

EIR Physical Economy

On the subject of evolution: The descent to Bush from man

by Lyndon H. LaRouche, Jr.

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“... rather than the theory of evolution, we should speak of several theories of evolution. On the one hand, this plurality has to do with the different explanations advanced for the mechanism of evolution, and on the other, with the various philosophies on which it is based. Hence the existence of materialist, reductionist and spiritualist interpretations.

“... theories of evolution which, in accordance with the philosophies inspiring them, consider the spirit as emerging from the forces of living matter or as a mere epiphenomenon of this matter, are incompatible with the truth about man. Nor are they able to ground the dignity of the person.”

—Pope John Paul II

Address to the Pontifical Academy of Sciences
On the subject of Evolution
October 22, 1996¹

“When English naturalist Charles Darwin first publicized his theory of evolution in 1859, he was met with outrage by theologians and others. . . . Now few mainstream Catholic or Protestant theologians find a contradiction in accepting both the biblical account and the evolutionary theory of natural selection of the species.”

—Laurie Goodstein

“Pope Backs Acceptance of Evolution”

Washington Post lead story

October 25, 1996

“To suddenly try to get my hair colored, and dance up and down in a miniskirt, or something. You know: show that I’ve got a lot of jazz out there. And, drop a bunch of one-liners. I’m running for President of the United States . . . I think I’m a scintillating kind of fellow.”

—Vice-President George Bush

Ohio, April 26, 1988

Once more, the *Washington Post* has lied in its customary fashion. The cited excerpt from Pope John Paul’s address states most plainly: there is nothing in the Catholic Church’s view of evolution which concurs with what Darwin identified as his own parody of the “natural selection” dogma of Thomas Malthus’ 1798 *Essay on The Principles of Population*.

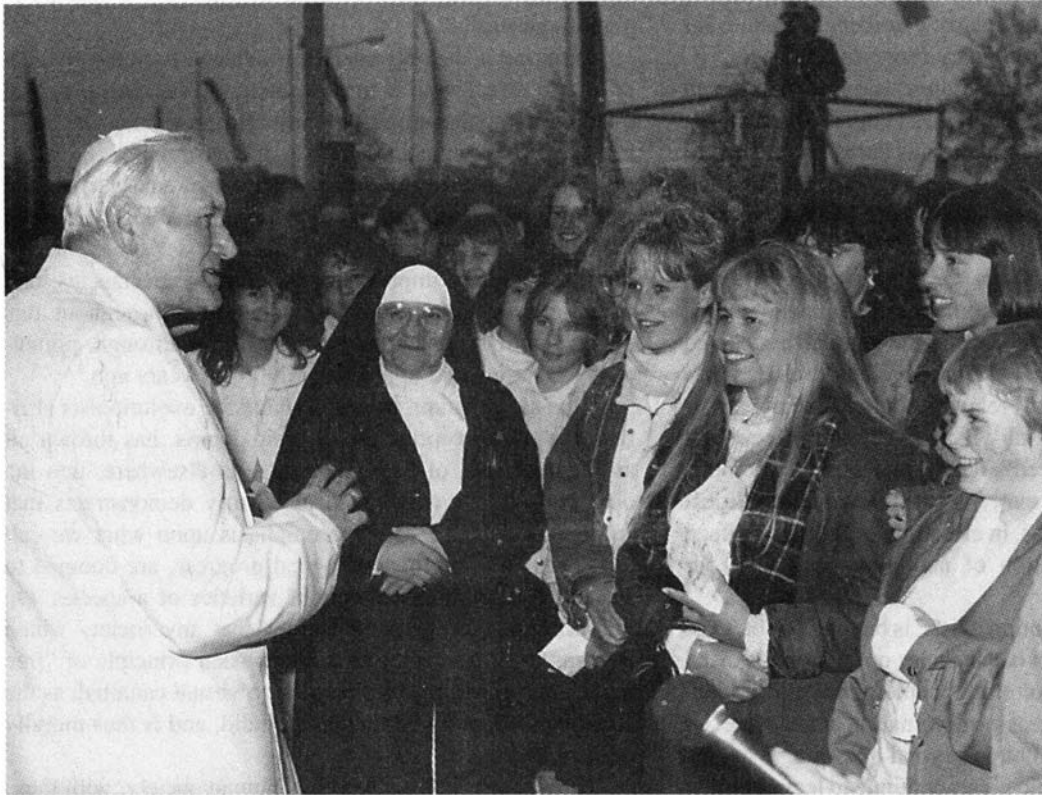
This fresh misrepresentation of the Vatican by the *Post*, intersects issues of urgent practical importance to every nation, every citizen today.

To the less thoughtful citizen, the most frightening practical threat known to today’s world, is contained within the repeated warning, by International Monetary Fund (IMF) Managing Director Michel Camdessus, that the world lives at the brink of a devastating, global banking crisis.² That warning is accurate; the onrushing crisis would, unremedied, plunge the entire planet into something far worse than a 1930s world depression: a prolonged “New Dark Age,” in which most existing nations would be wiped from the political map, entire languages would disappear, and the world’s population and ranges of life-expectancies drop to half, or, even far less than, the levels reached by the middle of the 1960s.

To the more thoughtful citizen, the most frightening im-

1. Translated from the original French.

2. John Hoefle, “IMF Admits Global Banking Crisis Is Out of Control,” *Executive Intelligence Review*, Oct. 11, 1996.



Pope John Paul II: "With man . . . we find ourselves in the presence of an ontological difference, an ontological leap, one could say." The pope is shown here in May 1987, during a visit to Speyer, Germany.

plication of the IMF warning, is that this presently onrushing collapse of the world's economic and financial systems, is the result of those economic-policy and related opinions which continue to be hegemonic in government, commerce, and general public opinion, up to this moment. We shall not escape the imminent, worst catastrophe of the century, unless we can purge our government and much of the citizenry of what currently passes, still, for "mainstream" thinking, on matters of economic and financial relevance. For the thoughtful citizen, getting rid of that "mainstream thinking," and that very soon, is the most awesome, most urgent real issue of current policy-shaping. The very existence of nearly everyone's family, even in the relatively near term, depends upon making that sudden change in popular opinion. The need to change stubbornly embedded "mainstream" opinion, is the task which the thoughtful citizen may find worthy to be considered truly awesome.

It happens to be the case, that the most crucial of the relevant issues of economic and financial thinking, are "genetically" identical with, and related to the uncompromisable issues separating John Paul II from the scalawags at the *Post*. It is with that outstanding and urgent political relevance in view, that we address a crucial feature of that controversy.

Rather than presuming to defend His Holiness' position in this matter, it were more tasteful, and more useful to the reader, that I identify my own expert knowledge, as a physical economist with relevant independent discoveries in this field.

I indicate the proof which shows, that virtually all extant academic theories of evolution, including those which contain some useful elements of research, are essentially ideological fabrications.

The primary error ruining today's academic treatments of "evolution," is a fallacy of composition: the crucial distinction between that putative end-product of evolution, man, and all preceding, inferior living species, is passed over with a wave of the academic hand. To establish the relevant benchmark for correcting that fallacy of composition, consider the relevance of a political case, in which evolutionary progress in human culture has been ostensibly reversed: the unnatural selection of George Bush as a former President of the U.S.A.

Did man descend from bushbabies, down a nocturnal primeval tree, as some devotees of the plagiarist Thomas Malthus imply?³ Putting matters from prehistory aside, Bush,

3. In presenting his famous work, Charles Darwin explained that he had arranged his data to fit the dogma of Thomas Malthus' 1798 *Essay*, which, in turn, had originally been advanced to promote the British government's policies for increasing the death-rates among Britain's "useless eaters": through proposed, Gingrich-like repeal of the Elizabethan "Poor Laws." Malthus, in turn, had cribbed his doctrine from the English translation of Giammaria Ortes' 1790 *Reflessioni sulla Popolazione della Nazioni*. After a Club of Rome project, *The Limits to Growth* (Washington, D.C.: Potomac Associates, 1972), authored by a group of Massachusetts Institute of Technology (MIT)-based charlatans, Donnella and Dennis Meadows and Jay Forrester, had been exposed as a hoax, the present-day international neo-Malthusian cult, headed by Prince Philip and Prince Bernhard's World Wildlife Fund,

morally and intellectually, is clearly a descent of man to far below the civilized state of literacy represented by the Fifteenth Century's Golden Renaissance and the Eighteenth Century's framing of the United States Federal Constitution.

As said, this George Bush case points our attention toward the crucial element of fraud in the *Post*'s commentary. To wit: Is "evolution" to be relegated, as the *Post* defines the issue, to a formal academic subject-matter of materialist, or reductionist biology? When we take into account the different philosophies parading under the name of "science" today, can we claim fairly, that any among the generally accepted classroom views of physical science, biology included, has competently treated the most relevant single piece of experimental evidence by means of which an explicit principle of evolution might be adduced? We signify as most notable, the role of the alternately evolving, and devolving political culture of the human species, in effecting, or failing to effect, man's increasing domination of nature on, and near our planet.

The evidence that evolution exists, is beyond doubt. Cosmic evolution continues to occur under our astrophysicists' noses, so to speak. The evolutionary emergence of our planet's biosphere, and the increasing domination of the planet by that biosphere's development, is beyond question. What the generally accepted academic views continue to leave entirely in the dark, is the demonstrable identity of an efficient specific principle of evolution. This crucial omission is not a chance oversight; it is a product of a relevant, specific, pervasive, axiomatic incompetence, still to be removed from within each of those professions.

In short: although virtually all contemporary dogma on the subject of "evolution," purports to explain the existence of our own species, no generally accepted academic doctrine, today, supplies a competent *functional* definition of the actuality, or even the possibility for the existence of that species, man, which evolution is presumed to have produced. It is that axiomatic incompetence which we address here.

The crucial significance of cognition

Can we rightly separate the question of evolution from the quality of human behavior, from the issues of morality expressed by a commitment of public policy to improvement of the potential relative population-density of mankind? Can one speak of the quality of our species, relative to the beasts, without considering as distinctively human, a policy of constituting those forms of governments, by means of which we may promote increase of the full spectrum of life-expectancies and of health, and advancements in those forms of leisure which are integral to intellectual and moral improvement of

during the course of the 1980s, dumped the untenable crudity of Malthus' plagiarism, to revive Ortes' original argument for "carrying capacity." See Webster G. Tarpley, "Giammaria Ortes and the Venetian Hoax of Carrying Capacity," *New Federalist*, June 20, 1994.

persons generally?

Mankind is the only species which has demonstrated the power to effect willful improvements in its own potential relative population-density, while also improving the spectrum of life-expectancies for all age and related classifications. It is through that willful behavior of our species, that man rose from a potential population estimable as not more than several millions of Lemuel Gulliver's Yahoos,⁴ to billions at a greatly improved level of life-expectancies, and conditions of family and individual life, throughout this planet: until a downturn which began through policy-changes introduced approximately thirty years ago.⁵

That same nature, itself, to which the evolutionists attribute the efficient principle of their dogma, has thrown all ancient empires, of Mesopotamia, and elsewhere, into the dust of history's waste-dumps. History demonstrates that cultures which fail to place emphasis upon what we call today scientific and technological progress, are doomed to suffer the ruin common to unfit varieties of a species. On this account, history demonstrates that any society which governs itself according to a Malthusian principle of "free trade," can exist only as a parasite, a virtual cannibal, as the Nineteenth Century British Empire did, and is thus morally unfit to survive.

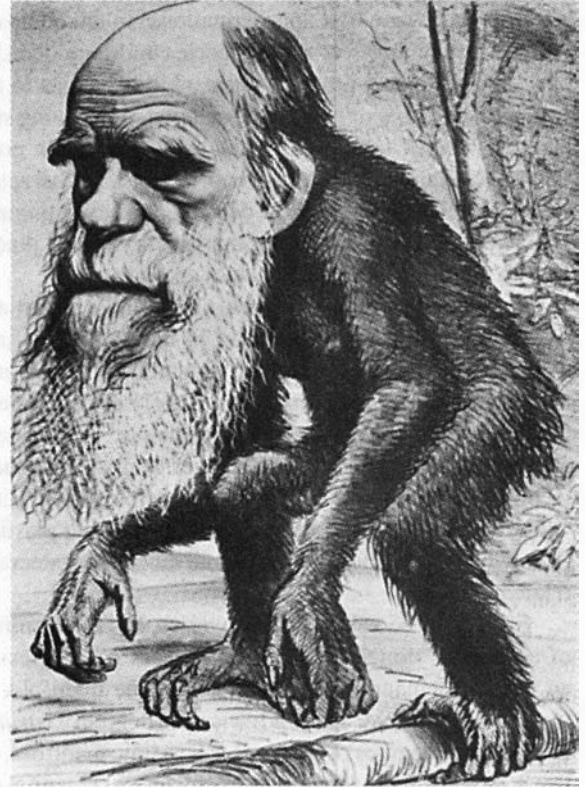
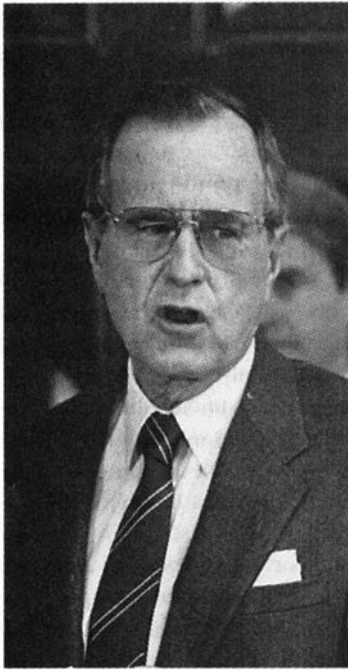
How could such a species as human society, with these functional, historical characteristics, evolve? Where, what is the evolutionary principle which subsumes the generation of this distinctive role of individual human cognitive behavior? Is it not ludicrous to address such a question to the judgment of a *Washington Post*, the which has failed to evolve to the biological-cultural level of producing a truthful editor?

The axiomatic incompetence of the sundry theories of evolution, is the same obsessive blunder which invalidates each and all of today's academically accredited attempts to develop deterministic mathematical models of economic growth. This refers to what the present writer has addressed under the rubric of the "Columbus Principle," the fact that modern mathematical economics presumes implicitly, that "commodities are produced by commodities."⁶ That absurd

4. The reader would show no appreciation of Jonathan Swift as a figure of considerable historical significance in his times, if it were not recognized that the spectacle of dirty, rutting, humanoid Yahoos under the lordships of horses' rear parts, is nothing other than a fair appreciation of the reduced state of affairs in Hugh Walpole's Eighteenth-Century Britain. See H. Graham Lowry, *How the Nation Was Won*, Vol. I (Washington, D.C.: Executive Intelligence Review, 1988); Chapters 4 and 5, pp. 59-157.

5. On the subject of the physical-economic downturn, see Lyndon H. LaRouche, Jr., "While Monetarism Dies," *Executive Intelligence Review*, Oct. 25, 1996, pp. 10-19.

6. *ibid.* The built-in, absurd, axiomatic assumption of all academically accredited, or kindred mathematical models, that commodities, as outputs, are caused by the consumption of commodities, as inputs. The prevalence of that deluding, axiomatic obsession among professionals, is chiefly the result of London's participation on the winning side of a long series of wars, beginning



Left to right: Former President George Bush; Katharine Graham, the publisher of the Washington Post, where evolution has yet to produce a truthful editor; and a cartoon from 1871 of Charles Darwin, whose theories didn't account for the devolution which led to George Bush.

proposition, as argued by Cambridge University's Piero Sraffa,⁷ is consistent with the derivatives of the logical-positivist Lausanne School of Leon Walras, as also the information theory and systems analysis of Norbert Wiener and John von Neumann. In no place in those economic doctrines, is any consideration given to the actual, functional role of the cognitive processes of the individual operative's mind, as the determining feature of the productive process as a whole.

This prevalent absurdity of academically accredited mathematical economics, is the "hereditary" consequence of a corresponding absurdity inhering in generally accepted classroom mathematics. G.W. Leibniz was the first modern economist to warn against this fatal fallacy of mathematics, a warning first delivered as a few sets of brief remarks, under the rubric of "Analysis Situs."⁸ The fundamental error of the

the 1701-1714 War of Spanish Succession, and continuing through the World Wars of the present century: as a by-product of the British monarchy's participation in these military victories, British empiricist ideology gained virtual global hegemony within areas dominated by European civilization, especially after the 1814-1815 Congress of Vienna. Empiricism, whose influence outside Britain was always in jeopardy, at best, until the close of the Napoleonic wars, won on the field of diplomacy what it had lost on the battlefields of science.

7. Piero Sraffa, *The Production of Commodities by Commodities* (1960).

8. See, G.W. Leibniz, "Studies in a Geometry of Situation," *Gottfried Wilhelm Leibniz: Philosophical Papers and Letters*, Leroy E. Loemker, ed., Vol. 2 (Norwell, Mass.: Kluwer Academic Publishers, 1989); pp. 247-258. The principle of Analysis Situs is the underlying feature of the Leibniz docu-

modern mathematical physicists and biologists, on the subject of evolution, as on other matters, is the mere failure, or militant refusal to accept Leibniz's warning against the types of nonsense inhering in any naive faith in today's generally accepted classroom mathematics. After Leibniz, the first successful attack on this fallacy, from within mathematical physics, was delivered by Bernhard Riemann's revolutionary habilitation dissertation, in which the first steps toward a comprehensive Analysis Situs were made.⁹

Consider the case for economics, first, and turn, then, directly, to identify the corresponding case for any deductive deterministic mathematics.

Relative to any doctrine of ecology, the distinction which sets mankind outside the competence of so-called ecology, is the functional nature of the variability in the human species' potential relative population-density.¹⁰ This variability is of a type which might be treated as of that "genetically" predetermined character which is experimentally tolerable (for pur-

ment which has come to be known under the title of *The Monadology*. [Cf. *Monadology and Other Philosophical Essays*, Paul and Anne Martin Schrecker, trans. (Englewood, N.J.: MacMillan, 1965).]

9. Bernhard Riemann, "Über die Hypothesen, welche der Geometrie zu Grunde liegen" (1854) *Bernhard Riemanns Gesammelte Mathematische Werke*, H. Weber, ed. (1902): (New York: Dover Publications [reprint], 1963).

10. Lyndon H. LaRouche, Jr., *So, You Wish to Learn All About Economics?* 2nd edition (Washington, D.C.: EIR News Service, Inc., 1995).

poses of pragmatic first approximations) in the comparative study of population-sets among species inferior to man. However, the ecological potential of mankind changes to the effect, that humanity appears to be an upward-evolving succession of species unto itself: that the impulse for constant upward evolution, respecting its behavior and characteristic potential relative population-density, is the distinguishing characteristic of human nature: a distinction which places the human species beyond the reach of ecology.

The cause for these advances in mankind's potential relative population-density, is found in mankind's realization, as practice, of certain validated, fundamental discoveries of natural principle. One thinks immediately of experimentally validated discoveries of physical principle, as those effects are encountered explicitly as advances in applied science and technology. These also include the principles underlying the Classical art-forms of poetry, drama, music, and plastic arts, from which mankind has derived advances in statecraft and related matters.

Each of these validated discoveries, has the significance of an added "dimension," in the process of progress from an n -fold Riemannian physical-space-time manifold, to an $(n+1)$ -fold manifold. These advances, in degree of *cardinality* of the higher degrees of physical-space-time manifold, correlate with an increase of mankind's (society's) potential power over nature, and with associated tendencies for increase of not only potential relative population-density, but also improved life-expectancies, and a quantitatively and qualitatively enhanced quality of family and individual life.

The realization of these advances in technology and statecraft, requires absolute increases in the necessary physical and related consumption, per capita of labor force, per household, and per square kilometer of relevant land-area. However, in successful physical economies, those increases in the rations of "energy of the system," are more than offset by gains in physical productivity.¹¹ The result is, that in a well-managed society, the ratio of relative "free energy" to relative

"energy of the system," does not fall. It tends, rather, to increase, despite the rising physical requirements of per-capita and per-square-kilometer market-baskets, for labor force, households, basic economic infrastructure, education, health care, science and technology services, production, and distribution. In sum, the transformation from input to output, is "not-entropic."¹² This gain in relative not-entropy, is the sole sustainable source of true profit in an economy.¹³

The agency underlying this not-entropic function, can not be located in a correlation between the array of inputs and subsequent array of outputs. The human mind is the relevant agency, the only source of this not-entropy.

This "not-entropic," distinctive characteristic of the individual human mind's function, has the same implications for the notion of evolution as it is crucial for distinguishing between scientific and non-scientific forms of political-economy. Contrary to the radically reductionist "brain" dogmas of Bertrand Russell devotees Norbert Wiener and John von Neumann,¹⁴ it is impossible to define this not-entropic function of the human individual mind in terms of any generally accepted form of classroom mathematics. This axiomatic incompetence of today's taught mathematics, is the most devastating experimental-physics demonstration of Leibniz's warning of the need to develop a generalized Analysis Situs. In present-day mathematics, only along those frontiers pioneered by Riemann's celebrated habilitation dissertation, can this principle be expressed for purposes of mathematical comprehension.

The array of physical inputs to an economic process, is a condition in the physical world; the array of physical outputs of that process, is also a condition in the physical world. Yet, from the standpoint of the philosophical materialist, or reductionists since Parmenides of Elea, what we identify as the "cause" of the transformation linking those two successive conditions, is, for them, an alleged, philosophically impermissible, *metaphysical* intervention by the not-entropic cog-

11. The prototype of the successful design of a modern economy is supplied by U.S. Treasury Secretary Alexander Hamilton, in his famous three reports to the U.S. Congress: *Report on Public Credit* (January 1790), *Report on a National Bank* (December 1790), and, most significantly, *Report on the Subject of Manufactures* (Dec. 5, 1791). This is the "American System" model of economy adopted by the Nineteenth-Century U.S. Whigs and Republicans, the Careys and Henry Clay, through Abraham Lincoln and William McKinley; it is also the model, as adopted by Friedrich List, for the successful rise of Nineteenth-Century Germany's economy, and the model adopted, until 1894-1895 by the rise of modern Japan, and the model adopted by modern Russia's greatest statesman of the Nineteenth and Twentieth Centuries, to date, Count Sergei Witte. A notable, recently released supplementary reference, is Friedrich List, *Outlines of American Political Economy*, Michael Liebig, ed., (Wiesbaden, Germany: Dr. Boettiger Verlag, GmbH, 1996). (This is published in parallel, German and English, texts.) Hamilton's reports are republished in Nancy Spannaus and Christopher White, editors, *The Political Economy of the American Revolution*, 2nd ed. (Washington, D.C.: Executive Intelligence Review, 1996).

12. We are obliged to resort to the relatively awkward term, "not entropic," because, over recent decades, a duped public has come to accept the mechanistic (and essentially absurd) significance of Professor Norbert Wiener's misuse of "negative entropy," or "negentropy."

13. This excludes the special case of equilibrium in a Gramm-Gingrich utopia, in which economic equilibrium is maintained, as Jonathan Swift has noted, by the employed eating the unemployed. A less abrasive term used for identifying these or kindred tactics, is *primitive accumulation*: looting of nature, of other populations, past investments of capital, etc., to provide a nominal profit for those who do the looting. For more on "Primitive Accumulation," see, also, "Chain Letter," "Pyramid Club," "Junk Bonds," "Hostile Takeover," "Derivatives."

14. Both Wiener and von Neumann were devotees of the positivist standpoint of Bertrand Russell. See, Norman Macrae, *John von Neumann* (New York: Random House, 1992), pp. 103-108. For balance, note Macrae's cross reference (p. 106) to Heims's "diametrically opposite view to mine on the two men's legacy to our times" [Steven J. Heims, *John von Neumann and Norbert Wiener: From Mathematics to the Technologies of Life and Death* (Cambridge, Mass.: MIT Press, 1980)].

nitive processes of the individual human mind.

Thus, it is the relationship of the governing “not-entropic” intervention of the individual human mind, to the productive process, which defines the relationship between inputs and outputs of that process. This is the classical demonstration of the case for an Analysis Situs, outside and above a deductive deterministic form of mathematics.

Consider the predicament which this poses to the block-headed variety of mathematical physicist. The methodological standpoint of experimental physics, as distinct from that of ivory-tower, mathematical formalism, presents us with the existence of efficient, cognitive not-entropy, as a phenomenon of *relationship*, a relationship for which there is no provision within existing mathematical physics. As we shall note, in the appropriate place below, the demonstration of the existence of this relationship as a physically efficient one, satisfies the most powerful standard of scientific truthfulness available in any part of science. It is a relationship nowhere permitted within the axiomatics of generally accepted classroom mathematics, a relationship banned by the dogmas of commonly taught mathematical physics. Yet, it exists!

The formalist’s reaction to this paradoxical situation, ought to remind us of the spectacle created, if a biological instructor were to assure his students, that we do not yet have any statistical certainty that the evolutionary development of cognitive human life might be probable. So, in response to a proof of the existence of a type of relationship which his mathematics viciously excludes, the formalist proposes that we go to the blackboard, to demonstrate that this relationship might be derived from within the terms of that mathematics! The fraudulent mathematical definition of “negative entropy,” as famously supplied by the late Professor Norbert Wiener, is a celebrated example of such pathetic posturing by a reductionist.¹⁵

The crucial point is, that not-entropy is not a special condition which might be constructed within the bounds of generally accepted classroom mathematics. In that latter domain, not-entropy presents itself only as a devastating paradox.¹⁶ It is an efficiently existing principle, which, however, exists

15. Norbert Wiener, *Cybernetics* (New York: John Wiley, 1948). Wiener degraded biological and other characteristically not-entropic processes to virtual statistical accidents within the type of mechanical domain associated with statistical gas theory: i.e., to Ludwig Boltzmann’s case for a highly improbable, local and temporary reversal of statistical entropy, according to the terms of Boltzmann’s construction of his famous H-theorem. See, Morris Levitt, “Linearity and Entropy: Ludwig Boltzmann and the Second Law of Thermodynamics,” *Fusion Energy Foundation Newsletter*, September 1976, pp. 3-18.

16. In an earlier location, the author has referred to the treatment of an aspect of this problem, in the work of A.D. Sakharov (“The Essential Role of ‘Time-Reversal’ in Mathematical Economics,” *Executive Intelligence Review*, Oct. 11, 1996). Cf. A.D. Sakharov, *Collected Scientific Works* D. Ter Haar, D.V. Chudnovsky, G.V. Chudnovsky, eds., (New York: Marcel Dekker, 1982); Part 2: “Cosmology,” pp. 59-155, esp. “12. Cosmological Models of the Universe with Reversal of Time’s Arrow.”

only outside the domain comprehended by such a mathematics. When such paradoxes confront mathematics, a scientific catastrophe is avoided by abandoning the confines of that mathematics; competence exhibits itself so, because it has recognized that the evidence obliges us to rise to that higher domain to which Leibniz assigned the name of Analysis Situs.

This relationship, within the higher domain of an Analysis Situs, is the characteristic feature of that science of physical economy founded by Leibniz, as this is already exemplified by the subject-matter of his 1671 *Society & Economy*.¹⁷ The same kind of paradox confronts the mathematician, in addressing that efficient, not-entropic relationship known as life.

Once we situate man at the center of the functional relationship, in the study of evolution, we are confronted, once again, by the same problem of Analysis Situs which life represents, but on an ontologically higher level. The characteristic of a human nature which demonstrates itself through successive increases in mankind’s potential relative population-density, is precisely that same not-entropic principle, the distinctive principle of the individual human mind: a conception hidden behind the formalist’s paradox of “mind over matter.”

To evade precisely that challenge, the reductionist retorts with the assertion condemned by John Paul II, that the human mind is an *epiphenomenon* of the physical existence of the living process; the difficulty is, that that argument creates for the reductionist logician the unwholesome, dismaying spectacle, of an epiphenomenon acting as the efficient cause of the phenomenon which, putatively, generates its own existence.

‘Et hypotheses non fingo . . .’

The relevant incompetence of generally accepted classroom mathematics, is most conveniently identified by the rarity of those putatively literate professionals who recognize the plain absurdity of a popularized piece of pompous idiocy uttered by Isaac Newton: *Et hypotheses non fingo . . .* (“I don’t make hypotheses”). Newton’s slogan is key for understanding the relevant incompetence of reductionist science on the subject of evolution, still today.

Leibniz and Jean Bernoulli, for example, already ridiculed Newton on this account; until the Congress of Vienna destroyed France’s scientific institutions, the leading scientists of continental Europe and the United States, openly, and accurately, ridiculed, as a hoax upon science, the attempted apotheosis of Newton by the Venetian Abbot Antonio Conti and his cabal. Even in Britain, John Herschel, the son of Britain’s only competent scientist of that time, joined with Cambridge University classmate Charles Babbage, to ridicule cabalist Newton and the shoddy London Royal Society for making Britain the laughing-stock of the scientific world.¹⁸

17. *Society & Economy*, John Chambliss, trans., *Fidelio*, Fall 1992. This also appears in Spannaus and White, eds., op. cit.

18. Charles Babbage and John Herschel, *The Principle of Pure Deism, in Opposition to the Dotage of the University* (1811). Charles Babbage, John

Riemann put his finger directly on the kernel of the problem: Newton's scientific illiteracy respecting even the bare meaning of the term "hypothesis." Riemann's ridicule of Newton's pompous idiocy, is key for understanding the genius of Riemann's relevant, own revolution in modern physics.¹⁹ Visions from Goya's *Los Caprichos* are invoked, as one thinks of today's students sitting in awe, like young donkeys at their first lodge meeting, while old asses, called professors, captivate them with Newton's silly "I don't make hypotheses."

The axiomatic incompetence of today's professionally accepted standards of mathematical thinking for addressing the topic of evolution, must be identified on two levels.

In the first degree, the problem is that explicitly solved by Riemann's habilitation dissertation. The problem on this first level is twofold. First: The darkness which none of the most famous of the concerned geometers, mathematicians, and philosophers, from Euclid through the Ecole Polytechnique's A.-M. Legendre, had been able to lift:²⁰ *the validity of that set of definitions, axioms, and postulates, which had underlain the theorem-lattice of both geometry, and the mathematics derived from that geometry, had been left uncertain.* Second: mathematical physics had been degraded into the effort to map relations within the domain of a virtually empty space-time defined by that unproven set of definitions, axioms, and postulates, the which had been taken on no better authority than the presumption that these arbitrary, underlying assumptions of formal mathematics were more or less self-evident.

In the second degree, this problem had been greatly aggravated by the assumptions of Paolo Sarpi, his lackey Galileo Galilei, and Galileo's mathematics pupil, Thomas Hobbes, the problem embedded in Newton's notorious *et*

Herschel, and George Peacock, trans., Lacroix's *Differential & Integral Calculus* (1812). These distinguished Cambridge students prompted the dumping of the useless Newton pseudo-calculus, and employing the actual calculus of Leibniz instead. Herschel moved on in his father's footsteps, to become Britain's leading astronomer and a collaborator of Germany's Carl F. Gauss. Babbage is most famous for continuing Leibniz's line of development of modern calculating machinery, and is closely associated with the circles of Monge's Ecole Polytechnique in France, and with Alexander von Humboldt in Germany.

19. "Das Wort Hypothese hat jetzt eine etwas andere Bedeutung als bei Newton. Man pflegt jetzt unter Hypothese Alles zu den Erscheinungen Hinzugedachte zu verstehen. Newton war weit entfernt von dem ungereimten Gedanken, als könne die Erklärung der Erscheinungen durch Abstraction gewonnen werden. . . . Die Unterscheidung, welche Newton zwischen Bewegungsgesetzen oder Axiomen und Hypothesen macht, scheint mir nicht haltbar. Das Trägheitsgesetz ist die Hypothese: Wenn ein materieller Punkt allein in der Welt vorhanden wäre und sich im Raum mit einer bestimmten Geschwindigkeit bewegte, so würde er diese Geschwindigkeit beständig behalten." Riemann's Werke op. cit., p. 525.

20. "Diese Dunkelheit wurde auch von Euklid bis Legendre, um dem berühmtesten neueren Bearbeiter der Geometrie zu nennen, wedervon den Mathematikern, noch von den Philosophen, welche sich damit beschäftigten, gehoben." Habilitation dissertation, loc. cit., p. 272.

hypotheses non fingo. . . . Specifically, in literate science, the premising of a theorem-lattice upon some underlying set of interacting definitions, axioms, and postulates, is named an *hypothesis*. Newton's "I don't make hypotheses" is an extremist's affirmation of the central absurdity of empiricism, the presumption that the relevant hypothesis must not be acknowledged to be an hypothesis; the purpose of that perverse semantic charade, is to defend the empiricists' hypothesis: that these definitions, axioms, and postulates are supplied by sense-perception, and that nothing could be known to exist, the which would contradict the views of the empiricists on these matters.

For our purposes here, consider those two levels in reversed order.

To the extent that the empiricist and related, positivist views are hegemonic in relevant institutions today, the delusion prevails that pure (e.g., formal) mathematics represents a branch of formal knowledge, formal abstract logic, which, once given by sense-certainty, is, by its nature, independent of any further demands by external authority.²¹ The resulting practical problem is, that the political defeat of the opponents of the empiricists and positivists, and the resulting, artificial authority of Newtonians such as Newton, Euler, Laplace, Cauchy, Kelvin, Clausius, Grassmann, Helmholtz, et al., has imposed upon mathematical science the presumption, that physical space-time itself can be regarded as linearized, probably in the extremes of the very, very large (in astrophysics), and, without doubt, in the very, very small (in microphysics). This arbitrary, popularized dogma of classroom mathematics, thus bans from official science, any experimentally demonstrated principle which does not conform to the Apollo priesthood's presumption of linearity in (for example) the very, very small.²²

Thus, as the case of Norbert Wiener's "information theory" hoax illustrates the problem, and as the related case of John von Neumann's idiot-savant view of "economic equilibrium" does similarly, what is called science either implicitly denies the very existence of those actually "not-entropic" processes, which physical economy demonstrates all successful models of economy and society to be, or the lack of means for mathematical comprehension of the expressed relationships results in devastatingly paradoxical mathematical formulations.

The same predicament arises in efforts to define a mathematical biophysics, such as the work of the famous Nicholas

21. This is the extremist version of radical empiricism (e.g., logical positivism) adopted by Bertrand Russell, et al.

22. Our acquaintances of the late 1970s and early 1980s at Lawrence Livermore Laboratories will recall, how often this writer and his associates scolded them over their repeated preference, respecting issues of isentropic compression in inertial-confinement, and other matters, for blind faith in the wisdom of that veritable Wizard of Oz, the local Pythia called "Lasnex," over the plainest experimental evidence to the contrary.

Rashevsky,²³ or the work of the celebrated hylozoic theory of A. Oparin and others. Until formalism bends to that higher authority of experimental physics, in which not-entropy exists as a relatively independent, efficient principle of relations within the universe, the best efforts to address such matters, will be brought to a halt by the defiant paradox which the stubbornness of reductionist mathematical formalism in the Euler-Lagrange tradition has brought upon itself.

As long as young donkeys copy the bad habits of empiricist old asses, no amount of research into the task of devising a theory of not-entropic processes, either in economy, or evolution, will do more than to make the mud muddier, by grinding the stuff, yet once again, with the same old ritual, mathematical hoof-stompings of infinitely infinite series.

Once we return to the first level, the form of the problem which Riemann describes at the outset of his habilitation dissertation, is to be seen as crucial for solving this problem of Analysis Situs.

Hypothesis as Analysis Situs

To meet the solution for that crisis in axiomatics which we have identified here, we must follow the pathway of the Augustine tradition of western European civilization, as Leibniz and Riemann did, and Nicolaus of Cusa before them. We must turn to the roots of modern science in Classical Greece, Plato's Academy at Athens specifically.²⁴ The solution lies in the notion of Socratic dialogue, as made the basis for science by Plato, but also as Plato developed this from a dialectical germ-principle central to the Homeric epics, and to the Classical Greek tragedy of Aeschylus and others which was developed on the foundation provided by those earlier epics. The refined kernel of scientific method, is *the principle of hypothesis* as this was developed in the dialogues of Plato.

23. Nicholas Rashevsky, *Mathematical Biophysics: Physico-Mathematical Foundations of Biology* (Chicago: University of Chicago Press, 1938); *Mathematical Biophysics* (Chicago: University of Chicago Press [revised], 1948).

24. The earliest demonstrated traces of modern scientific knowledge are dated, as Balgangadhar Tilak cites the evidence for this in his *Orion*, from between 6,000 and 4,000 B.C., in the solar astronomical equinoctial calendars of Central Asia. There are indications of similarly early developments in Chinese solar astronomical calendars, evidence which requires more exhaustive study. In historic times, the most advanced known pre-Classical Greece culture, is that of Egypt prior to the destructive introduction of what is called today the Isis-Osiris cult. Egypt, like Indo-European Central-Asian culture, was vastly more advanced than any appearing in early Mesopotamia (e.g., prior to the Hellenistic period and the later Arab Renaissance under the Baghdad Caliphate). The qualitative superiority of Classical Greek science over what is known of Egypt's, lies in the crucial emphasis upon the subjective side, by Plato and his relevant predecessors, upon the act of knowing. However, within Classical Greek culture, and the European tradition, the crucial contributions of Plato are unique in type and magnitude, far more advanced in principle than anything so far known of any ancient culture. In any case, modern European science is entirely indebted, directly, to Plato's Academy at Athens.

It was on this basis, that Nicolaus of Cusa launched the modern experimental physics traced into Leibniz, Riemann, et al., through Luca Pacioli, Leonardo da Vinci, Johannes Kepler, et al. Cusa's work to this effect is located in a series of writings on Platonic principles of experimentally based scientific method, beginning his *De docta ignorantia*.²⁵

This is the modern scientific tradition of the European, Fifteenth-Century Golden Renaissance, as opposed to the feudalist reaction, launched from Sixteenth-Century Venice and Padua, and known as the Enlightenment of Paolo Sarpi, Galileo, Descartes, Hobbes, and their sundry materialist, empiricist, positivist, and existentialist followers. Since Padua's Pietro Pomponazzi, and two of Enlightenment London's favorites, Francesco Zorzi (a.k.a., "Giorgi"), Sarpi, et al., all modern European science has been divided, principally, between two political camps: the Renaissance versus the Enlightenment's reductionist reaction. The Classical Christian Humanism of the Renaissance, is typified for modern science by Cusa, Leonardo, Kepler, Leibniz, Monge, Gauss, Riemann, et al. The opposing, Roman pagan tradition²⁶ is typified by the reductionist followers of Venice's Pomponazzi and Sarpi. Once that central political fact respecting the history of modern European science is understood, the nature and heredity of all the principal epistemological problems within modern science are implicitly identified.

What some might term "the basic feasible solution" for the crisis of Analysis Situs, came implicitly into focus with Riemann's habilitation dissertation, his "On the Hypotheses Which Underlie Geometry." Instead of regarding notions of three respectively independent senses of spatial direction, plus one of time, as self-evident, we must view these as but four senses of dimension within an expanding manifold: a physical-space-time manifold, in which the characteristic principle of action is the continual passing over from a manifold of "n," to "n+1" "dimensions." Each such "dimension" corresponds to a validated principle of nature. Each such "dimension" is treated as independent of other such "dimensions," in the sense three senses of spatial extension are defined as functionally mutually independent.²⁷

25. Nicolaus of Cusa, *On Learned Ignorance [De docta ignorantia]*, Fr. Germain Heron, trans. (New Haven: Yale University Press, 1954).

26. a.k.a., "oligarchical," "imperial," or "gnostic" tradition.

27. Since this point is crucial, the accuracy of our report of Riemann's discovery must not be left to speculation. We cite the critically relevant passages from his habilitation dissertation. "*Es hatte dies seinen Grund wohl darin, dass der allgemeine Begriff mehrfach ausgedehnter Grössen, unter welchem die Raumgrössen enthalten sind, ganz ungearbeitet blieb. Ich habe mir daher zunächst die Aufgabe gestellt, den Begriff einer mehrfach ausgedehnten Grösse aus allgemeinen Grössenbegriffen zu construieren. Es wird daraus hervorgehen, dass eine mehrfach ausgedehnte Grösse verschiedener Massverhältnisse fähig ist und der Raum also nur einen besonderen Fall einer dreifach ausgedehnten Grösse bildet. Hiervon aber ist eine nothwendige Folge, dass die Sätze der Geometrie sich nicht aus allgemeinen Grössenbegriffen ableiten lassen, sondern dass diejenigen Eigenschaften, durch welche*

There is a usually overlooked, crucial point in Riemann's development of an argument he supplies early in the writing of his habilitation dissertation. Failing to comprehend this point as he intends the reader should, would lead the reader to fatally wrong conclusions about the matter under discussion here: a failure which has been displayed often enough among putative academic and related authorities. We quote his German directly in this text, to spoil any suspicion that we might have altered the meaning in translation: "so kann diese Construction bezeichnet werden als eine Zusammensetzung von einer Veränderlichkeit von $n + 1$ Dimensionen aus einer Veränderlichkeit von n Dimensionen und aus einer Veränderlichkeit von Einer Dimension."²⁸ This can be fairly restated: "then this construction can be denoted by a composition of a variability [manifold] of $(n+1)$ dimensions, out of a manifold of n dimensions plus a variability of one dimension."²⁹ *Zusammensetzung* is used in the sense of *compose*, in congruence with the famous representation of the Creator as the "Composer," in the musical sense, in Plato's *Timaeus*. We elaborate the notion, and then explain the importance we place upon this point.

Given, an hypothesis, as represented by an experimentally validated Riemann manifold of n dimensions. Given, then, an experimental expression of a paradox, the which

sich der Raum von anderen denkbaren dreifach ausgedehnten Grössen unterscheidet, nur aus der Erfahrung entnommen werden können." loc.cit., pp. 272-273. "... erhält man eine dreifach ausgedehnte Mannigfaltigkeit, wenn man vorstellt, dass eine zweifach ausgedehnte in eine völlig verschiedene auf bestimmte Art übergeht, und es ist leicht zu sehen, wie man diese Construction fortsetzen kann. Wenn man, anstatt den Begriff als bestimmbar, seinen Gegenstand als veränderlich betrachtet, so kann diese Construction bezeichnet werden als eine Zusammensetzung einer Veränderlichkeit von $n + 1$ Dimensionen aus einer Veränderlichkeit von n Dimensionen und aus einer Veränderlichkeit von Einer Dimension." p. 275.

28. *ibid.*

29. Respecting problems of translation. Although each step of Riemann's argument is premised upon well-established philosophical, mathematical, and physical conceptions, the function of the dissertation is to present a genuinely original, and valid discovery of principle. This discovery is represented by derived conceptions which have never existed previously, at least in recorded human knowledge available in modern times up to that point. His use of existing language for the naming of these discoveries, can not avoid the principle of metaphor: like the composer of a magnificent, original Classical poem, Riemann is presenting meanings for which no previously established usage existed. Thus, only the most perverse of blockheaded grammarians, could propose that Riemann's words must be interpreted strictly according to their previously established standard meaning. Since Riemann thinks as a Platonist, we must define his nouns according to his crucially relevant use of verbs. Since Riemann is employing a recognizably Classical Greek Platonic conception, Plato's notion of "compose," which he approximates by a metaphorical use of *Zusammensetzung*, we should read the term *Veränderlichkeit* to agree with the Platonic notion of "compose," in the sense of "original creation": it signifies here both "manifold," as Riemann has identified that in preceding paragraphs (and, also later); insofar as we are examining the individual contents of the manifold, it has the *subordinate*, almost dictionary-literal significance, of "variability" or "changeability." That, in any case, is the way in which Riemann's mind works; we should therefore read his utterances as reflections of that mind's working.

defies the previously validated hypothesis of n dimensions. Given, next, the experimental validation of the discovery of a new physical principle corresponding to the subject-matter of the paradox. We now possess the old, previously validated n -dimension manifold, plus a newly discovered physical principle. We must now resynthesize³⁰ the validated physical principles of the previous manifold, together with the newly added principle. One can not simply add the new principle to the old hypothesis; the characteristic of the old manifold can not simply cohabit with the new principles. One must recompose a new manifold, of different characteristic than the old, from the interdependent combination of the n old principles plus the additional one. That act of composition (Riemann's *Zusammensetzung* here), is a relationship (synthesis=change) of the type located within the higher domain of Analysis Situs. The act of *composition* here, is an act of original creation, an act of original discovery of a principle of the universe: it is an act of creation, the kind of act which defines the individual man or woman to be made in the living image of God, to exert dominion over the universe.³¹

The core of the result of Riemann's discovery, is twofold. First, each n -fold physical-space-time manifold of the series, represents an hypothesis, this in the same sense that the set of definitions, axioms, and postulates of an open-ended Euclidean theorem-lattice represent, combined, an hypothesis. Second, the array of any such Riemannian series of experimentally validated hypotheses, presents us with an hypothesis-lattice, this in a sense analogous to the way in which the theorems of a Euclidean geometry form a theorem-lattice underlain by the relevant, encompassing hypothesis of Euclidean geometry.

Such a notion of an hypothesis-lattice presents us with a challenge analogous to that presented to the fictionalized Parmenides of Plato's *Parmenides* dialogue. That challenge, both in Plato's *Parmenides*, and in Riemannian geometry, has the quality and form of what is termed an *ontological paradox*.

The question posed, which neither the fictional nor real-life Parmenides of Elea could meet, is: *What is the common generating principle which underlies that series of hypotheses, in the same sense that the Euclidean hypothesis constitutes the generative principle of the Euclidean theorem-lattice?* As Plato's *Parmenides* informs us, the problem is Parmenides' failure to consider Heraclitus' notion of the ontological primacy of *change* within a physical space-time: that the quality of *change*, rather than the form of the sense-object, is the nature of substance.

Note, at this juncture, that such a lattice-series of hypoth-

30. At this juncture, "synthesize" is employed in the sense of rejecting Immanuel Kant's arguments on the subject of cognitive synthesis (i.e., "synthetic judgment a priori").

31. Nicolaus of Cusa's *imago viva Dei*.

eses, is a model of directed evolutionary development. It is a notion of that kind of ordering-principle which confronts us in the idea of evolution generally, and in those forms of economic progress which are defined in accord with the constraints specified above.

Plato's work defines the relevant ordering-principle underlying a lattice of validated hypotheses, as an higher hypothesis. This notion, higher hypothesis, has the same functional relationship to an array of cohering hypotheses, that the Euclidean hypothesis has to the member-theorems of its theorem-lattice. In the work of Plato, it is here, in this notion of higher hypothesis, that we encounter those higher notions of relations to which Leibniz refers in the matter of Analysis Situs.

The notion of relationship as such, which is to be extended to the general notion of Analysis Situs, is the notion of the way in which the series of theorems is determined by those theorems' commonly underlying hypothesis, or a series of hypotheses by its commonly underlying higher hypothesis.³² Thus, the notion of a principled relation of the type of efficient not-entropy, typifies the quality of idea of relationship which, in higher hypothesis, supersedes the role we have assigned to hypothesis in Euclidean geometry.

The principle of hypothesis, so identified, has four features to be emphasized here: 1) Ontological, 2) The Notion of Time, 3) The Principle of Truthfulness, 4) The Function of Memory, and the basis it provides, uniquely, for human knowledge. This principle, so viewed, defines Leibniz's domain of Analysis Situs; from that standpoint, and only that standpoint, the notions of evolution and of physical-economic not-entropy, may be freed from the shackles of the reductionist's mystifications, and rendered comprehensible. First, the notion of ontological paradox, as it is presented by Plato's *Parmenides*.

Return for a moment to the lattice of hypotheses represented by a series of the type:

$$\frac{(1 + h_i)}{(h_i)} \rightarrow (h_{i+1})$$

According to the discussion above, this Many corresponds to a One, the which is an higher hypothesis H_j . Then, the lattice of higher hypotheses represents a Many whose corres-

32. Leibniz's notion of *necessary and sufficient reason* is an example of this notion of determination of members of a lattice by their commonly underlying hypothesis. In Leibniz, this is associated with the notion of universal characteristics, a notion which corresponds to Riemann's notion of each physical space-time manifold as characterized by a distinctive physical-space-time curvature (hence, the emphasis on C.F. Gauss's development of the principle of experimental measurement associated with biquadratic residues). The characteristic curvature of physical space-time is experimentally coherent with the validation of a corresponding hypothesis, or higher hypothesis. Under that latter condition, that hypothesis, or higher hypothesis, is the "necessary and sufficient reason" for the universal characteristics of that species, or sub-species of domain.

ponding One is Plato's hypothesizing the higher hypothesis. This array corresponds to the notion of "Becoming" in Plato. The relative Absolute is, then, Plato's "Good," the latter which corresponds to "simultaneity of all" (in Christian theology). The transformations so ordered, constitute the domain of Leibniz's Analysis Situs.

Now, proceed to examine the four listed features of the domain of Analysis Situs as determined by Plato's, Leibniz's, and Riemann's principle of hypothesis.

On ontology: If an agency determines the existence of another agency, in the sense an hypothesis determines a theorem-lattice, the determining agency is ontologically primary. Thus, the refusal of the fictional (and actual) Parmenides, to recognize the One underlying, as hypothesis, the Many members of the theorem-lattice, is recognized by relevant scholars as an *ontological paradox*. The efficient agency is the substance of the process; that which is determined by this agency, is only a predicate of the substance. The fact that the Many exists, shows, by virtue of its character as corresponding to a theorem-lattice, that these terms are predicates of some higher substantiality. To deny the existence of that necessary substance, presents a devastating ontological paradox: the essential Platonic refutation of the sophists and other reductionists.

Thus, for Plato, the successively higher orderings, along the successive pathways from Many to One, are the march from the shadowland of sensuality, toward the relative substantiality which lies only within the domain of reason.³³ Thus, we proceed from the experience to the theorem, from the theorem-lattice to its hypothesis, from the hypothesis-lattice to the higher hypothesis, to hypothesizing the notion of higher hypothesis, and the unchanged Good.³⁴ Each upward step, in this succession, brings consciousness nearer to ontological reality.

On time: Thus, for Plato, as for Christianity, there are no eschatologists' "End Times," nor other "bad infinity," but only the subsumption of universal change (and time), by the ultimate simultaneity of all. *Time is not an absolute, but only a name conveniently assigned to the experience of change.* The senses of direction of experienced change, are crucial for science, as we shall indicate below.

On truthfulness: The science of physical economy solves a problem which perplexes the physicist. In experimental physics, the relationship of superior to inferior hypothesis is seen as located in the superior efficiency of the former. The person wielding the superior exerts a potential degree of power in nature, greater than that of the person relying upon the inferior. For sundry reasons, this test is readily recognizable as only a relative standard of truthfulness. Chiefly, the ultimate experimental truth is situated in the relationship of

33. E.g., Plato's parable, in his *Republic*, of the shadows on the wall of the firelit cave.

34. i.e., Good=Absolute.

mankind as a whole, to the universe as whole: just as the profit of the Wall Street speculator is derived solely from swindling the wealth of others, so the power of the individual, or even entire nations, is not proof of the truthfulness of their policies for mankind. Only the science of physical economy addresses this matter efficiently.

It is the increase of the human species' potential relative population-density (with those additional, qualifying constraints identified earlier here), which is the measure of mankind's dominion over the universe. What is measured, is not mere techniques. What is measured, is the validity of those methods, by means of which the individual human mind generates a succession of hypotheses: whether these hypotheses are produced as validated original discoveries, or are generated within the mind of the student by replicating an original discoverer's generation of the idea. Man is not related to the universe by the validation of individual discoveries, one by one; man is related to the universe by the mental process of individual human minds, through which a succession of validated advances in hypotheses is generated and replicated for human practice.

The term, "objective science," is misleading. It is that subjective principle, which sets the human individual absolutely apart from, and above the beasts, which is the location of scientific activity.

In practice, contrary to dangerously misguided, incompetent doctrines for so-called "educational reform" today, knowledge is not transmitted as "information." Knowledge is the validated process of *higher hypothesizing* by the individual mind. *The unit activity through which the student acquires knowledge, is nothing less than the student's individual act of replicating the mental experience enjoyed by the original discoverer's act of discovery of a validated principle.* The typical case, is one in which the discovery bears a proper name, such as "Eudoxus' principle of exhaustion," "Theaetatus' proof for the five Platonic solids," "Eratosthenes' measurement of the curvature of the Earth's meridian," "Leonardo da Vinci's' proof of the retarded propagation of sound," "Roemer's measurement of the retarded propagation of light," and so on.³⁵ Discoveries of validated principle, to whose total number we might assign Riemann's indefinite n , represent a manifold, an actual, or potential hypothesis in the mind of the pupil who has acquired these principles as knowledge, rather than as mere "information."

Each such validated discovery of principle of nature, whether original, or replicated within the sovereign internal

35. The fact that we reconstruct, similarly, many original discoveries (such as the early Indo-European discovery of the equinoctial cycle), does not violate this principle of competent educational practice. If we do not have a proper name for the relevant discoverer, we substitute the idea of some unknown individual discoverer, who we must presume did have a proper name in his own time and place.

mental processes of an individual student, comes into existence within the individual mind, not as a kind of amoeboid secretion of some body of collective opinion. (Public opinion is designed to spread ignorant prejudices, not knowledge.) Each of these acts, of original or replicated discovery of principle, occurs as a true mental act of creation, not of mere learning. That is, the mind is confronted, externally, by a paradox; the solution is then generated, entirely, within the sovereign mental process of the individual thinker. The discovery—the synthesis—so effected by, and within the individual mind, is then susceptible of experimental verification. Only in this way, is anything deserving of the name of "knowledge" acquired.

In the degree that the process of developing knowledge comes to dominate the sovereign mental processes of the educated individual mind, in this, or an equivalent mode, the student's mind develops both hypothesis, and at least a prescience of the act of higher hypothesizing. The social aspect of this process of education, occurs as the old people of the tribe confront the young with the paradoxes whose known solutions should each be the subject of an individual discovery replicated by the student. This process of transmitting knowledge, in this way, from the society, to its individual members, is a suitable definition for the term "culture."

Thus, within a society, those who represent the relatively highest levels of development of culture, also represent a certain level of higher hypothesis. The point here is, that the survival of a society is not gained through a body of fixed ideas, such as so-called "traditions." The survival of society requires constant change; it is the way in which the society orders those changes, which determines that culture's ultimate fitness to survive. The ordering of changes which provides for the long-term survival and progress of not only a specific culture, but also for humanity in general, is the culture whose implied higher hypothesis corresponds to truthfulness.

It is the pathway of higher hypothesizing which points toward the human species' increasing dominion over the universe, which best approximates a comparative standard of truthfulness.

In other words, the universe is so pre-designed, that it is obliged to obey mankind's will, whenever that will is expressed in a way which corresponds to truthful hypothesizing of the higher hypothesis. That, in turn, is the standard of truthfulness which must rule over scientific opinion in all respects.

On memory: We know nothing through our senses. Music, for example, does not exist within hearing; it exists within those processes of memory which are sitting in judgment on the accumulation of what is being heard. As we have seen in earlier locations, the development of modern Classical thorough-composition through Mozart's comprehension of Bach's own discovery central to *A Musical Offer-*

ing, is the best example of what has been afoot in the development of music since its emergence from the vocalization of ancient Classical poetry.³⁶ A few additional observations, here, demonstrate the point to be made.

Only in Ramon Llull's *Ars Magna* of memory, can the mind hear the development of the conclusion of the piece during the same moment the mind is focussed upon a portion of the composition leading in the direction of that conclusion. Only in the mind, can one hear each and all of the relevant inversions of actual intervals within voices, and also cross voices, in the locality of the polyphony of what is being immediately recalled. Indeed, polyphony exists primarily (functionally) within the mind's processes of memory.

As we have stressed earlier, the musical idea corresponding to the entirety of a work of thorough-composition, is of the form of an higher hypothesis, the One which subsumes the sequence of hypothetical modalities through which the piece as a unit is developed into its completed form.³⁷ The character of an hypothesis, relative to all of that which it underlies, is that it is not subject to the quoted local time within the domain which it underlies. In this same sense, the "Absolute," or Plato's "Good," corresponds to a "simultaneity of all change." Thus, within the physical space-time domain defined by an hypothesis, or higher hypothesis, the past and future fold efficiently into the relative present. These relationships exist for knowledge only in properly defined functional notion of individual memory.

When we are hearing music, we are simultaneously "storing it in memory." It is within our conscious memory that we are judging that provoked by the sounds we are hearing. It is in those judgmental functions of memory that we apprehend music from the memory generated by the heard, or imagined sounds. "Memory" is the name we give to the functional location of the imagination; "memory" is the name we give to conscious thinking. It functions so, whether we are hearing or seeing present sense-impressions, recalling the past, or imagining what is presently unknown to our experience. It is within these functions of memory, that knowledge and intelligence reside. It is in the relations defined by the principle of hypothesis, within the function of memory, that the notions pertaining to what Leibniz named Analysis Situs are operative for our conscious, efficient will to action.

Whenever, in physical science, or Classical art-forms, a paradox points us toward an explanation of the seemingly improbable, which invokes the notion of reversal of time, we should recognize immediately, that what we have encountered in that case, is that the appearance of time-reversal is associated with the relations of time lodged within the relatively higher functions of the principle of hypothesis.

36. e.g., Lyndon H. LaRouche, Jr., "The Essential Role of 'Time-Reversal' in Mathematical Economics," *Executive Intelligence Review*. Oct. 11, 1996.

37. *ibid.*

Only in the domain of hypothesis, does the mind comprehend the efficient principle underlying those processes in which it is as if the future were acting efficiently, and improbably, on the present.

Those seemingly improbable cases are not rare exceptions in our universe. That the universe manifests its proneness, as if by pre-design, to obey mankind's command, is clearly demonstrated to us only for the case that mankind's dominion over the universe is increased in this way. The fact that the universe obeys mankind in those instances, in that fashion, shows that the characteristic of the relevant ordering of progress in human knowledge is congruent with those characteristics which may be meaningfully termed "the laws of the universe." Since this aspect of progress in human knowledge is characteristically not-entropic, we know, and that on the highest experimental knowledge possible, that the universe itself is characteristically not-entropic: a process of continuing creation, if you will.

This not-entropic congruence is of the form suggested by generalization of Riemann's referenced discovery. That is what we know of the principle of universal, not-entropic evolution. For the edification of those who might otherwise be duped by the *Washington Post*, that coheres with the argument for evolution in the work of the Cardinal Nicolaus of Cusa who became a canon of the Vatican in his time.

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