraudulent opinion against both Gauss's teacher Kästner and Gauss, which persists to the present time.

9. According to the influential Klein, for example, the definition of the mathematically transcendental in general, and of pi, in particular, was originally accomplished by Hermite and Lindemann, working from what was, in fact, a fraudulent definition of that task, successively, by Euler and Lambert. In fact, the modern concept of that transcendental was first presented, in a critical treatment of the discoveries of Archimedes, by Nicholas of Cusa. The modern mathematical-physics definition of the transcendental, was introduced as an integral feature of Leibniz's proof for a principle of the origin of the infinitesimal, a proof integral to his catenary-cued definition of both natural logarithms and the principles of universal physical least action. Leibniz-hater Euler, by denying the existence of the infinitesimal, as, for example, in his 1761 *Letters to a German Princess,* created a fraudulent, radically reductionist substitute for Leibniz's infinitesimal, in Euler's own and Lambert's misstated definition of the "transcendental." Hence, Klein's pro-reductionist praise for the work of the reductionist followers of Lambert, Hermite and Lindemann. The indicated errors include those who present so-called mathematical models of Riemann surfaces without any indicated notion of the physical meaning of such a surface. On the discoveries of Ampère, Weber, Gauss, and Riemann, in opposition to the reductionists Grassmann et al., see Laurence Hecht, "The Significance fo the 1845 Gauss-Weber Correspondence," *21st Century Science & Technology,* Fall 1996; Jonathan Tennenbaum, "An Introduction to 'The Significance of the 1845 Gauss-Weber Correspondence,'" *21st Century Science & Technology,* Fall 1996.

which is posed by Gauss's 1799 paper, I have always stubbornly insisted, since my first moment of encounter with the "ivory tower" superstitions taught as the definitions, axioms, and postulates of secondary-school geometry, that the matter of the optimal design of a functioning, real world, structural beam, already suffices to point out that the nature of mathematics must be demonstrated from an experimental, *physical* standpoint, not *a priori* definitions, axioms, and postulates.

New York Public Library Picture Collection

Carl Friedrich Gauss (1777-1855)

Library of Congress

Bernhard Riemann (1826-1866)

Vladimir Vernadsky (1863-1945)

I point, now as then, to that experimental standpoint which, in fact, coincides with the relevant epistemological proofs of the experimental methods of hypothesis presented in Plato's Socratic dialogues, and echoed in the Apostle Paul's I Corinthians 13. Then, in my adolescence, and, later, until early 1952, even before I came to actually master some part of the crucial, axiomatic aspects of the work of Gauss, Riemann, et al., I was already prudent enough to limit the claims which I presented in my arguments, to the same Classical epistemological premises which I have continued to employ since, as here today. The spontaneous, childish ridicule unsuccessfully heaped upon me by foolish teachers and classmates then, more than sixty-five years ago, in the secondary classroom's response to my rather obvious statement of fact to that effect, had only succeeded in convincing me, rightly, of the backwardness of both the popular and classroom culture of that time.

Since the post-war 1940s, I have developed and adopted a progressively refined form of that same epistemological proof in all of my principled arguments respecting art and physical science. I restate it here in the same frame of reference I came to know it during 1948-1953, including, especially, through the addition of my 1952-1953 comparison, and contrast of the standpoints of the 1880s work of Georg Cantor and, the methods I prefer to Weierstrass and Cantor at the latter's pre-1890s best, those of Bernard Riemann.

My leading motive for restating that case here, is to expose the nature of the mental block which I have observed as a frequent cause of the student's failure to grasp the deep implications of Gauss's 1799 paper. It is the need to strengthen our youth movement's higher-education program on this pivotal topic, on which my attention is focussed here. However, the same argument is also needed by the wider audience which I include here.

On that account, as I shall show, although the topics implicit in Gauss's 1799 paper have been much more than merely ably presented by a number of my collaborators, Dr. Jonathan Tennenbaum, Bruce Director, and some of the youth themselves, I think an additional degree of improvement in our program is needed. The epistemological issue of the functional difference between man and beast, should be presented more emphatically, as part of the argument, and with that degree of qualitatively greater emphasis which I employ here. In such topical areas within epistemology, I have become the relevant specialist. The deeper, epistemological issue, has been the intended, but sometimes merely implied feature of all of my published work, including my original scientific discoveries on the principles of economy, the crucial proof of the economic fraud of so-called "information theory," and related matters. Here, in this present report, I have thought it necessary to focus that same much-honed epistemological insight more sharply on the psychological aspect of the related physical-science issues of mathematics as such.

The interdependent set of issues so brought into focus, is as follows.

1. What, Physically, Is the Complex Domain?

The subsuming, pivotal question implied by Gauss's 1799 paper, is: *What is the nature of human knowledge?* In other words: *What is the experimental evidence which demonstrates, that the existence of the human species as we know it, depends upon some universal principle of human individual and social behavior, a principle which is lacking in all other living species?*

Proceed to that end by successive approximations.

Begin by taking as an example, a comparison of the construction of a solution for the task of doubling the cube, as solved by the ancient Archytas, with the modern approach represented by Gauss's 1799 exposure of the folly of Euler and Lagrange on this point. When Gauss's solution for the ontological problem of Cardan's algebraic approach to cubic roots (as already solved geometrically by Archytas) is used to demonstrate the principle already at work in the axiomatic issues of doubling the line and

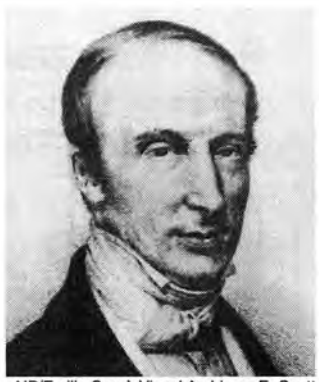
10. Plato, arguing from the standpoint of pre-Euclidean notions of physical geometry, defined the concept of "power," as reflecting those discoveries by means of which the human mind is able to increase the power of man's willful action upon the universe. (e.g., *Theaetetus*). This notion of "power" was opposed by Plato's famous opponent, that sophistical reductionist Aristotle, who introduced that reductionist's notion of "energy" employed in reductionist thermodynamics since Clausius, Grassmann, Kelvin, et al. Cf. Antony Papert, private comments and lectures on Greek language and history.

AIP/Emilio Segrè Visual Archives

Leonard Euler
(1707-1783)

AIP/Emilio Segrè Visual Archives, E. Scott Barr Collection

Joseph Louis Lagrange
(1736-1813)



AIP/Emilio Segrè Visual Archives, E. Scott Barr Collection

Baron Augustin Louis Cauchy
(1789-1857)

square, the existence of the complex domain, as a domain of efficient *power* (in Plato's sense of the notion of *power),* we must recognize that the physical reality of Gauss's argument was already clearly, and conclusively shown by the pre-Euclidean Classical Greeks working in the tradition of Pythagoras.[10] The task assumed by Gauss in 1799, was to unveil that same ancient principle of pre-Euclidean (e.g., anti-Euclidean) geometry within the frame of reference of modern, post-Fourteenth-Century mathematical physics.

In other words, as I shall clarify this significantly below, modern mathematical physics must recognize those historic circumstances specific to the history of modern economy, which prompted the successive steps of development, chiefly by the efforts of Gauss, Dirichlet, Abel, and Riemann, of solutions for the higher principles of a general notion of physical space-time curvature.

Modern developments, since that Fifteenth-Century European Renaissance which founded modern European civilization, have presented us with a new form of practical, social expression of the same issues of physical geometry treated by Archytas, Plato, et al. The succession of developments from such Renaissance founders of modern science as Nicholas of Cusa, Luca Pacioli, and Leonardo da Vinci, and their outstanding, avowed follower, Johannes Kepler, created those Seventeenth-Century foundations of the valid mathematical physics developed by Gottfried Leibniz and his associates.

Unfortunately, the subsequent gaining of relative political hegemony by the contrary, decadent, pro-empiricist political currents of Eighteenth-Century Europe's so-called "Enlightenment," provided that century's empiricist followers of Sarpi, Galileo, and Descartes the opportunity to nearly succeed in destroying science.[11] The already referenced, two skilled "ivory tower" formalists of that time from among mathematicians, the fanatical hoaxsters Leonhard Euler and Lagrange, led that fraudulent attack upon Leibniz which, fortunately, Gauss refuted, essentially, in his own 1799 paper.

Napoleon Bonaparte's accession to what is to be termed today a fascist form of imperial power, and his sponsorship of presentation of the empiricist dogmas of Lagrange, produced the opportunity and precedent for a new, Eighteenth-Century attempt to destroy Classical forms of modern French science. This assault was continued with increased force in the post-1814 role of the British-founded, French Restoration monarchy's favorites, Laplace and Cauchy, in their attempt to eradicate the original, Leibnizian program of the Carnot-Monge geometric tradition of the Ecole Polytechnique. That same hoax was continued in such forms as the savage attacks on the foundations of modern European science by the combination of the British empiricists and neo-Cartesian followers of Lagrange's assault on the Leibnizian roots of France's Ecole Polytechnique. As a result, since that time, especially since the hoaxes of Clausius, Grassmann, Kelvin, Helmholtz, et al., that form of the conflict between good, Classical science, and empiricist hoaxes in the name of science (reductionism), has persisted to the present day. Usually, reductionism has prevailed politically, so far.

That much said on those pivotal historical features of those problems of modern science, I return to the trail of my principal, ontological argument here.

Two elementary modern discoveries of physical science illustrate the method *already employed by such ancients* as the Pythagoreans and Plato to solve such elementary paradoxes as the doubling of the line, square, and cube, and the uniqueness, by construction, of the five Platonic solids.[12] The most elementary, and crucial *modern* applications of the same Classical method, are Kepler's uniquely original discovery of universal gravitation and the elaboration of Fermat's principle of universal quickest action, as continued through Leibniz's original development of the infinitesimal calculus, and as the catenary-keyed universal physical principle of least action.

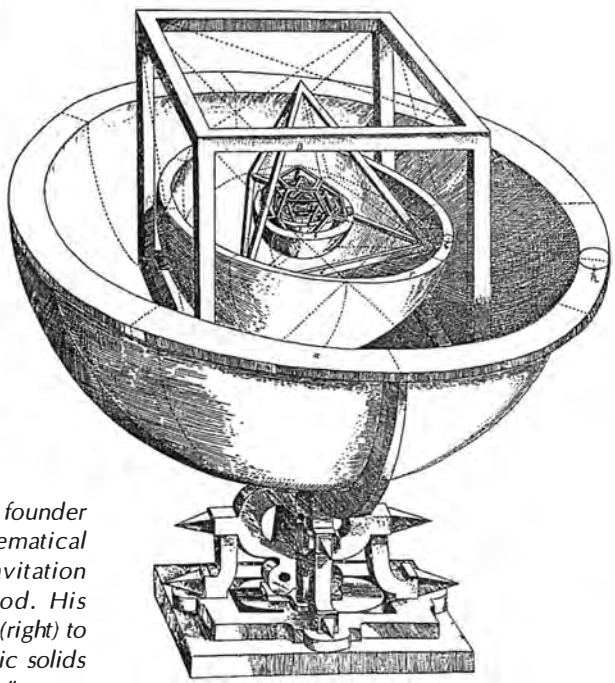
These works of Kepler, Leibniz, and their like, were the discoveries fraudulently attacked by those pro-satanic modern sophists known variously as the empiricists, Cartesians, Physiocrats, phenomenologists, and existentialists.[13] The role

11. The method of Descartes is to be treated as a variant of empiricism.

12. Again, Plato's notion of "power," as opposed to the "ivory tower" metaphysics of so-called "energy."

13. Since this report was drafted, my associate Michael Liebig has stoutly and correctly emphasized his thesis, that the continuing root problem of European civilization, still today, is what Socrates and Plato attacked as the essential form of pure evil in their time, the sophists, and, I add, such predecessors of the sophists as the reductionist Eleatics, such as Parmenides, and the Delphi Apollo cult. The modern reductionists, such as the empiricists, are essentially a continuation of that popularized cult of sophistry which destroyed the civilization of ancient Greece, and also Rome, from within. This sophist tradition is the same acid by which contemporary European civilization, including that of U.S. popular opinion, has nearly destroyed the U.S.A. and Europe from within, over the recent four decades. Sophism were better understood as a typical synonym for the generality of the methods of reductionism.

Illustration by Jan van der Heyden, courtesy of New York Public Library Prints Division



Reproduced from Kepler's 1596 *Mysterium Cosmographicum*

Johannes Kepler (1571-1630), the founder of astrophysics and modern mathematical physics, discovered universal gravitation using an anti-Aristotelean method. His ordering of the orbits of the planets (right) to cohere with the ordering of Platonic solids was not based on "sense perception."

of the cult of "free trade," is typical of the way in which such forms of what I shall expose here as pro-satanic forms of belief, induce a people, such as many in our U.S.A., to tend to destroy itself, as by a flight from being the world's leading productive power, to the floundering, post-1964 decadence of our predatory, pro-imperialist, consumerist culture, an increasing moral, cultural, and economic decadence, which took over control during the 1964-2003 interval to date. Look at the two cases, gravitation and least action, successively, as cases which illustrate a crucial, most elementary ontological principle of all competent scientific method. Failure to grasp the elementary principle expressed by those cases, would cripple all subsequent attempts to define a scientific way of modern thinking in general.

As our association's educational program has emphasized in its work to date, Kepler's observation is typical of all valid scientific method, in pointing out the scientifically fatal errors of judgment common to the pro-Aristotelean astronomy of Claudius Ptolemy, Copernicus, and Tycho Brahe. Contrary to the mathematical presumptions of those pro-Aristotelean astronomers, the planetary orbits were not only elliptical, with the Sun situated as one of the foci; but, the motion along the orbital trajectory was constantly non-uniform. As Kepler emphasized, explicitly, this evidence demonstrated, among other things, that that product of reductionism known as Aristoteleanism, was fraudulent.[14] Aristotle's "apriorism," which degraded knowledge to the mere describing of sense-perception, was proven false by a more competent study of certain kinds of irregularities in the observed phenomena themselves. Kepler's discovery of gravitation was the point of origin of such crucial later developments as Leibniz's uniquely original discovery of the infinitesimal calculus, and, as I shall emphasize here, of the crucially pivotal concept of a Riemann Surface Function.

The sophist (reductionist) method denies the existence of knowable truth, as the ancient Aristotelean hoaxsters denied such knowledge, for astronomy or otherwise, and the famous modern hoaxster, the empiricist neo-Aristotelean Immanuel Kant did.[15] The reductionist insists that we actually know only that which is presented to us by our senses.[16] Contrary to the sophists, the measured characteristics of the compared planetary orbits of Earth and Mars, sufficed to exemplify the proof that we do not know physical reality from our senses; we know reality through the specifically human power of hypothesizing, by experimental determination of the validity of those hypotheses which solve the contradictory paradoxes which often arise when we attempt to explain the behavior of the observed world by reliance on merely describing the experience of sense-perception.[17]

Shadow and substance! (*Passion!*) Gravitation is an experimentally proven hypothesis, which defines our knowledge of that universal physical principle as one which can not be detected directly by the senses, but which nonetheless efficiently affects the movement of those mere

14. Aristotle was deployed from Demosthenes' school of rhetoric, to bore from within Plato's Academy. His *Nicomachean Ethics* is typical of the sophist method. Claudius Ptolemy's scheme, which was based upon the fraudulent method of Aristotle, was an effort to destroy the most competent astronomy of that time, the legacy of Aristarchus and Eratosthenes. Kepler deals explicitly with the methodological fallacy of Aristotle in his own report of the discovery of gravitation. Aristotle's method is the reductionist method otherwise associated with the name of sophistry.

15. (Kant, previously a rabid empiricist from the school of David Hume, produced his series of "Critiques" premised upon a syncretic expression of empiricism incorporating the teachings of Aristotle.) Meanwhile, while this was being edited for release, my associate Bruce Director elaborated the same essential point, in contrasting it to the revolutionary discovery presented by Bernhard Riemann in the latter's 1854 habilitation dissertation. Cf. Bruce Director, "Defeating I. Kant," *Riemann for Anti-Dummies*, no. 47, at www.theacademy2004.com.

16. "That's only a theory!" is the typical protest of the sterile intellect steeped in the dogmas of simple sense-certainty. The curious fact of the matter, is that the advocate of such views miraculously fails to grow the tail which would manifest at least the species-sincerity of his doctrine.

17. Actually, as I have occasionally illustrated this point, this discovery by Kepler requires the implied notion of a Riemann Surface Function as the means for representing the mental image of Kepler's concept visually.

shadows which are the sensed aspects of our world. This points the mind of the intelligent observer to the fact, that our sense-apparatus is merely part of our organism. What our senses report to us, is, at best, the effect of action by the world outside on those sense-organs, not the image of that efficient action itself.[18] The senses show us, at best, shadows cast by a universe which exists beyond the direct observation of the senses. The domain of sense-perception presents us the mere shadows of the real principles which operate in a universe outside the domain of direct sense-perception. The same point was made in Plato's treatment of the doubling of the square (*Theaetetus*)[19] and the construction of the Platonic solids.[20]

Shadow and substance! (*Passion!*) Fermat discovered that the propagation of light follows a pathway of quickest time, rather than shortest distance. The continued refinement of that discovery, successively, by Huyghens, Leibniz, and John Bernouilli, most notably, led to Leibniz's interrelated discoveries of that principle of universal least action, which is the unique basis for the infinitesimal calculus, the related physical principle of logarithmic functions, and the role of the catenary as an expression of the most characteristic feature of what Gauss and Riemann later defined, successively, as the complex domain.

Both of the outcomes of those exemplary cases, Kepler's uniquely original discovery of the principle of gravitation, and Leibniz's defining of a universal physical principle of least action, defy that naive, false presumption which teaches that our senses show us directly the real universe in which we exist. These, and comparable discoveries of universal physical principle, show us principles by means of which we can increase our willful, and also visible control of the universe; but, they also show us the nature of that universal principle of physical hypothesis, the faculty of *noësis*[21] by means of which we are able to adduce the existence of, and effect the practical *(emotional)* mastery of those specific physical principles.

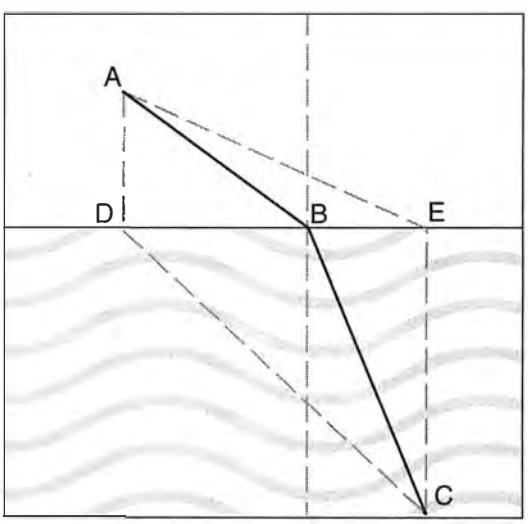
The acquisition of such efficiently practical knowledge of principles beyond the powers of sense perception, enables us to define the efficient function of sense-perception within that real universe which lies within nothing less than the complex domain, a universe beyond the shadow-world of sense-perception as such. Describe this relationship by aid of the following illustration.

The Case of the Nighttime Sky

The oldest known precedent for what we call "physical science" today, is reflected in ancient astronomical calendars. The derivation of the notion of science today, is traced in European civilization from a geometric study of astronomy which the pro-Egyptian Pythagoreans named "spherics." The notion of "universally efficient physical principles" today, is derived from study of the regular behavior of the "wanderers" of our Solar System, as seen against the background of the clearer moments of opportunity to view the nighttime stellar sky.[22]

As man begins to approximate a "normalization" of the nighttime sky, to compensate for the fact that any observation from a point on Earth, is viewing immediate sights from a point on the surface of a rotating and moving quasi-spheroid, our planet, a certain notion of what we call a "universe" emerges. The question is thus posed: What are we seeing, "up there"?

From a "normalized" position on Earth, the stellar display appears to lie on the interior surface of a spherical space of great, but undetermined radius. In ancient times, solar events seemed to many to be willfully insolent wanderers against the backdrop of an array of seemingly fixed stars, stars apparently lying along the internal surface of a celestial sphere. Call this upward-looking view of the universe, the relevant starting-point for mankind's notion of a universal *Sensorium,* a view of



Pierre de Fermat (1601-1665), French philosopher and mathematician, discovered that the propagation of light follows a pathway of quickest or least time, rather than least distance. A light ray beginning at point A in air, and entering the water at point B, will direct itself towards the point C in the denser medium, the total time of travel along the path ABC being the least possible.

18. Again, the image conveyed by the notion of a Riemann Surface Function.
19. On this, see, once again, Antony Papert on Plato's use of the notion of "power," here, in opposition to the reductionist term, "energy," subsequently introduced by Plato's adversary Aristotle.
20. In this instance, I reference Plato's treatment of the implications of that construction in his *Timaeus.*
21. Vernadsky's term for those uniquely human powers of creative reason, by means of which individuals discover those hypotheses which prove, experimentally, to be universal physical principles, principles which exist beyond the abilities of lower forms of life, and beyond the direct reach of our powers of perception.
22. The "deep pit" method used by Eratosthenes and others, provided a way of viewing the stars during midday. E.g., the method of observation employed to assist his celebrated estimation of the curvature of the Earth.

that universe as it is presented to our sense-organs. Those who made the mistake of assuming that our senses show us the real universe directly, tended toward the belief that the measurements of what could be read as constant angular, or straight-line motion of observed bodies, would be the simply statistical form of expression of laws directly governing the universe, lawful effects which were thus misinterpreted as merely lying within, confined to the bounds as of a universal *Sensorium* within which the existence of our Earth was presumably situated.

Similarly, as in the example of the typical modern dupe's misunderstanding of cyclical and related periodic movements within financial markets, the dupe assumes that charting those apparent patterns produces knowledge of supposed "laws of the marketplace." That dupe fails to grasp the point that financial markets, like sheep-shearings, are deployed to trap and strip the victim-investor by aid of the investor's own simple-minded cupidity, his foolish faith in "seeing is believing," as in his substitution of patterns of simplistic statistical readings for what should have been his attention to physically efficient causes of effects.

That said, turn one's attention in two directions. In one direction we have, contrary to the reductionists, those more insightful ancients who viewed the universe within the bounds of that Sensorium from a pre-Euclidean standpoint akin to that of Thales and the Pythagoreans. We have also, their proper successors, including the Aristarchus who demonstrated that the Earth orbitted the Sun, and the Eratosthenes who measured the curvature of the surface of the Earth (with remarkable approximation) by observations made from points, in the vicinity of the Mediterranean, on the surface of our planet. Then, we have modern science, which erupted within the Fifteenth-Century, Italy-centered Renaissance.

I shall bring our attention back to that fact at a relevant point, later in this report; for the moment, focus on the fact that this Renaissance revived ancient Classical Greek knowledge of the methods of physical science from the relative intellectual dark ages of Roman imperial traditions, and did this in the setting of giving birth to the first modern sovereign nation-states, those of Louis XI's France and Henry VII's England. This was also the birth of modern European civilization out from a long dark age which dominated Europe under the emerging Roman Empire and the subsequent prolongation of feudalism.[23] It was also the birthplace of modern science, as typified by the work of Brunelleschi, Nicholas of Cusa, Leonardo da Vinci, and their follower, the founder of the notion of a comprehensive modern mathematical physics, Johannes Kepler. The historical circumstances most relevant to this report, are, in summary, the following.

Gil Riviere-Weckstein

The courage of Joan of Arc in the Fifteenth Century made possible the first nation-state—a united France under Louis XI, which made it possible for the majority of the population to rise above the status of "human cattle." Here, a statue of Joan in Paris.

Although the fact of the Earth's orbitting the Sun was known to mid-Fifteenth-Century founders of modern experimental science, such as Nicholas of Cusa, Inquisition-ridden, post-A.D. 1511 Europe returned to the failed Aristotelean, "ivory tower" methods of astronomy of Claudius Ptolemy, Copernicus, and Tycho Brahe: until Kepler. All three of these pre-Kepler copiers of Aristotle's reductionism, portrayed the universe as lying within the apparent linear-statistical regularity of motion within the "internal surface" of the astronomical Sensorium.

Now, centuries later, the Sensorium is conceived in depth. It is imagined that an expanding universe of galaxies, and of highly complex and vast configurations within each galaxy is to be considered. However, such latter discoveries do not yet address the crucial question: Is the Sensorium, so defined, *self-evidently* real? This forces our attention to the function of the modern, pro-Platonic nation-state republic, in giving a needed new definition to the meaning of science.

23. The emergence of the modern nation-state out of the morass of ancient imperial Rome and ultramontane feudalism, is to be studied, chiefly, as an impulse toward the freeing of society from the Romantic's ultramontane notion of imperial law. This process is chiefly divided between two periods. The first of these steps toward freeing mankind from the ultramontane, is typified by the rejection of the fraudulent "Donation of Constantine," from Charlemagne through Dante Alighieri. That first period is treated by legal historian Friedrich August von Der Heydte's *Die Geburtsstunde des souveränen Staates* (Regensburg: Druck und Verlag Josef Habbel, 1952). The second phase is the birth of the modern sovereign nation-state republic during the course of the Fifteenth-Century Renaissance, as expressed by Louis XI's France and Henry VII's England. A comparison of the two cases has been made public by my wife, Helga Zepp-LaRouche.

What was the pathological assumption which prompted post-1511 official, relatively decadent, then predominant, Venice-centered, reactionary authorities in Europe, to attempt to turn back the clock of science to reductionist superstitions, such as the methods of Aristotle and William of Ockham? What is the simplest way of making clear the systemic features of that Venice-orchestrated rampage of moral decadence during the 1511-1648 interval of religious warfare? Consider the social origins of the decadence, first, and then focus upon the epistemological consequences.

As I shall emphasize here, the underlying political issue posed by the Venice-led attempt to reverse the progress of the Fifteenth-Century Renaissance, is the fight over the proposition: *Is man a higher form of beast, or a species categorically distinct from, and superior to all lower forms of life?* In other words, this issue is, once again: What is the functional nature of *specifically human knowledge, which sets the human species apart from the beasts?* What are the conditions under which the members of a culture are confronted with proof of such considerations?

The Fifteenth-Century, Florence-centered Renaissance is the historical benchmark which separates emergence of modern European civilization from the admittedly still lingering aromas of the declining, philosophically irrationalist, Romantic world of feudalism. The central intellectual figure of that revolutionary moment of historic change is Cardinal Nicholas of Cusa, whose *Concordantia Catholica* prescribed both an ecumenical reform of the then shattered Papacy, and the replacement of the feudal system by a community of principle among sovereign nation-state republics,[24] and whose *De Docta Ignorantia* provided the initial approximation of a comprehensive definition of what became known as modern physical science. The crucial complementary development to that effect in Italy, was the transition, pioneered by the courage of Jeanne d'Arc, which made possible the first modern nation-state, a united France under Louis XI. The second modern nation-state was England under Henry VII.

The correlated political development was Christopher Columbus's voyage of discovery, implementing a post-A.D. 1453 project which organized by Nicholas of Cusa, and carried out according to maps and other designs which Columbus planned and conducted, on the basis of materials he obtained from Cusa's collaborator Toscanelli. The irony of Columbus's 1492 re-discovery of the inhabited land across the Atlantic, was that it coincided with the precedent of that brutish savagery of tyrannical Spain's monstrous persecution of the Jews and Moors.[25] The latter brutishness opened the door for what has been called modern Europe's "little new dark age" of recurring religious and related wars of the 1511-1648 period.

Despite the brutish horrors of those chiefly Venice-orchestrated religious and related wars of the 1511-1648 interval, the secular thrust of the entire span of 1401-1789, and beyond, through all ebbs and flows, was the net progress, over the period taken as a whole, toward forms of society which liberated Europe from that prevalent degradation of the mass of humanity to the status of either hunted or herded human cattle. For the first time, the principle of *agape,* of Plato and Christianity, found expression in a notion of political society as rightly governed by that principle of natural law which appeared later as the fundamental constitutional principle of law in the Preamble of the U.S. Federal Constitution. That principle is expressed summarily by the combined names of an interdependent notion of *national sovereignty, general welfare,* and *posterity.*

This doctrine of natural law meant three things in practice. That a nation-state republic must be perfectly *sovereign.* That the rulers had no moral right to reign except as they were efficiently dedicated to the *general welfare* of all of the population, and that society placed the benefits to *posterity* above those enjoyed by the presently living. It followed, that although states must enjoy sovereignty, they are bound,

Philip Ulanowsky

Columbus sailed to the New World in a project organized by Nicholas of Cusa, using maps and materials from Cusa's collaborator, Paolo Toscanelli. This statue of the explorer stands at Columbus Circle in New York City.

24. *Concordantia Catholica* is, in principle, the successor to Dante Alighieri's *De Monarchia.* The latter, which reflects the totality of Dante's principal work, defined the proposed emergence of a form of national societies freed from the shackles of *ultramontane* 13th and 14th centuries Venetian-Norman feudal hegemony.

25. This expulsion of the Moors and Jews, was the crime against God and mankind which set the pace for the brutish self-destruction of 1511-1648 Spain, and for the subsequent eruption of Carlism and such fascist sequels as the pathological doctrine of Hispanidad.

according to natural law, to promote these three rights and benefits among all peoples; hence, those concurring conditions represent the basis in natural law for *a community of principle,* rather than a system based on the prescription of inevitable conflict, such as that of the empiricists Hobbes and Locke.

This Fifteenth-Century, Renaissance-led revolution in statecraft, as typified in approximation by Louis XI's France and Henry VII's England, was the date and place of the birth of actual political-economy. This birth of political-economy gave practical expression of a new, lawful definition of the proper nature of government of both the human individual and society. This notion of the state's moral accountability for fostering the general welfare of all persons and their posterity, is the birth of modern society, the progressive freeing of that former underclass, the majority of mankind, from the social-political, and economic status of being treated as virtually merely "human cattle."

It was this modern conception of natural law, rooted in a functional notion of the promotion of the general welfare of all persons and their individual and collective posterities, which is the basis for any competent notion of law and political-economy in particular, and of physical science in general. It is from the standpoint of the Fifteenth-Century notion of modern science, that we adopt the ancient Classical precursors of science, such as the pre-Euclidean Pythagoreans, as an imperfectly developed, but integral part of the foundations for emergence of a competent modern science today.

Earlier, that larger mass of mankind, which had been treated conventionally as hunted or herded human cattle, had few lawful rights under feudal imperial (ultramontane) law which differed little, even unwittingly, from those forms of rights accorded to fairly treated herded cattle. This same feudal doctrine, expressed by the Anjou-like Anglo-French *Fronde* tradition of the Sixteenth and Seventeenth centuries, was the premise of the neo-feudalist dogma of the Physiocrats, as defined axiomatically by Dr. Francois Quesnay. Quesnay's doctrine of *laissez-faire,* like that of Turgot, and of the Adam Smith who plagiarized his "free trade" dogma largely from France's Physiocrats, was premised on the proposition, that the serfs of the estate had no more rights than those enjoyed by herded, non-human cattle, and that, therefore, the profit of the estate was a magical expression of the Cathar-like benefit of the charter expressed by the patent of lordship over the estate held by that usually lazy parasite currently the decadent, aristocratic landlord or other titleholder to property-right or "shareholder value."

Prior to the new, modern conception of law, a notion of law typified by such works of Cusa as his inherently complementary *Concordantia Catholica* and his subsequent *De Docta Ignorantia,* the reduction of the foreigner and lower classes to the virtual status of human cattle, defined the latter as merely at the service of the ruling classes, as cattle are, rather than measuring society's performance in terms of the included benefits expressed in the uplifting of the whole population.

For example. Following the U.S. Civil War, the policies of education of the slave represented by the work of Frederick Douglass, were widely superseded by a doctrine which lowered the standard of education and intellectual life of the freed slave to the level sufficient for a workaday life of menial work. Earlier, the world's leading economist of that time, Henry C. Carey, documented the case, the pre-1865 U.S. national economy, had "lost money" on the work of the slaves, while the profits of that slavery were enjoyed chiefly by British interests and their American Tory accomplices. The ultimately catastrophic collapse of the internal economy of Italy under the slavery-ridden Roman Empire, is typical of the kind of false, merely superficial and temporary prosperity enjoyed by a nation which obtains the apparent prosperity of the few, through the looting of the land and persons of the many, which loots, thus, both that land and those lower classes which it treats as virtually human cattle.

The collapse today, of a U.S.A., which had been the world's leading producer-power under Presidents Franklin Roosevelt, Eisenhower, and Kennedy, into a predatory, decadent, ruined consumerist culture, reflects the ruinous effects of U.S.-directed post-1971 monetary-financial policies of the IMF on the nations of the Americas which those U.S.-directed IMF policies have driven to collapse. The parasite which thus destroys its host, is thus condemned to collapse out of its own reckless folly.

The principle of the sovereign nation-state gave the serf the right, taken from him by ultramontane feudalism, of being human, under a new conception of the law of sovereign nation-states. The development of the productive powers of the individual and the right to participate in the fruit produced by that development, became the *intent* of the natural law of the newly introduced institution, the modern sovereign nation-state. Under this law, the people and land of the nation were no longer mere cordwood to be consumed for the warmth of the oligarchs and their lackeys; the defense and improvement of the welfare of all the people and their posterity became the calculable form of obligation on which the continued authority of the government depended. That is the elementary expression, in first approximation, of the modern institution called political-economy.

Rendering this new order of society in that implicitly calculable form of organization, by defining political-economy creates the setting which was indispensable for the Fifteenth-Century birth of modern European science. The possibility of an improvement of the conditions of life of both current and future generations, depends upon the objective interdependency of two forms of specifically human activity, by means of which man accomplishes what no other living species can do, the effecting of willful increases of the potential relative population-density of the human species.

These two forms of activity are typified in their effect as, first, the efficiently used discoveries of universal principles, and, second, those insights into the principled role of Classical artistic composition, such as the Classical tragedy of Aeschylus, Shakespeare, and Schiller, in enabling society to intend to cooperate willfully and efficiently in efficient promotion and use of the benefits of physical-scientific progress.

The difference between those two cooperating impulses, is that *in the fundamental discoveries of universal physical principle, the individual creative mind is acting in individual relationship to the physical universe. In the principles of Classical artistic composition, the individual is acting in an emotion-driven relationship to the principles of those social processes*

Nicolaus of Cusa (1401-1464)

Gottfried Leibniz (1646-1716)

The founding of the U.S. Republic, based on the ideas of Leibniz and his Renaissance predecessors, created the conditions for modern physical economy, scientific and social progress, and a reference model for relations among nation states.

notion of "shareholder value" spread in modern nations today exists only as a specifically fascist doctrine of the Romantic law-tradition of the accomplices Hegel and Savigny, and their follower the Nazi Carl Schmitt. Like science, republican natural law measures intention and performance by nothing less than universal standards: specifically, the universality of mankind, and mankind's implicitly assigned role of exerting increasing control over, and responsibility for the welfare of mankind, and improvement of the universe we inhabit.

With the Fifteenth-Century Renaissance, the idea of man in the universe, as a universal being so expressed by willful practice, became the guide for those changes in mankind's practice which deserve the name of progress. With the 1789 adoption of the Preamble of the U.S. Federal Constitution, an impassioned moral standard was established for all modern European civilization, under which society obliged itself to regulate itself according to the measurable progress of its entire population, toward the improvement of the general welfare of all of its people and their posterity. With that continuation of the Fifteenth-Century Renaissance's founding of the modern nation-state, the 1648 Treaty of Westphalia, the 1776 U.S. Declaration of Independence, and the 1789 U.S. Federal Constitution, a form of lawful physical economy was invoked as a model of reference for a supreme law of nations, which, when served, represents a measurable form of the true nature of mankind. Hence, the very name of modern history, and the related notion of modern science, must be so dated.

through which society cooperates in the application of discovered universal physical principles. The benefits of those activities are the only actual source of what should be regarded as the physical form of economic profit by society. *There is no other source of true and legitimate profit than the combined benefit of the action of discovering and adopting these two kinds of universal principles.*

This view of science, within the context of political economy, forces modern society to confront itself with a new kind of view of the difference between man and the beast. As we can show clearly from the doctrine of Moses, the work of Plato, and the principles of Christianity, for example, exceptional individuals of earlier society were able to adduce an essentially correct definition of the nature of man which sets our species apart from, and above the beasts; but the modern nation-state republic, as seen in Nicholas of Cusa's *Concordantia Catholica,* was the first appearance of a form of society whose passions are efficiently ordered for the promotion of forms of progress consistent with the special nature of the human being, as a creature whose characteristic activity is the passion for discovery and application of those two classes of universal principles.

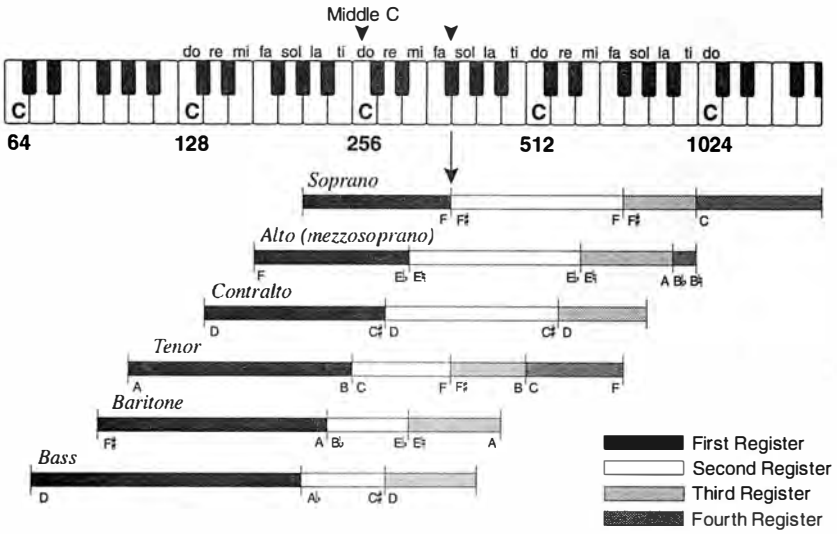
The modern sovereign nation-state republic, is a form of state which must be efficiently dedicated to that higher authority of the doctrine of natural law expressed as the Preamble of the U.S. Federal Constitution, which does not recognize the existence of a right to "class interest" by any social class; the

These missions of the modern republic can be accomplished in no other way than accumulated knowledge and use of those discovered universal physical principles which exist beyond the mere shadow-world of naive sense-perception. This proper view of mankind, its power, and its mission, begins when we seek those principles, of those two kinds, which, by their nature, are hidden from mere sense-perception, by knowledge of which man may reach out toward controlling the invisible ordering of events in the Sensorium which is reflected to our senses as the nighttime sky.

It was under those political preconditions, that modern science adduced the notion of the complex domain from the precedents of the ancient Platonic tradition.

2. The Complex Domain and Man's Immortality

The proof that the universe contains efficient universal principles which are not themselves directly objects of the senses, presents us with the need to think of the individual's relation-



Berlin Press Agency, 1930

The bel canto *method, which defines six types of human singing voices, and the social relationships this implies, is a necessary feature of Classical composition. Classical performance requires human thought and passion, not simply playing or singing the notes. The conductor Wilhelm Furtwaengler called this "playing between the notes," a quality startlingly evident in recordings of his performances.*

ship to nature around us in terms of two geometries. The first of those is what I have defined, in the preceding pages, as the anti-Euclidean form of the geometry of the universal Sensorium; the second is a geometry based on nothing but an experimental reading of the measurable relations within a set of inter-relationships among those discoverable, and experimentally validated universal physical principles which are generated by Plato's method of hypothesis. The first, is approximately the shadow-world geometry of sense-perceptual space-time. The second, is the unperceived universe of those actual principles which produce those paradoxical sensory effects which prompt the recognition of the existence of the unperceived, but efficiently existing universal physical principles. The two geometries are everywhere interacting.

We shall consider this, first, as it impacts the work of the physical scientist. Later, we shall turn to the matter of Classical artistic composition.

In the first of those two instances: The known interaction of those two geometries, perceptual and physical, is the effect reflected in modern mathematical physics as the notion of the actuality of the Gauss-Riemann complex domain. Within this combined notion, the relationship of the second, the physically efficient action, to the first, the physical geometry of the visible domain, is expressed as the shadowy impact of physical principles on the Sensorium; these, combined, are the subject of the general notion of a Riemann Surface function, as elaborated by Riemann on, chiefly, the foundations of Gauss's notions of the general principles of curvature.[26] For first approximation, consider this case for gravitation as Kepler defines it. Next, in second approximation, consider the evolutionary development of Fermat's concept of quickest time, the notion which was to appear in a more developed form as Leibniz's catenary-pivotted concept of universal least action.

Kepler situates the physical principle of gravitation with respect to evidence bearing upon the successive treatments of the implications of the construction of the Platonic solids by Plato,[27] Luca Pacioli,[28] and Leonardo da Vinci. Kepler proceeds from this insight into the ostensibly elliptical harmonic characteristics of the set of solar orbits, to make the first generalized leap of insight into what became known later as the physical nature of the complex domain. This insight led to Kepler's defining a set of orbital values characteristic of a necessary, but also necessarily exploded planet, lying in a designated orbit between Mars and Jupiter, an exploded planet which Gauss proved, nearly two centuries later, to be the remains known as the Asteroid belt.

These considerations by Kepler define an unseen, but efficient action occurring everywhere in the perceived Solar System, action causing that system to behave differently, at every visible point, than can be accounted for in terms of constant action among visible movements. Therefore, we must create the mental image of a new space-time, which, on the one hand, corresponds to perception, but, on the other hand, moves perceived action by the *intention* expressed as some *impassioned,* knowable, but imperceptible universal physical principle. The conjunction of these two actions, respectively shadow and substance, defines a new geometry in which both effects, perceived and causal, are combined as one geometry.[29] That becomes the complex domain of Leibniz's principle

26. Bernhard Riemann, "On the Hypotheses Which Underlie Geometry" (*Über die Hypothesen welche der Geometrie zu Grunde liegen) Bernhard Riemanns Gesammelte Mathematische Werke* (New York: Dover Publications reprint edition, 1953).

27. E.g., *Timaeus.*

28. E.g., *De Divina Proportione.*

29. Hence, what Euler mistakenly discards as "imaginary," is the real, and what Euler calls "real," is the product of the sensory imagination!

of universal least action, the complex domain as defined, successively, by Gauss and Riemann, in concert with their collaborators, such as Lejeune Dirichlet, and others, such as Abel, on whose work the product presented by Riemann depended in most significant degree.

Such is that quality of passion which separates true genius from pedantry, in both physical science and Classical artistic composition and performance.

I shall leave it to our collaborators to work through the pedagogical exercises required by the geometries my outline has thus implied. The included purpose of that assigned exercise, is to break through the barrier which separates simply perceptual visualization of events in sensory space-time, from the conceptualization of higher geometries arising from synthetic visualization of the unseen principle of action revealing its presence at each point. The reader's attention will be returned to some implications of that matter, below, after we have compared this case to that presented by the notion of a Classical principle of artistic composition. Therefore, reasons for this decision by me will be clarified a bit later in this report.

The Subject of Classical Irony

In an effective staging of a Classical tragedy, or of a Classical musical composition, the images on stage are superseded by a drama performed on the internal "stage" of the individual audience member's imagination. The comparison of the two stages, the shadows perceived and the imagined reality, involves contrasted human mental states analogous to the contrast between sensory perception and recognition of the unseeable universal principle governing the movements of that which is perceived. Every *successful* Classical performer, dramatic or musical, is implicitly aware of this, and is governed by a prescience of such relationships.[30] This is the key to the definition of all Classical artistic principles; it is also the key to all political practice which leads nations along an upward course of social self-development of the human species as a whole.

Those introductory remarks on the matter now immediately before us, are intended to point attention to a question: *What is the object which corresponds to the individual's mental act of hypothetical discovery of what proves, experimentally, to be a universal physical principle?* That mental act corresponds to what Vernadsky defines as (biogeochemical) *noësis.*

In true *noësis,* our subject is the existence of ideas which reside outside the scope of sense-perception; yet, they are definite, experimentally efficient ideas, of the same degree of distinctness, as ideas, as might be ascribed to any sense-perceived object.[31] These are referenced under the heading of *powers* by Plato.[32] Therefore, out of respect for the definite nature of such ideas of principle, I refer to these distinct conceptions as *thought-objects.*[33]

To hone my foregoing observation to a fine point: what is the *thought-object* represented by the act of discovery of a universal physical principle? What is the recognition of such a *thought-object* in one mind by another person? What is the kindred *thought-object* whose controlling presence defines the successful composition, or performance of a Classical tragedy, or musical composition, as distinct from the mere sensationalism of Romantic and modernist artistic composition or performance?[34]

Both of these compared types of *thought-objects,* physical and Classical-artistic, have the ontological quality we meet in my earlier references, here, to the original discovery of an experimentally validated, hypothetical physical principle. The best choice of introductory exercises for acquiring a sense of the equivalence of universal physical principles to the thought-objects of Classical artistic composition and performance, is the study of the collection of Plato dialogues. In that collection as a whole, the student encounters the thought-objects called *Platonic hypotheses,* which pertain to physical principles; the same method yields those insights, also called hypotheses, which pertain to the principles of social processes.

The latter class of insights into social processes, populate the domain of Classical artistic composition, and are, as I have often emphasized in earlier utterances, the key to recognizing the interdependency between Classical artistic composition and a competent force of a political science of history-making.

In Classical composition, as in the discovery of experimentally validated universal physical principles, the entire composition is both generated by a single act of insight, and never departs from being an expression of that single insight. Take a musical example of this principle. The late Beethoven string quartets Opus 131 and 132 are a work of genius even by the standard of Beethoven's best earlier compositions, the most notable, most coherent, and highest expression, to date, of a compositional principle of well-tempered counterpoint first defined by J.S. Bach. Properly apprehended, these compositions, properly delivered, like related cases of so-called "late" Beethoven compositions, fascinate the mind's powers of concentration, subjecting it to an *impassioned,* kaleidoscopic succession of exciting acts of discovery, as coherent development, from start to the aftermath of the close.[35] The ordering princi-

30. The task of the playwright or composer, is to foresee the arrangement of the shadows represented by the seen and heard action on stage, and to arrange those shadowy elements deployed in such an ironical fashion as to provoke the audience to search its own mind for the reality to which those shadows correspond. It is as if God arranged the visible motion of the Solar System to cause Kepler's mind to recognize the reality of a universal principle of gravitation. So, the adequate performer of a Classical musical composition crafts his or her performance to force the real intent of the composer upon the audience. The greatest conductor of the Twentieth Century, Wilhelm Furtwängler, referred to this as "performing between the notes."

31. Cf. B. Riemann, "1. Zur Psychologie und Metaphysik," *Bernhard Riemanns Gesammelte Mathematische Werke,* pp. 507-538. N.B. pp. 509-520.

32. A. Papert, op. cit.

33. There are those who recognize such thought-objects, and those who protest, "I Kant!"

34. Exemplary is the disgusting practice of "director theater" arrangements of Classical drama, the one more disgusting than the version it superseded.

35. The performance of any similarly qualified Classical composition, requires the performers, and audience, alike, to make the unfolding, unifying process of the completed composition "one's own." This is accomplished by reducing the entire composition's process of development, from an ominous moment of silence before its beginning, to a moment of silence at the end, to a single principle of development. The late Beethoven quartets are perhaps the best cases to consider from this standpoint. Instead of a succession of stages, there is a seamless process of transcendental development, a notion of development which expresses the unfolding of the entire composition as a single idea, an idea comparable to Kepler's notion of the organization of the Solar System.

ple which subsumes that succession, is a thought-object. That thought-object is the generating idea of the composition's unity of effect.

A great performance of a Classical tragedy has a similar effect.

That said, begin the definition of Classical composition in general with a crucial question: *How does the individual's mind discover the set of principles of both composition and performance; how does this relate to the individual's sovereign act of generating an experimentally validated universal physical principle?* In other words, *what is the feature of thought-objects which is common to discoveries of principle in both physical science and Classical composition?* How does the answer to that question make clear the reason why we must see Classical artistic and opposing forms of artistic composition (or, performance) as placed into qualitatively opposing categories. Classical and Romantic artistry are not contrasting views of art; they are different species of existence, opposing one another's existence in a way comparable to the interspecific sterility enjoyed between mammals and reptiles.

The key to the answer to that question so posed, is already reflected, typically, in the account of Pythagoras' definition of the musical *comma*. That account states that Pythagoras derived the proof of that *comma* by, in effect, comparing the division as of the octave, by a singing-voice and a monochord. In such an experiment, the comma is generated consistently only when the human singing voice is one developed to its naturally optimal potential by methods equivalent to that Fifteenth-Century Florentine *bel canto* singing-voice tradition associated with the musical knowledge referenced by the fragmentary remains of Leonardo da Vinci's book *De Musica*. The result is the same characteristic of the human singing-voice reflected in the systemic conflict between Bach's well-tempered counterpoint and the empiricist's equal-tempered keyboard.

In the Florentine *bel canto* tradition, for example, the act of placing of the tones and phrasing of the human singing voice, is established in memory as a set of *ideas* in the sense of Platonic thought-objects as ideas.[36] This notion of the *bel canto* singing voice, is the pivotal feature of Classical composition of not only music, but also, as the German and Italian Classical song and opera which the Classical poetry and drama of those musical compositions require. The same is the rule *of passion* for the composition and performance of poetry, or the musical substructure of what is to be delivered as the drama for the Classical stage.

There is some more, which is of crucial performance in distinguishing music as Classical art, for example, from a musical physics.

The *bel canto* musical scale divides the categories of human singing voices among six types of human singing voices, as determined by what are known as natural register-shifts, and otherwise determined by secondary differentiations within voice-types. The combined effect of these and related features of the properly developed natural potentials of the human singing voice, define music as a social, rather than an individual expression of the use of the human creative powers for generating and sharing experience of the generation of thought-objects as ideas. This set of social relations integral to the "chest" of human singing voices, and the essential role of counterpoint in Classical musical composition, defines Classical musical composition and performance, as a domain of Classical artistic composition, rather than a type of mathematical physics, even though the definitions of human thought-objects for Classical art and physical science are otherwise perfectly congruent.

Thus, as Bach's *Well-Tempered Preludes and Fugues* illustrate the case, the social characteristic of musical ideas is expressed by the principles of Well-Tempered counterpoint. On this account, Classical musical performance requires that instrumentalists impose the characteristics of the *bel canto*-trained human singing voice on the instruments; otherwise, the attempted instrumental aspect of performance of even Classical compositions degenerates into a mimickry of Romanticism, such as that of Liszt and Wagner, or even modernism. Competent performers never play the notes of the score; the score is a mnemonic device, a mere shadow of the Classical composer's intention, which must be back-translated into the process, the unifying thought-object, the principle, which is the intended composition as an indivisible single conception to be transmitted to the audience.

Insight into these functions of Classical musical composition derived from the natural, *bel canto,* characteristics of the human singing voice, leads into insight into the cognitive functions of the human speaking voice itself. These connections are best explored by attention to the role of Classical forms of sung prosody in ancient through modern forms of the poetry of sundry languages.[37] Modernist compositions and utterance of poetry and prose are an expression of forms of decadence which have resulted in the victims' critical loss of the ability to compose and utter such prosody, or even to compose the forms of spoken and written utterance required to convey what Percy Bysshe Shelley identifies as "profound and impassioned conceptions respecting man and nature." This loss of the power of intelligible communication of important ideas, has become increasingly acute in European languages during the course of the recent forty years since the beginning of the popularization of a "rock-drug-sex youth-counterculture" as a mode of attempted eradication of the influence of Classical culture.[38]

One of the notable effects of the post-1963 spread of the so-called "cultural paradigm-shift" among those entering

36. This conception of music is that which Kepler adopted from both the implications of Plato's treatment of the determination of the five Platonic solids and the treatment of the same matter by Luca Pacioli and Leonardo da Vinci.

37. Cf. the comparison of the modern Classical Italian and German modes of the *bel canto* human singing voice's application to Classical song composition. See: *A Manual on the Rudiments of Tuning and Registration, Book I: Introduction and Human Singing Voice*, Project Editors John Sigerson and Kathy Wolfe (Washington, D.C.: Schiller Institute, 1992)

38. In decadent forms of composition, or of misreading of Classical compositions, the passion is attached to the sensual effect of the perceived sensations; in Classical composition and performance, the passion is attached to the idea, the act of insight whose object lies beyond the limits of sense-perception as such.

adolescence in Europe and the Americas during the middle through late 1960s, is a widespread impairment of the literate use of language. Much of this impairment is a reflection of the destructive impact of the "rock-drug-sex youth-counterculture" on the sense of the role of musicality (i.e., *bel canto*-rooted prosody). This was aggravated by other, coincident factors. The latter factors included the shift of this generation away from the future-oriented culture of earlier generations, to the "Now Generation's" loss of a sense of personal historical perspective. The result of that qualitative moral down-shift in perspective, is that most of those now between fifty and sixty years of age have undergone an existentialist, emotional-intellectual impairment of the cognitive powers comparable to the synarchist cult's pathological "end of history" dogma.[39]

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Two peas in an empiricist pod: Thomas Hobbes (1588-1679) and U.S. Supreme Court Justice Antonin Scalia.

This accelerating cultural down-shift of recent decades, is reflected in a loss of that power of prosody in speaking which is rooted in the principles of Classical poetry and song, with a consequent diminution, or even loss of the power of communicating actual ideas.

The apparent exceptions to that aspect of a general cultural decline in recent generations' capacity for intelligible prosody, include the substitution of a kind of Romantic sing-song which is mistaken by the credulous for "pretty speech," a sing-song proffered as a substitute for the quality of utterance needed to convey the kinds of ideas typified by, but not limited to Classical scientific discovery of universal physical principles. In other words, the location of the passion is shifted from human ideas, to beast-like sensations of both objects and perceived monkey-equivalent moods (screaming, cooing, and so on) of other persons.[40]

Consider the exemplary case of the leading pro-fascist ideologue on the present U.S. Supreme Court, Justice Antonin Scalia. Scalia is notorious for his shameless admission of his denial of the existence of any historically defined principles of law, and for his repeatedly, publicly uttered, explicit insistence on a substitute for reason, in his "Orwellian," dictionary-nominalist dogma of what he calls "text." On that account, Scalia has flunked the reading of even the Preamble of the U.S. Federal Constitution.

Consider, for example, the principle of *sovereignty*.

The Irony of Sovereignty

It is notable that the empiricist Thomas Hobbes expresses explicitly his own and the positivists' seemingly instinctive abhorrence of irony in general, and metaphor most emphatically. As I have already noted, as the central theme of this report, the reduction of the definition of "rational" to a mechanistic, "connect-the-dots" kind of description of experience, has the effect, and intention of outlawing acknowledgment of the existence of any reality which is not a kind of "connect-the-dots" reading of sensory experience. Charlatans such as Bertrand Russell and his acolytes, such as Norbert Wiener, John von Neumann and their like, carry Hobbes' satanic dogma to an extreme.

Contrary to Hobbes's and Antonin Scalia's implied dictionary nominalism, only forms of human mental behavior fairly described as schizophrenic could assume that what might have been intended as a literal meaning of words encompasses human knowledge. The sane use of any language begs recognition of similarities to the Gauss-Riemann complex domain. Words are used literally, to designate perceptions of object-like subjects, or perceptions of emotional impulses.

39. The prevalent decadence of the so-called "Baby Boomer" generations of (most notably Europe and the Americas), is a reflection of the combined effects of the 1961-1964 succession of such events as the Bay of Pigs, Cuba Missiles Crisis, Kennedy assassination, and launching of the official U.S.A. war in Indo-China. The flight of relatively privileged strata of emerging post-adolescents into the rock-drug-sex-counterculture, was merely one of several expressions of the decadence this experience promoted among those recruited from numerous socio-economic strata currently in their 50s or 60s. The commonly underlying feature of the sundry is what is fairly described as a special kind of cultural "desensitization." The result was the assortment of expressions of flights into crude sensationalism, including neurotic flights from one becoming boring "life-style" fugue into the mayfly existence of a successor. The result, in all variations, is the common pathology of a flight from the reality of a producer society's culture to that of a consumerist culture. The lust for experiencing of decadent forms of cultural sensations, rather than ideas of the future social outcome of one's living, is the common feature of the decadence which grips most of those in those "Baby Boomer" age-categories today. The passions are diverted from the real universe into the Romantic-existentialist fantasy-world of "my immediate feeling experience." The attachment of passion is shifted from the universe inhabited by the human mind, to the universe of animal-like sensations, with the result that the victim tends to act toward man as beast toward beast.

40. This use of "location" corresponds roughly to Sigmund Freud's notion of "cathexis."

41. There is no room in Classical art for mere symbolism; no condoning of symbolism is intended, or allowed by me here.

But, sane human speech is never simply literal; sane speech has its own version of the complex domain. By means of irony in general, or metaphor most emphatically, intelligent speech encompasses notions of realities which operate, like universal physical principles, beyond the realm of literal descriptions of sense-perception. Sometimes, the ironies are misleading, even false; but, the existence of truthful ironies is indispensable for truthful human communication of ideas, true or false. Classical poetry, for example, is based entirely upon the basis of that higher order of intention shared between speaker and hearer.[41]

These subtler, higher meanings permeate the folklore of a people, and are encountered in their more refined expression in Classical plastic, as much as non-plastic art. Typical is the distinction of Classical from Archaic modes of ancient Greek sculpture and the related original redefinition of perspective for painting by Leonardo da Vinci. Great Classical sculpture presents the mind with a body, not as fixed, but recognizable by the mind as captured in mid-motion; the mind senses the existence of that motion, as John Keats describes this effect in his "Ode to a Grecian Urn." This kind of art expresses principles, in the same sense that the complex domain expresses principles of continuing development in action, as the mathematics of Galileo, Euler, Lagrange, and Cauchy does not. Folklore and Classical art convey the sense of principles of action which lie beyond the comprehension of the reductionist form of literal statements.

Thus, intelligent communication among a people relies essentially on those ironical, anti-reductionist meanings which lie between the cracks of literal imageries. The introduction of new, principled ideas to a people, depends largely on the sharing of that store of such ideas within the practice of the existing language-culture.

In general, therefore, it is only to the degree that a people has the approximation of a Classical language-culture that it is able to discover, and to deliberate upon new ideas. What is called the freedom of the individual members of a society, depends upon processes of deliberation within the society which are based upon the accumulation of ironies embedded in the general language-culture of that society. Without those functions of a literate form of irony-rich language, the members of a society are degraded to the functional status of virtual human cattle, unable to participate efficiently in shaping the common national destiny.

The problem on which our attention is focussed here, is the same issue of *passion* which has been repeatedly referenced in preceding portions of this report. Pause here to reflect on a common expression of the problems involved. Focus on the factor of irrational rage which permeates the reductionist's attempts to explain the occurrence of any phenomenon whose existence corresponds to a true universal physical principle (or Classical artistic composition).

Some decades past, I chanced to study the report of one knowledgeable specialist, that mathematicians tend to dream in black-and-white, whereas Classical musicians tend to dream in color. I found his report knowledgeable, in correspondence with my observation of differences in behavior between Classical musicians and mathematicians. Yet, his report is only an insightful generalization, not a firm and fast rule; the human mind is not quite so simple as his clever observation implies. Yet, it is true that the essential classroom or kindred emotion produced by adherence to the reductionist assumptions of Aristotle, the empiricists generally, and the Kantians in particular, is usually an anally focussed quality of *gray rage,* the quality of rage which fosters the promotion of existentialist and related pro-fascist ideologies. Smiling John von Neumann's rage against the Kurt Gödel who had destroyed the fundamental assumption of von Neumann's god, Bertrand Russell, before von Neumann's eyes, is only one notable example of the controlling role of *gray rage—a night in which all Hegelian and other lurking wolves are gray*—typical of expressions of reductionist forms of logic.[42]

The emotional problem created by the victim's submission to reductionist methods, such as those of Kant, is that of the mathematician so afflicted. It is much the same even with the experimental physicist who is compelled by the Mephistophelean social pressures exerted by his colleagues, to corrupt himself by an act of degrading his experimentally validated discovery, by appearing to prove that his experimental results were nothing more than an extrapolation of that preexisting, generally accepted classroom mathematics which were prescribed by a Babylonian-priesthood-like body of so-called peer review. [43]

The principled character of both the intellectual and emotional crisis produced by such roles of the reductionist method, may be summarized at this point, as follows.

Human knowledge, as contrasted with the academic monkey-business of the typical reductionist, recognizes a distinction between those mental objects which are an interpretation of sense-experience, and those other kinds of Classical-artistic or scientific mental objects which correspond to experimentally validated discoveries of those universal physical principles which, while provably efficient, do not exist, themselves, as objects of sense-perception. Within the relatively more narrowly defined notion of the latter, higher order of mental objects, the notion typified by universal physical principles, those mental objects correspond to sense-perceived experiences of such a paradoxical quality that they defy interpretation from the standpoint of sense-perception as such.

The problem is, that of the impassioned reductionist, who insists on the "materialist" or kindred view, that the elementary nature of the physical universe is in direct correspondence to the presumption that sense-perception is the only existent expression of physical reality. In the desperate wishes of the victim of such reductionist presumptions, everything, however paradoxical, "must be explainable" in terms of the common-sensical view that sense-perception's objects are the essence of whatever might be assumed to correspond to "matter." The assumption is made, that ideas of universal physical principle have the same statistical quality as ordinary counting-number-mathematical images of simple mechanical relations.

42. Cf. Kurt Gödel, "On Formally Undecidable Propositions of *Principia Mathematica* and Related Systems," [1931] *Kurt Gödel Collected Works*, ed. Solomon Feferman, et al. (New York: Oxford University Press, 1986), pp. 144-195.

43. The fraud of referring to a Cauchy-Riemann function, is typical of the work of such fascist-like peer-review traditions in contemporary academic life.

Archives of the Institute for Advanced Studies, Princeton, N.J.

Bertrand Russell's devotees, such as information theorists John von Neumann and Norbert Wiener, hated Kurt Gödel (right) for his exposé of Russell's principal hoax, Principia Mathematica. *Here, Gödel with friend Einstein at the Institute for Advanced Studies, in the 1950s.*

In reality, we know that the reductionist's assumption is false. As I have already emphasized earlier here, sense-perception is the shadow which reality casts upon the senses, not that reality itself. The fellow who is conditioned to reject that view, becomes hysterical whenever the evidence of a universal physical principle is introduced as the subject of attention. That hysteric is obsessed, like a fox trying to pass for a chicken in a shotgun-armed farmer's hen-house, with a sense of need to "explain away" the need to consider this issue.

The case of John von Neumann's enraged, life-long reaction to Kurt Gödel's 1931 exposure of the pervasive hoax of Bertrand Russell's *Principia Mathematica,* illustrates the point. The lunatic cult of "information theory," "artificial intelligence," and so on, is premised explicitly on the rage of such Russell devotees as von Neumann, Norbert Wiener, and sundry other Russell devotees then prominent at Chicago University and the Princeton Institute for Advanced Studies. The lunatic abracadabra of the Reverend Moon's science cult, is an outgrowth of the rabidly logical-positivist cult of the "unification of the sciences" launched during the 1930s by Russell, Chicago's Hutchins, et al. Strip away the exotic costuming of a Moon-side mass marriage, and the remaining, underlying issue is exactly the same as that folly of Euler and Lagrange attacked by Carl F. Gauss's 1799 definition of the concept of the complex domain.

In the exemplary cases of Kepler's uniquely original discovery of universal gravitation, the development of Fermat's concept of quickest action, and the generalization, by Gauss and Riemann successively, of Leibniz's derived concept of a catenary-cued principle of universal physical least-action, we are dealing with mental objects which, by definition, are not the experience of mere fixed objects of sense-perception. The opposing view, that of the materialist or empiricist, prefers the experienced superficial view of the factual evidence; this opposing view is premised upon the error of mistaking the mere shadow of reality, mere sense-perception as such, for the imperceptible reality which casts the shadow.

In all relevant cases, the quality of ontological difference between shadow and substance, is that emphasized by Heraclitus, and Plato after him, the famous aphorism: *nothing is constant but change.* Return to Kepler's notion of gravitation to illustrate the point.

Kepler's correction of certain relevant errors in Tycho Brahe's observations, demonstrated that the planetary orbits are not of the regular form demanded by the reductionist ideologues who had been deluded into following the doctrine of such as Aristotle. Rather, the planetary orbits are approximately elliptical, with the Sun at one of the foci of the ellipses, and the motion of the planets along their orbital pathways is constantly non-uniform motion. Thus, a deluded faith in sense-perception is confronted by the evidence, that the planets' orbits are governed by a principle of *constant change,* as Heraclitus' famous aphorism makes the point. This characteristic requires an agency operating from outside the scope of sense-perception, an agency whose efficient presence is expressed as an *intention,* requires the discovery of a universal physical principle invisible to the senses. The experimental proof of that principle, now becomes a definite object of the mind, an object which exists from beyond sense-perception.

The understanding of such a mental object as that, such as any universal physical principle, requires the mind to generate a kind of object which has the content and form of *constant change.* Only ideas of those characteristics qualify as universal physical principles. An autobiographical note is in order here.

My own 1953 adoption of the standpoint of Bernhard Riemann as the required approach to systematic representation of my own earlier discoveries in the science of physical

44. "Anhang," *Bernhard Riemann's Gesammelte Mathematische Werke,* H. Weber, Ed. (New York: Dover Publications reprint edition, 1953), pp.507-538. (English translation in "Riemann's Philosophical Fragments," *21st Century Science,* Winter 1995-96, pp. 50-62).

45. Riemann references his earlier auditing of a series of lectures delivered at Göttingen University by Johann Herbart. Herbart, who was, notably, educated early at Professor of History Friedrich Schiller's Jena University, became a noted pedagogue in the orbit of Wilhelm von Humboldt, and was a leading opponent of the influence of such notables as Schiller's adversary-target Kant and the pro-fascist Romantic admirer of Napoleon Bonaparte's tyranny, G.W.F. Hegel. The impact of Herbart, a giant relative to the prevalent philosophers of the post-1815 period, on Riemann's thinking is notably of scholarly epistemological interest today. During the mid-1980s, I had intended to address that implication of Herbart's work, the intervention of pressing events prevented me from completing the study of his extensive literary remains which would have been necessary.

economy, was affected in a most crucial way by intensive reflection on three of Riemann's posthumously published philosophical papers, dating in origin from 1853.[44] The first of these three, entitled *"Zur Psychologie und Metaphysik,"* was most important for me *at* that time, and remains so, for somewhat different reasons still today.[45] I reference it here out of regard for Riemann's treatment of the notion of *"Geistesmasse"* in that location, an epistemological notion which underlies Riemann's emphasis on what he identifies as Dirichlet's Principle, and Riemann's adducing the concept of Riemannian manifolds from the starting point provided by Gauss's concept of the general principles of curvature. In my own original discoveries in the science of physical economy, the efficient role of the generation and transmission of universal physical principles is the only axiomatic basis for a rational notion of economic processes. Although that concept was already clear to me during my work of the 1948-1952 interval, the review of my own conceptions in the light of Riemann's reference to *Geistesmasse,* has been crucial in most of my life's work since, including the material restated in this present report.

In coming to understand the notion of any experimentally defined universal physical principle, we must, so to speak, relive *the kind of unfolding continuing action of constant change* which that principle represents. Kepler's notion of gravitation, for example, or Leibniz's discovery of the principle of universal physical least action, are excellent pedagogical illustrations of that point. Whereas the sense-perceptual images give us a notion of fixed objects in motion, notions of universal physical principle are images of the continuous unfolding of non-uniform action (e.g., *change*).

To illustrate that point of distinction, contrast the Classical and Romantic view of J.S. Bach's development of the principles of well-tempered counterpoint.

The reductionist seeks to reduce Bach's work to a set of rules; the Classical composer, as typified best by the late string quartets of Beethoven, understands counterpoint as the use of a principle of *constant change,* such that a seemingly elementary contrapuntal irony becomes the generation of an elaborated, complete composition: a composition which is a uniquely definite object, contrasted with all other objects. Thus the performer, or conductor proceeds, from the start, with attention fixed on the idea of the principled character of the contrapuntal irony which defines the entire composition, from the pause which precedes the uttering of the first tone to the breath of silence following the last. He performs, as Furtwängler states the case: "between the notes."

Not only are all ideas occurring in the mind thought-objects; there are qualitative differences in internal characteristics which distinguish ideas of objects of sense-perception (e.g., thought-objects) from those thought-objects which correspond to universal physical principles. The ontological content of the latter class of thought-objects, is a generative principle of constant change.

The characteristic form of pathological states of mind associated with empiricist and kindred forms of reductionist thinking about notions of principle, are the expression of the attempt to impose the relatively static quality of a sense-perceptual idea upon the mental experience of an idea corresponding to a non-constant factor of qualitative change of state, within the domain of universal physical principles. In mathematics, the result is the imposition of the deductive mechanics of arithmetic procedures upon events which, by their nature, lie, ontologically, outside the realm of the simple counting numbers. The effect of substituting deductive procedures for higher geometric ones, is the generation of a mental state corresponding to rage within the milieu within which the deductive approach is prevalent.

This point becomes clearer when we apply the same critical approach to the subject of Classical artistic composition.

In the Domain of Art

Now, taking into account what I have written, thus far, on physical science, the most effective modes for developing cultures, including national cultures, is Classical art, most notably Classical forms of poetry, drama, music, and plastic arts. In architecture, Classical principles are functionally essential to a healthy, and happy national culture, such that the organization of communities, and architecture of buildings, meet an intelligible Classical-artistic standard. Take the matter of the difference in principle between Archaic and Classical Greek sculpture, as a keystone illustration of the point.

The essentially distinguishing principle of Classical Greek sculpture, is that the mind of the viewer sees the figure as in mid-motion, that in a way consistent with Heraclitus' "nothing is permanent but change." A related feat was accomplished by Leonardo da Vinci's revolution in perspective, as applied to painting, as to the work of Raphael Sanzio and such Rembrandt works of genius as "Homer contemplating the fatuous Aristotle." These works of art, employ the introduction of paradoxical ironies in the visible shadows, to convey a sense of the real universe of the unseen domain whence the shadows are generated. So, in Classical art, as in science, the qualities of thought-objects pertaining to the shadowy domain of sense-perception are of a different nature than the thought-objects of that real universe of nothing but change, which lies, and disposes from the realm beyond sense-perception. So, as for Percy Shelley, the great moments in the history of a people express a momentary increase of "the power of imparting and receiving profound and impassioned conceptions respecting man and nature"—both physical science and those aspects of social relations expressed in their most concentrated form as Classical art.

In other words, the same principle expressed by the complex domain for physical science, is realized in an explicitly social form by Classical art. This is so essential to the happiness and functional effectiveness of a people, that a healthy society requires perfect national sovereignty based upon an increasingly rich and rational Classical form of culture. No "Towers of Babel" are permitted. It is necessary that different nations have a common standard of truth; but, each will reach that standard voluntarily, only through its own sovereign function of a sovereignly national Classical standard of culture.

The means by which such respectively sovereign, separate language-cultures are able to share a common notion of truth, is usefully described as a broadly defined principle of ecumenicism. In theology, such an ecumenical principle is asso-

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Classical art, like science, uses the ironies in the visible shadows, to convey a sense of the real universe of the unseen domain that generates the shadows. Here, Rembrandt's "Homer contemplating the fatuous Aristotle."

ciated with the the notion of "The One God," as in Nicholas of Cusa's *De Pace Fidei* or the argument of Moses Mendelssohn. This notion, the notion of a universal natural law, is seen more broadly, without losing any of the connotations of Cusa's and Mendelssohn's argument, at the moment we emphasize the nature of man and woman as made equally in the image of the Creator, and assigned responsibility for dominion within the bounds of that Creation.

The functional forms of effective ecumenical relations among differing religious bodies, or nations, are arrangements which limit their commonly shared obligations to a certain definition of the nature of mankind, as set apart from, and above the beasts. These principles which are properly common to respectively sovereign states or bodies of religious belief, limit their supranational or equivalent authority to the principles of a body of *universal natural law,* such as those three referenced principles set forth in the Preamble of the U.S. Federal Constitution.

Such an ecumenical principle could exist only if it is premised on a strict and universal distinction of man from beast. That distinction is, essentially, nothing other than the power of the human mind to discover experimentally validated universal physical principles lying beyond the capabilities of sense-perception as such. The form of Socratic dialectic permeating Plato's dialogues, typifies a universal body of principle, which expresses this universal distinction of the human mind, and so. from this higher standpoint, defines a body of ecumenical harmony bridging the perfect sovereignties of separate national cultures. In other words, that form of the dialectic is an efficient common principle properly shared among otherwise perfectly sovereign, distinct national cultures and their languages.

The additional point to be emphasized, is that the relevant dialogue must be expressed in terms of the predicates of each sovereign national culture, even though the conclusions to be reached may be ultimately, truthfully the same among each and all of those respectively sovereign national cultures. Those aspects of national cultures which meet that standard of "Classical" which is typified by my foregoing exposition above, are the expression of the means by which that ecumenical fraternity among sovereign cultures may be established and maintained.

The pivotal issue of universal natural law is the following.

At first thought, the human individual has two choices of personal identity. For most persons in societies known so far, the individual's choice of personal identity is that associated with the mortal existence between conception and death. For persons of a relatively more cultivated disposition, the essential identity of the individual is located in that immortal personality which temporarily inhabits the mortal existence. The first, inferior choice, thus locates the individual person's *mortal* identity within the bounds of sense-perception as such. In this case the motivating *passion* of the idea of self is located in that way. The second, true sense of human individual identity locates the *immortal* existence of the individual, by name, as good science recalls the personal name of those discoverers of valid universal physical principle whose ideas, in fact, belonging to the Gauss-Riemann complex domain, or, similarly, of Classical artistic composition, handed down from generation to generation. The great Classical scientist or artist is the epitome of a true, implicitly immortal, individual identity. In the second, higher sense of the nature of the individual self, the passions of the experience of discovery of universal principle, scientific and Classical-artistic, supplies the *passion* which implies the immortality of that individual's soul. The fatal lack of such higher-order passion in Shakespeare's Hamlet, typifies the inferior sense of personal identity.

In the existence of society so far, the success of any culture depends upon the contributions of the leading role of the persons devoted to the second, immortal sense of universal identity, as guides of a people which were pulled down morally by an excessive emphasis on the less than universal, inferior, mor-

tal sense of personal identity. So, for all globally extended European civilization to date, exceptional persons of universal outlook, such as Solon of Athens, the Socrates of Plato's dialogues, and Plato himself, are typical of, and essential for the internal European origins of the best of European culture as a whole.

The point just underlined returns our attention to the essential functional distinction of modern European civilization. The obligation of the head of state is to defend the sovereignty, and promote the general welfare of all the living and their posterity for the present and future of the nation as a whole. Thus, the leadership of the nation requires persons who efficiently embody an historical sense of universality, and who, thus, each act as an indispensable agent of national conscience, to subordinate the small-minded, parochial impulses of the people to the universality of the past, present, and future historical existence of the nation as a whole. This requires of such leaders, whether official or moral, a commitment to a sense of historical past, present, and future humanity as a whole. This means a commitment to the discovery and application of principles which are not only those properly characteristic of the nation, but also of humanity generally.

The related problem in the world thus far, the U.S.A. and Europe included, is that our people, even our leaders, are much too small-minded, even miserably petty in both the moral and practical expression of their opinions and practices. Throughout known history, as Solon of Athens warned, good societies have depended upon the interventions of morally and intellectually exceptional leaders, such as our Benjamin Franklin, Abraham Lincoln, et al, to lead the people of a nation out of that folly which they then, as during recent decades, have brought down upon themselves.

On this account, our Federal Constitution, which was shaped by aid of reflection on the warning by Solon of Athens, has been the most durably effective instrument of all modern political history, even through long periods during which that Constitution was savagely betrayed, as during the 1964-2003 interval. The crucial element of true genius in that Constitution, is expressed as its Preamble, to which all interpretation of other elements of the Constitution, its amendments, Federal laws, and Federal Court decisions, are subject. The invocation of that triadic principle of sovereignty, general welfare, and posterity, lodged in that Preamble, has been the point of reference and national renewable virtue which has made our political Constitution the most durably efficient in known history. The unexcelled genius so embedded in that Preamble, is that it obliges the Federal government to return to the standpoint of true universality, to rescue the nation from the follies of recurring, errant and petty currents of popular opinion. Thus, when we adhere to that Constitution, in that mode, our republic has a certain genius for immortality, if we use it, not achieved by others to date.

"Only the nation so committed to endless progress can secure its citizens the rightful access to true functional immortality."

The importance of that view of our Constitution's Preamble is usefully contrasted to the fatal traditionalism of the ultramontane, Roman Code of Diocletian. Tradition in the sense of that Code is the deadliest enemy of any people foolish enough to embrace such a policy. It is change for the better which must constantly supersede such tradition. Scientific and Classical cultural progress must be the tradition which constantly supersedes any other tradition. It is in this, that the immortality of the personality inhabiting the mortal individual is secured. Only the nation so committed to endless progress can secure its citizens the rightful access to true functional immortality.

This brings us to the matter of the principles of curvature, wherein I treat the determining function of discoveries of universal physical principle for economies.

3. The Principles of Curvature

I return our attention to the opening thematic topic of this report. This time, I focus attention on the example of J. Clerk Maxwell as—like such followers of Ernst Mach as the Ludwig Boltzmann who played a key role in laying the groundwork for the Wiener-von Neumann "information theory" hoax—one who is still among the very influential, Nineteenth-Century figures in the corruption polluting academic and related science-instruction and belief still today.

J. Clerk Maxwell's reprehensible "explanation" of his fraudulent treatment of the combined contributions of Gauss, Weber, and Riemann (and Ampère's principle) to the founding of electrodynamics, typifies the hoaxes which underlie the generally accepted classroom view of cosmogony still today. Maxwell's explanation of his fraudulent behavior was his self-described "moral" indignation at the prospect of being obliged to acknowledge the existence of "any geometries" other than "our own." He meant the empiricist's reductionist tradition of Sarpi, Galileo, Euler, Lagrange, Laplace, Cauchy, Faraday, Clausius, Grassmann, Kelvin, and Helmholtz.[46] The result of that and kindred expressions of the popular, but immoral view still prevalent in classrooms and related premises today, is the following generally accepted view of cosmogony in general.

The root of this problem is typified by the form of sophistry which I have described as associated with the "apriorisms" of Aristotle and Euclid, and expressed in a more radical form by modern empiricism and its derivatives.

This aprioristic tradition produces a reductionist conception of the universe, a conception which is an intrinsically entropic set of "ivory tower" definitions, axioms, and postulates. The submission of physical scientists to the acceptance of that aprioristic hoax, as expressed by Euler, Lagrange, Laplace, Cauchy, et al., results in a superimposed, axiomatically entropic, mathematical interpretation of physical evidence.

46. To propose that Maxwell's views on this point are typical of England, overlooks the work of the founder of the concept of the programmable digital computer, Charles Babbage. Babbage, young Herschel, and Peacock's blast at the incompetence of the taught mathematics of early Nineteenth-Century Britain, typifies the existence of a competent current of international modern culture in physical science, operating in parallel to the incompetent "Enlightenment" traditions.

Millikan and Gale, *A First Course in Physics* (Boston: Ginn & Co., 1915)

James Clerk Maxwell (1831-1879)

Maxwell rejected the true implications of the work of Carl Gauss and Wilhelm Weber—which confirmed Ampère's revolutionary hypothesis concerning the angular force between current elements—because it demolished the empirical edifice of Newton.

Courtesy of the Museum of Electricity at Polymieux

André-Marie Ampère (1775-1836)

Acceptable physical theories are those designed to fit that "generally accepted classroom" notion of mathematical models. In turn, deductions are made from the theories so corrupted, to the effect that varying interpretations concocted within the bounds of those pathetic deductive schemes, become hotly debated in academic circles, and spill over as the form of silly, essentially superficial debates on such matters in the lay press. In general, all agree, today, that the universe is essentially entropic as a whole.

As I shall restate the case summarily here and now, One of the most relevant modern approaches to exposing the fraud of cosmogonies of that reductionist type, has been the elaboration of the notions of the *Biosphere* and *Noösphere* by a great successor of D.I. Mendeleev, Vladimir Vernadsky.[47] I have addressed that contribution by Vernadsky in various locations published earlier; on this present occasion, I merely summarize the essentials relevant to the present topic. The crucial point to be emphasized, is the way in which Vernadsky's development and application of the principles of biogeochemistry gave fresh expression to what had been the traditionally Classical view since Plato et al., that the universe is a multiply-connected composite of three distinct, principled phase-spaces: the ostensibly non-living, the living, and the human-cognitive. Vernadsky's approach, biogeochemistry, supplied the modern experimental basis for defining the principled distinctions and principled interconnections among those three phase-spaces.

The successive work of Pasteur, Curie, Vernadsky, et al., demonstrated, experimentally, that, from the standpoint of experimental physical chemistry, "life" is a category of universal physical principle which is efficient, but does not lie within the domain of non-living processes. Hence, it represents a distinct universal phase-space. Similarly, the creative powers of the human mind express principles which do not lie within the domain of living processes generally. Hence, human cognition, which Vernadsky terms *noësis,* which is expressed by the Platonic dialectic, is not a principle merely derived, experimentally, from living processes in general: it can not be derived from living processes in general, but, instead, intervenes within the domain of living processes, as if by a higher, anti-entropic principle from "outside" life in general.[48]

Vernadsky's application of what he defined as biogeochemistry, shows that living processes dominate the non-living increasingly, and that *noësis* dominates biogeochemical processes increasingly. From the vantage-point of statistical thermodynamics, life is intrinsically anti-entropic, relative to non-living processes, and *noësis* is intrinsically anti-entropic, relative to living processes generally. Hence, the universe as the interaction among these three ontological qualities of principle, is intrinsically anti-entropic, since all phase-spaces are efficiently multiply-connected. The universe is ruled by the principle which is to be adduced from the pervasive principle of the Platonic dialectic, as Plato's *Timaeus* points to this, and as Pacioli, Leonardo da Vinci, and Kepler point to this.

In addition, the way in which the respective space-phases of non-living, living, and *noëtic* processes interact, is a universal physical principle, a principle, a *passion,* consistent with Heraclitus' "nothing is constant but change." This interaction is of the form of *passion* which Plato identifies as *powers,* in contrast to Aristotle's and the empiricist's contrary, sterile (dead) principle of *energy,* and, as Philo of Alexandria, for example, argues against the "post-creation" sterility of a God as wrongly defined by Aristotle.

47. It is sufficient to note here, that the elaboration of Mendeleev's famous discovery had two successive phases of development. The first, was that which usually commands attention, and interpretation from a reductionist standpoint. The second, the optical-geometric approach, echoing Plato's concept of power, rather than Aristotle's misleading doctrine of energy, emphasized by the work of our leading collaborator, the late physical chemist Professor Robert Moon of Chicago University, is yet to be fully grasped. However, Vernadsky's treatments of the Biosphere and Noösphere, imply the implications of the second level of Mendeleev's work. Unfortunately, the corrupting influence of Britain's Cambridge University systems-analysis group, of John von Neumann-influenced Lord Kaldor, et al., on Soviet science, via the Laxenberg, Austria International Institute for Applied Systems Analysis (IIASA), induced the spread of a pro-Malthusian, pro-reductionist view among some late-Soviet-era Russian students of Vernadsky's work. Consequently, the fact that Vernadsky's work implicitly shows the universe to be anti-entropic, rather than entropic, is obscured among a significant portion of even his followers in Russia and Ukraine today.

48. This notion of *noësis* corresponds to the complementary notions of individual human soul and Creator, in Christian theology, for example. The immortal aspect of human life, which is the site of the dialectical creative powers of the human mind, is a higher state of being than the non-living and biotic processes themselves. Vernadsky, like Plato, gives the ontological quality of that soul a rigorously experimental-scientific basis.

Review the methodological implications of what I have just written. Review the matter from the vantage-point of epistemology.

Fraudulent substitutes for scientific method, such as Aristotle and the empiricists explicitly, and the reductionists generally, argue for a *priori* definitions, axioms, and postulates, on the premise that those arbitrary assumptions appear to explain a shadowy universe confined to the shadowy appearances of sense-perception. They then, as Euler, Lagrange, Laplace, Cauchy, Clausius, et al. do, interpret the phenomena statistically according to the precepts of those arbitrary presumptions. An epistemology which abhors arbitrary presumptions, looks into the human mental processes to uncover, there, all presumptions applied to the interpretation of experience.

The result is comparable to Riemann's leading argument in his habilitation dissertation: No universal assumption can be allowed in physical science which is not rooted, like Kepler's discovery of universal gravitation, in evidence which proves that a certain relevant class of phenomena exists only as a reflection of a thought-object, a set of universal physical principles, which exist only outside, and beyond the reach of mere sense-certainty. However, the efficiency of those universal physical principles, is demonstrable from a rigorous experimental scrutiny of experience, especially, as Vernadsky defines the Noösphere, man's experience in willfully changing his universe through application of the discovery of such principles. Hence, the universe of physical scientific inquiry has a physical-geometrical doubleness, which combines sense-experience, as an intrinsically non-linear process in universal principle, with the "curvature" of efficient actions (universal physical principles) external to direct sense-perception.

Economy: Under Our Creative Sun

Hence, we have the following picture of mankind's universe, as viewed experimentally. I develop that picture in two successive steps of approximation.

In first approximation, the universe appears to be composed of two sets of universal physical principles, the first set of principles, *m*, as the implied totality of discoverable such principles, and the smaller set, *n*, of experimentally validated principles presently known to mankind. However, in second approximation, the universe *m* is already developing in an anti-entropic way prior to man's willful intervention. Take, as illustration of that argument, the case of the "history" of the Solar System. Each among these principles is of the form of universal physical principles, thought-objects, belonging to the real universe beyond the shadows of sense-perception.

Currently, our best knowledge is, that the Solar System began as a fast-spinning, youthfully exuberant solitary Sun in the universe at large. According to Kepler's principles, this young Sun spun off some part of its material into a disc orbitting the Sun itself. If we assume polarized nuclear fusion occurring within that disk, then it were possible for polarized fusion, and, presumably, only polarized fusion, to have generated the observed periodic table of the Solar System. That fusion-generated material from the disk would have been "fractionally distilled" into approximately the Platonic orbits defined by Kepler. Then, according to Gauss's reading of the matter, the elliptical-harmonic characteristics of the orbit would have "condensed" the material distributed along each orbit into relevant planets and their moons. The crucial view of this hypothesis was provided by Gauss's proof of Kepler's case for the self-fractured missing planet, the debris known as the asteroid belt.

Such Kepler-Gauss-et al. conclusions are in accord with the primary characteristics of what I have summarily described as Vernadsky's systemic biogeochemical view of the universe. In other words, the argument is, that the universe is created as an intrinsically self-developing universe, in a process of development expressed, inclusively, by built-in generation of more highly differentiated states of self-organization. Additionally, that the anti-entropic principle of cognition (*noësis*) already existed in that universe "from the beginning," but could be expressed as man only under the emergence of certain new, lawfully generated states of local organization of the universe as part of the universe's overall. anti-entropic self-development. Since the anti-entropic principles of life and noësis are of a universal quality inhering in a multiply connected universe, the universe was always anti-entropic as a whole. Man's manifest power to increase his willful control over the universe through nothing other than *noësis,* demonstrates this experimentally. Such is the work of epistemology; no ideas are legitimate, unless the necessity of their coming into being is demonstrated from an experimental standpoint.

This view of the universe has a complementary proof. Men and women who view their personal existence in a way which is coherent with that view of the universe, are the most effective leaders of mankind, in physical science, in art, and otherwise. Those who share the burden of a contrary "feeling" about the universe tend to be failures as leaders in any crisis in their life's work.

If you believe that you are truly immortal in the sense of the universe which I have summarized here, then you have an unshakable capacity for effective leadership, in what happens to be your appropriate life's work, as Jeanne d'Arc did for the coming-into-being of the sovereign nation-state republic, for example, as Ludwig Beethoven's work shows this, as the saintly Friedrich Schiller did, as poet, dramatist, philosopher, and historian. For the scientist who approaches this topic of reflection as I do here, there exists a very clear physical-scientific proof of that sublime notion of immortality. The weight of such a line of argument, is, considering man's extraordinary place in the universe, the outlook on that universe which produces the most effective motivation for improvement of the universe, is an expression of the outlook which most nearly corresponds to what the universe actually is.

This universe has no beginning, and no end. As Einstein once put the point, the universe is finite and unbounded. There is nothing outside it, and nothing exists before or after it. It is a self-developing, anti-entropic universe, ruled by that same personal principle which is reflected in the maturely developed work of the great creative scientist and Classical artist; it is a personalized universe, representing a personalized Creator, knowable as personalized because he expresses the same *noëtic* principle which sets the human individual apart from, and above all lower forms of existence. In those our travels we call our mortal life, within this universe, time is not measured as back and forth, but, rather, up and down, just as the unfolding development of the Solar System, from a fast-

spinning, young, solitary Sun, suggests. What we should call "progress," is up, and we call "tradition," or "entropy," is down. It is therefore a wonderful universe in which to live.

What, then, is our life? The answer comes: "Your life is what you do with it, what you do for past, present, and future humanity as a whole, what you do for man's willful assumption of increasing responsibilities for the *noëtic* development of the universe itself." Your life, your immortality, is your work to such effects. You have but a brief mortal existence; therefore, spend that talent wisely, according to what the universe and its Creator require of you as your work. Such insight into the condition of our brief existence in a mortal frame, frees us from all of those doubts which make cowards of all like Shakespeare's Hamlet, all like the typical, relative best among nearly all U.S.A. political leaders, for example, today. We who grasp those principles are more powerful morally than others, because we have no Hamlet-like need to doubt the value of whatever good we may be able to contribute toward the improvement of the human condition and to the betterment of the universe we inhabit.

AIP Niels Bohr Library

"Your life is what you do with it, what you do for past, present, and future humanity as a whole, what you do for man's willful assumption of increasing responsibilities for the noetic development of the universe itself." Here, Marie Curie (1867-1934), who consciously viewed her scientific discoveries in these terms.

This was recognized, at least to some useful degree of approximation even among certain English poets who came later than Shakespeare. Wordsworth wrote of "intimations of immortality," Keats described the matter with beautiful elegance in his "Ode to a Grecian Urn," and Shelley went to the essence of the practical issue in his "In Defence of Poetry," in celebrating periods of history of a people during which there is an upsurge of "the power of communicating profound and impassioned conceptions respecting man and nature."

When we have come, thus, to our reconciliation with the fact of mortal life and death, as the requiem for a deceased hero, or friend, should jolt us joyfully into remembering this fact, we are able to become truly moral persons, at last. When we see that the brevity of mortal life has a purpose expressed by the immortal soul's realization of the work of *noësis,* there is nothing, as the man might have said, "which can stop us" from performing that mission which is more precious to us, and to the Creator, than our mortal existence itself.

The universe is there, without anything outside it, without beginning or end. If we make ourselves part of its purpose, we are everything; if we betray that purpose, we are as nothing. Thus, our view of that universe is the great source of added strength, which produces the greatest leaders in science, in Classical art, and in political life.

Unfortunately, relatively few persons have come to the point of knowing that view. They seek, foolishly, the meaning of life in the trash-pile which is, usually, the currently popular body of opinion. Today, more than fifty years or so later, many are somewhat like the singer of trash who dies in an ugly way of an overdose of a so-called recreational drug. It is the stink of pessimism, which is today's prevalent popular opinion, which produces the fearful Hamlets which have served as the relatively better political leaders, and fosters that fearful rage of popular despair on which today's fascist thugs, the so-called "neo-conservatives," feed like greedy vultures.

Such demoralizing fears are nourished by a pessimistic attitude toward the progress of what is called physical science, and by the spread of the satanic influence of existentialist cults of those truth-haters of the Frankfurt-School style. On the one side, optimism toward the universe and mankind's place in it, breeds morality and happiness; pessimistic attitudes toward scientific and technological progress, and Hobbesian pessimism toward mankind, are the stuff of which Hitlers are made.

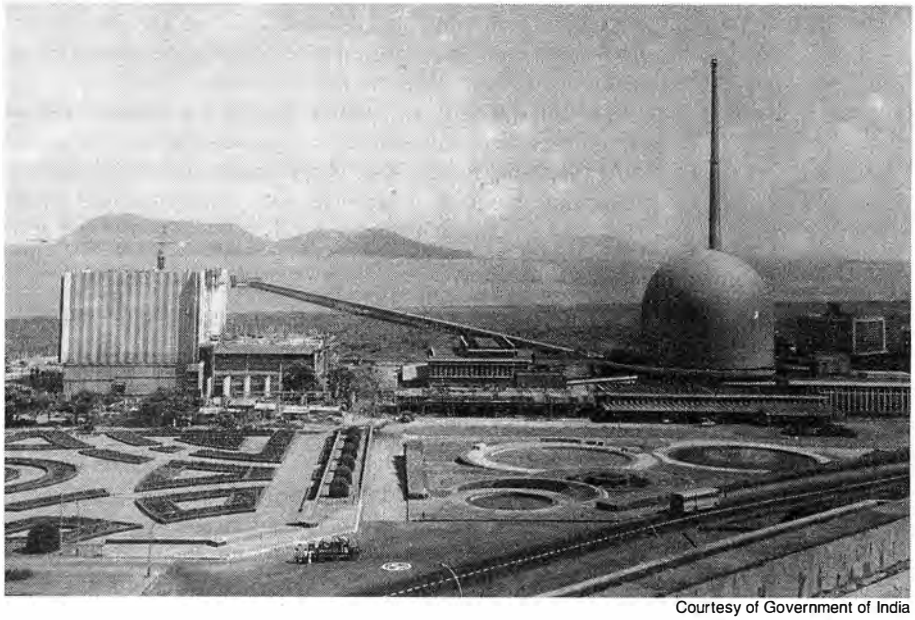
Let the Sun shine in our view of the universe of which we are a part. That Sun is not an object, but a self-developing process, as is the universe as a whole. See ourselves in that setting, and see, above all, the special, forever immortal place of mankind in the universal, boundless, endless process of Creation as a whole.

Once we have recognized the existence of universal physical principles as (implicitly Riemannian) thought-objects, we have gained access to a more advantageous insight into the practical implications of those general notions of curvature developed, successively, by Gauss and Riemann.

You do not "see" this curvature itself with your senses. Do not ruin your days attempting to do so. You see it with your mind, not your senses. Nonetheless, you are able to prove its efficient existence by aid of the explicit evidence provided by your senses, but only as Kepler discovered the *intention* which

"Those who desire to keep most of mankind in the condition of virtual human cattle, are therefore intent on preventing the general use of nuclear fission and fusion as power-sources. For if we raise the standard of living, and education, of humanity generally, what oligarchy could hope to continue overlordship among mankind?" Here, two views of India: Cowdung collection for agriculture vs. nuclear power production.

C. Srinivasan/United Nations



Courtesy of Government of India

he recognized as universal gravitation. Look at the thought-object which was Kepler's discovery of gravitation. (Do not waste unnecessary time on that slime-ball Galileo and his empiricist cult-followers.)

Think of what I identified, above, as the Sensorium. Try to map observed celestial events, for example, on the implied surface of the interior of that Sensorium. How, then, shall we treat irregular movements, movements which do not correspond to notions of physical laws as Aristotle or Claudius Ptolemy, for example, did. Now, define a curvature of something touching the apparent trajectory of the planet or star, a trajectory which is not to be seen visually, but only in the imagination. This measured, but unseen trajectory touches and regulates the action along the Sensorium-trajectory at every point. The movement of that unseen trajectory, along the Sensorium, defines the impact of an unseen physical geometry, for which the apparently seen trajectory is but a shadow of reality.

By returning, more radically than Gauss had done publicly, to the Pythagorean type of pre-Euclidean (e.g., anti-Euclidean) physical (constructive) geometry of Plato et al., Riemann eradicated all relics of Euclidean or kindred geometries from the competent opinion of modern science, leaving us with nothing but the observational Sensorium, whose reflected motions express the unseen physical curvatures associated with those thought-objects we know as universal physical principles.

The existing array of such universal physical principles, can be estimated, at any point in experience, as representing what I have referenced as the "m" universal physical principles of the universe as a whole. Of these possible "m" principles, mankind so far knows, actually, only some, "n." Each of the latter corresponds to a curvature, but the array of known such principles, also defines a curvature relative to what is observed experimentally in terms of the Sensorium. The combined effect of those curvatures also represents a curvature, a curvature implicitly determined by the interaction of all of the behind-the-scenes curvatures taken into account.

What, Then, Is Economics?

Now comes man's willful intervention, guided by such acquired knowledge, into the universe. Mankind's willful action on behalf of an accumulation of discovered such principles, changes the universe. For example, the rate of man's effective action on the universe speeds up as scientific progress is applied. The net curvature of the apparent universe is thus changed by scientific progress. Man thus creates new states of nature, such that the curvature of the universe of man's action, and experience, is changed.

Even if, as we assume, that all universal physical principles pre-exist, the fact that man applies those discovered principles to that universe, now as subjects of his will, changes the universe. *Man is able to change the universe by making those discovered, pre-existing principles the subject of the human voluntary will.* Man thus increases the anti-entropy of the universe, as Vernadsky's principle of life dominated the Earth to bring forth the increasing power of the Biosphere, and as his physical chemist's notion of human noësis generates a Noösphere which is superior to the Biosphere. On this account, the acts of discovery and wielding of such pre-existing universal physical principles are not separable events, but constitute, as for Heraclitus, a single, permanent principle of universal change.

Thus, as we know more of the principles of the universe, our opinion of the curvature of the universe changes. As we apply that increased knowledge successfully, the curvature of the universe of man's action is changed. Look at this as I redefined a science of physical economy, back during my undertaking of 1948-1953.

When mankind discovers, and applies a pre-existing universal physical principle: Take, for example, the shift from

power-sources associated with chemical combustion, to the qualitatively higher "energy flux densities" of nuclear fission, and the qualitatively still-higher such densities of nuclear fusion, or, perhaps, so-called matter-antimatter reactions.

For example, if we outlaw nuclear fission as a principal power-source, we place limits on the human condition which must result in a global catastrophe for the human species. If we fail to master nuclear fusion, another catastrophe for mankind as a whole lies a bit further down the line. Those who desire to keep most of mankind in the condition of virtual human cattle, are therefore intent on preventing the general use of nuclear fission and fusion as power-sources. For, if we raise the standard of living, and education, of humanity generally, what oligarchy could hope to continue overlordship among mankind? The oligarchy prefers to keep the masses of mankind brutally poor and as stupid as conditions allow, as we see in the post-1973 changes in health-care, education, popular-cultural, and related policies of the U.S.A. and other nations.

This taken into account, how, as a matter of principle, is it possible for man to produce added wealth?

We can fairly estimate the potential relative population-density of the most advanced form of higher ape, as corresponding to a maximum sustainable level of several millions living individuals, under any of the known general conditions existing since the onslaught of the Ice Age cycles. Today, the estimate is, that more than six billions human individuals now live on this planet. This increase of approximately three decimal orders of magnitude of the human potential relative population-density above that of any higher-ape species, points to the effect of the accumulated discovery and transmission of universal principles to the transformation of generalized human practice.

As I have freshly emphasized that in this report, the relevant principles are each and all of the quality of thought-objects which lie within the Gauss-Riemann complex domain, beyond the reach of sense-perception. From this standpoint, the relevant form of action by human individuals, is the discovery and transmission of a growing accumulation of those kinds of principles. It is not repetitive toil by avowed ape-man Frederick Engels' "horny hand of labor" which generates progress, but, rather, the transformation of practiced knowledge to the effect of increasing the relative anti-entropy of mankind's action on the universe. It is the qualitative transformation of the quality and circumstances of human labor, which is the only possible source of true physical margins of profit of society. This is to be conceived as a principle of permanent change. This is the fundamental, hubristic principle of any competent form of political-economy, the fundamental, anti-entropic principle of the science of physical economy. It is the transformation of ideas of principle, in this anti-entropic way, which is the only possible source of true profit of a national or world economy.

Here lies the key to understand the kind of stupidity, as typified by the foolish followers of Adam Smith, et al., which has transformed the U.S. economy from the world's pre-1964, most productive nation of the world, into a pathetic, predatory, consumerist-culture parasite sucking upon the wealth it is able to suck from the juices of other nations and peoples, even the lower eighty percentile of the family income brackets of the U.S.A. itself. Here lies the answer to such questions, and, by corresponding implication, the solution.

This brings the focus of our attention back to the nature of the essential evils of Aristoteleanism, empiricism, and the like, both respecting the practice of taught and practiced science, and in education, and cultural policies (including religious policies, such as those so-called U.S. reformed or potential, bipolar and other drunks and dope-addicts known as the Elmer Gantry-style "religious fundamentalists") generally. Stupefy the people, and you have already recruited them to the ranks of willing human cattle. The post-Civil War educational "reforms" for ex-slaves, of "not educating them above their intended station in life," typifies the same policy of keeping people captive within the barns and shacks, or barren fields and stinking dumps, where the human cattle are housed.

It is in our practiced conception of the nature of man, that the cause of all the respective forms of progress and retrogression of society are to be found. It is to the degree that human thought and practice are situated within the higher regions of the complex domain, rather than the swamps of brutish reductionism, that man is enabled to exist and progress as mankind. It is the passion for the truth which lies only beyond the shadows of mere sense-perception, by means of which we can rescue mankind from the global catastrophe which the past thirty-odd years of decadence of the culture of globally extended European civilization have now brought upon us all.

4. Satanism & Economy

The immediately foregoing observations now bring us to that point of discussion promised at the outset of this report: Satanism and society, or, empiricism as the basis for the American Enterprise Institute's, Heritage Foundation's, and kindred swamp-creatures's practice of de facto Satanism in the name of political-economy. First, a few essential historical facts about Satanism.

The tradition of Satanism in modern Europe is traced, today, chiefly, from the reign of the Roman Emperor and Mithra-cultist Tiberius at the Isle of Capri, and, secondly, from the role of Venice's financier oligarchy during and since its position of de facto ruling imperial maritime power of the Mediterranean and Europe more widely, since developments since the interval from the reign of the Emperor Otto III and the time of Norman Conquest, until the decline of Venice's imperial pretensions as a state toward the close of the Seventeenth Century. However, the tradition of Venice's diplomatic/spy system and its role as a manipulator of European history through its financier-oligarchical networks, continues to the present day. Attack the traditions of Capri and Venice explicitly on such relevant historical points of continuing importance today, and you will think you have touched a political and religious hornet's nest.

The central reference-point for identifying the continuing historical significance of Tiberius and the cult of Capri for leading features of Twentieth-Century European history still today, is the Satanist's emphasis on the actually historical role of Tiberius and his de facto son-in-law Pontius Pilate in the Crucifixion of Jesus Christ. The cult of Tiberius at Capri, is the principal modern cult of the Anti-Christ.

This set of connections of continuing major relevance for today, is typified by the set of explicitly pro-Satanic cults associ-

ated with a leading crony of H. G. Wells, Bertrand Russell, and Julian and Aldous Huxley, the avowed Satanist and Theosophist Aleister Crowley. Gregory Bateson, the one-time spouse of witch-staff-wielding population-control-freak Margaret Mead, is also found at the center of the networks associated with the Capri pro-Satanist cults. The history of fascism,[49] from its founder, occultist Napoleon Bonaparte, through Mussolini, Hitler, and Spain's Franco, is a history redolent with the pro-Satanic occult tradition of Capri's Twentieth-Century Mithra-cult proceedings, including the Maxim Gorki cult-sessions at the Capri grotto. Fascism today, as practiced by the Leo Strauss-related U.S. neo-conservatives around Vice-President Dick Cheney, is the leading political expression of Satanism.[50]

The posing of the issue of Satanism, as I do here, is not in any way an exaggeration of that subject's practical significance for society today. As the danger of world war from the actually Synarchist cult of neo-conservatives attests, there is no sane basis for objecting to raising the issue of Satanism in connection with today's world strategic crises. The problem to be mastered, is understanding it as a clinical phenomenon, the nature and causes of the kind of mass-phenomenon mental disease it expresses, as I do here.

As I have indicated at the outset of this report, the essence of the matter is that suppressing responsiveness to the essential difference between man and beast, is the essential functional distinction of what is Satanism-in-fact. When that matter is viewed in that rigorously scientific way, we are obliged to recognize that the known existence of society prior to the referenced Fifteenth-Century Renaissance was a state of affairs in which some people hunted or herded other people as virtually human cattle. The treatment of the majority of humanity as human cattle, as beasts, degraded the hunters and keepers to a common bestiality. Thus, the pre-history and history of mankind has been, essentially, a long effort to liberate mankind from self-inflicted bestiality.

In the history of European civilization, this struggle against the hegemony of bestiality includes such featured developments as the history of science running through the Pythagoreans, Solon of Athens, and Plato, through the principle of human universality as in the image of the Creator, established by Jesus Christ, and spread through, most notably, the Gospel of John and Epistles of Paul. The realization of that impact of a Classical-Greek situated Christianity upon Judaism and, later, Islam, prepared the ground for the first emergence of the modern nation-state under the conditions produced by the return from Latin, to revived emphasis upon the morally and intellectually superior Classical Greek culture of Plato's Academy at Athens, during the Fifteenth-Century Renaissance.

As I have emphasized, the Venice-orchestrated religious wars of the 1511-1648 interval's "little new dark age," the wrecking of France's Seventeenth-Century renaissance by the combined legacy of Louis XIV and the Eighteenth-Century Enlightenment, reduced the prospects for continuing the political legacy of the Renaissance founding of the modern nation-state, to the European backing for the effort, led by Benjamin Franklin, in North America. The London-directed efforts of Lord Shelburne's Jeremy Bentham, et al., which launched the July 14, 1789 storming of the Bastille as a plot to prevent the continued effort for the Bailly-Lafayette constitution, and the subsequent Jacobin Terror and Napoleon's reign, ruined the possibility of establishing true republics like the U.S.A. in Europe. The result was, the mixed blessing of certain reforms of the feudal order, producing the presently typical Anglo-Dutch Liberal model of banker-controlled parliamentary democracy.[51] Today, unfortunately, the success of the right-wing currents associated with the 1966-1968 Presidential campaign of Richard Nixon, and the incumbency of Nixon's control by the pro-consulate of Henry Kissinger, George Shultz, Paul Volcker, et al., unleashed that uprooting of the U.S. Constitutional tradition which has brought ruin upon both the Americas, Europe, and sub-Saharan Africa today.

Nonetheless, the U.S. Constitution is the most durable of all designs of government in the world today, a Constitution which has been brought back, repeatedly, as from the grave, as under Presidents Abraham Lincoln and Franklin Roosevelt. The most crucial element of true genius in that Constitution is its Preamble, which is in itself, as I have described it, the fundamental law of our republic.

To round out the argument of this report, consider the following strategic assessment of the present world situation.

If you were the Devil himself, and wished to eradicate from this planet all that represented the efficient difference between man and beast, from whence would you launch your attack? To establish a world-empire for Satan, so to speak, what part of the world would you choose as prime target for takeover?

Go back to the Summer of 1944. The Allied breakthrough in Normandy has assured the early doom of the Nazi regime. A President Franklin D. Roosevelt, tired from the combination of his continuing illness and his labors, is preparing for the post-war reorganization of the world as a world composed of a unity of anti-colonialist principle among sovereign nation-states. He has chosen his Vice-President Henry Wallace as, once again, his choice of Vice-Presidential nominee for the coming Democratic Party convention. The right-wing, inside and outside the U.S.A., representing those financier interests, and their accomplices, behind the Synarchist rulers of Nazi Germany, fascist Italy and Spain, and Vichy France, are determined to secure themselves against the looming threat of justice, and to ensure a termination of those policies which President Roosevelt represents. Thus, Senator Harry Truman is forced upon Roosevelt as replacement for Wallace at the convention.

The election of President Dwight Eisenhower temporarily reversed the drive toward a fascist takeover of the U.S.A. under Truman, but it proved to be only a setback, a delay for the ambitions of those utopian, factional forces of intended international fascism who are associated today with names such as neo-conservatives and a "Revolution in Military Affairs (RMA)." The

49. I.e., what is officially known to U.S. and France intelligence services under the post-World War I file designation of "Synarchism/Nazi Communism."

50. Today's imperial, e.g., "neo-conservative" form of fascism is known by such rubrics as "universal fascism," the Nazi international Waffen SS copied form known in the U.S.A. as the "Revolution in Military Affairs (RMA)."

51. The attempt to establish the Fifth Republic in France, under which France's national finances were tied to the U.S. model of the gold-reserve-based fixed-exchange-rate system, is the most notable approximation of an actual republic in Europe to date. That was ruined by the U.S.-led developments of 1971-1972, but the legacy of that aspect of "Gaullism" lingers as a potential future benefit today.

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"Fascism today, as practiced by the Leo Strauss-related U.S. neo-conservatives around Vice-President Dick Cheney, is the leading political expression of Satanism." Here, Hieronymus Bosch's (ca. 1460-1516) depiction of Hell as a garden of earthly pleasures, which exemplifies what LaRouche calls "Satanism in fact"—denying the difference between man and beast.

1962 missile crisis, the assassination of President Kennedy, and the launching of the U.S. official war in Indo-China, transformed the United States from the world's leading producer economy, into the parasitical, bankrupt, and world-predatory consumer society is has degenerated into becoming today.

The essential feature of this change is typified by the referenced case of Associate Federal Justice Antonin Scalia's pro-fascist, and frankly pro-Satanic doctrine of "shareholder value." The essence of the Satanic quality which Scalia merely typifies, is the denial of the essential principles of the U.S. Constitution, most notably the anti-Satanic principles of "general welfare" and "posterity."

The denial of the right of the population to be developed and employed in service of that realized scientific-technological progress essential to the human nature of the population as a whole, is the essence of practical Satanism, the bestialization of the people as human cattle deemed best suited to serve as the prey of a financier-predator class.

The objective of such pranks, is not merely to deprive the people of their right to such development of society. The truly Satanic character of the onslaught against the U.S. Constitution, is the commitment to eradicate from the people the popular will to participate in scientific-technological progress.

If the people are caused to degenerate in that way, then, they, like the popular opinion of the citizens of ancient imperial Rome marching in to enjoy the bestial spectacles of the gladiatorial arena, will become fascists like those ancient Romans. Then, they, and similar populations of subject other nations, will became a predatory mass of beast-men, to bring about the Satanic goal of uprooting an order among people which was dedicated to the principle of man and woman made equally in the image of the Creator. There is no policy more Satanic than such a reliving of the ancient Roman Empire of Tiberius, et al., as that.

Could any of you be so degenerate, as to be willing to compromise with that Satanic intention being expressed by the neo-conservative changelings infesting the U.S. government, and Democratic National Committee's tyrants today?

Addendum

Take as a case in point, the nominally Christian priest who either ceased to believe, or never actually did, but who continues to be a priest, and defends the priesthood on some pretext other than an actually Christian belief. I have encountered a number of representatives of that type, in various denominations. The worst of those is typified in history by the horrid legacy of the Crusades and Inquisition. At his worst, such a false priest becomes nothing but Satanic. Essentially, by inclination, he usually tends to represent a continuation of the same tradition in sophistry represented by Kant, Euler, and Lagrange.

Our contemporary Protestant "fundamentalists," most notably the nominally Zionist variety of these traditionally anti-Semitic creatures, are only the reverse side of the coin for the right-wing priest who is no longer gripped by the *passion* of Christ, or, perhaps, never was. What do such wretches as any of those believe?

Compare the case of Theodor Adorno and Hannah Arendt, two existentialist cronies of the Nazi philosopher Martin Heidegger, whose disqualifications for the Nazi Party membership toward which their philosophy inclined them, was, essentially, nothing but the birth records which identified them as Jewish. Like Heidegger's follower Leo Strauss, these nominally Jewish swine found in the U.S.A. a place to practice a Nazi-like dogma, for which they became noted as liberals, all without giving up anything of that which they shared essentially with the Nazism of Heidegger. What do such wretches as those actually believe? What do non-believing priests of all colors actually believe? In the case of Christianity, the appropriate type of answer to such questions is more or less readily accessible. I summarize the argument, as follows.

Christianity is premised inclusively, adducibly, on the Mosaic doctrine that man and woman are made equally in the likeness of the Creator, and endowed with the powers and responsibilities for the security and ongoing development of the domain to which they are assigned. In short, the essence of Christianity is the absolute distinction between man and beast, as I have, once again, defined that distinction in this report.

Moreover, the distinction of Christian is that notion of

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The storming of the Bastille, July 14, 1789, was launched by the London-directed forces to prevent France from adopting a U.S.-style Constitution. The Jacobin Terror and Napoleon's reign which followed, wrecked the efforts of Benjamin Franklin and others to continue the Renaissance legacy by establishing republics in Europe.

immortality which, as I have emphasized, affrights the Hamlet of the Third Act soliloquy. The persistence of the Christian Church after the judicial murders of Apostles such as Peter and Paul, and the terrible mass-murders of Christians by Roman Emperors, beginning with the crucifixion of Christ by the son-in-law of the Emperor Tiberius of Capri notoriety, is a reflection of precisely that notion of immortality which Shakespeare's Hamlet feared more than death itself. The Christian, especially the true priest, is a person with an immortal mission, a person who follows the light of that thought-object, to a place beyond the domain of sense-perception, which lies, as an object within the simultaneity of the infinity which is reflected by the complex domain. That thought-object expresses his passion, his creative devotion.

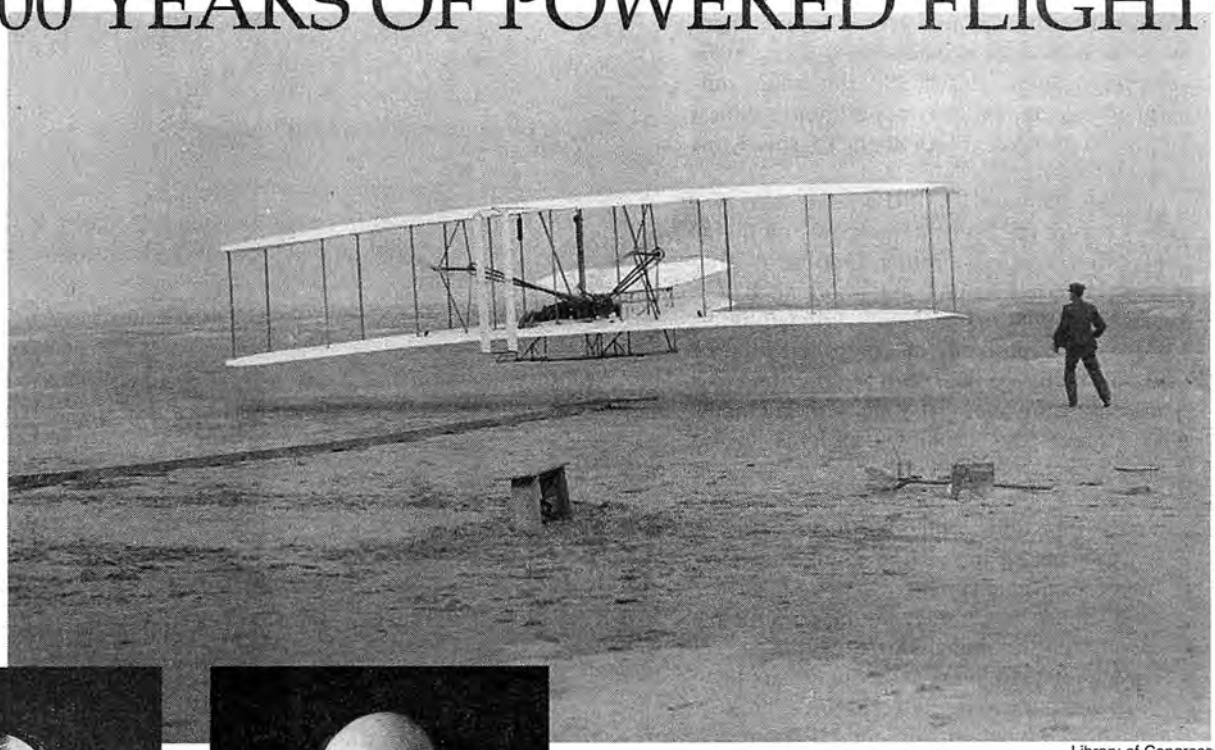
On that account, mankind's appropriate passion for his own destiny is seen in Classical Greek tradition as essentially *Promethean,* in the sense of the Mosaic definition found within *Genesis* 1, but also echoed in Aeschylus' *Prometheus Bound*. Those who condemn such a Promethean devotion, are no Christians, but, more likely, suspect devotees of the virtually Malthusian Code of the Roman Emperor Diocletian.

What, then, of the priest who lacks such a controlling thought-object, such a controlling passion? He finds a substitute for passion as all the reductionists do, the sophists most notably. Like the frankly Satanic Bertrand Russell and his devotees, he makes up sets of *a priori* rules, like the definitions, axioms, and postulates of a Euclidean geometry, or the counting-number dogmas of the empiricists or the kindred dogmas of the Cartesians. These sets of rules become the arbitrary rules of a children's game, a game often as ugly as Dungeons and Dragons, or the sadism of the Harry Potter stories. The rules are always beastly, as the heirs of the Emperor Constantine defended the institution of serfdom against the modern sovereign republic; they situate the actor within the bounds of a sense-certainty prescribed by an unknowable beyond, and demand that the dupe of such rules solve the puzzle by these rules, upon which the Babylonian priest insists. If the rules fail, a new set of rules, with the same fault as the first, will be provided magically, by the Delphic oracle or her like. If all else fails, the rules are defended as an order of affairs predetermined by arbitrary divine right of those to which such authority is attributed.

The priesthood of those who do not believe in the mission of their profession, degenerate into a kind of freemasonic bureaucracy, not much distant from the occult, Cathar-like freemasonry of the Synarchist private bankers. Thus, some such priests, in Spain and elsewhere, became adjunct and part of Synarchism, during the past, and still today.

In the real universe, as Philo of Alexandria argued against the sophist's folly of Aristotle, there are no known limits to the knowable true rules of this universe. Rather, as I have summarized the case within this report, the universe beyond the powers of direct sense-perception is made accessible, increasingly, through our discovery of more and more among those principles which lie still, yet to be discovered as verified Platonic hypotheses, beyond the bounds of sense-perception.

Therefore, where could that sophist of a non-believing, but practicing priest go to pray; to what strange god does he pray in fact? What strange god does he actually serve? To what drum-beat does he march? In fact, that false-flagged priest, like the occultists Aleister Crowley, H.G. Wells, and Bertrand Russell, can do no better than play games of sophistry, making up sets of axiomatic rules to explain away what he can not comprehend, as the the Hellish assortments of sundry empiricists, Kantians, and positivists of the modern academic form of Babylonian priesthood of peer review do still today, as Euler and Lagrange, and their followers Kant and Hegel, did approximately two centuries ago.



Orville Wright is at the controls, with his brother Wilbur running alongside, in the first powered flight, Dec. 17, 1903.

Library of Congress

Orville Wright at 34

Wilbur Wright at 38

How The Wright Brothers Began It All

by Carl Osgood

American ingenuity, persistence, and most of all, a love of discovery led to man's first powered flight.

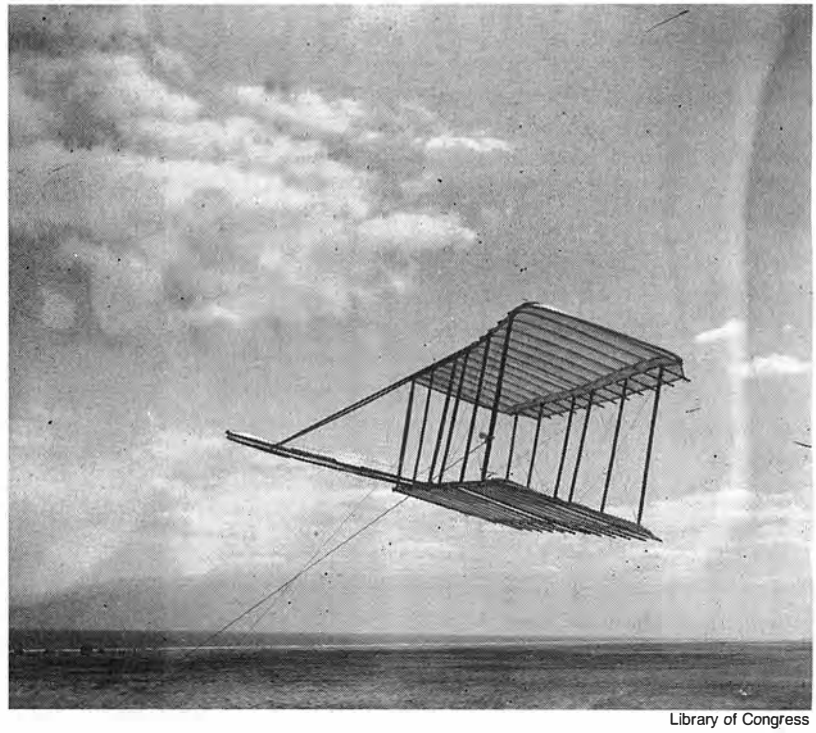
Today, dear reader, you take it for granted that man can fly. Just 100 years ago this was not so. We will explore here how it is that man lifted himself out of the mud and began to soar.

The pioneers of manned flight are Orville and Wilbur Wright. By far and away, their insights into the barriers man had to transcend to lift himself up into the air were unique. When the Wright brothers' historic flight occurred on December 17, 1903, they "flew" only 120 feet and were a mere 10 feet off the ground. But to make this leap for mankind, it required ingenuity and love of discovery.

The problems to solve were not small. Just before the turn of the 20th Century, there were a number of experimenters flying man-carrying gliders. But it was the tragic outcome of one such experiment which impelled the Wright brothers to solve this great challenge.

On September 18, 1901—more than two years before the historic first powered flights of Wilbur and his brother Orville at Kitty Hawk, North Carolina and more than five years after they first became seriously interested in the problem of controlled heavier than air flight—Wilbur Wright described to a meeting of the Western Society of Engineers in Chicago the crucial problems to be solved:

> The difficulties which obstruct the pathway to success in flying machine construction are of three general classes:
> (1) Those which relate to the construction of the sustaining wings; (2) Those which relate to the generation and application of the power required to drive the machine through the air; and (3) Those relating to the balance and steering of the machine after it is actually in flight.[1]



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The 1900 glider flying as a kite. The Kitty Hawk Lifesaving station and the Weather Bureau are in the background at left.

Although the breakthrough achieved by the brothers would be in the solution to the third problem addressed by Wilbur—the problem of stability and control in powered flight—they would also considerably advance the knowledge in the other two areas, as well, in the march to their great achievement.

The Bishop's Sons

Wilbur and Orville Wright were the two youngest sons of Bishop Milton Wright of the Church of the United Brethren in Christ. In addition to fathering the inventors of the airplane, Bishop Wright is also known as one of the most controversial figures in the history of that church. He had a commitment to principle and piety that would become an identifiable trait in his two famous sons.

As a father of the church, Bishop Wright travelled widely to tend to its various congregations, and the family moved frequently during the post-Civil War period. Wilbur was born on a farm in Millville, Indiana, on April 16, 1867, and Orville was born on August 19, 1871, in the house the family would come to occupy for more than 40 years, at 7 Hawthorne St. in Dayton, Ohio. Two older brothers had grown up and were out of the house by the time Wilbur was a teenager, and a sister, Katharine, was born three years after Orville.

Orville would recount in later years that he and Wilbur's first interests in flight began when they were children, with powered rubber-band-helicopter toys that their father would bring home for them from trips around the country. Orville and Wilbur would build duplicates of these toys and bounce them off the ceiling. For reasons that they did not yet understand, however, larger versions of these toys did not work so well.

Both boys loved to solve problems that seemed insoluble to others. The more difficult the problem, the more they saw it as a challenge. Delving into the unknown was such a joy for them that Orville once said "I can remember when Wilbur and I could hardly wait for morning to come to get at something that interested us. That's happiness!"[2]

Putting their ingenuity to work, the boys entered the printing business soon after high school. Orville designed and then built a printing press for this enterprise. At first they did contract printing for other people, and soon one of their biggest customers during the early 1890s was father Milton's church. They also tried the newspaper business, and although their two newspapers, the *West Side News* and the *Evening Item* were considered to be of high quality, Dayton already had 12 daily newspapers, so the Wrights soon returned to contract printing.

Branching out into other areas, they also opened a bicycle business. Bicycling was the fastest growing sport in the country at that time, and their repair shop soon led them into building bicycles of their own design, often with tools of their own construction, such as the lathe driven by a one cylinder gasoline engine built by Orville. The bicycle shop would provide the livelihood that would allow them to carry out their aeronautical experiments.

The Flying Experiments

They first became seriously interested in the heavier-than-air flight problem when Wilbur read of the death of the German experimenter Otto Lilienthal in 1896. Lilienthal had

been experimenting with hang gliders for a number of years. Both brothers avidly read reports of his experiments in the newspapers, and his death made Wilbur ask, "what went wrong?"

They began to scour books on bird flight to see if anyone had investigated how birds fly, but found little contemporary literature on the subject beyond the work of Leonardo da Vinci. Orville reports many years later, "We could not understand that there was anything about a bird that would enable it to fly that could not be built on a larger scale and used by man." Wilbur devoured all the books on flight that he could find, based on a list provided by the Smithsonian Institution, including accounts of the work of Englishman Sir Hiram Maxim, who had built a steam-powered machine in 1896, and Percy Pilcher who was testing gliders similar to those of Lilienthal. In contrast to many of their contemporaries, Wilbur wanted to know what one had to know to fly, so he began by finding out everything that was known about the problem up to that time.[3]

Wilbur and Orville concluded from this research that Lilienthal's mistake had been trying to maintain control of his glider by the shifting of his body weight. This method required a degree of skill that was almost impossible to attain.

One day, Wilbur, while idly twisting a small cardboard box, had an insight which led to a solution to the problem of how to control the machine in flight. Based on this insight, the brothers devised a mechanism by which the wings could be "warped." One end of the wing would turn up while the other end would turn down, thus effecting lateral control of the machine. They built a biplane kite of 5-foot wingspan to test out this idea in July 1899, and Wilbur tested it that September.

This kite worked well enough that they were encouraged to build a glider large enough to carry a man. The data they used for designing it were based on tables of lift and drag (resistance of the air to the forward motion of the machine in flight), developed by Lilienthal and Octave Chanute, a French-born civil engineer who had carried out glider experiments on the dunes of Indiana in 1896. The Wrights would soon begin an extensive correspondence with Chanute, which lasted from 1901 until his death in 1910. After corresponding with the U.S. Weather Service, the Wrights decided to test their new machine on the Kill Devil Hills, outside of Kitty Hawk, North Carolina, in the fall of 1900.

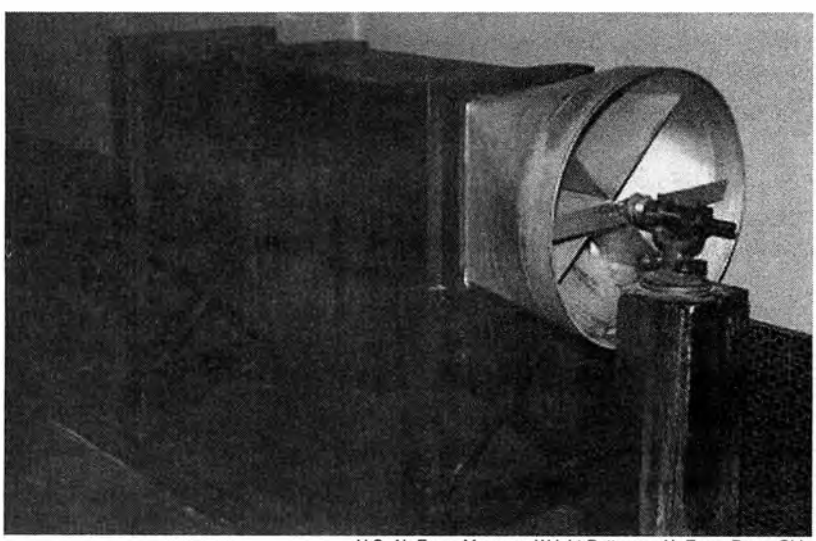
They had recognized that even though Lilienthal had made 2,000 glides until his fatal accident, his total airtime was probably no more than a few hours, because the average length of each flight was only 15 to 20 seconds. Rather than simply gliding, Orville and Wilbur wanted to test the new glider as a man-carrying kite, the idea being to ride the wind for hours at a time to fully experiment with the wing-warping mechanism, and to learn how to control the machine in flight.

When they tried to fly it, they found that the winds were not strong enough to lift it, so they flew it as an unmanned kite. They tested the wing-warping system through cords running to the ground, and although this did not give them the practice they hoped for, they did verify the basic principle of the control system.

They were encouraged enough by these first tests that they decided to build a larger machine the following year and return to Kitty Hawk with the new machine. The wing area was increased to 308 square feet from the 165 square feet of the 1900 machine, in order to ensure that it would have sufficient lifting capacity to carry out the experiments that they had planned. The results of the tests were disappointing, and forced them to come to the conclusion that Lilienthal's lift data were severely flawed. They broke camp earlier than they had originally planned and went back to Dayton. Wilbur, in particular, was determined to solve the problem.

The problem had much to do with camber, or the degree of curvature of the cross section of the wing. It was known prior to the experiments of the Wright brothers that a curved surface in an airflow generated pressures greater on the concave side than on the convex side of the surface. The amount of curvature used on the 1901 glider was the same as that used by Lilienthal, about 1/12 of the depth of the chord, or the distance from the front edge of the wing to the trailing edge, with the peak of the curve about 1/3 of the distance of the chord from the front edge. At this curvature, the actual lift of the machine was about 1/3 of what Lilienthal's tables had indicated it should be.

On August 7, they took the top wing off the glider and flew it as a kite. From this test, they determined that the center of pressure was travelling towards the rear edge of the wing as the angle at which the wing met the air decreased, instead of towards the front edge, as had been expected. They decreased the camber to about 1/20, and this change immediately resulted in improved performance



U.S. Air Force Museum, Wright Patterson Air Force Base, Ohio

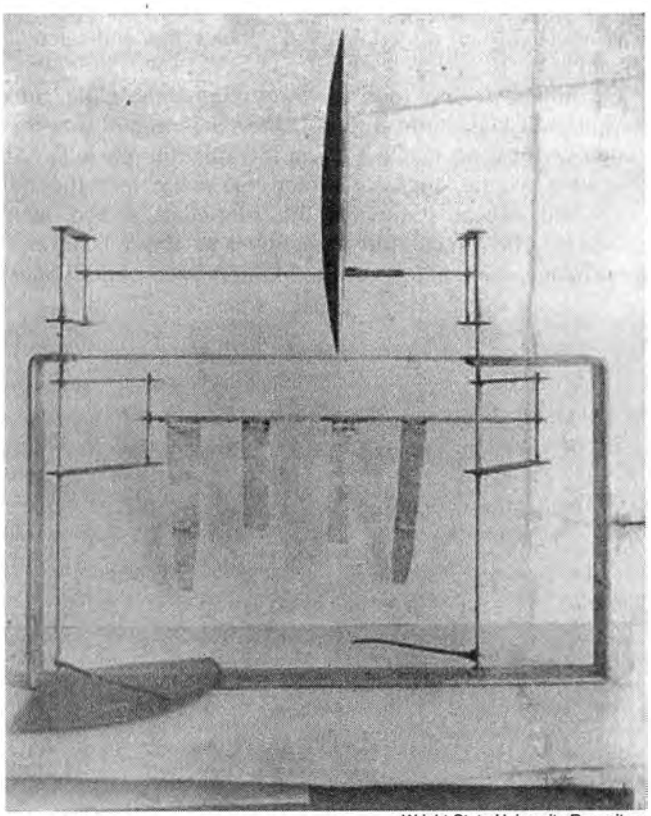
Replica of the Wright Brothers' 1901 wind tunnel at the U.S. Air Force Museum. The blower fan, driven by an overhead belt, produced a 25 to 35 mph wind. The replica was built in the 1930s under Orville's supervision.

of the glider; the longest glide made with it was 389 feet on August 8.

The Wind Tunnel

After they returned to Dayton at the end of August 1901, they determined that they had to develop their own lift and drag tables upon which to base the design of their next glider. They built a testing device using a horizontally mounted bicycle wheel, to make comparative measurements of airflow pressures against various flat and curved surfaces. When the natural wind proved undependable, however, they mounted the device on the front of a bicycle and raced up and down the street in front of their workshop to get their measurements.

Although the differences between flat and curved surfaces were dramatic, they could not make precise measurements of the pressures against the surfaces they were testing. So, they built a simple wind tunnel in the bicycle shop that consisted of a wooden trough, 6 feet long with a cross section 16 inches square. It had a fan at one end that would draw air through the trough which would flow over the airfoils that they would put in the tunnel. The fan was to be driven by the gasoline motor that Orville had built some years before to run the bicycle shop's lathe. The wind tunnel contained vanes and a wire mesh to straighten the airflow, and it produced a wind velocity of between 25 and 35 miles per hour.



Wright State University Repository

The 1901 wind tunnel airfoil and lift balance photographed by Orville Wright. The Wright brothers' wind tunnel was not the first one in existence, but it was the first one built specifically for the purpose of designing an airplane.

The real genius of the wind tunnel lay in the apparatus used to test the various airfoil shapes that the brothers experimented with. The devices used would balance the curved surface to be tested against a flat surface of equivalent surface area. The principle was similar to that of the bicycle wheel device tried earlier, but it gave very precise results.

In all, three balances were built, all made of hacksaw blades and bicycle spokes. The first measured both lift and drag, but the device's inherent error was so great that they built two separate balances, one for lift and the other drag (or "drift" as the Wrights termed it).

Once the tunnel and balances were complete, they ran a remarkable series of tests through November and December of 1901, on about 150 different surfaces, including planes and bird wings. They developed results so quickly, because of the systematic way they ran the tests, that Chanute commented on November 18:

> it is perfectly marvelous to me how quickly you get results with your testing machine. You are evidently better equipped to test the endless variety of curved surfaces than anybody has ever been.[4]

Although this was not the first wind tunnel ever built, or even the first one to be built in the United States, it was the first time that a wind tunnel was used to develop data for the design and construction of an airplane. Thus, the Wrights were the first aeronautical engineers.

The methods they employed in the 1901 tests would later be used by the National Advisory Committee on Aerodynamics at its first aeronautical laboratory in the 1920s and 1930s, when the United States became the leading nation in aeronautical research. (Ironically, this lab was named after Professor Samuel Langley, who failed to achieve powered flight precisely because he didn't adopt the methods employed by the Wrights.)

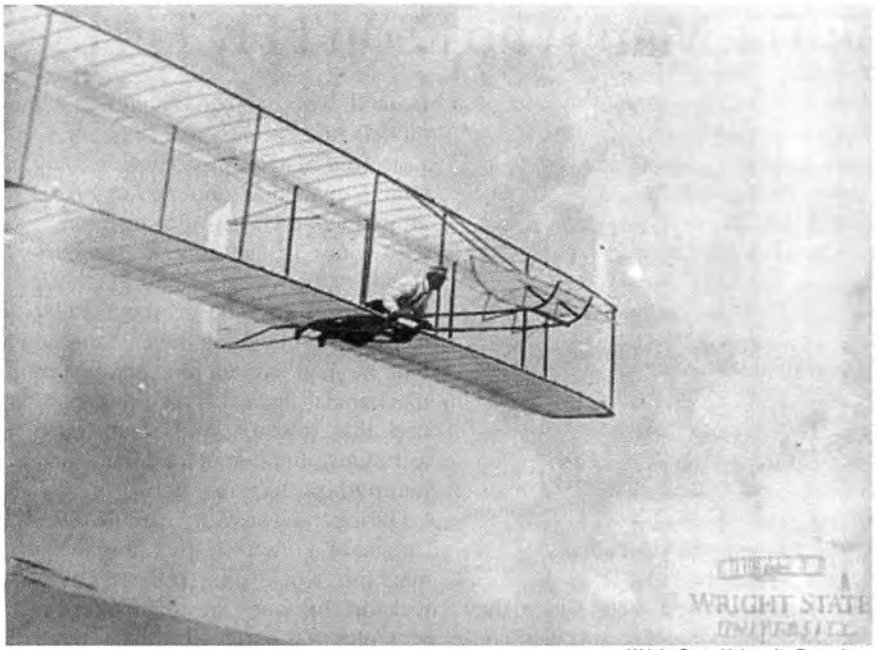
With this wind tunnel, the brothers also tackled the second problem that they had encountered during the 1901 tests at Kitty Hawk, that of pressure co-efficient.

In a 1908 article, Orville Wright defined pressure co-efficient as "the force produced by a current of air of 1 mile per hour velocity striking square against a plane of 1 square foot area." To calculate the lift of a given surface, the following formula is used:

$$L = k \times S \times V(2) \times C(L)$$

L is the lift measured in pounds, *k* the pressure co-efficient, *S* the surface area of the machine in square feet, *V* the total velocity of the machine (headwind plus speed over the ground) and *C(L)* the lift co-efficient, which varies with the shape of the airfoil surface and the angle of attack.

The value for *k* that the Wrights used in the design of the 1901 glider was 0.005, which was the value used by Lilienthal. This figure was originally derived by Englishman John Smeaton, an 18th Century engineer, to measure the pressure of a fluid stream against a flat surface. He arrived at it by experiment and there was considerable disagreement as to whether this figure was accurate. Only a week after his



Wright State University Repository

Wilbur Wright piloting the Wrights' 1902 glider, fitted with a single movable vertical rudder, at Kill Devil Hills in October 1902. The attaching of the control of the rudder to the wing-warping mechanism provided the breakthrough the Wrights needed to control the machine in flight.

speech to the Western Society of Engineers, Wilbur pointed out to Chanute that this figure was probably too high, and that both the U.S. Weather Service and Professor Langley had made measurements of the pressure co-efficient and arrived at a figure of .0032, which, Wilbur said, was probably more accurate.

The New Glider

They went back to Kitty Hawk in September of 1902 with a glider whose design was based on their new lift and drag data derived from the wind tunnel experiments. The new glider had a front horizontal double surface, which they called a "rudder," and a rear, vertical tail. Initially, the vertical tail was fixed but it would not remain so.

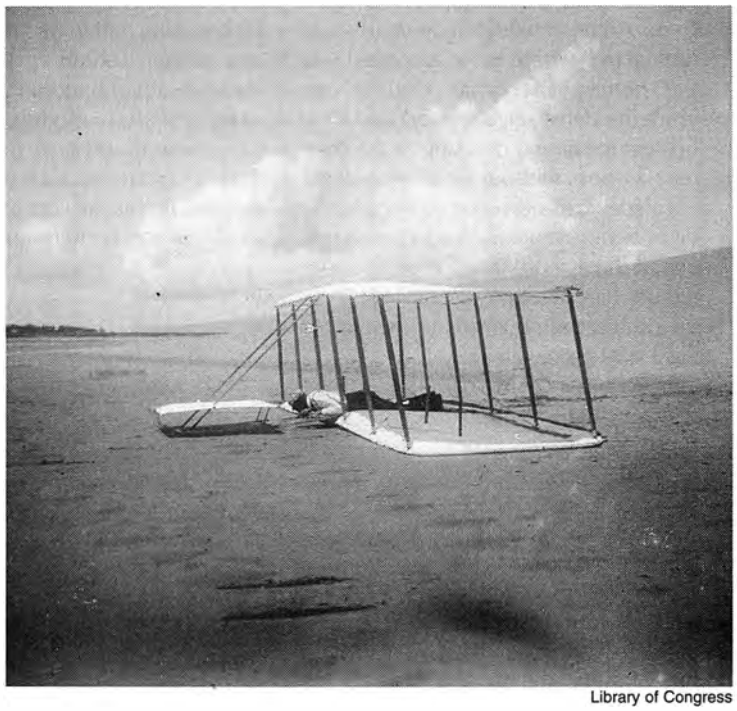
The wing-warping system was operated by a hip cradle that the pilot would lie in, which was linked to control cables going out to the wingtips. While making the glider steerable, the cradle would also cause an increase in drag on the wing that was turned up. This new problem demanded a solution after a spectacular accident on September 23. Orville was making his third or fourth glide of the day (Wilbur had already made several), when he noticed that the machine had a tendency to slide towards the lower wing when in a turn. He became so absorbed with trying to compensate for this, that he did not notice the glider go nose up and stall (that is, lose all lift), and he and the glider ended up "in a heap."

The accident brought a temporary end to the glide tests, until the machine could be repaired, but in spite of it, wrote Orville in his diary, "we are tonight in a hilarious mood as a result of the encouraging performance of the machine both in control and in angles of flight. . . ."[5]

The key to solving the problem of unequal drag that led to the crash of September 23, lay in the vertical tail. On October 4, the Wrights built a new vertical rudder that was steerable and linked to the wing-warping control. This allowed the pilot to turn the glider toward the lower wing to compensate for the increased drag of the higher wing when the device made turns. With this modification, the control system that made possible their achievement, and later their patent, was complete in its basic form.

They made more than 1,000 glides from the Kill Devil Hills, many covering over 600 feet in distance and up to a minute in duration. These tests gave them so much confidence in their wing design and control system that they knew they were ready to build a powered machine.

By this time, the work of the Wrights was becoming known all over the United States and Europe, at least among the aeronautical fraternity, such as it was, mostly because of the efforts of Octave Chanute, who had



Library of Congress

Wilbur Wright lying on the 1902 glider, just after landing. Its skid marks are visible behind. The skid marks in the foreground are from a previous landing.

Samuel P. Langley: The Man Who Didn't Fly First

Unlike the Wright Brothers, Samuel Pierpont Langley had accumulated a long list of scientific and academic credentials, including reaching what some might have considered the pinnacle of the scientific establishment in 1887, when he was appointed as Secretary of the Smithsonian Institution. Although dozens of his contemporaries had dreamed of flight, Langley was the most famous. While the Wrights worked in obscurity, in their bicycle shop, and on the dunes of Kitty Hawk, North Carolina, Langley's attempts at flight were widely publicized.[1]

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Samuel Pierpont Langley

Langley established his scientific reputation in the field of astronomy, but was also interested in less savory fields of investigation. As historian Anton Chaitkin documented in his 1985 book *Treason in America*,[2] at the same time that he headed the Smithsonian, Langley was the American president of a strange transatlantic group known as the Society for Psychic Research, a vehicle for warfare by the European feudalists against the American system of Benjamin Franklin and Abraham Lincoln.

According to Langley's associate Cyrus Adler, Langley made yearly trips to England, where he would often visit the home of Thomas Carlyle, the crude feudalist racial writer, and sit at his feet for hours, drinking in the master's wisdom without speaking a word.

Langley had been fascinated with the flight of birds since he had been a boy, and at the age of 50, he turned his attention to the problem of powered flight. He began with systematic observations of wind, which he published as a paper, "The Internal Work of the Wind," in 1893. Although he based his observations on birds, he did not see this as simply as an "ornithological problem," but stated that "[I]t points to novel conclusions of mechanical and utilitarian importance. They are paradoxical at first sight, since they imply that under certain specified conditions, very heavy bodies entirely detached from the earth, immersed in, and free to move in, the air, can be sustained there indefinitely, without any expenditure of energy from within."

Just as birds glide, so could craft.

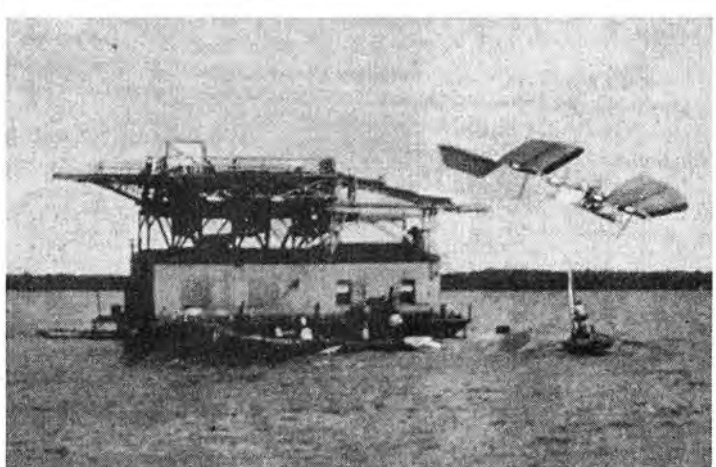
He followed this with an investigation of the drag of various objects mounted on the end of a whirling arm, which he built in a laboratory at the Smithsonian, after he became secretary of that institution. He then took the next step of building small, rubber-band-powered models, which he called aerodromes, to investigate the flight characteristics of different wing designs. In this, he was inspired by the work of a Frenchman, Alphonse Penaud, who had been building such models from as early as 1872.

In 1896, Langley successfully flew what he called aerodrome number 6, an unmanned steam-powered craft, with wings 12 feet long. It reached a height of between 70 and 100 feet, and flew a distance of about 3,000 feet over the Potomac River. Satisfied that he had proven the efficacy of mechanical flight, Langley discontinued this research and returned to astronomy. But before long, he would return to his flight research.

During the war with Spain in 1898, Langley had written that the flying machine would first see use as a weapon of war. President William McKinley was intrigued with Langley's prediction, and asked Langley to return to his research, this time with the aim of building a flying machine large enough to carry a man.

However, Langley approached the problem in exactly the opposite way to that of the Wrights. Instead of adopting an engineering approach, like the one Wilbur Wright laid out in his 1901 address to the Western Society of Engineers (wherein he identified the three problems to be solved, and the order in which they had to be solved), Langley simply scaled up his 1896 aerodrome, and went looking for the largest power plant he could find to power it.

Langley's assistant, a mechanical engineer by the name of Charles Manly, ultimately built a gasoline engine that could generate 52.4 horsepower, with a total weight of 187 pounds, an enormously powerful engine for its time. A one-quarter scale model of the aerodrome was also built, and used for flight tests in preparation for when the full-size model would be flown.



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Langley's flying machine flops after launch from a houseboat.

To launch the aerodrome, Langley had built a large houseboat with a launching apparatus on its roof. The houseboat was moored

NEW YORK, THURSDAY, OCT

FLYING MACHINE FIASCO ANOTHER WHIT

Prof. Langley's Airship Proves a Complete Failure.

are known to mankind.

FLYING MACHINES WHICH DO NOT FLY.

The ridiculous fiasco which attended the attempt at aerial navigation in the Langley flying machine was not unexpected, unless possibly by the distinguished Secretary of the Smithsonian Institution, who devised it, and his assistants. Prof. MANLY, who undertook the voyage, prudently clothed himself in a cork jacket--doubtless because cork is a good non-conductor and would tend to keep the wearer warm in the rarefied strata of the upper atmosphere in which

Once again, The New York Times *fits its news to its pessimistic views*

to a spot in the Potomac near Widewater, Virginia, because Langley judged this area to be best for flying.

It was not until Oct. 7, 1903, that both the full-size aerodrome and the weather were ready for the first flight attempt. Langley was busy at the Smithsonian, and had left responsibility for the flight in Manly's hands. At 12:20 p.m., with Manly aboard and dozens of newspaper reporters watching, the aerodrome was launched—and immediately dropped into the river. Despite Manly's emphasizing that the test was only an experiment, Langley was castigated by the press.

Another *New York Times* Fiasco

The New York Times headlined its coverage "Flying Machine Fiasco—Prof. Langley's Airship proves a complete failure." The *Times* further editorialized that "[I]t should be remembered that the bird successful in flight is an evolution. It has taken a great many generations of his kind to develop his muscular system in just the right way for flying purposes and very likely the process has consumed many centuries of time. The mistake of the scientist would appear to be in his assumption that he can do with much less suitable material by a single act of creative genius what nature accomplishes with such immeasurable deliberation."

As if this were not enough, the same editorial continues:

"[I]t might be assumed that the flying machine which will really fly might be evolved . . . in from one million to ten million years—provided, of course, that we can eliminate such little drawbacks and embarrassments as the existing relationship between weight and strength in inorganic materials. No doubt, the problem has attraction for those it interests, but to the ordinary man it would seem as if effort might be employed more profitably."

Undeterred, the aerodrome was prepared for a second attempt at flight. In the meantime, the houseboat had been towed up from its original mooring and tied up at a dock at the end of 8th Street in southwest Washington. It was now in full view of anybody who cared to see what was going on, and the onset of winter meant that there would be less boat traffic on the Potomac. Langley and Manly agreed that the next test could be carried out at the junction of the Potomac and Anacostia rivers.

That attempt came on December 8, 1903. The houseboat, with the rebuilt aerodrome on the catapult on its roof, was towed out to the launching site. Because of the difficulty of finding a tug and the uncertainties of the weather, the aerodrome was not ready until 4:45 p.m., just as dusk was setting in. Because of pressure from Congress and the Army, there were no more funds for further tests. This was the last chance.

Manly climbed into the cockpit and, with the engine running smoothly, the catapult was released. Exactly what happened was never determined, but the aerodrome flipped over on its back and dropped into the river. Manly was concentrating on the performance of the engine and, as he wrote later, "was unable to see anything that occurred at the rear of the machine." Because of the darkness, only one picture of the aerodrome in flight was obtained, by the photographer from the *Washington Star.* It clearly shows the aerodrome in a vertical position with the rear set of wings whipping back towards the launch platform.

This failed attempt was the end of Langley's flight experiments. The clamor from Congress to spend money more responsibly, and the attacks in the press made further experiments impossible. *The New York Times,* in its usually optimistic way, wrote on December 10, "We hope that Prof. Langley will not put his substantial greatness as a scientist in further peril by continuing to waste his time, and the money involved, in further airship experiments." Only a week later, with no fanfare whatever, the Wrights succeeded where Langley had failed.

Later, in 1914, the Smithsonian turned Langley's machine over to aviation pioneer Glenn Curtiss, who successfully flew it, although he did not demonstrate it to be a practical flying machine, after having made numerous modifications. This caused the Smithsonian to declare that Langley had built the first machine that could fly. This claim led to a dispute between Orville Wright (Wilbur had died in 1912) and the Smithsonian, which included Orville's decision to send his 1903 flyer to a museum in London. The dispute was not resolved until Orville's death in 1948.

Several months after Langley's death in 1906, Wilbur Wright was asked to comment on Langley's influence on his and his brother's own work. He charitably wrote:

"The knowledge that the head of the most prominent scientific institution in America believed in the possibility of human flight was one of the influences that led us to undertake the preliminary investigation that preceded our active work. . . . When scientists in general considered it discreditable to work in the field of aeronautics, he possessed . . . the moral courage to subject himself to the ridicule of the public and the apologies of his friends."

The discoveries that the Wrights had made, were entirely their own, based on the method of investigation they had chosen, without any prejudice from the scientific establishment that Langley represented.

—Carl Osgood

Notes

1. For more on Langley, see the author's article "Langley Research Center: 75 Years of Aerospace Innovation," *21st Century,* Winter 1992, pp. 32-43.
2. Anton Chaitkin, *Treason in America* (Washington, D.C.: Executive Intelligence Review, 1998).

circulated Wilbur Wright's 1901 paper to his extensive contacts. Before long, poor copies of the 1902 glider were making news in France, although they didn't fly as well, because the Wrights had refused consent to Chanute to reveal how the wing-warping mechanism worked.

Solving the Propulsion Problem

The Wrights spent much of the following winter and spring working out the propulsion problem. They needed a motor that was both light enough and capable of providing the necessary power, but they also needed propellers that would produce the necessary thrust to move the machine forward. Initially they thought that the automotive industry could provide the motor, and that data for marine propellers could be the basis for designing their air propeller.

The automotive industry, it turned out, could not meet their specifications, so it was back to the bicycle shop to build their own motor, with cast iron cylinders set in a cast aluminum crankcase that was custom made for them. Charles Taylor, a machinist whom the Wrights had hired to work in the bicycle shop in 1901, ground a one-piece crankshaft out of a piece of steel armor plate. It would be linked to two propellers by a chain drive.

Their calculations told them they would need 8 horsepower (hp) to propel a machine with a total weight, including operator, of 600 pounds. When they tested the engine in the late winter of 1903, they were pleasantly surprised to find that it produced 12 to 13 hp. This meant the machine could be as much as 75 lbs heavier than they had calculated.

Constructing the propeller, however, turned out to be more of a problem. There was no data, at that time, for air propellers, so the brothers thought they could get the theory from that applied to marine propellers and then supply their own tables of air pressures to come up with a suitable air propeller. Orville wrote in an article a few years later, "So far as we could learn, the marine engineers possessed only empirical formulas, and the exact action of the screw propeller, after a century of use, was still very obscure."[6]

They decided they had to design their propeller from theory and calculation alone, but the more they studied the problem the more complex it became. Orville wrote:

> With the machine moving forward, the air flying backward, the propeller turning sideways, and nothing standing still, it seemed impossible to find a starting point from which to trace the various simultaneous reactions. Contemplation of it was confusing. After long arguments we often found ourselves in the ludicrous position of each having been converted to the other's side with no more agreement than when the discussion began.[7]

The reasoned insight that led to their propeller design was that an air-propeller was not a screw, as had been the approach of other experimenters, like Langley, but rather a rotating wing. Thus, the combination of the knowledge gained from the wind tunnel experiments with the results of two crucial tests of December 1902 and February 1903, led to a design so remarkably efficient that there would be no more fundamental work on propellers until 1916.

The First Powered Airplane

With the propulsion problem solved, the new machine began to take shape. They decided on a layout similar to the 1902 glider, but larger. The engine would be mounted on the lower wing. There would be a propeller of 8 1/2-foot diameter on either side, driven by a chain and sprocket, which would drive the propellers at about one-third of the revolu-

The Wright Brothers and Paul Lawrence Dunbar

One early friend and collaborator of the Wright Brothers was the African-American poet Paul Lawrence Dunbar. Orville and Dunbar had been high school classmates in Dayton, and when the Wrights went into the printing business, Dunbar went into the business along with them. The Wrights published some of Dunbar's poems in their newspapers, the *West Side News* and the *Evening Item*. Later they collaborated with Dunbar on the paper he edited, the *Tattler*, which was aimed at Dayton's African-American community, then about 5,000 people.

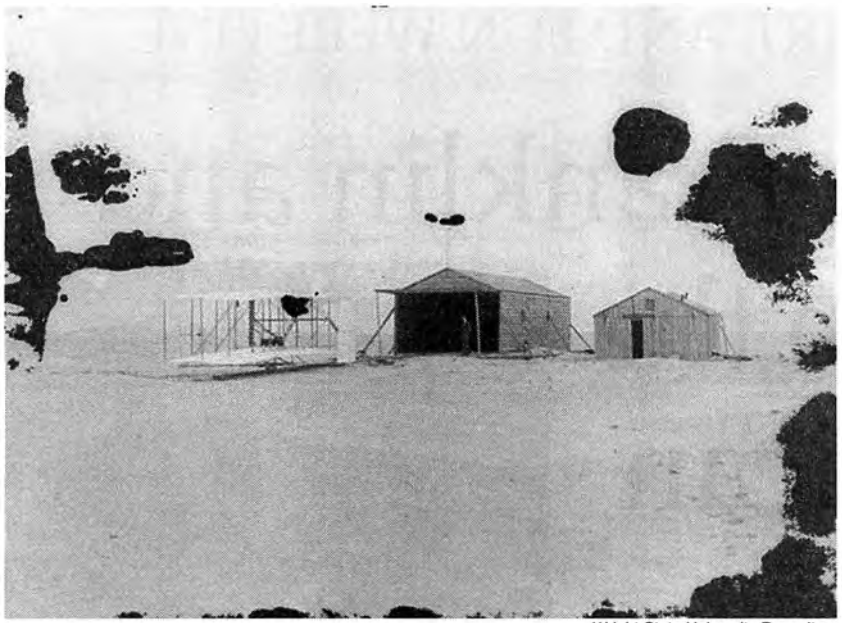
In its first edition, dated Dec. 13, 1890, Dunbar wrote that the mission of the *Tattler* was

> to encourage and assist the enterprises of the city, to give our young people a field in which to exercise their literary talents, to champion the cause of right and to espouse the principles of honest republicanism. The desire which is the guiding star of our existence is that some word may be dropped in our columns, which shall reach the hearts of our colored voters and snatch them from the brink of that yawning chasm of paid democracy.

The *Tattler* was anything but parochial in its concerns. The Dec. 20 issue included a commentary on the meaning of the political downfall of Charles Stewart Parnell for the freedom of Ireland from English rule. Parnell was one of the leading advocates for home rule in Ireland, and the *Tattler* noted that home rule stood little chance of surviving without Parnell's leadership.

Dunbar's friendship with the Wrights continued long after the venture with the *Tattler* failed. Legend has it that Dunbar scrawled the following piece of doggerel on the wall of the Wrights' bicycle shop:

> Orville Wright is out of sight
> In the printing business.
> No other mind is half as bright
> As his'n is.
>
> —*Carl Osgood*



Wright State University Repository

The 1903 flyer outside the Wright Brothers camp at Kill Devil Hills. The flyer was housed in the large building, and the smaller one served as a workshop and living quarters.

tions per minute of the engine. Before the end of the summer, they were planning their return to Kitty Hawk.

They arrived at the Kill Devil Hills around the end of September. After rebuilding their camp (a 90-mile-per-hour wind had shifted the building they had put up the year before nearly 2 feet, and they spent the first few days putting up a new one). They began assembling the new machine a week or so later, but it would not be ready until early December, owing to a series of problems, the worst being the cracking of the propeller shafts. Orville finally had to return to Dayton, at the end of November, to make new ones, because there was no shop in Kitty Hawk where the work could be done.

Finally, on December 14, they were ready. With Wilbur on board, and the engine running, they ran the machine down a specially constructed rail. It rose about 15 feet above the ground at a distance of 60 feet from the end of the track, and then lost all headway and sank to the ground, damaging the front elevator.

Repairs were completed on the 17th, and they were ready to try again. With a wind speed of around 20 miles per hour, Orville climbed on board and warmed up the engine. The machine accelerated down the track and rose about 10 feet into the air. It traveled 120 feet from where it had lifted off and settled back onto the sand. They made three more flights that day, the longest being 852 feet in 59 seconds. Five other men were present to witness the world's first powered flights: three from the Kill Devil Hills Lifesaving Station and two local residents.

The machine was damaged after the last flight, but they had achieved success and they knew it. Word of their accomplishment reached Dayton by a telegram Orville sent to father Milton, late that afternoon:

> Success four flights Thursday morning all against twenty-one mile wind started from level with engine power alone average speed through air thirty one miles longest 57 (sic) seconds inform press home Christmas.[8]

The achievement culminating in that day, essentially completed their engineering work. They would spend the summers of 1904 and 1905 at Huffman Prairie, just outside of Dayton, with two new flying machines, refining what they had already done, until they were confident that they had built a reliable and practical airplane. Starting in 1906, they turned to the business possibilities of their new invention.

Although rumors and wild stories abounded about their work, they did not reveal it publicly until 1908, mostly because of patent considerations. When they did, however, they electrified the world. Only then, did other experimenters, both in the United States and Europe, realize how far the Wrights were ahead of everyone else in solving the problems of powered flight. Not only did they accomplish on 12 hp what others had been unable to do with as much as 50 hp, they had complete mastery of the machine once it was in the air.

Wilbur died at the age of 45, in 1912, before the full impact of their invention was apparent. Milton Wright, in his diary that day, wrote that Wilbur had lived a short life, but one "full of consequence." Orville lived on until 1948, long enough to see the advent of the jet engine and supersonic flight. From the 1920s until his death, he would be treated as the "elder statesman" of aeronautics, but in interviews and letters he would always maintain that the invention of the airplane was the result of the love of discovery that he shared with Wilbur.

Carl Osgood, an Air Force veteran, is a correspondent for Executive Intelligence Review *in Washington, D.C., and at the Pentagon.*

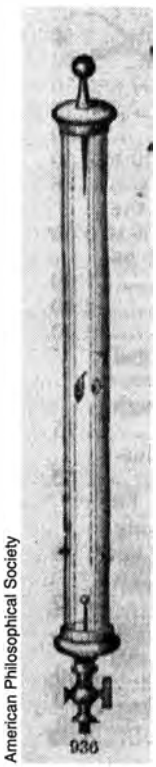
Notes

1. Wilbur Wright on "Some Aeronautical Experiments," to the Western Society of Engineers, Sept 18, 1901, *The Papers of Wilbur and Orville Wright: Including the Chanute-Wright Letters and Other Papers of Octave Chanute* (New York: McGraw-Hill, 1953), 2 vol., pp 99-118.
2. Wright Reminiscences, compiled by Ivonette Wright Miller, privately published, 1978, p. 60.
3. Tom Crouch, *The Bishops Boys: A Life of Wilbur and Orville Wright,* (New York: W.W. Norton and Co., 1989.
4. Octave Chanute to Wilbur Wright, November 18, 1901, in *The Papers of Wilbur and Orville Wright* p. 156 (see Note 1).
5. Orville Wright's Diary B, 1902, Tuesday, Sept. 22, In *The Papers of Wilbur and Orville Wright,* pp. 259-260 (see Note 1).
6. "The Wright Brother's Airplane," by Orville and Wilbur Wright, *The Century Magazine,* September 1908.
7. *Ibid.*
8. Orville Wright to Milton Wright, December 17, 1903, in *The Papers of Wilbur and Orville Wright, p. 397 (see Note 1).*

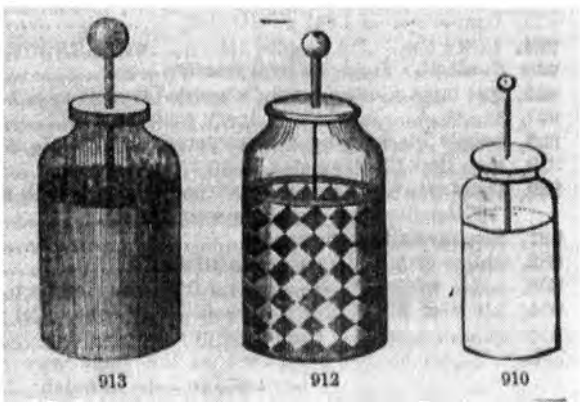
WHEN SCIENCE, ART, AND FUN WERE ONE

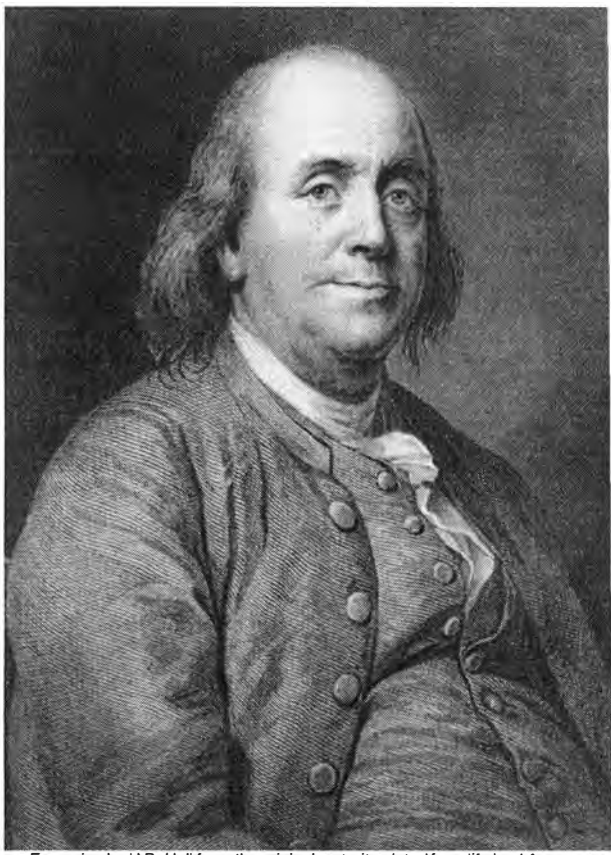
Benjamin Franklin and 'Science in the American Parlor'

by Elisabeth Pascali



American Philosophical Society





Engraving by H.B. Hall from the original portrait painted from life by J.A. Duplessis in 1783. Courtesy Library of Congress

Benjamin Franklin, founder of the American Philosophical Society (APS), with drawings of early electricity experiments.

The American Philosophical Society, founded by Benjamin Franklin in 1743, brought the intellectual culture of early America to life with a recent exhibit of the scientific instruments in daily use in Philadelphia, 1750-1875.

What distinguishes an empire from a republic? How is it that the population of the 1700s in the United States was so much more optimistic, willing to solve problems and not settle for a tyranny? What has kept us, so far, from regaining such strength today?

These and other reflections on life in the 1700s came to mind while visiting a fascinating exhibit sponsored by the American Philosophical Society in Philadelphia, in February 2003, titled "From the Laboratory to the Parlor: Scientific Instruments in Philadelphia, 1750-1875." The exhibit not only gave a glimpse of what life must have been like in the first years of the Republic's history, but also, through contrast, shed light on the path that our nation has followed since that time.

The American Philosophical Society (APS) was one of several institutions founded and fostered by Benjamin Franklin. In 1743, he circulated a letter, titled "A Proposal for Promoting Useful Knowledge among the British

Plantations in America," which solicited interest in founding a society of correspondence so that members who were separated from each other by great distances could keep current on the latest developments in "natural philosophy," the term which, in that day, meant any kind of physical science as well as mathematics. Over the next several decades, many of the men most responsible for founding the United States—George Washington, John Adams, Thomas Jefferson, Alexander Hamilton, Thomas Paine, and James Madison, among others—became members.

The APS still exists today. Because many of its early members, or their descendants, bequeathed their papers, scientific instruments, natural history collections, and other artifacts to the Society, it has one of the most exciting archives of writings and objects from American society of the 1700s and 1800s. The APS has always made its library available to scholars, but, until now, has kept a relatively low profile in terms of educating the general public. This changed with the decision to hire a curator for the collection, and to sponsor a series of public exhibits. Judging from the first exhibit, Ms. Sue Ann Prince, the new curator, has done an excellent job.

> "I think a general government necessary for us, and there is no form of government but what may be a blessing to the people if it is well administered; and believe farther that this is likely to be well administered for a course of years and can only end in despotism, as other forms have done before it, when the people shall become so corrupt as to need despotic government, being incapable of any other. . . ."
>
> —Benjamin Franklin to the delegates of the Constitutional Convention, prior to the final vote[1]

The first exhibit, "From the Laboratory to the Parlor," unfortunately closed on March 31, 2003, very soon after this author visited it. The exhibit deserves to continue on, for every school-age child, as well as those young at heart, should see it, to catch the spirit of the time, and understand the scientific culture of the early days of this nation. The exhibit takes up only one large room in the APS Philosophical Hall, a room dominated by several telescopes, globes, clocks, and portraits of early APS members. Each nook and cranny tells the story of a lost chapter in the history of the United States.

The American Parlor in the 1800s

The scientific instruments from Benjamin Franklin's time were used not just by a few intellectuals and scientists in a backroom laboratory, but by *everyone*, as this exhibit shows. The ferment and excitement over discovering new things with these instruments was clearly so widespread that it was sometimes difficult to distinguish between science, the application of science in the form of new technology, and daily entertainment.

That may be a real shock for today's audience, when the kindest thing that can be said about today's popular entertainment is that it tends to encourage the lowering, or "relaxing," of the level of thinking among the population, rather than uplifting and developing it. The parlors, or living rooms, were much different places in the 18th and 19th Century than they are today. Often the parlors displayed globes, a microscope, or an electrical machine. The most popular parlor activities were those that combined advanced technology with fun. This was one of the central themes of the APS exhibit.

The exhibit displayed an example of a Sun microscope which allowed the magnified image of a specimen to be projected onto a wall for everyone in the room to see. There were several different pocket telescopes, microscopes, sundials, and other instruments used by youngsters and amateur scientists in exploring the world around them. There were also three different catalogs of optical, mathematical, and "philosophical" instruments for the "upscale and every day man" of the mid-1800s. It is easy to picture children (and parents) carrying portable microscopes into the fields, finding interesting specimens to collect, and bringing them back to the parlor for later display and discussion.

The exhibit showed some of the original illustrations of the microscope by a German illustrator of the period, Martin Frobenus Ledermuller. Microscopic life was a subject of great excitement and debate, from scientific laboratories and meeting rooms to the family living room.

At the entrance of the exhibit, it was hard to miss two large globes on stands: one terrestrial (of the Earth) and one celestial (of the stars). These globes which are beautiful enough to be used as ornaments, could also be used to follow the journals of great contemporary explorers like Captain Cook, as they travelled to new, unknown lands, or to learn how to make astronomical observations. There was also a beautiful Italian-style banjo barometer, which could be used to follow changes in the weather. (See photo, p. 64.)

Imagine if the entertainment centers of living rooms today had globes to spark the imagination of our children, and Leyden jars (see section on electrical experiments) to spark their fingers in a way to help them rediscover the great electrical discoveries of Benjamin Franklin. In fact, there are many more modern breakthrough experiments which would be relatively easy to recreate as well, such as the electrical experiments of André-Marie Ampère, or Pierre Curie's piezo-electrometer for detecting radioactivity.

Although not part of this exhibit, music and art were also a big part of parlor life in the 18th Century. Just as professional science was not separated from popular culture, music and art were not divorced from science and everyday life. In his *Autobiography,* Benjamin Franklin describes his father thus:

> . . . he was ingenious, he could draw prettily, was skilled a little in music, and had a clear pleasing voice, so that when he played psalm tunes on his violin and sung withal, as he sometimes did in an evening after the business of the day was over, it was extremely agreeable to hear.[2]

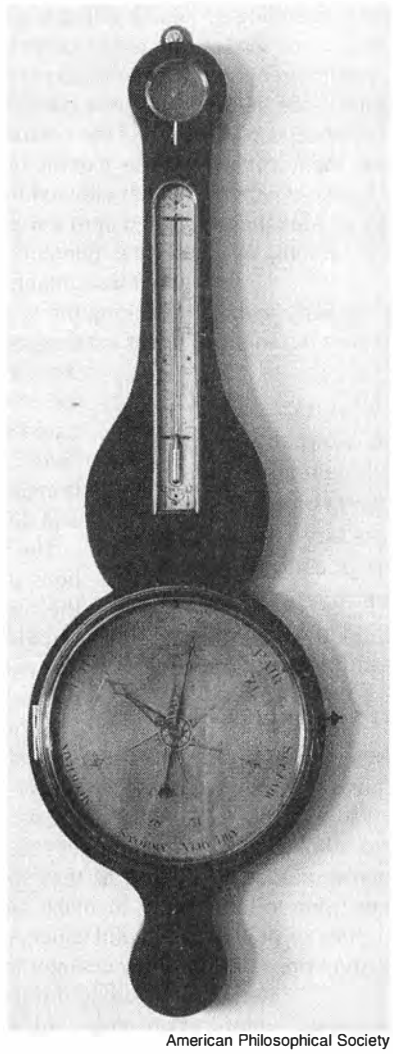
Benjamin Franklin also taught himself the violin, harp, and guitar, wrote at least one string quartet, and invented an instrument called the glass harmonica. The glass harmonica is made up of a spiral of glass and dripping water, and it fascinated

many in Europe as well as America. (See illustration, p. 65) Each note on the glass harmonica sounds similar to the sound that can be generated by wetting one's finger and rubbing the edge of a good glass. But on the glass harmonica, one can produce a number of octaves with ease. Many composers wrote music for it at the time, including Wolfgang Amadeus Mozart and Ludwig van Beethoven.

The Raising of Benjamin Franklin

To gain an insight into the source of the excitement at the time for new knowledge, let's look at the childhood and upbringing of Benjamin Franklin. He was born on January 6, 1706, in Boston, Massachusetts, the center of the Massachusetts Bay Colony, which was founded by republican circles about 75 years earlier. The Massachusetts Bay Colony required that every child be literate, and it set up the first public schools in the colonies. Boston was also a great shipbuilding and trading center. The wharves were filled with skilled workers, and goods from many parts of the world entered the port. This combination of literacy and skilled labor characterizes the best of the young American republic.

Benjamin Franklin was the tenth and youngest son of Josiah Franklin. He had two years of schooling, where he learned reading, writing, some math. and some Latin. At the age of 10, he became an apprentice in his father's candle and soap making shop. It was during this apprenticeship that Benjamin began his self-education, reading as many books as possible, as well as observing how the local business of Boston was run during the errands that his father would send him on.



American Philosophical Society

The banjo barometer on display at the APS exhibit, which was used to follow changes in the weather.

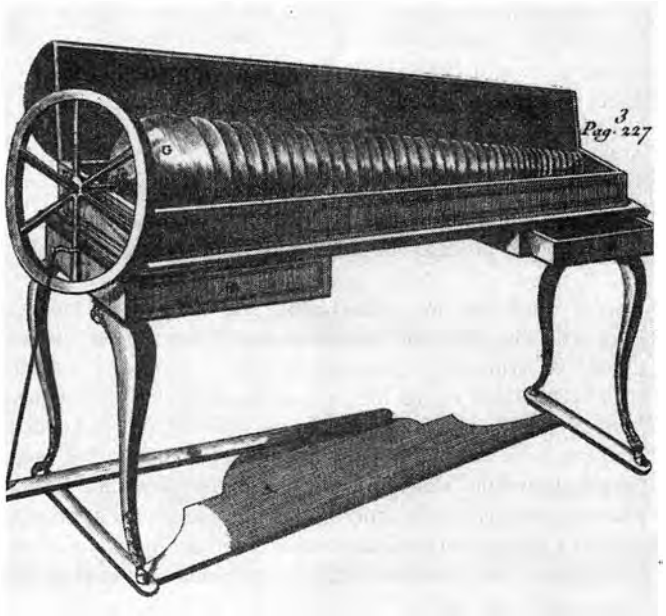
After two years, Benjamin showed a distinct boredom with the candle-making business and a continuing fascination with the sea. His father had already lost one son to the sea and did not want to lose another. "In consequence," writes Franklin in his *Autobiography,* my father

> took me to walk with him and see joiners, bricklayers, turners, braziers, etc., at their work, that he might observe my inclination, and endeavor to fix it on some trade or other on land. It has ever since been a pleasure to me to see good workmen handle their tools; and it has been useful to me, having learnt so much by it as to be able to do little jobs myself in my house when a workman could not be readily got, and to construct little machines for my experiments, while the intention of making the experiment was fresh and warm in my mind.[3]

Josiah Franklin finally decided that Benjamin would be apprenticed to his older brother, James, to become a printer. James had learned his trade in London and had just returned to Boston with new type fonts and a press of his own. In 1718, at the age of 12, Benjamin signed on to a nine-year apprenticeship with his brother.

Printers and their skill, made it possible to mass circulate ideas rather than be dependent on hand-copying texts. Although printing was invented almost 300 years before Franklin's time, it was still a very labor-intensive industry. Here is a description of what a typical day at the office would have involved for James and Benjamin Franklin. Compare this to today's desktop publishing, or perhaps, a better comparison, to the typical day of a web programmer—because the Internet might be thought of as the next revolution in the speed with which we can circulate ideas:

> Printing was hard and slow physical labor, but it was never dull, never wholly predictable, and infinitely varied in its productions. Every signature of pages was a separate piece of work, having to be composed entirely by hand with no tool but a composing stick that guided the compositor in adhering to fixed length for each line. Each form, usually consisting of four pages, was then locked up in a frame, inked by two inking balls, one held in each hand, and first rubbed or "brayed" together to make sure that the degree of ink in them matched. The form was then locked into the stone bed of the press, the tympan [a framed piece of cloth placed between the platen and the paper to soften the pressure of the latter upon the inked type] was folded over the type, a single sheet of paper was inserted, and then the whole rolled under the platen. The printer then pulled the spindle lever, pressing the paper on the type.
>
> All these operations were involved in the production of every single individual sheet printed—that is, for every set of single copies of the four different pages on the form. Thus, if a forty page pamphlet was being printed, it would take ten operations of inking the type, preparing the sheet of paper and tympan, pulling the lever, rolling back the bed to take off the printed sheet, and hanging up the sheet to dry. If the print order was for five hundred copies of the pamphlet, it would take five thousand such series of operations on the press to produce them even before sorting, cutting, and binding the sheets into the finished product. It was estimated that two pressmen of equal ability operating a press—



Franklin Collection, Yale University Library

Franklin's glass harmonica, depicted here in a 1773 French-language Works of Mr. Franklin *by Jacques Barbeu-Dubourg.*

> one inking the type and one handling the sheet, tympan, and platen lever—could at best print two hundred forty sheets an hour once the slower tasks of setting and proofing type were accomplished. . . . For a printing house's output to reach a profitable level at this rate, a twelve-hour day was a necessity, and in summertime the additional daylight [because of course, electric lighting was not available yet—ed.] was often used to stretch the working day to fourteen or fifteen hours.[4]

Beyond this requirement for detailed physical work, it was also often necessary to know how to create type face letters, or fix a press. Benjamin Franklin became one of the most skilled printers of his time. He was called on upon several occasions to get a print shop in order: both in terms of the physical infrastructure, and in terms of training the labor available to work as a skilled team.

The requirement to be able to machine one's own tools, and create the materials needed from raw resources, was true of all skills in the Colonial era, and in this sense it is easy to see where the idea of emphasizing "useful knowledge" as a virtue might have come from. Any new invention might save hours of physical labor for an artisan. Any new discovery in nature could bring a new capability to mankind. However, it is clear from reading the correspondence of natural philosophers such as Benjamin Franklin, Antoine Lavoisier, or others less famous, that there was a real intellectual excitement over "getting to the bottom" of the mysteries posed by God's universe. There was a real sense that each man's contribution to new knowledge could create a real improvement to society as a whole.

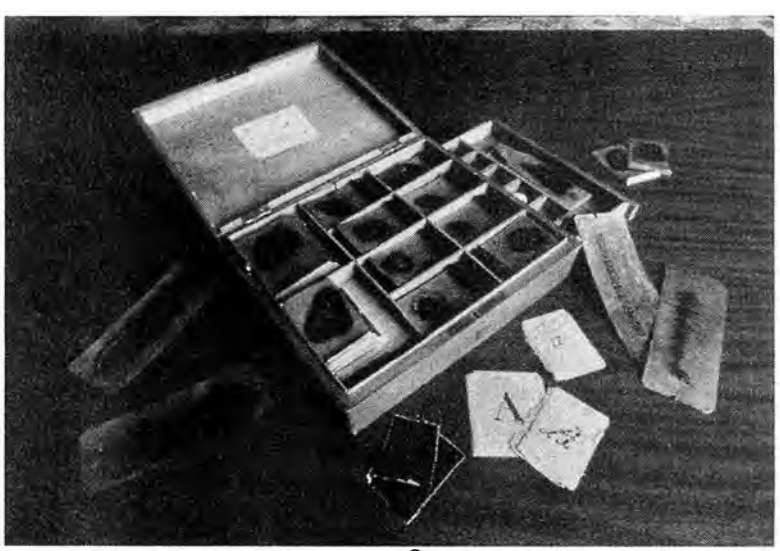
In the circular letter which Franklin printed on May 14, 1743, "A Proposal for Promoting Useful Knowledge among the British Plantations in America," the founding document of the American Philosophical Society, he wrote:

> The first drudgery of settling new colonies, which confines the attention of people to mere necessities, is now pretty well over; and there are many in every province in circumstances that set them at ease and afford leisure to cultivate the finer arts and improve the common stock of knowledge.

He pointed out that the size of the country kept them apart and ignorant of each other's speculations. What was needed was systematic correspondence among them, through the proposed society, on such subjects as these:

> all new-discovered plants, herbs, trees, roots, their virtues, uses, etc.; methods of propagating them, and

Franklin Collection, Yale University Library



© Theo Anderson/American Philosophical Society

Franklin was one of the most skilled printers of his time. Here, an 1846 illustration, "Franklin His Own Porter," from Pictorial Life of Benjamin Franklin. *At right, stencils bought by Franklin, on display at the APS exhibit.*

making such as are useful, but particular to some plantations, more general; improvements of vegetable juices, as ciders, wines, etc.; new methods of curing or preventing diseases; all new-discovered fossils in different countries, as mines, minerals, and quarries; new and useful improvements in any branch of mathematics; new discoveries in chemistry, such as improvements in distillation, brewing, and assaying of ores; new mechanical inventions for saving labor, saw mills and carriages, and for raising and conveying of water, draining of meadows, etc.; all new arts, trades and manufactures that may be proposed or thought of; surveys, maps, and charts of particular parts of the sea coasts or inland countries; course and junctions of rivers and great roads, situations of lakes and mountains, nature of the soil and productions; new methods of improving the breed of useful animals; introducing other sorts from foreign countries; new improvements in planting, gardening, and clearing land; and all philosophical experiments that let light into the nature of things, tend to increase the power of man over matter, and multiply the conveniences or pleasures of life. . . .[5]

The Roots of the American Philosophical Society

The idea of a Society that would centralize and propagate scientific and technological knowledge was not a new one, and was based on something more profound than practicality. Gottfried Leibniz, the great philosopher and scientist who lived a generation before Franklin, inspired the creation of several national "Academies of Science" in Europe. In one essay, "New Proposals," Leibniz wrote,

> I believe two things would be necessary for men to take advantage of their opportunities and to do everything they could to contribute to their own happiness, at least in the matter of knowledge, for I do not touch here on what pertains to the rectifying of their will. These two things are, *first,* an exact INVENTORY of all the knowledge acquired but dispersed and badly arranged (at least of that knowledge which appears to be most important at the beginning), and, *secondly,* the GENERAL SCIENCE which should give us not only the means to use knowledge already acquired but also the Method of judging and discovering, in order to go further and supply what we want.[6]

Franklin Collection, Yale University Library

Franklin's Philadelphia discussion club, the Junto, was based on the ideas of Cotton Mather and Gottfried Leibniz. Here is an 1846 depiction of the Junto Club from the Life of Benjamin Franklin, *edited by H.H. Weld.*

John Winthrop, Jr. (1606-1676), was the son of the first Massachusetts governor, as well as a great astronomer and scientist. Winthrop Jr. corresponded with Gottfried Leibniz towards the end of his life. His political successor, Increase Mather, kept up a correspondence with circles in Leyden, Holland, who were in touch with Leibniz, as did Mather's son, Cotton. Franklin states in his *Autobiography* that Cotton Mather was a great influence in his life. He says that he read Mather's *Essays to Do Good,* "which perhaps gave me a turn of thinking, that had an influence on some of the principal future events of my life."[7]

Increase Mather (1639-1723), who was still very active in Boston when Franklin was young, founded a Philosophical Society in 1683, which met once every two weeks to discuss "improvements in philosophy and additions to the stores of natural history." The Society corresponded with the circles close to Leibniz in Leyden, Holland, as well as with the British Royal Society and Dublin's Philosophical Society.[8]

In the *Essays to Do Good,* Cotton Mather calls for the creation of "benefit societies." These societies (of which Cotton Mather himself was a member of 20) were small groups of neighbors who would get together weekly to read the Bible, or a recent sermon, and then pose a collection of questions to themselves, with a pause after each question for reflection. These questions helped the members think about whether there was anything, or anyone, in their community whom they could help, or any injustice that should be righted.

In 1727, soon after he had settled in Philadelphia, Franklin founded a discussion club among his friends called the Junto, which was a combination of the benefit society idea of Cotton Mather and the Academy of Leibniz. The membership was limited to 12, and each new member was required to take an oath saying that he loved mankind in general and truth for truth's sake.[9] The Junto would meet once a week to ask and discuss a similar set of questions to those written out by Cotton Mather in his Essay. These questions allowed members to suggest ways in which they could help improve life for themselves and the population of Philadelphia as a whole.

Junto members often did favors secretly for friends or for newcomers to the area. They also worked with Franklin to start the community institutions of Philadelphia, such as the subscription library, hospital, school, and fire companies. Franklin also required that

> every member, in turn, should produce one or more queries on any point of Morals, Politics, or Natural Philosophy to be discussed by the company; and once in three months produce and read an essay of his own writing, on any subject he pleased.[10]

This idea was carried out on an international basis with the founding of the American Philosophical Society.

Franklin and Friends Master Electricity

Although Franklin circulated his proposal for the American Philosophical Society in 1743, the Society was less active than Franklin had hoped it would be.

> "The members . . . here are very idle gentlemen," he wrote to fellow member [Cadwallader] Colden after a year and a half. "They will take no pains." Their meetings were perhaps irregular, minutes were not always kept, and no proceedings or abstracts were published.[11]

However, a number of men who would later become members of the Society worked with Franklin on his famous "Experiments and Observations on Electricity."

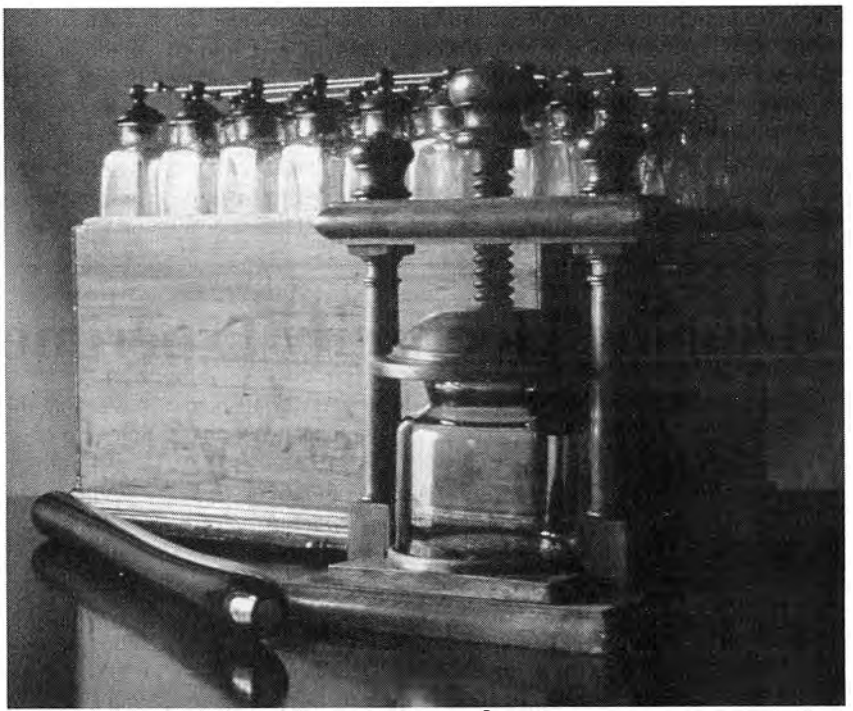
In 1746, Pieter von Musschenbroek at the University of Leyden, Holland, discovered how to store an amount of electricity in a jar which could then be released as one jolt. This "Leyden jar," or "electric bottle" as it was called by Franklin, is simply a glass, or other non-conductive container with a piece of metal, or other conducting material on the inside and outside. It is a type of capacitor. When the outside metal is grounded and the inside metal is charged with static electricity, a potential charge difference arises between the two conductors. Any conducting material that comes in contact with the two conductors will receive the discharge, often in the form of a shock. This lends itself to many possible demonstrations of the power and behavior of electricity.

The Leyden jar is still used today in teaching laboratories, and was the only means of storing electricity, until the chemical battery was invented by Alessandro Volta in 1800. The announcement of the invention of the "electric bottle," set off a wave of public demonstrations and intense experimentation across Europe.

Peter Collinson, a Quaker merchant and friend, sent Franklin his first "electrical bottle" in 1746. The bottle was very popular, and Franklin later wrote to Collinson saying,

> My house was continually full, for some time, with people who came to see these new wonders. To divide a little this encumbrance among my friends, I caused a number of similar tubes to be blown at our glass-house, with which they furnished themselves, so that at length we had several performers.[12]

The group that Franklin worked with also came up with several improvements to the experimental apparatus. Philip Syng, a member of the APS and a skilled silversmith, contrived a machine to save them labor, as Franklin reported:



© Theo. Anderson/American Philosophical Society

An electric battery, made up of a series of Leyden jars. In the foreground is a disinfecting apparatus and "electric bottle."

> The European papers on electricity, frequently speak of rubbing the tube as a fatiguing exercise. Our spheres are fixed on iron axes which pass through them. At one end of the axis there is a small handle with which you turn the sphere like a common grindstone.[13]

In 1749, Franklin reported to Collinson that they had created

> what we called an electric battery, consisting of eleven panes of large sash-glass, armed with thin leaden plates pasted on each side, placed vertically and supported at two inches' distance on silk cords, with thick hooks of leaden wire, one from each side, standing upright, distant from each other, and convenient communications of wire and chain from the giving side of one pane to the receiving side of the other; that so the whole might be charged together and with the same labor as one single pane.[14]

Both of these apparatuses were on display at the APS exhibit.

With the labor-saving electric charging machine and the electric battery, Franklin and his friends carried out a series of experiments which led to the most accurate understanding of electrical phenomena in the world. The experiments were relatively simple and would be easy to reproduce today. There were two major breakthroughs that were made by this group of "upstart colonials," as the British Royal Society referred to them:

(1) That what many had thought of as two different types of electricity (resinous and vitreous) were really the result of a single fluid being either drawn off or placed in excess. They discovered this through a series of very careful observations.

They also noticed that there was a limit to the amount of electricity which a given bottle would accept, but that they could harness much more electricity with the same amount of labor, by using the battery described above.

(2) That atmospheric electricity, or lighting, was the same phenomenon as their parlor electricity on a much larger scale.

In a letter to Peter Collinson in 1747, Franklin describes the "practical uses" that he and his friends are finding for electricity:

> We suspend by fine silk thread a counterfeit spider, made of a small piece of burnt cork, with legs of linen thread, and a grain or two of lead stuck in him to give him more weight. Upon the table, over which he hangs, we stick a wire upright as high as the phial and wire, two or three inches from the spider; then we animate him by setting the electrified phial at the same distance on the other side of him; he will immediately fly to the

Bringing Electricity Experiments to the Public

Rev. Ebenezer Kinnersley a member of the APS who worked closely with Franklin on the electrical experiments, went on a tour to give public lectures on electricity in 1752 and 1753, lecturing in Philadelphia, Boston, Newport, and New York. The advertisement for his Newport lectures, which is on display in the exhibit, show that these lectures were very detailed, a combination of "shocking" demonstrations and theory.[1]

Electrical FIRE Newport, March 16, 1752

Notice is hereby given to the Curious, That at the COURT-HOUSE, in the Council-Chamber, is now to be exhibited, and continued from Day to Day, for a Week or two; A Course of Experiments, on the newly-discovered Electrical FIRE:

Containing, not only the most curious of those that have been made and published in Europe, but a considerable Number of new Ones lately made in Philadelphia; to be accompanied with methodical LECTURES on the Nature and Properties of that wonderful Element.

By Ebenezer Kinnersley.

LECTURE I.

I. Of Electricity in General, giving some Account of the Discovery of it.

II. That the Electrical Fire is a real Element, and different from those heretofore known and named, and collected out of other Matter (not created) by the Friction of Glass, Etc.

III. That it is an extremely subtle Fluid.

IV. That it doth not take up any perceptible Time in passing thro' large Portions of Space.

V. That it is intimately mixed with the Substance of all the other Fluids and Solids of our Globe.

VI. That our Bodies at all Times contain enough of it to set a House on Fire.

VII. That tho' it will fire inflammable Matters, itself has no sensible Heat.

VIII. That it differs from common Matter, in this: its Parts do not mutually attract, but mutually repel each other.

IX. That it is strongly attracted by all other Matter.

X. An artificial Spider, animated by the Electric Fire, so as to act like a live One.

XI. A Shower of Sand, which rises again as fast as it falls.

XII. That common Matter in the Form of Points attracts this Fire more strongly than in any other Form.m

XIII. A Leaf of the most weighty of Metals suspended in the Air, as is said of Mohomet's Tomb.

XIV. An Appearance like Fishes swimming in the Air.

XV. That this Fire will live in Water, a River not being sufficient to quench the smallest Spark of it.

XVI. A Representation of the Sensitive Plant.

XVII. A Representation of the seven Planets, shewing a probable Cause of their keeping their due Distances from each other, and from the Sun in the Center.

XVIII. The Salute repulsed by the Ladies Fire; of Fire darting from a Ladies Lips, so that she may defy any Person to salute her.

XIX. Eight musical Bells rung by an electrified Phial of Water.

XX. A Battery of eleven Guns discharged by Fire issuing out of a Person's Finger.

LECTURE II

I. A Description and Explanation of Mr. Muschenbrock's wonderful Bottle.

II. The amazing Force of the Electric Fire in passing thro' a Number of Bodies at the same Instant.

III. An Electric Mine sprung.

IV. Electrified Money, which scarce any Body will take when offer'd to them.

V. A Piece of Money drawn out of a Person's Mouth in spite of his Teeth; yet without touching it, or offering him the least Violence.

VI. Spirits kindled by Fire darting from a Lady's Eyes (without a Metaphor).

VII. Various Representations of Lightning, the Cause and Effects of which will be explained by a more probable Hypothisis than has higherto appeared, and some useful Instructions given, how to avoid the Danger of it; How to secure Houses, Ships, Etc. from being hurt by its destructive Violence

VIII The Force of the Electric Spark, making a fair Hole thro' a Quire of Paper.

IX. Metal melted by it (tho' without any Heat) in less than a thousandth Part of a Minute.

X. Animals killed by it instantaniously.

XI. Air issuing out of a Bladder set on Fire by a Spark from a Person's Finger, and burning like a Volcano.

XII. A few Drops of electrified cold Water let fall on a Person's Hand, supplying him with Fire sufficient to kindle a burning Flame with one of the Fingers of his other Hand.

XIII. A sulphourous Vapour kindled into Flame by Fire issuing out of a Cold Apple.

XIV. A curious Machine acting by means of the Electric Fire, and playing Variety of Tunes on eight musical Bells.

wire of the phial, bend his legs in touching it, then spring off, and fly to the wire in the table; thence again to the wire of the phial, playing with his legs against both in a very entertaining manner, appearing perfectly alive to persons unacquainted. He will continue this motion an hour or more in dry weather.[15]

This was a big hit at dinner parties!

Illustration from Robert Lawson's 1939 book, *Ben and Me*, courtesy of Franklin Collection, Yale University Library

A "shocking" demonstration of the properties of electricity.

XV. A Battery of eleven Guns discharged by a Spark, after it has passed through ten Foot of Water.

As the Knowledge of Nature tends to enlarge the human Mind, and give us more noble, more grand, and exalted Ideas of the AUTHOR of Nature, and if well pursu'd, seldom fails producing something useful to Man, 'tis hoped these Lectures may be tho't worthy of Regard and Encouragement.

Tickets to be had at the House of the Widow Allen, in Thames Street, next Door to Mr. John Tweedy's. Price Thirty Shillings each Lecture. The Lectures to begin each Day precisely at Three o'Clock in the Afternoon

Notes

1. This version of the advertisement is taken from http://home.earthlink.net/~edcline/elecfir.html. It is transcribed from an advertisement by the T. Louis Snitzer Co. showing a reproduction courtesy of the Rosenbach Foundation, comparing the current state-of-the-art instrumentation (in 1966) with State-of-the-Art instrumentation in 1752.

These kinds of tricks did require some work to master. In this same letter, Franklin describes the experiments that his group did to determine in detail the behavior of the electricity near a sharp point. They also carefully observed which direction the discharge spark was travelling:

Place an iron shot [a small cannonball] of three or four inches diameter, on the mouth of a clean dry glass bottle. By a fine silken thread from the ceiling, right over the mouth of the bottle, suspend a small cork-ball, about the bigness of a marble; the thread of such a length, as that the cork-ball may rest against the side of the shot. Electrify the shot, and the ball will be repelled to the distance of four or five inches, more or less, according to the quantity of Electricity. —When in this state, if you present to the shot the point of a long slender sharp bodkin [large needle], at six or eight inches distance, the repellency is instantly destroy'd, and the cork flies to the shot. A blunt body must be brought within an inch, and draw a spark, to produce the same effect. To prove that the electrical fire is *drawn off* by the point, if you take the blade of the bodkin out of the wooden handle, and fix it in a stick of sealing wax, and then present it at the distance aforesaid, or if you bring it very near, no such effect follows; but sliding one finger along the wax till you touch the blade, and the ball flies to the shot immediately. . . .

If you present the point in the dark, you will see, sometimes at a foot distance, and more, a light gather upon it like that of a fire-fly or glow-worm; the less sharp the point, the nearer you must bring it to observe the light; and at whatever distance you see the light, you may draw off the electric fire, and destroy the repellency. If a cork-ball so suspended be repelled by the tube, and a point be presented quick to it, tho' at a considerable distance, 'tis surprizing to see how suddenly it flies back to the tube. Points of wood will do as well as those of iron, provided the wood is not dry; for perfectly dry wood will no more conduct electricity than sealing wax.

To shew that points will *throw off* as well as *draw off* the electrical fire; lay a long sharp needle upon the shot, and you cannot electrify the shot, so as to make it repel the cork-ball. —Or fix a needle to the end of a suspended gun barrel, or iron rod, so as to point beyond it like a little bayonet; and while it remains there, the gun-barrel, or rod, cannot by applying the tube to the other end be electrified so as to give a spark, the fire continually running out silently at the point. In the dark you may see it make the same appearance as it does in the case beforementioned.

The repellency between the cork-ball and the shot is likewise destroyed; 1. By sifting fine sand on it; this does it gradually. 2. By breathing on it. 3. By making a smoke about it from burning wood (Footnote—We suppose every particle of sand, moisture, or smoke, being first attracted and then repelled, carries off with it a portion of the electrical fire; but that the same still subsists in those particles, til they communicate it to something else; and that it is never really destroyed. —So when water is

thrown on a common fire, we do not imagine the element is thereby destroyed or annihilated, but only dispersed, each particle of water carrying off in vapor its portion of the fire, which it had attracted and attached to itself.) 4. By candlelight, even tho' the candle is at a foot distance: these do it suddenly. —The light of a bright coal from a wood fire; and the light of red-hot iron do it likewise; but not at so great a distance. Smoke from dry rosin dropt on hot iron, does not destroy the repellency; but is attached by both the shot and the corkball, forming proportional atmospheres around them, making them look beautifully, somewhat like some of the figures in *Burnet's* or *Whiston's* theory of the Earth.

N.B. This experiment should be made in a closet [small room] where the air is very still.[16]

Stop and think for a moment how much thought, and play, had to go into inventing the different methods of observing these electrical phenomena. Also, imagine the patience needed to do this set of experiments. This is not simply a desire to gain practical knowledge. "Useful knowledge" to the natural philosophers of the 18th Century involved mastering new and profound ideas about the way that Nature works. These ideas might then also contribute to the greater happiness of mankind. But the pursuit of knowledge in this way was not simply pragmatic.

At the end of another letter, dated April 28, 1749, to Collinson, which contains 15 pages of careful observations about how electricity behaves under various circumstances, Franklin concludes:

> Chagrined a little that we have hitherto been able to produce nothing in this way of use to mankind; and the hot weather coming on, when electrical experiments are not so agreeable [because of the humidity—ed.], 'tis proposed to put an end to them for this season, somewhat humorously, in a party of pleasure, on the banks of the Schuylkill. Spirits, at the same time are to be fired by a spark sent from side to side through the river, without any other conductor than the water; an experiment which we sometime since performed, to the amazement of many. A turkey is to be killed for our dinner by the electrical shock and roasted by the electrical jack, before a fire kindled by the electrified bottle; when the healths of all the famous electricians in England, Holland, France and Germany are to be drank in electrified bumpers [a small thin glass tumbler, near filled with wine, and electrified as the bottle.] This when brought to the lips gives a shock, if the party be clean shaved, and does not breathe on the liquor, under the discharge of guns from the electrical battery.[17]

The American Philosophical Society seal depicts an Old World European leading a New World Native American toward the goddess of Wisdom, Minerva, who has an octant, telescope, and globe at her feet.

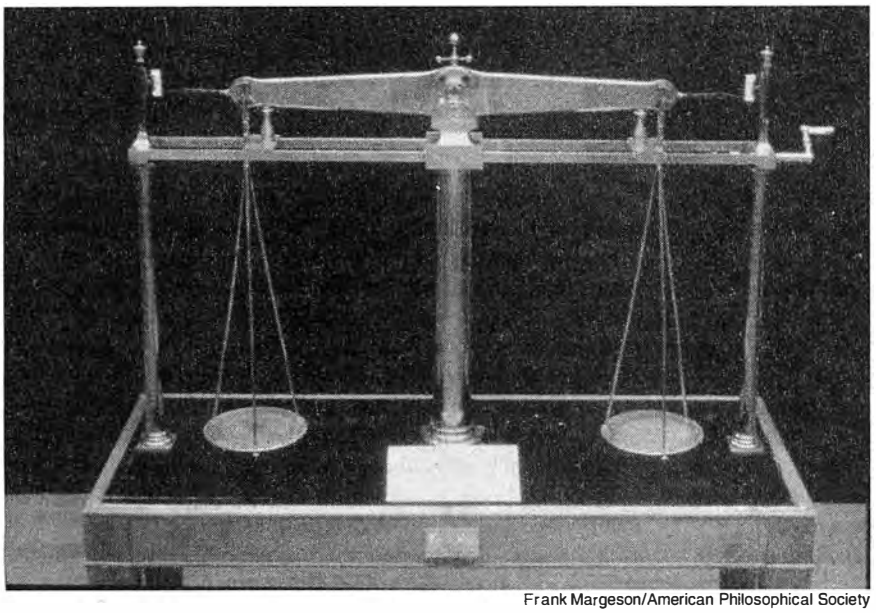
An immediately very useful invention did come out of all of this play: the lightning rod. Franklin observed that an electrical spark is attracted to a pointed surface much more readily than to a blunt one. This, together with observations on the similarity between lightning and electricity, led him to the idea of a lightning rod. The power of lightning, and the use of the lightning rod, is very clearly shown by the tip of a struck lightning rod, which is part of the APS exhibit.

Popular Public Lectures

A common form of public entertainment at the time of Franklin was public lectures on various aspects of natural philosophy. The general public was very interested in the latest breakthroughs in geology, chemistry, and natural history. Franklin first became interested in the phenomenon of electricity during a visit to see his family in Boston in 1743. During that trip, he attended some natural philosophy lectures given by Archibald Spencer which, among other things, went through the latest developments in electricity.

A few years later, after the invention of the "electric bottle," an odd sort of duel took place in Boston between a clockmaker named William Clagett, from Newport, Rhode Island, and a mathematical instrument maker named Daniel King from Boston. Here is an account of the excitement that swept Boston in 1747:

> After Claggett had developed sufficient skill in performing electrical experiments, the people of Newport flocked to see his demonstrations in great numbers. Having read an account of how these experiments had become popular throughout Europe, he decided to try them in Boston, and arranged with a Captain John Williams of that city to use his premises. Clagett advertised the first formal lecture in America devoted entirely to electricity in the Boston Evening Post for August 24, 1747, under the headline, "For the Entertainment of the Curious." The notice informed the public that there was to be seen at the home of Captain John Williams in King Street: "a Great Variety of curious Experiments of the most surprising Effects of Electricity . . . Performed by William Clagett, Clockmaker, whose Business will not suffer him to make a long Stay here [in Boston]. . . ."
>
> Clagett's demonstrations appear to have been extremely successful, and it was noted by the Reverend Arthur A. Ross in an address at Newport at a later time that Clagett "received about 1,500 British pounds in three weeks." After Clagett had returned to Newport to attend his business, [Captain] Williams decided to continue the performances himself. He soon learned that he had a rival, however. The



Frank Margeson/American Philosophical Society

The APS served as a standards office for measurement for the young republic. On display at the exhibit was the balance used by David Rittenhouse when he headed the U.S. Mint, to ensure that each coin minted had the same amount of metal.

popularity of the electrical experiments in Boston led Daniel King in Salem to set aside his craft temporarily and venture into the field of public performance. On September 28, 1747, the *Boston Evening Post* published the announcement, repeated in subsequent issues: "The wonderful and surprising Operations in Electricity, lately shown by Mr. Clagett in Boston are now performed by Daniel King near the Town-House in Salem."

Captain Williams was considerably distressed by King's announcements and feared that the public would be misled to believe that Clagett's electrostatic machine had been taken over by King. He countered with a following notice that appeared in the *Boston Evening Post* in the next three issues, October 26, and November 2 and 16, 1747: "The surprising Operations in Electricity are continued to be shewn at the House of John Williams in Sing-street, altho' People have been induced, from a late Advertisement in the Evening Post and Gazette, to think that the machine at said William's by which the Operations were performed was removed from thence."[18]

The public interest in this science did not flag with time. Franklin's group carried out their detailed electrical experiments in Philadelphia from 1747 to 1752. One of the most talented designers of these experiments, Rev. Ebenezer Kinnersley, devoted more than a year to travel in Philadelphia, Boston, Newport, and New York to give a detailed set of lectures on their discoveries about electricity. The advertisement for his Newport lectures, which was on display in the APS exhibit (see box, p. 68), shows that these lectures were very detailed, a combination of "shocking" demonstrations and theoretical observations.

The APS As Science Driver

From the official founding of the United States in 1782, to around 1840, the American Philosophical Society played a very important role as a national academy of science, national laboratory and museum, patent office, and standards office [for measurement] for the young republic. Some of this is evident in the APS exhibit. The balance used by David Rittenhouse when he headed the United States Mint, to ensure that each new penny had the same amount of copper and each new dime had the same amount of silver was on display.

Also, one of the most eye-catching pieces was a very interesting "Patent Polygraph" designed by I. Hawkins. This polygraph was not designed to determine whether patent applicants were telling the truth, but a very unique copying machine. It consisted of a rigid frame which held two pens a certain distance apart and allowed a writer to write two copies of a document simultaneously. This was one of the first "Xerox machines" of the 18th Century.

Although not mentioned in the show specifically, the APS also played a very significant role in preparing for the Lewis-Clark expedition of 1803. This was perhaps not accidental, because Thomas Jefferson was President of the APS at the same time that he was President of the United States.

> Jefferson sent Meriwether Lewis to Philadelphia for instruction and counseling with botanist Benjamin Smith Barton, mathematics professor Robert Patterson, physician and professor of chemistry Benjamin Rush, and Caspar Wistar, physician and professor of anatomy. Lewis also met with Andrew Ellicott, surveyor and mathematician, while John Vaughn, librarian and treasurer of the Society, worked to secure the appropriate instruments needed for Lewis to record longitudes and latitudes on the western trip. . . . Jefferson must have been sure of their common goal for he closed his letter requesting Benjamin Smith Barton's assistance with, "I make no apology for this trouble, because I know that the same wish to promote science which has induced me to bring forward its proposition, will induce you to aid in promoting it."[19]

The original journals of the expedition are now part of the APS archives. Upon Lewis and Clark's return, Jefferson sent some of the specimens to Charles Wilson Peale's Natural History Museum that was housed in Philosophical Hall in Philadelphia from 1794-1811. Today, the APS is holding the second exhibit of the current series in the same building entitled, "Stuffing Birds, Pressing Plants, Shaping Knowledge: Natural History in North America, 1730-1860." This exhibit began on June 20, 2003, and will run through December 31,

2004, displaying some of the same specimens made by Charles Wilson Peale.

The APS also promoted useful knowledge by sponsoring contests to encourage invention. The announcement of one such contest, which took place in 1796, was on display at the "From the Laboratory to the Parlor" exhibit. The categories of the competition give an idea of the areas of most interest to the young republic:

(1) For the best system of liberal education ($100).

(2) For the most simple, easy and expeditious method of computing longitude, from common lunar observations ($70).

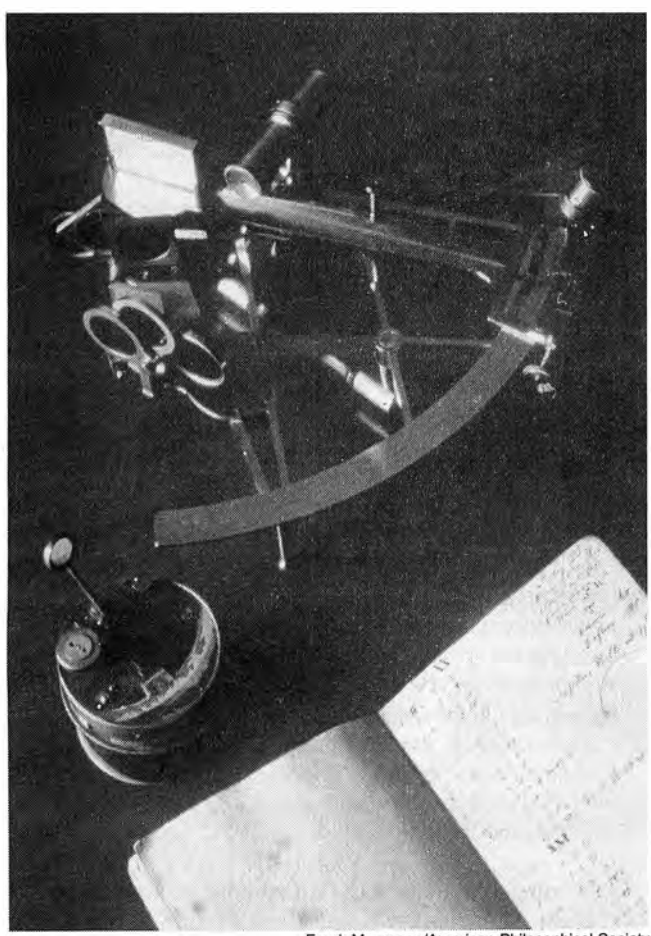
(3) The best construction or improvement of ship pumps ($70).

(4) The improvement of the fireplace ($60).

(5) To prevent the premature decay of peach trees ($60).

(6) The best treatise on native vegetable dyes ($60)

(7) The best improvement of lamps, especially street lamps ($50).



Frank Margeson/American Philosophical Society

David Rittenhouse, the third president of the APS, set up a laboratory at Norristown, Pennsylvania, to measure the Transit of Venus. The instruments he developed for this project, on display at the APS exhibit, were later used in surveying missions. Here, a sextant and a book of Rittenhouse's observations.

The contest was funded by a donation of 200 guineas (1 guinea is 21 British shillings) by a Mr. I.H. DeMagellan of London to be used "for the most useful improvements relating to Navigation, or to Natural Philosophy, mere Natural History only excluded."

Members of the APS were also active individually in promoting new knowledge that they saw as useful. A good example of this was included in the exhibit: APS member W.H. Furness read a book written by Emma Seiler, a recent German immigrant, which summarized her work in vocal physiology over several decades. Furness thought that the work was so important, that he translated her book from German and recommended it to the largest publisher in Philadelphia, J.B. Lippincott.

The book in English was published in 1868, and in 1870, Emma Seiler became the fifth woman to join the American Philosophical Society. A display case at the APS exhibit shows a copy of her book, a medical model of the human larynx from that period, and examples of the laryngoscope (a dental mirror) which Seiler used to perform her experiments. The laryngoscope had been developed by singer Manuel Garcia to observe the vocal chords while singing. Using this instrument, Mrs. Seiler observed a definite shift in the mode of vibration of the vocal chords at F#, when the voice reached the head register.

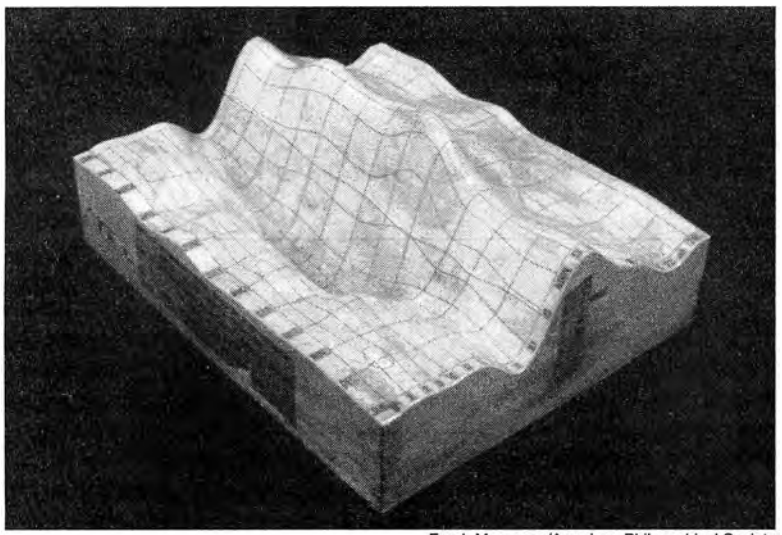
The exhibit also showed two examples of APS members' participation in international science initiatives. In 1769, David Rittenhouse, later the third president of the APS, set up an observatory in Norriton, Pennsylvania, to carry out measurements of the Transit of Venus. He built an astronomical clock and an astronomical transit telescope, both of which were on display at the exhibit.

Observations of the Transit of Venus in the 18th Century were part of the effort to establish what is called the "astronomical unit," the mean radius of the Earth's orbit around the Sun, and the standard measure for the solar system. While Kepler's Laws had enabled the relative distances of the planets to be determined, the absolute dimensions were not able to be known until a good value for the astronomical unit was obtained.

Venus passes (transits) between the Earth and the Sun in a regular cycle of 243 years, which is comprised of four intervals, alternately short and long; the short ones are 8 years apart, and the long ones are either 121 1/2 years or 105 1/2 years apart. The transits of 1761 and 1769 were considered at the time to be a golden opportunity to determine the distance between the Earth and the Sun. By using observations of the same event from around the globe, astronomers hoped to determine the radius of the Sun, from which the distance between the Earth and Sun could be calculated. (The next transits will take place in June 2004 and June 2012.)

David Rittenhouse later used the instruments that he developed for this project in various surveying missions, because astronomical measurements were used at that time to determine longitude and latitude for surveys. The transit telescope, was mounted so that it could rotate in a vertical arc, and was used to monitor the passage of the Sun over the meridian and thus determine the solar noon. It helped him to maintain the accuracy of his astronomical clock. The clock itself, with a pine case built for utility rather than beauty, had a dead-beat escapement that ensured a high degree of accuracy.

One of the quirks of this clock that the guides at the APS



Frank Margeson/American Philosophical Society

Several instruments developed by Franklin's great-grandson, Alexander Dallas Bache, to carry out the project of Carl Gauss to measure the Earth's magnetic field, were on display at the APS exhibit. Here, a three-dimensional magnetograph, based on the observations of Bache, at his Girard College observatory in Philadelphia. The model shows the changes in the declination of the magnetic field over the course of a year.

exhibit pointed out, is that on at least one occasion, the pendulum was apparently swinging too freely during a surveying project, and Rittenhouse cut holes in the clock case to keep the bob from hitting the sides and causing irregularities. The holes are partially patched, but can still be seen in the instrument on exhibit. This gives a real sense of the day-to-day use that these museum pieces received.

Rittenhouse was a leading member of the group commissioned in 1784 to survey the final miles of the Mason-Dixon line, the border between Maryland and Pennsylvania. The original team of Mason and Dixon had not been able to complete the survey in the 1760s, because of hostilities between the Indians and the British.

There is an interesting history to the Mason-Dixon line, both political and scientific which stretched over a century and is beyond the scope of this article. It was urgent that the survey be completed at that time because of competing claims by Pennsylvania and Maryland for the border territory. By 1784, there were several cases where different settlers had been given title to the same land by different states. It is a tribute to the optimism of the day that a civilized settlement could be reached, despite several physical skirmishes over the preceding years. The exhibit displayed a couple of examples of the crown stones that were used to initially mark the eastern part of the boundary where Mason and Dixon did complete their work.

There was another famous international project of measurement, started a few decades later from Göttingen, Germany by Professor Carl Gauss, to measure the structure of the magnetic field of the Earth. The great-grandson of Benjamin Franklin, Alexander Dallas Bache, built an observatory at Girard College in Philadelphia, and took measurements from 1840 to 1845. He was a member of the APS, and had an illustrious career of his own in furthering science and education in the young republic. There were several artifacts from Bache's work on the "Magnetic Union" project on display at the first APS exhibit, the most interesting of which is a three-dimensional Magnetograph made by Ferdinand Engle based on the observations of Professor Bache. The model shows the diurnal variations in the magnetic field declination at the Girard College observatory. One axis of the model lists the months of the year, the other the 24 hours of the day. The topography represents the changes in declination. (See photo, this page.)

Exhibits like "From the Laboratory to the Parlor: Scientific Instruments in Philadelphia, 1750-1875" can help the nation regain the memory of the optimism that characterized the founding of the United States. We urge the American Philosophical Society to find a permanent space for the exhibit, and to put it "on the road."

Elisabeth Pascali is an associate editor of 21st Century.

Notes

1. *Carl Van Doren Benjamin Franklin* (New York: Penguin Books, 1991), p. 753 (originally published in 1938 by The Viking Press).
2. Benjamin Franklin, *The Autobiography of Benjamin Franklin with a new introduction be Lewis Leary*, (The Crowell-Collier Publishing Co., New York, 1962), p. 21.
3. Franklin, *op.cit.*, p. 23.
4. Arthur Benon Tourtellot, *Benjamin Franklin: The Shaping of Genius: The Boston Years* (Garden City, N.Y.: Doubleday and Company, Inc., 1977), p. 207.
5. Van Doren, *op cit.*, p. 139.
6. *Leibniz Selections*, Ed. Philip P. Loemker (New York: Charles Scribner's Sons, 1951), p. 581.
7. Franklin, *op. cit.*, p. 24.
8. H. Graham Lowry, *How The Nation Was Won: America's Untold Story* (Washington, D.C.: Executive Intelligence Review, 1988), p. 29.
   Although the material covered in this book is beyond the scope of this article, it is a very important book for anyone to read who wants to understand the real republican roots of the United States. Contrary to the imperialist impulses dominating our Government today, Graham Lowry shows that there was a continuous, conscious effort to build a continental republic from the time of the Puritan founding of the Massachusetts Bay Company to the time of the American Revolution. The American Revolution was emphatically not a tax revolt, nor a fight for individual liberty and free trade. I will let you read the book to learn the details.
   His book opened my eyes to an entire century of history that had never been touched by any history I had been taught, and was the starting point for my ongoing research into Benjamin Franklin's contributions to science and statecraft.
9. Van Doren, *op cit.*, p. 78.
10. Franklin, *op. cit.*, p. 63.
11. Van Doren, *op cit.*, p. 141.
12. Van Doren, *op cit.*, p. 156.
13. Van Doren, *op cit.*, p. 157.
14. Van Doren, *op cit.*, p. 158.
15. "Experiments and Observations on Electricity made at Philadelphia in America," By Mr. Benjamin Franklin and Communicated in Several Letters to Mr. P. Collinson, of London, FRS, (London Printed and sold by E. Cave, at St. John Gate, 1751). Octavo reproduction, p. 16,
16. "Experiments by Franklin," *op. cit.*, pp. 10-12.
17. "Experiments by Franklin," *op. cit.*, p. 35.
18. Silvio A. Bedini, "Part 1: The Kings of Salem, Mathematical Instrument Makers," *Professional Surveyer*, Vol 21, No. 9, p. 71 (October 2001).
19. http://www.monticello.org/jefferson/lewisandclark/aps.html

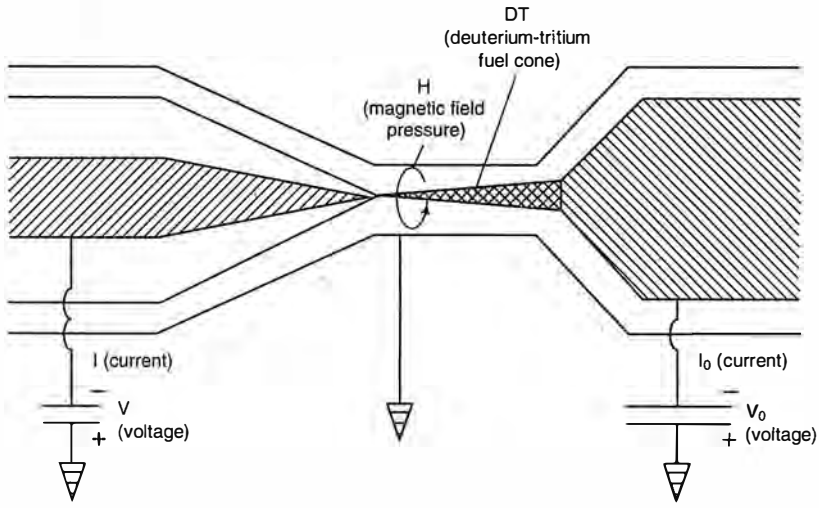
INTERVIEW WITH PROF. FRIEDWARDT WINTERBERG

A Revolutionary Concept for Fusion Energy

Friedwardt Winterberg, Professor of Physics at the University of Nevada at Reno, was at the center of public controversy, when his book, The Physical Principles of Thermonuclear Devices *was published by the Fusion Energy Foundation in 1981. In an effort to declassify information needed by scientists attempting to develop nuclear fusion as a civilian energy source, Dr. Winterberg revealed there certain essential principles behind the hydrogen bomb, known already to the United States's enemies—but not to its own scientists.*

Nuclear fusion is the energy source that powers the stars, including our Sun, and is thus the source for all life on Earth. Until now, thermonuclear fusion at significant power levels has been accomplished only in the H-bomb, whose name derives from the fact the the fuel is hydrogen, more specifically, heavy isotopes of hydrogen, known as deuterium and tritium. A practical means of producing controllable thermonuclear fusion for civilian energy production could revolutionize our society.

Dr. Winterberg was interviewed in July 2003 by Ralf Schauerhammer, an editor of the German-language Fusion *magazine and co-author of* The Holes in the Ozone Scare: The Scientific Evidence That the Sky Isn't Falling.



SCHEMATIC OF DEVICE FOR ACHIEVING HIGH-GAIN FUSION MICROEXPLOSIONS

A small, conically shaped target of deuterium-tritium fuel is placed at the juncture of two magnetically insulated transmission cables. A high voltage and relatively low current in the cable at left heats the tip of the cone to thermonuclear temperatures. A high current and relatively low voltage in the cable at the right generates a magnetic field pressure (marked H *in the diagram), which contains the deuterium-tritium, and causes a shock wave to move to the right, up the fuel cone, igniting the rest of the fuel without the need for any more confinement.*

Question: The German-language scientific journal *Zeitschrift für Naturforschung* just published your article, which contains a new idea for the realization of energy production by thermonuclear fusion.[1] Simply stated, it would seem that the civilian use of nuclear fusion could be achieved if we could produce tiny H-bombs, small enough that we could control their energy-output.

Yes, one speaks of "low-yield, high-gain" assemblies producing this type of microexplosions: "Low-yield," because they have to produce an amount of energy low enough to be handled technically; "high-gain," because the ignition energy to trigger the microexplosion must be as small as possible in relation to the achieved energy-output. This is important to achieve high efficiency of the fusion power reactor. In thermonuclear microexplosions a high gain can be achieved using a thermonuclear detonation wave, ignited from a "hot spot" in the center of the fuel pellet.

Question: One speaks of "inertial" fusion, because the detonation wave moves faster through the fuel than the fuel can be blown apart by the explosion. A different concept is to hold the fuel together and thermally insulate it with the aid of strong magnetic fields.

In the absence of a magnetic field, the fusion fuel requires precompression to 1,000 times solid density. A hot spot is created in the center by a convergent shock wave,[2] or by a pulsed ultra-intense laser beam,[3] the so-called "fast ignitor" concept.

Question: Didn't you work out ideas of how to produce such microexplosions in very simple ways many years ago?

Already 35 years ago, for example, I had shown that the ignition of a thermonuclear microexplosion should be possible by the bombardment of a small, solid deuterium-tritium target with an intense relativistic electron beam of 100 MA current at 10 MV voltage drawn from a large Marx generator.[4] It was the first proposal to use a Marx generator in fusion research.

Question: What is a Marx generator?

Some of the press flap generated by the 1981 publication of Professor Winterberg's book, The Physical Principles of Thermonuclear Explosions, *and its coverage in* 21st Century*'s predecessor magazine,* Fusion.

It is a pulse generator, first described by Erwin Marx in 1924. A number of capacitors are charged in parallel, and discharged in series, which produces a pulse of very high voltage.

Question: And your new idea builds upon your concept of 35 years ago?

In a certain way, but the crucial trick is that it uses two much smaller Marx generators, each one for a specific task. One, with a high current of 10 MA and a relatively lower voltage, is used for the compression and confinement; the other one, with a high voltage of 10 MV but a relatively lower current, is used for ignition.

Question: So this is the "fast ignitor" concept you mentioned?

Yes, but the difference is, that the existing "fast ignitor" uses very expensive lasers, which have, moreover, a very low efficiency. If my concept works experimentally, as I expect it to do, it could lead to devices which would be orders-of-magnitude cheaper than the fast ignitor concept currently being pursued by Lawrence Livermore National Lab.

Question: The present fast ignitor needs lasers in the power range of millions of millions of kilowatts, does it not?

The requirements are much larger than previously thought.

Question: But how is it possible to integrate the two discharges of the Marx generators?

It is probably best to look at the illustration I provided for use in the *Zeitschrift für Naturforschung* article [see figure]. The assembly consists of two nested, magnetically insulated transmission lines, with a small, conically shaped deuterium-tritium target placed at the focal point where the two lines come together. In the example presented in the article, a voltage of 10 MV and a current of 0.1 MA was chosen for the inner line, on the left side, For the outer line, on the right side, the voltage is 1 MV and the current 10 MA.

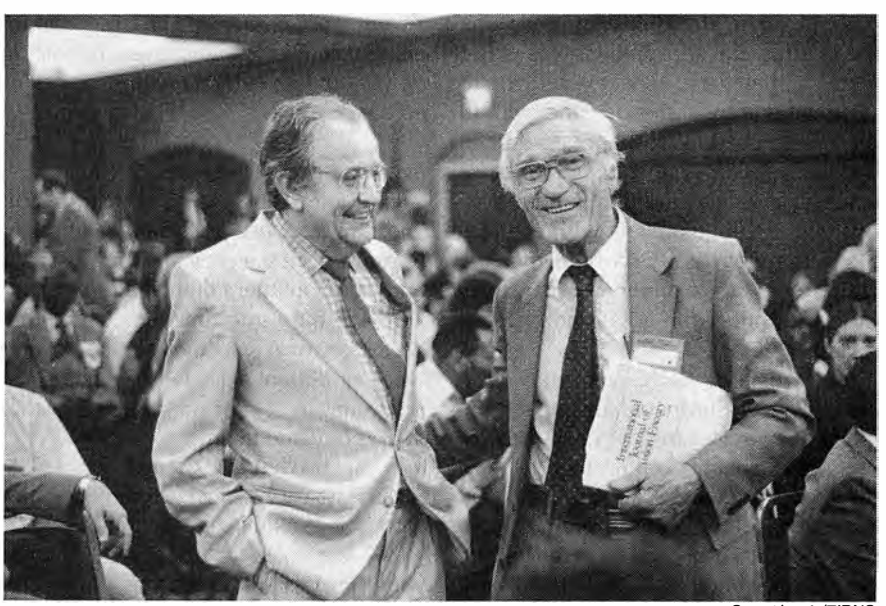
Question: How does the double-discharge work?

As you can see in the illustration, the return current conductor of the inner transmission line is connected at its smallest diameter to a cone of solid deuterium-tritium, which serves as the anode for this line. The intense relativistic electron beam emitted from the cathode tip of the inner line is focussed onto this cone, heating the cone's tip to thermonuclear temperatures.

At the same time, a large electric current is discharged through the outer transmission line. This current must be large enough to generate a magnetic field pressure which can balance the pressure of the deuterium-tritium plasma at thermonuclear temperatures. If this is the case, and if at the same time, its energy compensates for the axial expansion losses of the hot plasma blown to the left from the tip of the cone, then a shock wave moves to the right into the fuel cone.

Question: And how does this shock

Continued on page 78



Stuart Lewis/EIRNS

The author (left) with plasma physicist Winston Bostick at a 1985 memorial conference for space scientist Krafft Ehricke, organized by Lyndon H. LaRouche, Jr., and his wife, Helga Zepp-LaRouche.

WHEN THOR HEYERDAHL WAS DELIGHTED TO BE WRONG

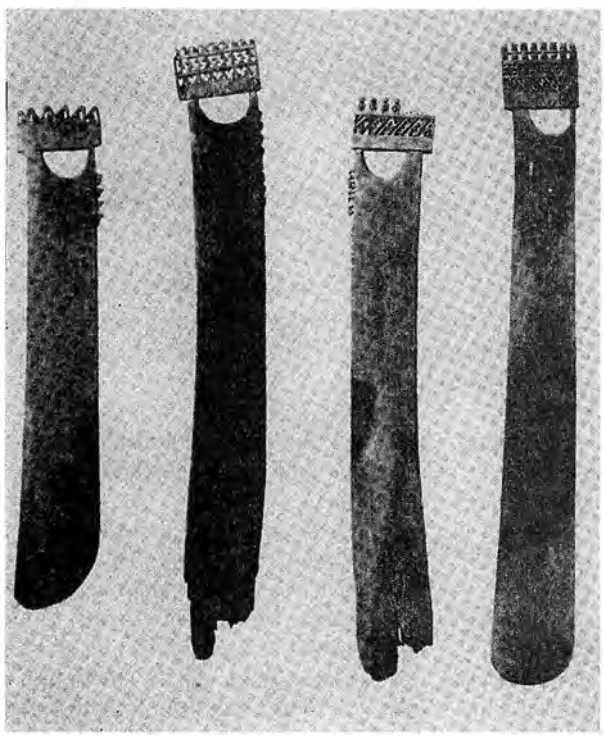
The Case of the *Guara* or Centerboard

by Rick Sanders

There is a certain amount of irony in the fact that Thor Heyerdahl, who was not a sailor, proved that some watercraft used by man a very long time ago, were actually more seaworthy than the ones that brought Europeans to America. When the Conquistadores came with their highly unseaworthy ships, they found extremely seaworthy rafts off the Andean coast. These rafts could, for example, land unharmed through the surf, and could carry Indian merchants and their whole extended families, along with 20 tons or more of cargo on board. The Spaniards recorded that the Incas remembered times when large organized flotillas of rafts would set out on direct exploring expeditions to very remote islands.

But established academics, especially in the 20th Century, are mostly convinced "isolationists" (a kind of hysteria which asserts that technologies are invented separately around the world, without their diffusion by travelling men). Thus, the accepted view is either to deny that these rafts existed, or to say that if they did exist, they could have been used for short voyages only, because gossip had it that dry balsa gets waterlogged quickly and sinks. And since the gossip fits with the ideology that man is like a little monkey which does not wander very far away from its mother, the gossip got a lot of mileage.

Nevertheless, such rafts did exist, although their most brilliant aspect, the function of the *guaras,* or centerboards, was not understood until much later by the Europeans who saw them used on the rafts. For centerboards were unknown in Europe, and were, in fact, not adopted (and even then, just as a single centerboard) until the 1870s. (The author's grandfather, seen in the photo, who fished the Scheldt in Zeeland, in the early 1900s, used lee boards, as did everyone else at the time.)



These are miniature guaras, *found in prehistoric gravesites. They clearly have a handle, to pull them up or down, but they are totally unsuited to use as a paddle or an oar.*

Explorer Thor Heyerdahl did not know how to use the *guaras,* although he knew from sketches that they existed, and so he put them on his raft—without knowing their true function. As for the professors who said the rafts could not work, or did not exist, they were not the right ones to ask for the function of the *guaras* or centerboards.

What Is a *Guara?*

Guaras are made of extremely hard wood, have a knife edge at the front, are 4 to 7 feet in length, and 5 to 10 inches wide. Professional historians could not figure them out, so they said these must be some kind of spade! Other academics opined that they were some kind of paddle!

How ridiculous can you get? Look at this object (in the illustration). There is a handle at the top, which obviously can be used only to raise it an lower it, not for paddling, nor as a rudder or steering oar.

Thor Heyerdahl was more equipped than the academics for *discovering* the answer to this, but he had no sailing experience when he went on the *Kon-tiki* expedition. True to his faith in historical truth, he had provided the raft with *guaras,* but there was no one to tell him how to use them, when to raise them, how far to insert them, what the ratio should be of the ones down in the bow, up in the stern, or some combination of the two.

So the *Kon-tiki* did not really sail; it drifted—aided by its sail. In fact, two people in a dinghy were almost lost when they could not catch up with the *Kon-tiki,* and the other crew members were unable to turn the raft around and sail against the wind: "We in the dinghy had to row for our lives out in the open sea in an attempt to regain the unmanageable raft, which could not stop and wait and could not possibly turn around and come back. Even when the boys on board the *Kon-tiki* got the sail down, the wind got such a grip on the bamboo cabin that the raft drifted away to westward as fast as we could splash after her in the dancing rubber dinghy with its tiny toy oars. There was only one

thought in the head of every man—we must not be separated. Those were horrible minutes we spent out on the sea before we got hold of the runaway raft and crawled on board to the others, home again" (Thor Heyerdahl, *Kon-tiki,* pp. 170-171).

This relentless direction of the *Kon-tiki* with the wind, led to one of Heyerdahl's major, early, and wrong conclusions: that only one-way communication was possible between South America and the Pacific islands—that is, by following the wind and the currents, which went from east to west. Later, Heyerdahl triumphantly proved himself wrong.

***Finding* the Secret—By Experiment!**

At some point after the *Kon-tiki* voyage, Heyerdahl and his friends ran into some intriguing historical material pointing towards the true use of the *guara.*

The Dutch admiral Spilbergen, in his early drawing of a balsa raft at Payta, Peru, published in 1619, illustrates two cloaked Indians standing by the sails, issuing orders to three others who squat on the raft's deck, each holding the upper section of his own *guara,* which is thrust down vertically in the cracks between the logs. The raft has no steering-oar or rudder. Spilbergen says that the sailing raft had been at sea fishing for two months (that is twice as long as Columbus took to reach the new world, and his men nearly threw him overboard because they thought they had been gone too long!), and now returned to Payta harbor with sufficient fish to supply all the ships of Spilbergen's fleet.

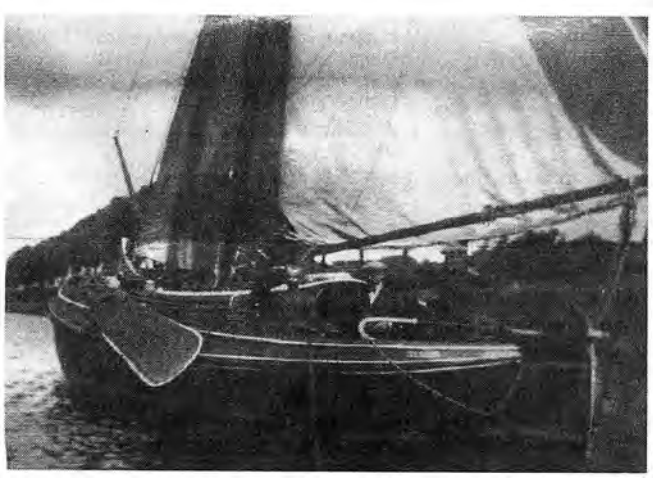
But more than 130 years had to pass before two Spanish naval officers, Juan and Ulloa, discovered the mystery of the *guara:* "It sails, tacks and works as well in contrary winds as ships with a keel, and makes very little leeway. This advantage it derives from another method of steering than by a rudder, namely, by some boards three or four yards in length, and half a yard in breadth, called *guaras,* which are placed vertically both at the head and stern between the main beams, and by thrusting some of these deep in the water, and raising others, they bear away, luff up, tack, lay to, and perform all the other motions of a regular ship.

"An invention hitherto unknown to the most intelligent nations of Europe, a *guara* being let down in the fore-part of a vessel must make her luff up, and by taking it out she will bear away or fall off. Likewise, on a *guara*'s being let down at the stern, she will bear away, and by taking out of the water, the balsa will luff, or keep nearer to the wind. Such is the method used by the Indians in steering the balsas, and sometimes they use five or six *guaras,* to prevent the balsa from making leeway. The method of steering by these *guaras* is so easy and simple, that when once the balsa is put in her proper course, one only is made use of, raising and lowering it as occasions require, and thus the balsa is always kept in her intended direction" (*Kon-tiki,* pp. 117-118).

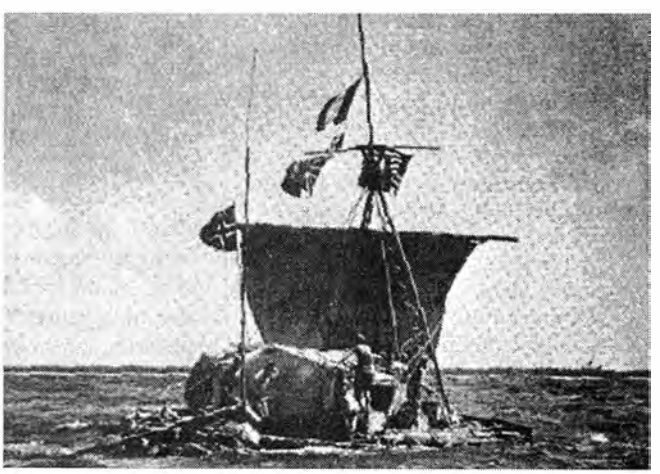
Heyerdahl reports that more on Peruvian *guara* navigation was published by Humboldt in 1810 and Stevenson in 1825. The latter had seen balsa rafts in Peru, which, merely by means of *guara,* were "beating up against the wind and current" for hundreds of miles with 25 or 30 tons of cargo (*Kon-tiki,* p. 118).

Finally, an experimental reconstruction of the ancient sailing techniques was put together. In 1953, with the help of Emilio Estrada, Thor Heyerdahl was able to make practical tests with a regular size balsa raft, and rediscovered the secret of how the Incas could sail their rafts into the wind.

"In 1953, Emilio Estrada of Guayaquil arranged for a small test raft to be constructed like the *Kon-tiki,* of nine balsa logs lashed together and covered by a bamboo deck. Likewise, for navigation, a square sail was hoisted on its usual bipod mast in native fashion, and similarly six *guaras* were inserted between the logs, two in the extreme bow and two in the stern. No paddles, rudder, or steering-oar were carried on the raft, which was launched from the open coast of Playas, Ecuador, with a crew of four" (*Kon-tiki,* p. 109).



The author's grandfather still used leeboards. He is seen here, fishing in the Scheldt in Zeeland in the 1920s and 1930s.

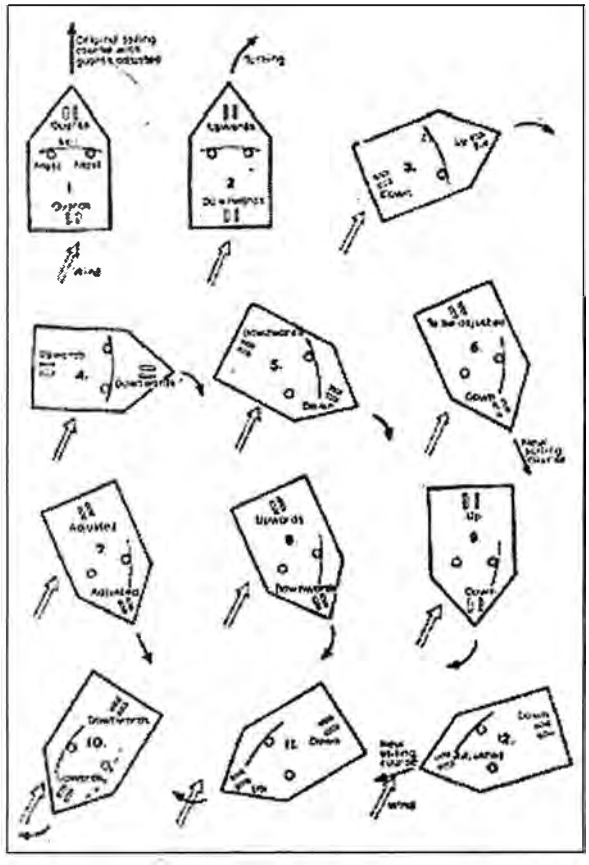


Note that these Peruvian rafts could carry as much, or more, cargo as European ships, and were in certain ways much more seaworthy.

Source: Thor Heyerdahl, *Sea Routes to Polynesia,* (London, George Allen and Unwin)

"The whole secret of how the Incas could sail their rafts into the wind was rediscovered and, like all ingenious inventions, the trick was exceedingly simple once it was known. It was found, by a crew consisting of Estrada, the two archaeologists Reed and Skjolsvold, and [Heyerdahl] that by quickly turning the sail and equally rapidly reversing the ratio of submerged *guara* surface respectively fore and aft of the mast, at the very critical moment when the turning raft was taking the wind straight abeam, then the raft would willingly turn all about and resume a new course into the contrary wind. [*Kon-tiki*, p. 121]." (See figure.)

So, Heyerdahl had been wrong, but his correction of that error further strengthened the argument against the isolationists: Early man had been even more mobile than optimists like Heyerdahl had thought. By using ideas, concepts of physics, moments around a pivot, and the like, they had freed themselves from helplessly drifting in the direction that the winds and the currents pushed them.



If you study these diagrams, keeping in mind the force of the wind, and the resultant force on the sail, you will see the brilliance of the solution of having centerboards that can be raised and lowered toward the stern and the bow of the ship.

In an ordinary boat, with one centerboard or a keel, the critical time is when you are going about, and you need to swing the rudder hard enough to get the bow over, so that the jib will catch the wind from the other direction. This would be very difficult to do with a slow-moving and heavy raft, but if you can pull up the centerboards, then it becomes much easier to rotate it in the direction you want, so that you can pick a new course.

Fusion Report

Continued from page 75

wave come about?

The outer current confines the charged, fusion-reaction alpha particles within the cone, and the shock wave goes over into a thermonuclear detonation wave, supersonically moving down the cone. The wave starts in the small region near the vertex of the cone, and only there is magnetic confinement necessary, which is why a high gain is achieved.

Question: So, the left transmission line of high voltage generates a thermonuclear spark which is held together by the high current from the right side, allowing a thermonuclear detonation wave to come into being within the cone. And the size of the microexplosion is mainly determined by the size of the fuel cone?

While in an H-bomb the explosive power is in the order of 10 million tons of conventional explosives, the microexplosion here equals only 25 kg [55 pounds] of conventional explosives, and the ignition energy is the equivalent of only 25 grams.

Question: This is a gain factor of 1,000! And 25 kg of explosive is an amount of energy, that can be dealt with in a reactor vessel.

Notes

1. F. Winterberg, "Ignition of a Thermonuclear Detonation Wave in the Focus of Two Magnetically Insulated Transmission Lines," *Zeitschrift für Naturforschung*, Vol. 58a, 197 (2003).
2. J. Nuckolls, L. Wood, G. Zimmerman, *Nature*, Vol. 239, p. 139 (1972).
3. M. Tabak et al. *Physics of Plasma*, Vol. 1, p. 1626 (1994).
4. F. Winterberg. *Phys. Rev.*, Vol. 174, p. 212 (1968).

Selected Publications of Friedwardt Winterberg

"Attainment of High Plasma Pressures by a Large Number of Channelled Pinch Discharges Intersecting in One Point," *Phys. Plasmas*, Vol. 3, p. 1 (1996).

"On a New Approach to the Thermonuclear Ignition Problem and Its Propulsion Potential," *Acta Astronautica*, Vol. 36, p. 123 (1995).

"Derivation of Quantum Mechanics from the Boltzmann Equation for the Planck Aether," *International Journal of Theoretical Physics*, Vol. 34, p. 2145 (1995).

Looking for the Sea Peoples of the Ice Age

by Charles E. Hughes

Underworld: The Mysterious Origins of Civilization
by Graham Hancock
New York: Crown Publishers, 2002
Hardcover, 769 pp., $30.00

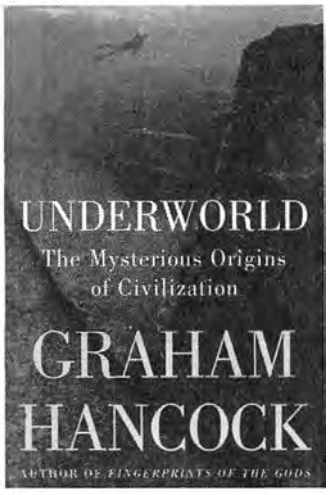
Lo! Death has reared himself a throne
In a strange city lying alone
Far down in the dim West,
Where the good and bad and worst and best
Have gone to their eternal rest.
—Edgar Allen Poe
"The City in the Sea"

Over the last several years, at least two sunken cities have been discovered, both off the coasts of India (One of these, Cambay, was reported on in *21st Century* in Fall 2002). Such sunken cities and ruins in the oceans of the world, possibly from the last Ice Age, are the subject of this book.

Although *Underworld* contains very little that could offend the credulity of the reader, we should warn our readers, that the author, Graham Hancock, has written some previous books of an excessively fantastic nature. One such book on a possible civilization on Mars describes an alleged human "face" on that planet.

Hancock's treatment of *Underworld*'s subject, the lost civilizations of the last Ice Age, is rationally and intelligently set forth to the reader by means of illustrations, graphs, maps, and numerous color plates, photographed on his own exploratory dives.

Readers of this publication, and of others associated with Lyndon LaRouche, Jr., will have read articles on the importance of searching for such remains of sunken cities in order to bring to light the true history of civilized man: that yes, there were cities, and quite large cities, before those in the Near East from 3000 B.C. One of physical economist LaRouche's crucial theses is that the accepted model of anthropology, which holds that city building was preceded by so-called hunting and gathering, and that agriculture resulted from development of small villages, would have been impossible. There would have to be an intermediate stage to provide abundant food for an expanding population, LaRouche says.



Such a mode of existence must have been ocean fishing, involving the technologies of both ship-building and ocean navigation. In order to navigate on the ocean, a knowledge of astonomical cycles is essential. The early cities of these Sea Peoples would be built close to the sea, and also near the mouths of large rivers. This idea of very ancient seagoing civilizations was well developed by LaRouche in an article dated Feb. 7, 1977, "A New Outline of History."

Let us look at Hancock's book, *Underworld,* and see how he develops the idea of civilizations at the time of the Ice Age. The book is divided into six sections of several chapters each. The first section, "Initiation," is where Hancock lays out his main thesis that 21,000 to 10,000 years ago, gigantic quantities of ocean water were taken out of the ocean in the form of ice. There were glaciers in and adjacent to the polar areas, and the entire Canadian landmass and most of northern Europe, and large parts of, but not the whole of northern Asia, were buried in ice thousands of feet thick.

The water extracted in such fashion from the oceans, lowered the ocean levels to about 600 feet below their present level, exposing vast areas of continental shelf. These areas today are submerged, and very difficult areas upon which to conduct archaeological investigations.

Many of the areas that rose up from the seas during the Ice Age were choice places for early peoples to inhabit, located in tropical and temperate climates. So, Hancock asks, why not investigate such places for city ruins? There are two reasons that this hasn't happened, he says: First, diving is very expensive and second, many archaeologists are terrified of finding things which would upset current dogma on human history.

It is true that exploring in water 50 to 100 feet deep is difficult and expensive. Below 200 feet, the cost is prohibitive. Yet, the finding of the city in the Gulf of Cambay in India took place in an area less than 100 feet deep.

Hancock argues that the age of a sunken site is directly related to the depth of the water in which it is found. He bases this simple determination on a study of ocean level changes conducted at Durham University in North Carolina. Of course, the site should be seismically stable, and the subsidence should be the result of sea level changes only, not land sinking from earthquakes.

The author's most controversial chapter in part one discusses what he believes are at the root of many ancient legends and classical writings describing cities destroyed by floods and earthquakes: for example, the stories told in the Bible; the writings of Plato, Diodorus Sicculus, and Hesiod; the Vedas of India, and the legends of the Aztecs and the Mayas, to mention just a few.

Meltdown Disaster

The hard freeze part of the Ice Age was stable in those areas not wiped out by ice sheets that were two miles high! But at the time of the melting of the ice sheets, in the coastal areas, it was a different story. Chapter three is called "Meltdown," and covers the period of

disaster for most of the coastal lands containing the early Sea People cultures, from about 10,000 B.C. until 7,000 B.C. As the ice sheets melted, it was not a drip by drip type of change, or gradual melting, which most experts on this period accept as their model. Hancock states that there is geological evidence of melt *catastrophes.*

A partially melted glacier would dam up large lakes in the middle of and behind the glaciers. Small seas of melt water were formed behind ice dams hundreds of miles long, which contained cubic miles of water. When such dams gave way, the pent-up water would rush towards the ocean, pulverizing everything in the way, and producing tidal waves in the ocean, which devastated the opposite seacoasts.

There are indications that at the time of the melt, ocean levels went up suddenly. For example, in the Carribean area, there was large-scale destruction of coral reefs, which are killed by fresh water. The extreme force of a tidal wave, perhaps a 1,000-feet high, would destroy even huge structures made of megalithic stone blocks, such that the underwater remains of an Ice Age civilization would be almost unrecognizable. As masses of ice melted, the land under the ice would rise up and the ocean bottom would sink because of the added weight of overlying water.

Such land changes would promote seismic instability as well. The melt period must have produced some huge earthquakes and volcanic eruptions not experienced since.

Ancient India

Parts two and three of this book concentrate on India. Hancock stresses that the subcontinent possesses a very ancient culture, which has come down to modern times reasonably intact. The Vedic religous writings may go back 10,000 to 15,000 years. For much of that time, the Vedic sagas must have been transmitted by word of mouth, and were only committed to writing over the last several thousand years.

Hancock thinks that India is the birthplace of Indo-European languages and the critical influence for the later civilizations of the Indus Valley, Sumerian, and other Middle Eastern civilizations which followed.

The cities just found in the Bay of Cambay were most likely Vedic, according to Hancock. How can historical and religious traditions be passed from generation to generation without written records? Many different ancient civilizations had a special class of people who committed all of the literary works to memory, and there are persons in India today who have memorized the entire Vedic body of poems, something over a million words, without changing or omitting a single word!

Artifacts were found beneath the Gulf of Cambay in the state of Gujarat on the west coast of India.

As an example of how Vedic literature proves itself to be ancient, because of astronomical clues within the poems and prayers, Hancock cites the Indian author and patriot Bal Gangadar Tilak and his book *Orion.* At least one Vedic poem says that when the poem was written the vernal equinox was in, or near, the constellation of Orion; that is in the zodiacal constellation of Taurus, which is the closest zodiacal constellation to Orion. The vernal equinox was in that part of the sky in 2000 B.C. to 3000 B.C.

This is the only reference to Tilak that I have encountered in any book about ancient civilizations, having read more than two dozen such. However, Hancock fails to mention Tilak's book *The Arctic Home of the Vedas,* which points to a possibly 40,000-year-old civilization of Sea Peoples at the North Pole!

Part three of the book is more on India, pinpointing sunken sites for probable submerged cities, such as Dvarka and several sites around Ceylon. The author investigated the ruins of a building off the coast of India near Poompuhur, deep enough down to be about 11,000 years old.

Part four is about the island of Malta near Italy, which is interesting, but very skimpy as to underwater exploration.

Part five concerns the proof of ancient land areas being above water at the time of the Ice Age through the study of old maps. Hancock thinks that maps are perhaps the oldest written documents. A map can be drawn entirely without the aid of a written language, and then copied and recopied over and over. In this section, maps from the Middle Ages and classical Greek and Roman times are examined for singularities which would show that they originated ages ago, with a seagoing civilization which had accurate knowledge of the geography of the Earth. Such knowledge was passed down to the Europeans at a later time via the Arabs for example.

Some examples are given which show areas now submerged, and accurate longitudes that are impossible for the time when the map was drawn. One map from the renaissance shows Australia and Antarctica!

The remainder of the book covers Asia. Extensive diving was done by Hancock around Japan, Taiwan, and Okinawa, mainly because he received considerable funding from a Japanese businessman. Japan is an area where there is much interest in undersea exploration; one in four Japanese citizens is a skin-diving sportsman, for example.

The Japanese culture may be as old, or even older than the Indian. The oldest pottery so far discovered, more than 13,000 years old, has been found in Japan—on land.

Underworld: The Mysterious Origins of Civilization is well illustrated with color plates, maps, and charts. It is well footnoted and contains appendices and postscripts. So why haven't more sunken cities been found? Is it because archaeologists are allergic to water?

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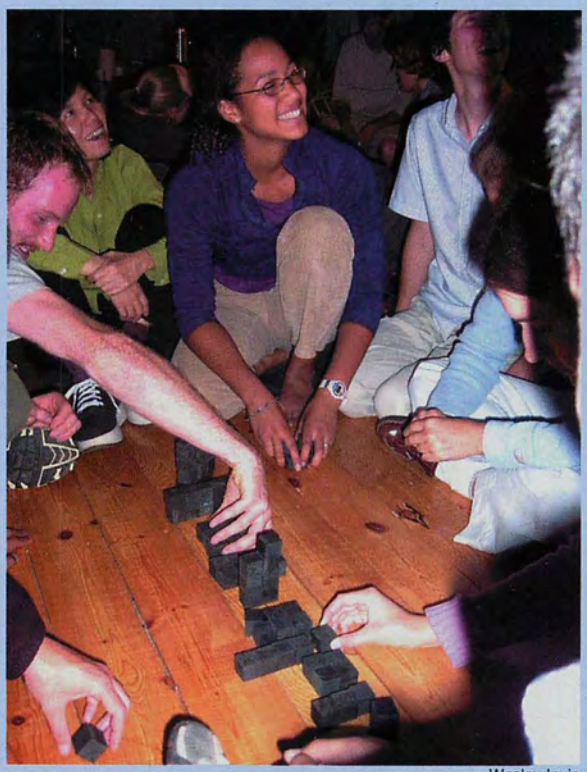


Wesley Irwin

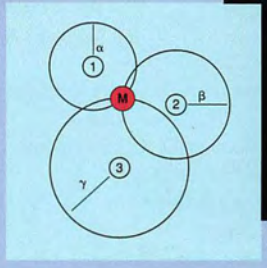
Tarrajna Dorsey with other exuberant members of the Seattle LaRouche Youth Movement, investigating the principle of powers, using cubic blocks.

THE *MENO* PRINCIPLE: DISCOVERY IS HUMAN

The LaRouche Youth Movement has spread to Europe. In "Burn the Textbooks! Re-create the Original Discoveries!" Youth Movement leader Jason Ross reveals the open secret behind the explosive growth of this "Combat University on Wheels." Plato was right! What defines our humanity, as distinct from animals, is the inherent ability to discover, as illustrated by the famous discussion between Socrates and the slave boy in Plato's *Meno* dialogue.

DOES MARS'S MOTION INFLUENCE THE FUTURE?

Mars may not affect your love life in the way the astrologers believe. But the investigation of this astronomical phenomenon by the LaRouche Youth Movement is already demonstrated to have a definite steering effect on future events, as Youth Movement leader Timothy Vance demonstrates in "Studying Mars Retrograde Motion to Reverse Academic Menticide."



From left: Summer Shields, Oyang Teng, and Lee Miok demonstrate how to measure the angular distance of Mars from nearby stars, using a device adapted from a Lenart Sphere protractor. The flashlight illuminates the tips of the dowels inserted into the spherical protractor.

The diagram (inset) shows a method developed for triangulating Mars, knowing the angular distance from three nearby stars.