
I. Great Leadership to Change History

DECEMBER 1981

The Economic Need for Increasing the Human Population

by Lyndon H. LaRouche, Jr.

AUTHOR'S FOREWORD

Man Is Not Ecologically an Animal Population

Little more than a generation after the opening up of the Nazi concentration-camps, OECD official Dr. Alexander King and others established an organization, the Club of Rome, whose intent has been to cause global genocide on a scale a hundred times greater than that perpetrated by the Hitler regime. Today after more than a decade of such malthusian propaganda, institutions of the United Nations Organization, the International Monetary Fund, the World Bank, and Bank for International Settlements, and sections of leading nations' governments and major political parties are openly engaging in genocidal practices and advocacies defined as capital offenses during the post-war Nuremberg proceedings.

In general, advocates of this genocide have shown their degenerated consciences increasingly impervious to charges of criminal intent. They respond to such charges with what they present as "scientific arguments," or with related arguments to the effect that the targeted populations of

the "Third World" nations are "doomed to die anyway."

Worse, the majority of the citizenry of leading nations refuses to treat such advocacy as an abomination. This is obviously a pervasive problem among the OECD nations. The Soviet chairman of the Austria-based International Institute for Applied Systems Analysis (IIASA), Dzhermen Gvishiani and the "global systems analysis" circles in Moscow are as cold-bloodedly committed to mass-murder in the "Third World" as

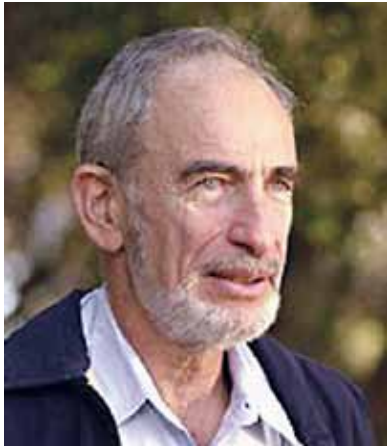


"Without an increased population, it will become increasingly difficult to maintain the increasingly diversified division of labor which technological progress implies."

Gvishiani's personal friend and collaborator Aurelio Peccei.

This pervasion of genocidal practices and advocacies by influential circles and individuals, combined with the monstrous toleration of such advocacies by the general populations, is to be viewed as a reflection of the fact that the moral condition of leading institutions and populations is today qualitatively worse than during

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“The mere fact that the human species might reach 100 million individuals, to say nothing of more than 4 billion, is already proof that the Malthusian ecologists’ calculations are totally incompetent.” Shown are Paul Ehrlich and Prince Charles, two modern promoters of Malthusianism.

the 1930s and 1940s. The issue before us is not merely that of preventing genocide; the toleration of policies such as *Global 2000* today is to be seen as conclusively symptomatic of a civilization which must be rescued from a loss of the moral fitness to survive.

There has been, of course, important resistance against the genocidal proposals of the malthusian world-federalists. However, so far, this opposition has been predominantly impotent. Two facets of this morally impotent behavior stand out in the author’s view. Firstly, there has been an unwillingness to publicly denounce leading perpetrators, including Aurelio Peccei, as purely and simply Nuremberg Code violators. By treating the issue of genocide as a “gentlemanly difference of opinion,” we contribute to the passivity of public opinion on this issue in conditioning populations, step by step into toleration or even support of such mass-murder policies.

Secondly, the opponents of genocide have usually put themselves into the position of debating what the malthusians represent as conclusions logically deduced by scientific procedures. Anti-malthusian scientists refuse generally to expose other members of their fraternity as evil hoaxsters, even though most scientists are qualified to prove that every allegedly scientific argument of the malthusian “environmentalists” is an outright fraud. So, the news media is advantaged to misrepresent the issue as a conflict between “traditionalist moral prejudices” and “the objective, if cruel, conclusions produced by rigorous scientific inquiry.”

The following report attacks the malthusians on

their most vulnerable point respecting “scientific arguments.” The simplest and most pervasive empirical evidence demonstrates that it is worse than absurd to apply to human populations the statistical procedures developed by Ronald A. Fisher and others for studies of plant and animal populations.

If the human species were to be considered as another animal population for purposes of statistical ecological population-studies, we consider only those abstracted features of human behavior which rank man slightly above a gifted baboon. It would be generous, on the basis of such false assumptions, to estimate that the human species might have achieved at any time up to the present a

total population in the order of several millions living individuals.

Therefore, if one assumed at a corresponding point in a socratic dialogue that the existence of a population in the order of four and a half billions represents an ecological problem, the mere admission of such a problem by the malthusians is a virtual admission of the total incompetence of the assumptions of fact and method upon which the entirety of the malthusian mode of argument depends. The mere fact that the human species might at any point reach a hundred millions individuals, to say nothing of more than four billions, *is already proof that the malthusian ecologists’ calculations are totally incompetent by at least three orders of magnitude.* Any corporation whose engineer made such an error would assign that engineer promptly to occupations for which he were professionally qualified, such as picking up refuse.

As this report summarizes the method for determining such a judgment, the maintenance of the *potential relative population-density* of a human population requires forms of technological progress which, in turn, require an increase of the total productive labor-force of society, and hence the total population.

The required range of human population, to effect ecological stability, over the period into decades of the coming century, is approximately ten billions individuals. Without an increased population of that order of magnitude, it will become increasingly difficult to maintain the increasingly diversified division of labor which technological progress implies. Without techno-

logical progress in that order of advancement, the world will suffer a genocidal sort of ecological crisis more or less of the magnitude the most radical among the malthusian ecologists project.

—Lyndon H. LaRouche, Jr.
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1.

Rudiments of ‘Human Ecology’

The obvious measurement to be applied to the study of the reproduction of any population is *potential relative population-density*. This measures the density of population which can be achieved by a population solely through its own activities of producing the material preconditions for existence of the entire population.

Excepting man, the characteristic potential relative population-density is *fixed in range* by heredity. This potential can be improved only by action external to the species or variety itself, as such external action is illustrated by improvements in cultivation of crops and livestock. Only man can willfully improve his society’s potential relative potential population-density.

The study of human ecology is a study of the necessary conditions and means for effecting such willful changes in the productive and related behavior of our species.

For this inquiry, we employ Gottfried Leibniz’s contributions to both economic science and physical science: *work*, *power* and *technology*. Although Leibniz’s discoveries date from his founding of modern economic science, with the publication of his *Society and Economy* during the 1670s, these notions obviously apply as appropriately to the earliest known phases of human social practice, as well as to recent centuries. It is improvements in technology which are the immediate correlative of improvements in a society’s potential relative population-density.

The question immediately posed is whether improvements in technology are necessary for human existence, or whether such improvements, however beneficial, are merely optional. The key to human ecology is the proof that a succession of such improvements is necessary for perpetuation of human existence.

It is a fact that there are no absolute limits to the natural resources available to mankind; it is sufficient to note that fact without proof at this point in our report. There are, however, *relative* limits to exploitable forms

of natural resources, at least relative to any fixed order of technology. The nature of such *relative* limitations is so obvious empirically that we need merely describe the proof. This observation is the beginning of a scientific form of human ecology.

Potential relative population-density is, as we have indicated, an examination of a society’s ability to produce the material preconditions of existence of a society of the same or expanded number of at least the current quality of individuals. The crux of this process is the activity of a section of the whole population we may describe in descriptive terms as the society’s goods-



Gottfried Wilhelm Leibniz
(1646-1716)

producing labor-force. It is the activity of that labor-force which produces all of the changes in the material preconditions of life and production upon which the continued or expanded existence of the whole population depends.

The useful activities of this goods-producing labor-force are divided principally into the transformation of natural resources into raw materials, and the processing of those raw materials into usable forms of goods (plus, of course, the physical distribution of goods within the network of production and consumption).

It requires no extensive discussion, at this stage of our report, to note that the total goods-producing labor-force is a determined percentile of the entire popula-



White House/Eric Draper

The extent to which a natural resource is exploitable, is relative to a fixed order of technology. Shown is an oil rig in the Gulf of Mexico near Cameron, Louisiana.

tion. It is also obvious, that there is an implicit number of individuals of the total population maintained per average member of the goods-producing labor-force. We shall soon consider how variations in these ratios are determined; for the immediate moment, the observation made is adequate.

It is clear, therefore, that if the percentile of total labor-force required for any part of the production of a total required goods-output were increased (without thereby increasing the total goods-output), the number of persons sustained in the total population would be reduced relative to the total labor-force.

There is no disagreement between us and the malthusians, that the usable number of types of natural resources is limited for any fixed quality of prevailing technology of goods-production. Nor is there any disagreement between us respecting the bare fact that as exploitation of those natural resources continues, society incurs the growing social cost of using poorer grades of such resources, and of going further and digging deeper to secure resources of equal or poorer quality. This is the general case, at least, as long as the level of technology practiced is approximately fixed.

So, if the percentile of the labor-force required for producing the same, required quantity and quality of raw materials is increased in such a fashion, the remaining percentile of the total labor-force is reduced, and the possible standard of living of the total population is re-

duced in consequence of such chain-reaction effects.

In other words, *the potential relative population-density is reduced.*

Technological progress overcomes this problem in two ways. Insofar as technological progress merely increases the productivity of labor, this rise in productivity may be adequate, or better than adequate to offset the rising costs of raw materials. More fundamental forms of advancement in technology redefine advantageously the spectrum of what constitutes natural resources.

Technological progress is indispensable even to maintain a constant potential relative population density.

This technological progress is not superimposed on unchanging “biological individuals.” Technological progress means an increase in the power of the average individual over nature. Such a more powerful individual is a more developed individual. If we measure the social cost of producing an individual of a certain quality in terms of a “market-basket” of average consumption of goods and services, the individual of greater productive power costs more to produce. However, in successful development, the social costs (percentile of the total labor-force’s activity) required to produce the more abundant market-basket required to produce the more developed individual shrinks *relative to* the costs of producing a poorer individual in a less technologically advanced form of that society. The amount of average goods and services rises, but the total social cost of filling that market-basket declines. In other words, the percentile of the potential activity of the total population required to produce its required human consumption decreases at the same time that the content of the average market-basket improves in quantity and quality.

Family Composition

To develop from the average new-born person an adult who is both morally qualified as a citizen, and qualified to assimilate modern productive and related technology, requires a program of combined classical and scientific general education spanning the ages of from approximately six to eighteen years of age, prior to any specialist education. Even with the best content of public educational programs imaginable at present, this span of basic education could not be significantly shortened.

Specialist education beyond eighteen years of age requires approximately two additional years for technicians, and even with optimal improvements in university curricula could not produce qualified doctoral can-



National Cancer Institute

“Without a life-expectancy on the order of 70-80 years, the maintenance of a modern society becomes almost unfeasible on grounds of social costs alone.” Shown are high school students conducting experiments, and a patient receiving kidney dialysis.

didates in the arts and science in less than an average six years. In specialist fields of medicine, the period of advanced education and related training is longer.

Let us consider briefly some of the implications of these requirements for training of youth prior to entry into a modern labor-force. The implications are all properly obvious, yet they also serve to point out a few crucial facts too often ignored by policy-makers and policy-influencers.

First, let us imagine attempting to maintain a program of education of the labor-force completed at between eighteen and twenty-four years of age in a whole population whose mean life expectancy were between thirty-five and forty-five years of age. It is sufficient to compare the ratio of the whole population’s labor-force members of households to see the point immediately. Without a life-expectancy in the order of between seventy and eighty years the maintenance of a modern society becomes almost unfeasible on grounds of social costs alone.

So, in addition to rising “market-basket” costs of education, and of sustaining the persons being educated, we must expend efforts to increase longevity. Hygienic programs, health-care, improved nutrition are obviously indispensable. It is also clear that the most costly per-patient aspect of medical science, diseases associated with aging, is the fighting-front of warfare against death, out of which combat the knowledge is adduced necessary to increasing the average life-expectancy of the entire population. Imagine that we would extend the productive age of the population to seventy-five or eighty

years, by improvements in health and longevity: consider the effects, in terms of reduced social costs of sustaining an average individual, for the entire society!

In the same vein of thought, one leading social-cost problem of industrialized-nation economies today is a sharp decline in the birth-rate, whose effect is to make the populations of those nations demographically aged. Rather than increasing the birth-rate, to restore the balance in the population, influential forces of those nations are proposing to accelerate the death-rate among persons over fifty-five years of age: to redress the imbalance by *murder as a state policy*.

Complementing this demographic aging of industrialized nations’ populations, we have a population in the sixty-five to eighty-five year interval of age who are being killed by combinations of increasing material deprivation and ennui. We must improve the physical well-being of the average individual entering and participating in this age-range, and must provide optional forms of fruitful activity—instead of relegating the retired ages to the equivalent of a mythical “elephant’s graveyard.” The net social cost of larger medical expenditures and other supportive efforts will be less than nothing, and all of us can then cease to lower our heads in shame when we look at the condition of our aged parents and grandparents.

In addition to the costs directly attributable to education and to support of the young during that age-interval, the advancement of technology requires improvement in the cultural circumstances of life of the entire population—of all ages. This improvement is required,



EIRNS/Sylvia Spaniolo

“In addition to the costs directly attributable to education, and to support of the youth during that age-interval, the advancement of technology requires improvement in the cultural circumstances of life of the entire population—of all ages.” Shown is the Schiller Institute Chorus.

most obviously in respect to the adult household’s functions of child-rearing. The cultural level of the household and general community affect most significantly the intellectual potentials of the youth in school.

That is but the first obvious feature of this matter. As it should become obvious in the course of the unfolding of this report, the level of technological culture achieved by a member of the labor-force at the close of basic education and apprenticeship can not be the end of education. In a well-ordered society technological revolutions of some degree must occur cumulatively over periods of not less than seven and fifteen years. The member of the labor-force must do more than qualify for a fixed level of technological competence. The member of the labor-force must not only assimilate new technologies several times over the course of a lifetime, but must participate in the usual case in contributing to initiation of improvements in technology. A rich cultural life, with the institutions of leisure appropriate to this, is an unavoidable aspect of just maintaining and improving the potential relative population density.

As the costs of educating an individual increase relative to earlier, prior levels of technology, and as the value of creative leisure-time activities to society increases, such forms of waste as an average of several hours each working-day travelling to and from work become intolerable. Similarly, the necessity of expend-

ing a significant number of hours each day in shopping for food and other regular items of household consumption becomes an intolerable condition.

Fools argue that these costs to the population do not count as costs to production. Foolish accountants do not understand the importance of several hours a week spent singing in a chorus, performing in an amateur orchestra or instrumental group, house-music in the community and home, study at home of some matter of interest to the citizen, of various social activities with family, friends and acquaintances. In these leisure activities, not only are the qualities of the citizen developed, but a population which is creatively stimulated in its leisure life is of improved morale and greater increased disposition and aptitude for creative innovation in activities as a member of the labor-force.

These observations are not to be pushed aside as amiable sentimentalities, as the significance of such matters of leisure activities should become clear as this report unfolds.

A population were prudent to waste none of its wealth on gambling, tawdry entertainments, on household-consumption expenditures to solicit envy, and so forth. A good, simple life were better, saving expenditures and time for those activities of family, community and private leisure which improve the mind and soul of the citizen. Conspicuous is the case of the United States, which may spend as much on mind-destroying “recreational drugs” as upon military defense, and which spends massive amounts on pornography and other predicates of Sodom and Gomorrah. After we strip away such immoral waste, and reduce our requirements to those of a simple, fruitful, and good household and individual life, those prudent requirements can not be left unfulfilled without some cumulative damage to the productive potentials of the population.

Through technological progress, society produces individuals of average increased power over nature. This increase of power is correlated, in direction, with increases in the quantities and varieties of the content of the average market-basket of goods and services. At the same time, there are correlated changes in the necessary composition of the family household. For these and related reasons, it is absurd to compare the population-reproduction characteristics of two societies or two different periods of the same society on the basis of merely counting the number of individuals produced: 1, 2, 3, From the vantage-point of the implied mathematics for study of human ecology, no fea-

ture of the statistical analysis employed for ecological studies of plant and animal populations has any applicability to human populations.

2.

The 'Thermodynamics' of Society

The indispensable succession of technological advances required merely to maintain a constant value of potential relative population-density defines the process of human reproduction as what is properly termed *negentropic*. This, as we shall elaborate the point at a proper, later point of this report, is key to understanding why increases in the absolute size of the human population are necessary for those technological advances which would be required even to maintain a constant potential relative population-density even for a smaller population.

In a proper approach to analysis of any physical system, we analyze the total work applied to the system into two principal components. A certain amount of work must be applied to the system to maintain it in the same degree of organization as during a preceding epoch. In ordinary usage, one speaks today of the "energy of the system" in identifying the work necessary to maintain the physical system in the equivalent of a constant state. In applying this to society, the constant value of reference is a constant value for potential relative population-density. This is the first component of our analysis of the work applied to society.

The second component is the portion of work available to accomplish useful change above and beyond maintaining the system in its previous or equivalent state. This second component is usually identified as the "free energy" of the system. In the instance of human ecology, this is the portion of the total work of society available to expand the scale of the society and to increase the value of the society's potential relative population-density.

The study of all physical systems is properly focussed upon the way in which the values of the ratio of *free energy* to *energy of the system* change. A system in which this ratio increases is called *negentropic* (negative entropy). A system in which this ratio decreases is called *entropic*.

It is important, at this point, to stress that modes of

economic analysis which purport to measure the wealth of a nation as the sum of the wealth of individuals, firms and farms, are intrinsically incompetent modes of analysis. If the total wealth of a nation falls below the levels of consumption required to maintain a constant potential relative population-density, the national economy is functioning at a level insufficient to maintain the equivalent of "energy of the system." The economy is collapsing. If the trends so reflected continue, the society will die. We must take the society as a whole as the indivisible unit of primary measurement; we must consider the parts of the whole only in respect to the effect of action of the part on the balance of growth or contraction of the whole. Any violation of this requirement introduces ab-



Through technological progress, society produces individuals of average increased power over nature. Shown are workers assembling combustion engines at Ford Motor Company's Cleveland Engine Plant #1.

surdity into the accounting. Unfortunately, at this time, precisely such absurdity predominates in the national income-accounting procedures of nations, the UNO and supranational and private institutions.

To analyze an economy (a society), we begin with the population as a whole as the primary unit of measurement. We then analyze the activities of this population as a whole, studying the mediation of the reproduction of the population as a whole through the production of goods by the labor-force portion of that total population.

To effect such an analysis, we assort the population into two principal categories. We make this assortment by households, not by individuals, since the household is the indivisible unit of reproduction and rearing of new members of society. For purposes of broad analysis, we divide the population of households into two

principal categories: households represented by members of the goods-producing (and transportation) labor-force, and other households.

Although useful administration and services contribute directly or indirectly to maintaining and improving the productivity of goods-producing labor, administrative and service functions are not productive in and of themselves. Their benefit to the economy (potential relative population-density) must be mediated through goods-producing labor, and that labor must be fruitfully employed.

We treat essential categories of administration and services, plus necessary military and security functions, plus idleness and other waste, as “overhead expenses” of society as a whole.

We divide the whole goods-output of productive labor (as a whole) into categorical forms of consumption of such goods. First: the consumption of goods by households of the goods-producing labor-force. Second: capital-goods consumption for goods-production and transportation. Third: consumption for maintenance of categories of “overhead expenses.” Fourth, finally, the margin of “net profit,” represented by goods or available goods-producing capacity, after deducting the cited three categories of combined costs and expenses.

It might be argued that members of the labor-force may change employment from productive or overhead forms of occupations, and that two members of the same household may be employed in different categories. This poses no inherent difficulty for analysis, since it is, as we shall show, the rate of change of ratios, rather than momentary statistical values, which concern us.

It should be readily seen that the combined costs and expenses we have identified correspond to “energy of the system,” and that the “net profit” corresponds, at least potentially, to the “free energy” of the reproductive process. It is the ratio of these two values which becomes the central point of reference for our continuing process of analysis.

If the society were both fixed in scale of population and productive activity, the rise in marginal costs of the



cc/Neil Palmer (CIAT)

If the level of a national economy is insufficient to maintain the equivalent of the “energy of the system,” the total wealth of that nation will be unable to maintain its relative population-density. Shown is a Kenyan farmer at work using labor-intensive farming techniques.

raw materials associated with a fixed technology would cause the value of the key ratio to fall over the course of successive epochs of production: *entropy*. Without the application of “free energy” (the net-profit margin) to expand the economy and to increase productivity through technological advances, the society is self-doomed to die.

We interrupt the development of our point here to refer to the argument of the malthusians.

The malthusians argue that because of apparent limits of the natural resources

which present technology requires for necessary raw materials, we must halt or even reverse technological progress, placing increased emphasis upon labor-intensive over capital-intensive modes of production. They argue that this policy they propose is indispensable to delay an ecological crisis.

From the points we have outlined thus far, and we have relied upon no debatable inferences in any of this, it is clear that if an ecological crisis were to confront us, it would occur for no other reason than that we were foolish enough to heed the advice of such ecologists. Unless we increase productivity, relying upon advances in the quality of productive technology for this purpose, we shall indeed bring a genocidal sort of ecological crisis upon humanity. If we refused to begin deploying nuclear-energy technology on a large scale immediately, hundreds of millions of people in the developing sector would die unnecessarily from combined direct and indirect consequences of combined shortages and high social costs of energy.

To resume our development of the points of this section:

We have already emphasized the seeming paradox that the social cost of producing an individual must decline, while the costs in terms of comparative market-baskets must increase. Translating what we have outlined on that point into the terms of reference we have introduced in this present section, we say that such a rise in the market-basket cost of average labor represents an increase in the level of “energy of the system” per-cap-

ita. However, if this is associated with a lower social cost of producing the average individual's market-basket, there is a tendency for the rate of profit to rise—provided expenses do not increase to prevent this, and that capital costs do not increase to prevent this result. In such a case, the “energy of the system” would increase, while the free-energy ratio increased also. *The persistence of such a trend over successive epochs of the productive cycle represents manifest negentropy.*

The source of such negentropy is not investment in production as such, but rather investment in improved productivity, investment in improved technology. It is the rate of “injection” of improved technologies into the economy which determines the potential negentropy of the economy, and nothing else. This is the only source for maintaining and improving the potential relative population-density of the society.

For reasons we shall now begin to elaborate, the increase in the per-capita level of “energy of the system” occurs not only in respect to household and related consumption. It occurs also with respect to capital consumption by agriculture (broadly defined), industry and transportation. It also occurs with respect to certain essential features of administration and services, as distinct for the increases in “energy density-levels” of the households associated with administration and services. We shall now elaborate these features of the matter in successive steps, until a rounded picture of the matter is thus presented.

Leibniz's Revolution in Economic Science

The school of Naples contributed an essential, leading role in development of statecraft for all of Europe. At the beginning of the seventeenth century, this center added major contributions to what was known as cameralism in Italy and Germany, and as mercantilism in France. In opposition to the rentier-financier interests, which identified wealth with fixed natural resources and extraction of profit only as usury or ground-rent, the cameralists treated natural resources as “mere accidents of geography,” and correctly located the source of wealth as the development of the productive powers of labor. Within this policy, the importance of the articulated tool was situated, and was frequently termed “artificial labor.”

Within this general policy-outlook, Gottfried Leibniz effected a revolution through which modern economic science was established beginning the 1670s in France.

The central feature of Leibniz's revolution in statecraft was his focus upon the generalized implications of heat-powered machines, “by which one man may accomplish the work of a hundred others.” From this inquiry, overlapping Leibniz's pre-1676 development of the differential calculus, Leibniz developed the notions of *work*, *power* and *technology* common to both economic science and to physical science thereafter. To these conceptions and their implications for our subject here, we shall refer repeatedly as we proceed through the remaining pages of this report. We interpolate here a few indispensable observations respecting the directions in which Leibniz's influence flowed in economic science and physical science into the mid-nineteenth century, so that we need not introduce such qualifications piecemeal as occasion for such references occurs at later points in this report.

By *economic science* we mean the currents of mercantilism and cameralism which guided the economic development of leading nations of continental Europe and the United States inclusively, over the period from 1653 (Cardinal Mazarin's defeat of the Spanish Hapsburgs) into the third quarter of the nineteenth century, including the industrial development of Northern Italy by Cavour's circle and the successful Meiji Restoration development in Japan. After Leibniz, the names mercantilism and cameralism continued to be used to designate a subsumed economic science, and also the alternate term “physical economy.” This was mediated during the eighteenth century through Leibniz's influence, and most notably through circles associated with the Oratorian teaching-order in France. In France, Leibniz's term *technology* was translated as *Polytechnique*. Out of these currents emerged two subsumed developments. The first was the 1789-1791 establishment of what was named “The American System” of political-economy, under President George Washington and Treasury Secretary Alexander Hamilton. This American System was based on a Leibnizian version of French mercantilism. The second was the establishment of the École Polytechnique by Lazare Carnot and his former teacher Gaspard Monge. After 1815, and the fusion of German cameralism with the American System (e.g., Friedrich List), the term American System became the name in general use to designate economic science.

In general, outside Japan and the influence of this author and his associates, economic science no longer exists in practice. What is taught as economics in European and United States universities (and in most other



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Lazare Carnot (1753-1823)



François Séraphin Delpech

Gaspard Monge (1746-1818)



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Friedrich List (1789-1846)

“By economic science we mean the currents of mercantilism and cameralism (physical economy) which guided the economic development of leading nations of continental Europe and the U.S. from 1653 to the third quarter of the 19th century.”

nations) is the so-called British school of political-economy. The dominant variety of British dogma taught, and upheld by most putative professionals today, is the application of the “hedonistic calculus” of Jeremy Bentham, which John Stuart Mill, William Jevons and Alfred Marshall renamed the “utilitarian” dogma in political-economy.

The axiomatic premise of marginal utility is the argument of Bentham, that man is incapable of knowing any values but those corresponding to the individual’s subjective perception of the pleasure and pain associated with isolated transactions. Marginal utility presumes that variations in prices reflect the individual’s efforts to measure the relative pleasure and pain associated with transactions. It is assumed that in an extended ergodic process, the actual money-prices will tend to converge on the relative hedonistic values associated with the individual’s experience in buying and selling of goods, labor and services.

Professor Milton Friedman is thoroughly consistent with the axiomatic principles of British economy when he proposes legalization of many things now treated as unlawful practices, including traffic in heroin, on grounds of “free trade.” His argument is the hedonistic argument we have just summarily identified.

In its earlier version, that of British East India Company propagandists Adam Smith, Thomas Malthus, and David Ricardo, the British System of political-economy was the most immediate issue of the American War of Independence. The representatives of the American System, including Mathew Carey, Friedrich List,

and Henry C. Carey, were most explicit and detailed in explaining how and why the American System and the British System of Smith, Malthus and Ricardo were deadly adversaries.

Behind the shameless immorality of modern British (and Viennese neo-positivist) political-economy, its avowed adherence to the “hedonistic principle,” British political-economy is totally adapted to the principles of a rentier-financier society, as opposed to an industrial-capitalist society. As David Ricardo was quite explicit on this point, and as Karl Marx critically defends Ricardo’s essential point, the British System before and after John Stuart Mill is based on the principle of usury and ground-rent. If one recognizes that usury is a special form of ground-rent, one understands the whole matter more readily. It denies the existence of a necessary (determined) level of industrial profit on production by industries and farms, and refuses to take into account such features of the economic process as we emphasize in this report.

The British dogma of “free trade” has always been a policy aimed at driving the prices of industrial and agricultural products and labor down to the lowest margin possible, thus increasing the portion of the total income of society exacted in the form of usury and ground-rent. On these and related grounds, the Careys and others described the British system as a mixed feudalist-industrialist system. Better than “feudalist” would be the designation “oligarchical,” using that term in the sense of the policy embodied in the fourth century B.C. proposal to establish a “Western Division of the



Adam Smith (1723-1790)

Clipart



David Ricardo (1772-1823)

Thomas Phillips



Thomas Malthus (1766-1834)

John Linnell

“The British dogma of free trade has always aimed at driving the prices of industrial and agricultural products and labor down to the lowest margin possible, thus increasing the portion of the total income of society exacted in the form of usury and ground-rent.”

Persian Empire” on the basis of the “Persian Model.”

Although several presidents of the United States (Jefferson, Madison, Jackson, van Buren, Pierce, Buchanan, and others) were advocates of the British East India Company’s policies, Washington, Adams, Monroe, John Quincy Adams and Lincoln adhered vigorously to the American System. Through the work of those administrations, all of the policy-institutions of education and of agricultural and industrial progress were established before 1871. With the British and J.P. Morgan’s success in corrupting the Congress in 1876, to enact the Specie Resumption Act, the United States surrendered its sovereignty over its national debt, currency and principal flows of credit to foreign forces centered in the City of London. Today, only Japan adheres to economic science. In policy, or at least in terms of accepted economic doctrines, every other nation of note, including East bloc nations, teaches and worships the British system of political-economy in either its strict form or its Marxian offshoot.

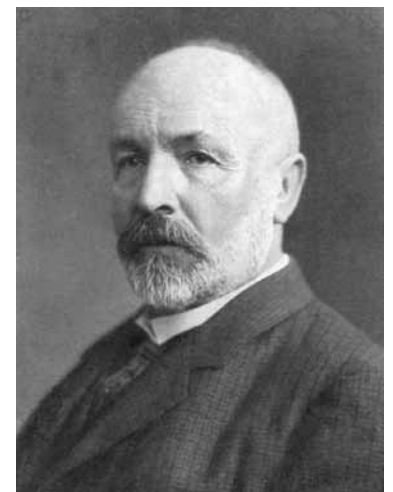
As this author has given the proof in published locations, the British doctrine of political-economy is axiomatically malthusian in its implications for practice. Those objections to malthusian policies which one might suppose to originate with even the narrowest self-interests of industry and agri-

culture are nullified by the widespread, credulous acceptance of British dogma in the name of putative economics.

In physical science, the patterns flowing from Leibniz are approximately the same as for economic science. The emigration of the École Polytechnique’s leading figures to Alexander von Humboldt’s Berlin, during the post-1815 period, brought Leibniz’s French currents into union with his German currents, and with the collaborators of Bernhard Riemann (e.g., Enrico Betti) around Cavour’s circles in northern Italy. Since the work of Riemann and Georg Cantor during the



Bernhard Riemann (1826-1866)



George Cantor (1845-1918)

“In physical science, the patterns flowing from Leibniz are approximately the same as for economic science.... Since the work of Riemann and Cantor, no truly fundamental accomplishments in scientific knowledge have occurred.”



USDA/NRCS/Jeff Vanuga



USDA

Treating the soil with trace-elements and other conditioning features, and injecting energy in the form of manufactured fertilizers, combined with the use of powered machinery, irrigation and improvements in crops and livestock, enables us to increase greatly per-hectare yields. Shown is a farmer applying fertilizer to a field in California; and another adjusting water flow on a furrow-irrigated lettuce field in Arizona.

period concluding with Cantor's work of 1871-1883, no truly fundamental accomplishments in scientific knowledge have occurred. There have been numerous important achievements in scientific work, applying to broader domains the scientific apparatus developed at Göttingen and Berlin through the 1880s, but no fundamental discoveries of the sort which marked the progress of continental science from Nicholas of Cusa's commentaries on Archimedean science, through Kepler, Pascal, Leibniz, et al. into Riemann's and Cantor's fundamental breakthroughs. The fundamental, unsolved problems of physical science today remain as they were when Riemann died in 1866 and Cantor rounded out his work of the 1871-1883 period.

Why the years immediately preceding and following 1871 appear in so many facets of culture to be a critical turning-point in the general trends of modern history is an important, and most significant question, but one we think it inappropriate to more than indicate here. What is significant in this dating for the halt in fundamental progress in scientific method is that Riemann's successors, excepting perhaps some among Betti's circle in Italy, either rejected or greatly diluted the central feature of Riemann's contribution to physics and mathematics, what is sometimes termed the principle of the *ontologically transfinite*, a notion precisely

congruent with the classical Christian theological presentation of the nature of substantiality in the perfect consubstantiality of the Trinity. This was the center of the impetus given to physical science by Cusa, the dominant feature of the founding of modern mathematical physics by Kepler, the central feature of Leibniz's scientific method, and also of Riemann and Cantor (among others). Once that principle was pushed out of scientific work, fundamental scientific progress flattened-out, progressing sideways to considerable extent, but not forwards.

This principle, as reflected in the author's understanding of Riemann's 1854 habilitation dissertation and other matters, is the crucial feature of the author's contributions to economic science, and thus the premise for what is termed the LaRouche-Riemann method of economic analysis.

Now, having summarily identified matters we shall encounter subsequently in this report, we resume the immediate point.

In the ordinary development of a heat-powered machine, we study the essential movements to which we desire to give a powered expression in the machine. Thus, we shift the source of energy from the muscle-power of man and beast to the heat-energy driving the machine. We then go further in the same direction, not

only increasing the power of machines, but increasing the energy-flux-density of the heat-sources employed to drive productive processes of all kinds.

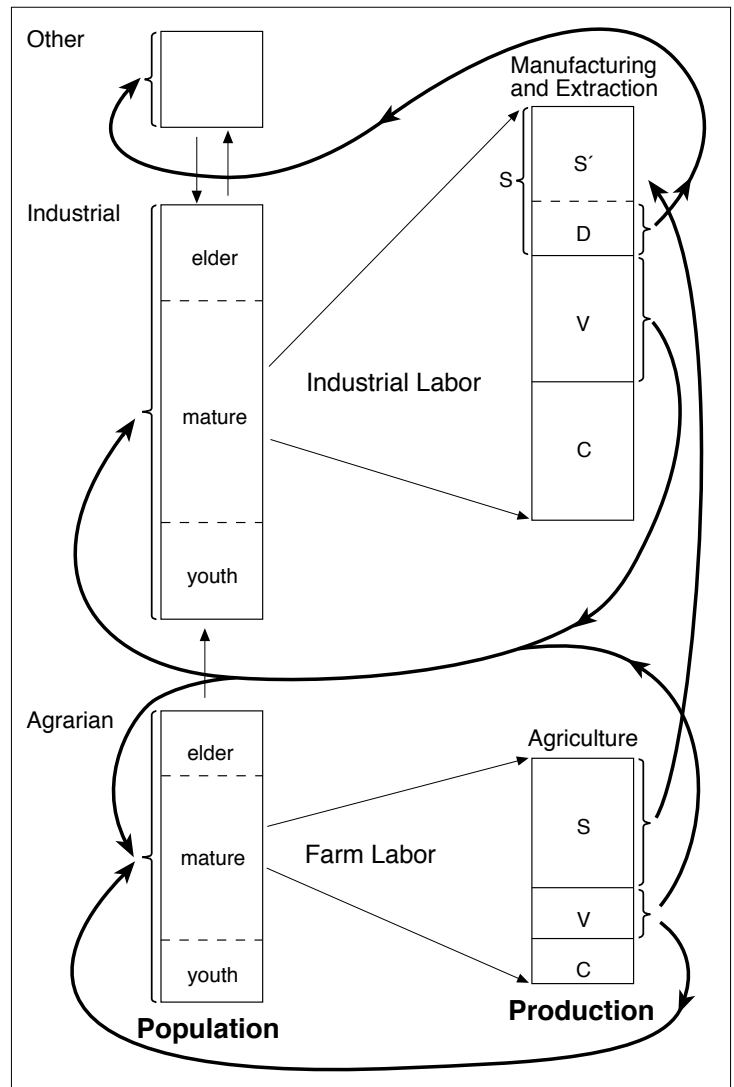
A similar process occurs in the development of agriculture. The very low energy-flux-density of sunlight per hectare and the rates at which plants can convert sunlight into biomass are limiting conditions. Since the work of Justus von Liebig et al., we treat the soil with trace-elements and other conditioning features, and inject energy in the form of manufactured fertilizers. This, combined with powered machinery, irrigation, and so forth, and with improvements in crops and livestock to take advantage of artificial conditions, enables us to increase greatly the per-hectare yields, while, increasing greatly the number of hectares efficiently worked by a single farmer. The increase in levels of per-capita consumption of agriculturally produced food and fiber in the United States, while the agricultural component of the labor-force has contracted from 90% (1790) to approximately 4% today, is the much-cited illustration of this.

Wild agricultural land, like the earth itself, has a poor fertility. The fertility of agricultural land is the benefit of human labor, the improvements in the land, crops, livestock and methods of production cumulatively injected and maintained by farmers in cooperation with society generally.

So, in the advancement of technology, we increase the per-capita “energy of the system” in the household, in industry, in agriculture, and in transportation. As this process unfolds in the domain of production of goods (and in transportation), the relative increase of per-capita “energy of the system” in the form of improvements in nature and in production capital is greater than in the growth of relative per-capita “energy of the system” in the form of household consumption.

Let us change the definition of the content of Karl Marx’s symbology to concur with the different content we assign in this report. Let the household and related goods-consumption of the goods-producing labor-force be signified by V . Let the “energy of the system” represented by capital improvements in nature and production capital be signified by C . Let the “overhead expenses” be signified by d . Let the gross surplus of goods

Physical Economics Flow Chart



produced, after deducting $(C + V)$, be signified by S . Let $(S - d)$ be signified by S' .

Then, $S'/(C + V)$ represents the crucial ratio of “free energy” to “energy of the system” as measured in terms of the ratios of goods-producing households. C increases more rapidly than V , while it is required that $S'/(C + V)$ must rise. Since the market-basket value of V per-capita increases even though the social cost of V per-capita decreases, the increase in productivity required must be premised on the required result in terms of $S'/(C + V)$ for the condition that the market-basket content of per-capita V rises as required. This rise in productivity must be effected by injections of improved technology.

The measure of a succession of values for the ratio $S''/(C + V)$ is an increase in the society's potential relative population-density. The change in value of $S''/(C + V)$ sufficient to increase the potential relative population-density by some designated degree is the measure of the net work accomplished by society. All other work applied to the economy (society) merely maintains the value of the system (value of potential relative population-density), and is thus broadly comparable to the molecular activity in some three-legged stool standing stably in a corner. This latter work we designate, therefore, as *virtual work*.

The rate of increase of the net work of the economy (society) is the *power* of the process being analyzed.

The ordering of innovations which fulfills the conditions we have identified so far is *technology*.

This ordering correlates with a long-term tendency for the required per-capita energy-density consumed by society to rise geometrically relative to increases in society's indicated potential relative population-density.

Given this basic and other conditions to be satisfied, the business of statecraft is to discover and implement those improvements which satisfy these conditions. Foremost among those requirements of statecraft is the fostering of general education and scientific inquiry, such that the needed innovations in technology may be developed, and, as developed, will be given to a labor-force educated to the level needed to assimilate such improvements for practice.

3.

About Ten Billions People

During the recent three years, the author and his associates have been conducting computer-assisted projections of economic development for India, Mexico and other nations, as well as recurring studies of current trends in the U.S. and other economies. This method, called the LaRouche-Riemann method, is the only computer study of the post-October 1979 Volcker measures' effects which has accurately forecast all of the essential features of the recent period! In fact, all of the leading econometric studies have been repeatedly totally incompetent.

Using this same approach, we have attempted to es-

timate the general characteristics of an acceptable form of world-economy approximately fifty years ahead. Using rather conservative estimates of the rates at which technological progress might be effected in developing nations, but requiring the elimination of misery, we find that the required world population fifty years from now must be slightly less than or greater than ten billions people. The precise calculations are not the significant point. Any competent calculation must yield a comparable result.

The calculations are to be made, in any case, by something approximating the following successive steps.

The estimated per-capita energy-consumption of in-



cc/Charles C. Watson, Jr.

Vogtle Electric Generating Plant, a nuclear power plant near Waynesboro, Georgia.

ustrialized nations is about 38,000 kilowatt-hours. The energy-consumption of poorer, but not the poorest, developing nations is approximately *an order of magnitude less!* For reasons implicit in our review of factors of "energy of the system," it is impossible to achieve combined agricultural and industrial outputs per-capita equivalent to 1980 industrialized-sector averages without approaching 30,000 to 35,000 kilowatt-hours per capita in all of the developing sector.

Our goals are modest ones. For India forty-five years hence, we project an estimated agricultural component of the labor-force of about 25%, about that of the Soviet Union today, or of France at the beginning of

the Fifth Republic. We project at the present phase of our study, about 35,000 kilowatt-hours per-capita for Egypt, with a population of about 90 millions persons, by the year 2020.

This sort of fact leads to the desired calculations.

First, we know that most of the added energy production must be supplied by nuclear-energy plants.

Costs of fossil-fuel energy-production are already significantly higher than for current generations of fission-energy plants, and must rise on the basis of unavoidably rising social costs of fossil fuels—although undeveloped resources of petroleum and natural gas vastly exceed published estimates. We will use natural gas where economics prescribes, and will include high-potential hydroelectric development wherever it exists or can be developed as a by-product of urgently needed water-management programs. The proposals for solar energy for industrial use and for “renewable resources” are a wild hoax: the capital costs of solar-energy substitution are inherently one or two orders of magnitude higher per kilowatt-hour than nuclear.

Except as fossil fuels are locally cheap and abundant, and except as high-potential hydroelectric sources are available, the entire increase of energy-input to the developing sector must come from nuclear energy.

Based on our knowledge of the scientific and engineering problems involved, and aided by studies of projections by U.S. energy agencies, we know that laboratory production of net energy, from a fusion-energy process can be demonstrated before 1985, and that commercial fusion-energy production can be made available by the turn of the century. This means that the bulk of the added energy for developing-sector and other nations’ needs must be supplied by known types of fission-energy plants for about the next twenty-five years or longer.

We know the labor-content of the construction and operation of each such type of energy-plant. We know the labor-content of the types of materials used in construction of such plants. A set of corresponding linear



Ford Motor Co.

The advancement of technology depends upon an increase in the complexity of the social division of goods-producing labor; while heat-powered elements in goods-producing capacity is also increasing. Shown is automated robotic spot welding at Ford Motor Company's Chicago Assembly Plant.

equations permits us to estimate with fair accuracy the total amount of labor-force required merely to supply the plants and materials used in constructing and maintaining such plants over the next quarter century, and to construct estimates in a similar fashion for an additional quarter century.

We also know, as a fair estimate, the ratios of social cost for energy-production to other categories of production and other employment. By such means we construct an estimate of the total labor-force required fifty years hence. Since we know the variables of household demography well enough to offer fair estimates of the ratio of labor-force to total-household population, a fair estimate of the size of required population follows. Hence, approximately ten billions people, are estimated as required.

The principal objection to such an estimate is the observation that productivity should increase significantly over fifty years. At first glance, that is a very persuasive objection. After rigorous reflection, we reject the objection. The effect of improvements in technology must necessarily be to increase the scale of required labor-force, and hence the population.

In summary, descriptive terms, our refutation of the indicated sort of objection is this.

The advancement of technology depends upon a

two-component increase in the complexity of the social division of goods-producing labor. The social division of labor, in human-labor terms, is increased, while, at the same time the elements of the division of labor incorporated as heat-powered elements in goods-producing capacity is also increasing. So far, this twofold process always results in a net increase in the number of elements of the social division of goods-producing labor.

Furthermore, for related reasons, as technology advances, and as production becomes increasingly capital-intensive, the number of required scientists and engineers per 100,000 goods-producing operatives increases. This increase is associated with the rate of required increase in capital-intensity, and with the complexity of the division of labor.

Therefore, if we take the sum of distinctive functions of the social division of goods-producing (and transportation) labor plus the equivalent embedded in goods-producing capacity's capital-intensity, and designate that sum by the symbol n , then technological progress takes the form of a transformation of the complexity of the productive process from order n to order $n + m$.

This yields another expression for technological progress: $P = F_n[(n + m)/n]$. In that expression, P signifies potential relative population-density, F signifies some function to be designated for the ratio enclosed in the brackets, and n and m have the significance we have identified immediately before this point. Since we also have, from our earlier discussion, $P = F_p[S'/(C + V); S/(C + V + d)]$, for which F_p is not the same as F_n the projective equivalence of the two functions is indicated.

As we shall indicate later in this report, there is a strong, conclusive proof for the appropriateness of the notion of functions F_n . Such a function is uniquely Riemannian, in the sense "Riemannian" is defined in exemplary fashion by Bernhard Riemann's 1854 habilitation dissertation, "On the Hypotheses Which Underlie Geometry." The author has treated this summarily in published writings including the recently published treatment of systems analysis¹ in the *Executive Intelligence Review*. A proper definition of "negentropic" is a purely-geometric definition, as distinct from the statis-

tical definition commonly used during the post-war period to date. A negentropic universe is a Riemannian universe, whose characteristic feature is a constant transformation from a continuous manifold of momentary order n to a successor such manifold of order $n + 1$. The mere fact that our universe exists is already conclusive empirical proof that that universe is negentropic as a whole, in the sense associated with Riemann. This latter point was argued by Philo of Alexandria, and appears as a leading point of ridicule of Isaac Newton's work by Leibniz in the Leibniz-Clarke correspondence. To that point, we shall return, as indicated, in due course here.

Hypothetically, technological progress could reach some qualitative point of transformation in the general ordering of progress, at which point of change the net increase in the topological ordering of economic phase-space would be entirely "compacted" into the development of capital goods of production and transportation. In terms of industrial and agricultural technology as defined by the period 1670 to the present, such a change is presently impossible; to the present, a net increase in the social division of labor in production and transportation of goods is inherent in progress. Only after we have shifted into a new series of kinds of technological progress, a generalized Riemannian relativistic physics of the sort implicit in Riemann's 1860 "shock-wave" experimental design, could we begin to envisage the kind of transformation in which advances in economy per se would not directly incur required increases in the labor-force.

Therefore, pending a generalization of such Riemannian relativistic physics as a new basis for productive technology in general, we are obliged to assume the persistence of the indicated rule, that technological progress increases the complexity of the social division of labor, and increases the required scale of the labor-force as a result of such increases in complexity.

Consequently, if the projection indicated by calculation from rough constraints (energy requirements fulfilled by nuclear-energy production) underestimates technological progress, on the one side, such overestimation of social costs of production is an underestimation of the increase in required size of the labor-force caused by technological progress.

Before examining the proof to this effect to be adduced from physical science, we consider the economic principles involved from the vantage-point of the clas-

1. Lyndon H. LaRouche, Jr. Two-part report on systems analysis, "Systems Analysis is White-Collar Genocide," [Part 1](#): *EIR* Vol. 8, No. 49, Dec. 22, 1981; and [Part 2](#): *EIR* Vol. 8, No. 50, Dec. 29, 1981.



USDA/Lance Cheung

A Virginia farmer driving one of his operation's smaller John Deere corn harvesting combines from one field to another during a harvest.

sical formulation of the American System, U.S. Treasury Secretary Alexander Hamilton's 1791 report, "On the Subject of Manufactures."

From Rural To Urban Preponderance

The root of misery in the world today is that underdevelopment of the social division of labor which is reflected in a twenty-five percent or higher rural component of the total national labor-force.

A relatively low yield per hectare, and, relatively much worse, a high ratio of farm labor required per 100 hectares, intrinsically defines a society as subject to a relatively low potential relative population density. The ratio of total population sustained per farmer is the first measurement of economic development and the broad determinant of a society's potential relative population-density. A policy of promoting rural over urban life, and of promoting labor-intensive, rather than capital-intensive development of agriculture, is today in and of itself an act of genocide.

The leading task of the world today is to develop rapidly both the per-hectare yields of farming, forestry, and so forth, and the number of hectares productively subsumed under the labor of an average farmer. In broad terms of policy, this is to be accomplished by a choice of direction outlined in Hamilton's cited report, a report which uniquely corresponds to successful agricultural development over the course of the past two centuries to date, and which has been proven the only competent policy of approach to de-

veloping economies generally.

Given the indicated commitment to supply the world with adequate per-capita energy-supplies, the application of this energy-input in the developing sector must emphasize those combined actions for capital-intensive development of agriculture and of the entire population which leads to the kind of rural-to-urban shift required. We must give precedence to the application of limited global means to those forms of investment which have the most immediate bearing upon this indicated transformation.

There must be a "shock" transformation of public education, together with measures of hygiene and health-care, which rapidly qualify populations usually fifty percent children and youth, both as citizens and as employable productive labor in terms of modern technology. In agriculture, we begin by injections of water-management, soil treatment, pest control, fertilization and mechanization, to transform the productivity of modes of agricultural production already in use, but we act so with definite targets to be reached over one and two generations, and in terms of incremental improvements estimated in decades.

Mexico is among the more fortunate instances of a nation whose population has a developed sense of national common interest, and which is able to assimilate masses of improvements in agricultural and urban goods-production, on condition that the youth population—half the total—is educated rapidly enough and afforded suitable employment opportunities as youth enter the labor-force. This transformation of agriculture and of conditions of life of the populations requires emphasis on certain forms of capital-intensive industrial and transportation developments. Let us view this problem first in its presently most practical, and cruelest terms of reference among the most afflicted nations of Africa.

The Draper Fund, established by the genocidalist General William Draper of the investment-banking firm of Dillon, Read, advocates the racist-genocidalist policies of Cecil B. Rhodes with a vengeance. Draper Fund representatives such as General Maxwell Taylor prescribe the virtual extermination of whole national populations of black Africa, and of other regions of the

developing sector, to preserve the natural resources of these targetted regions as future “strategic assets” of the dominant Anglo-Saxon populations. Taylor, in strongly pressing the government of the United States to openly adopt such a genocidal policy as “strategy,” merely reflects more shamelessly, as does genocidalist William Paddock on the subject of Mexico, the prevailing views of a complex of persons and institutions including the Aspen Institute, Ford Foundation, New York Council on Foreign Relations, George Ball, and influential elements within the Averell Harriman faction of the U.S. Democratic Party, the U.S. State Department, and the Congress.

The “conditionalities” policy of the International Monetary Fund, related policies of the World Bank and Bank for International Settlements, and of such UNO agencies as UNITAR (United Nations Institute for Training and Research), are only efficient means for imposing genocidal conditions of famine, epidemic and homicidal strife upon and among developing-sector nations. The leading authors of these policies are fully witting of that connection.

The same, pro-genocidal policy is applied in practice to the delivery of food-aid to famine-stricken regions of Africa. Let us compare the prevailing practice of delivery of aid with the approach which should be implemented. The rudimentary principles of an assistance-development policy for the most-suffering regions of the world emerge clearly from considering this problem in its simplest, practical terms of reference.

During the period beginning August 1980, the author and his collaborators attempted to mobilize needed U.S. governmental action for aid of starving populations in Africa—over the wicked opposition of the Carter Administration. Assembling a task-force of experienced leading U.S. farmers and with counsel from logistical specialists, we proposed the following approach.

We proposed that the logistical methods which would be recommended by the U.S. Corps of Engineers under war-time conditions be deployed to effect both delivery and means of distribution of food into regions of Africa in which the imperiled portions of the population are located. If we commit our will to such emergency undertakings, we can make a peaceful use of the logistical policy employed for warfare to construct simultaneously ports, airfields, rail systems, highway systems and functioning transportation networks,

through which to deliver food-supplies and other aid needed directly to or close to the areas in which the needy population resides.

The transportation network established for the efficient initial distribution of aid becomes the network through which basic development aid, to aid the populations in increasing their self-sustaining powers for the next year’s crops, is also delivered. This same transportation network permits agriculture to begin efficient specialization in production of an above-subsistence surplus for urban markets. If the development of water-management systems, and supplies of pesticides, soil-treatment materials, and fertilizers is introduced by way of the transportation network, a modest but marginally decisive improvement in the self-sustaining capacities of populations can be effected.

If food aid is distributed, instead, to relief camps, and the population invited to move toward those relief-camps in search of food, a hideous destruction of the society results. The villages and households are destroyed, the affected population reduced to an utterly helpless state of dependency upon aid, promoting vagabondage among males, and rendering the relief-camps virtual death-camps and the trek to the camps a gruesome death-march. Under such circumstances, food aid, whether intended to have such effects or not, becomes an instrument for promoting genocide.

To repeat the important point: Assistance must be directed to increasing the potential relative population-density of the population, to increasing the population’s power to sustain its own existence by means of its own productive labor.

Continuing beyond emergency measures of the kinds we have indicated to be needed, we must aid the nations affected in producing themselves the most crucial among the agricultural capital-goods initially supplied from abroad. In general, such investments will not mature to become financially self-sustaining during a period of less than seven to fifteen years. Low-cost, long-term credit amortized after an initial period of grace over a total span of fifteen to twenty-five years, is the general policy required to supply nations of the most-afflicted categories with the transformations by which they will become truly self-sustaining.

Over the period from the late fourteenth century through the early nineteenth century, in Europe, we



IAEA/Petr Pavlicek

India today has a third of the world's qualified professionals, but the rural poor represents an entropic drag on the negentropic impulse of the relatively more developed sector of its population. Shown is a technician in the control room at the Madras Atomic Power Station in Kalpakkam, India.

demonstrated with aid of improvements devised on the basis of experience, approaches to promotion of classical culture, scientific education, and general education, through which new generations of peoples were uplifted in their moral capacities and self-sustaining powers.

The rentier-financier interests of oligarchism, typified earlier in this timespan by Venice and Genoa, and later by Venice's colony of Switzerland and the extension of Venetian-Genoese power through the British, Dutch and other East India companies, caused the mercantilist-cameralist policies of economy and national development to be curtailed, contaminated or even sabotaged. So, the practice of Europe as a whole over the indicated period is no model of reference, especially abhorrent is the colonialist-imperialist policy fostered chiefly under British influence.

Yet, if we abstract the good work promoted within the overall policy-conflict within Europe, we have a model of reference for discerning the capacities and susceptibilities of any human population to be uplifted. The Humboldt reforms introduced to Prussia, although never fully realized, exemplify the early nineteenth-century assimilation of the whole sweep of experience of Europe from the work of Dante Alighieri through the period of the successive Jacobin

and Napoleonic tragedies of France.

The case of India takes us to the opposite end of the spectrum among developing nations. The Sanskrit language is the oldest of living literate languages today, dated by Brahmins to Vedic writings from as early as 3,000 B.C. The internal "grammatical" features of Sanskrit, even those features immediately evident from the outside of the language's speakers, are more advanced in respect of potential conceptual powers of communication than even the classical Greek or Dante's Italian. Although Indian culture has never fully recovered overall from the devastating influence of the plague of wicked cults devastating Europe, Asia and northern Africa during the course of the first millennium B.C., where the Sanskrit culture is preserved as a leading

elite influence, and where this influence intersects modern science and technology, India includes a population with the highest-ranking cultural potential among nations of the world today.

The number of Ph.D. and related science graduates annually in India compares favorably with the total for the United States. India ranks third in the world today in the sheer numbers of qualified professionals, and, at current rates alone, will exceed the United States in this category by the close of the present century.

The cultured urban labor-force is presently in the approximate range of about 60 millions—more than the entire population of most nations, and should rise to about 100 millions or more in approximately a generation. Given the harsh constraints on available productive capital-goods for industry, agriculture and transportation, the industrial sector of India's economy is at a modern technological level relative to Western Europe, the United States and the Soviet Union. Where limited means have been concentrated for agricultural development, as in Prime Minister Nehru's program in the Punjab, India has demonstrated its ability to become a potential food-exporter.

The problem of India is that the large component of rural poor represents an entropic drag on the negentropic impulse of the relatively more developed sector of

the population. A different, but broadly comparable situation exists in Brazil, in Indonesia, and other nations which might be grouped loosely into the same broad sub-classification among developing nations as a whole. In accounting terms, the Indian economy as a whole is operating at, or just below “break-even” in terms of potential relative population-density.

A few additional remarks concerning India aid in making the working-point clearer. Out of the upper 20% of India’s annual graduates of advanced scientific training institutions, 40%-48% of the total 12,000 emigrate to employment-opportunities in chiefly industrialized nations. The medical professionals from ranks of sub-continent nationals are becoming a dominant feature of the medical care of Britain’s population, which is only the most conspicuous case. If we estimate that the equivalent of between 250,000 and 300,000 dollars is required to educate a graduate scientist in the United States and that a scientist has a working professional life of about thirty-five or more years, the impact of lost professional strata of the population of such developing nations is better appreciated.

Conversely, if this same lost potential were redirected, by aid of suitable material means, to internal development of the developing-sector, or even to the internal development of the nation represented by such professionals, we have a rough sense of what is very immediately feasible in cases roughly approximating the case of India. The reduction of the rural component of India’s labor-force to about 25% by 2020-2025 A.D., is a clearly feasible proposition. This means that the average condition of life of substantially more than a billion Indians, by the period 2020-2025 A.D., could be better in quality than that for France during the 1950s. By a generation later, comparable results could be effected in poorer developing regions. These estimates are, in our view, safely conservative.

This work of export of capital-goods from industrialized into developing regions, would be economically practicable if the dominant British system of rentier-financier world-order were replaced by renewal of the American System. A shift from usury and ground-rent into investible profits of goods-production and distribution of such goods would make possible an increase to approximately 200 billions dollars annually or greater in long-term development-investment credit to developing nations. This would acceler-

ate capital turnover in industrialized exporting nations, and would thus foster rapid increases in technologically-driven productivity of goods production in exporting nations. This increase in internal productivity of exporting nations would itself pay for the costs of developing credit for expanded exports. That is, the populations of exporting nations would experience no reduction in their material conditions of life as a result of enlarged volumes of capital-goods exports to developing nations.

We in the industrialized nations have a vast reservoir of human productive power presently wasted in an excessive growth of labor-intensive services and the administration of such variously wasteful or outrightly immoral and parasitic activities. If the United States, for example, reoriented toward bringing the goods-producing component of the labor-force back to even substantially less than the percentile existing in 1946-1947, the total physical output of the United States would be more than doubled, through combined increase in the goods-producing percentile and advances in productivity associated with such priorities in investment policies. This shift would be deflationary respecting the internal U.S. economy and hardening of the value of the dollar. Related kinds of improvements are feasible over the course of a decade in other industrialized nations of Western Europe.

Presently, the industrialized sector as a whole is operating below breakeven-levels, as measured in potential relative population-density for the nations’ populations, each as a whole and the sector as a whole.

If the levels of goods-output is increased substantially, and only within immediately feasible degrees, there must be an abrupt shift to a net-growth trend within the industrialized sector as a whole, from a negative value of $S'/(C + I)$ to a positive value for $S'/(C + I)$. This shift means the unleashing of a regenerative negentropic potential within the affected economies, a process of self-feeding economic growth and technological progress.

Under such conditions, the new world economic order our remarks imply becomes eminently feasible—on condition we begin soon, before a catastrophic collapse in the economic situation under present IMF policies.

Under those conditions proposed, the first limitation on the world-economy is defined as the need for acceleration of development of more advanced technologies.

That development, in turn, requires overcoming the shortage of qualified people, which, in turn, requires that we reproduce and develop the people required.

4.

The LaRouche-Riemann Method

Although the author's economic science is properly situated within the mercantilism-cameralism of Leibniz and the American System, during 1952 he made a crucial discovery, through reexamining Bernhard Riemann's 1854 habilitation dissertation from the vantage-point of approximately a year of wrestling with Georg Cantor's notion of the *transfinite*. Through that view of Riemann's contributions, this author was enabled to develop a fresh approach to crucial, included problems of economic science, most specifically the problem of conceptualizing as a mathematical idea the stimulation of economic growth through injections of advances in technology.

Although this is treated more or less adequately in either published locations or in items scheduled for publication during the first half of 1982, there are practical reasons for restating those matters from a theological standpoint of reference here. We will be excused for limiting our specific references to several exemplary points from the history of modern science; we wish to take up only as much as bears directly on the immediate purposes of this report.

Although the implications of the "five platonic solids" were extensively explored during the late fifteenth and sixteenth centuries, Johannes Kepler established modern mathematical physics by proving the hypothesis of the golden mean on the scale of the broadest empirical evidence available, the solar orbits. Although Kepler himself devotes the greatest portion of his published writings to this fundamental point, Kepler's work has been so extensively suppressed or misrepresented in textbooks and classrooms over recent centuries that even physical-science professionals generally manifest no awareness of the crucial point or its significance.

The fact that only five regular polyhedral solids can be constructed in visual space proves conclusively that visual space is shaped by something higher, that the characteristic features of lawfully ordered transformations in visual space reflect a determining principle beyond the immediate scope of representation

within visual space. Kepler proved that the orbits of the planets could not be determined by any mode of action contained entirely within visual space, but rather that this action was shaped by harmonic principles reflecting the efficiency of a largely unseen, higher-order space.

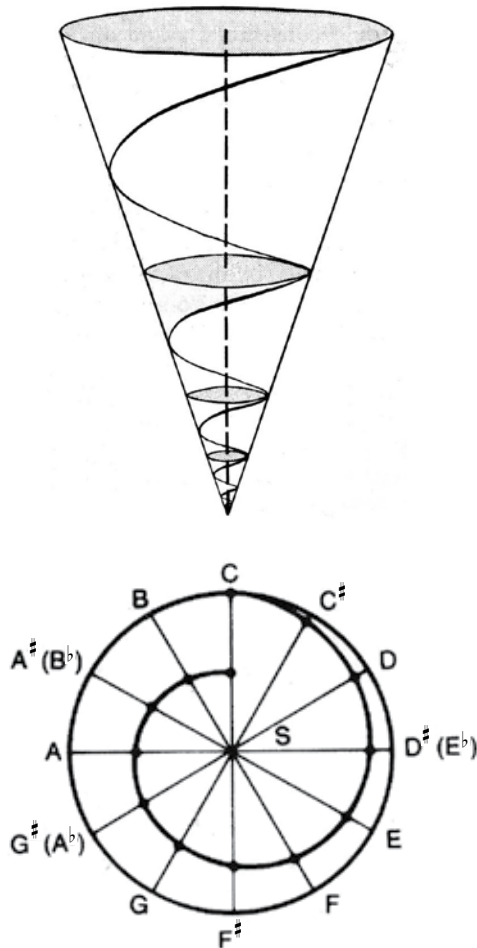
Gottfried Leibniz combined the outline of future development of physics given by Kepler with crucial discoveries of Blaise Pascal, discovering the differential calculus during the period 1675-1676, and otherwise founding more, interrelated branches of human knowledge than the modern university graduate would be able to list. This successive work of Kepler, Pascal, Leibniz and contributing influences was mediated through Göttingen and the École Polytechnique (chiefly), to a cumulative effect reflected for today in the combined work of chiefly Riemann and Cantor.

We know—we are able to prove conclusively—that the visual space is what is termed a *discrete manifold*, which is in large part a shadowy projection of a higher-order reality, a *continuous manifold*. Through mastery of the implications of the projective relationship between the continuous and discrete manifold, we are able to focus our attention on certain unique classes of observations and experiments which open up to our knowledge certainty respecting crucial features of the unseen continuous manifold.

Shadows do not cause the movement of shadows. Yet, the shadows are *projectively real*, and reflect efficient, ontologically-existent action within the continuous manifold projected to our vision as the discrete manifold. The definite objects and metrical relationships we associate with visual space are shadowy ephemerals, yet they reflect real existence in the continuous manifold, as evaporating footprints in the snow reflect the man who has passed there.

Through the line of investigation traced through Archimedes, Nicholas of Cusa, Leonardo da Vinci, Luca Pacioli, Kepler, et al., we know as Leibniz insisted against Descartes, that the proper representation of action in the continuous manifold (from the vantage-point of visual thinking) is not straight-line action, but vortical action harmonically proportioned in a manner which is linked to the principle of the golden mean.

If we construct, for example, a conical helping-figure, we can precisely determine the values of the chords for a twenty-four key well-tempered domain of musical



composition. That demonstration has been reformulated recently by one of the author's collaborators, Dr. Jonathan Tennenbaum, as is summarily described here to assist the readers in following the nature of our argument.

The helping-figure used is a simple conical construction of a logarithmic spiral on the side of a cone, constructing the sector of a circle, and constructing a cone from that sector. Project the spiral onto the circular base of the cone, and divide the base into twelve equal sectors. The chords marked off on the spiral by the radii defining the twelve sectors of the circular base are the proportions of the twelve tones of the well-tempered octave scale.

A useful pedagogical device for communicating the notion of projective relationships between a continuous manifold and a discrete manifold is the following adaptation of a Riemannian stereographic projection. Project higher-order conical projections of spiral action onto the interior surface of a hollow sphere. Within this hollow sphere place a smaller hollow sphere. The observer's

eyes are looking into the interior surface of the smaller hollow sphere from a point we designate as the "north pole." The images seen by the observer are stereographic projections of images on the interior surface of the larger sphere. Those images on the interior surface of the larger sphere are projections of conical spiral action.

This construction, we emphasize, is a pedagogical device, employed to communicate to a student certain very general notions concerning, projective relations between a continuous and discrete manifold. Most of the commonplace fallacies encountered, included the fallacy of "indeterminable interconnectedness," are dispelled by aid of such a pedagogical device.

Since a spiral action is generated by continuous action in the form represented by functions of complex variables, spiral action within hyperconical space is a representation of a continuous manifold. Through such projections (laser techniques are useful for classroom models), we show the student how the appearances of a discrete manifold are generated on the interior surface of the smaller of the hollow spheres.

Through such pedagogical devices we demystify topology. Topology is seen as a matter of isolating those features of projective relationships which are consistent at all phases, from the continuous manifold to the stereographic projection to the observer on the interior surface of the smaller hollow sphere.

Immediately, a certain range of conceptual problems are readily eliminated, but this brings new, more profound problems to our attention.

The points, lines, surfaces, and solids of discrete-manifold images are understood to be not self-evidently discrete objects, in the ontological sense of self-evident discreteness, but are rather lawfully determined topological singularities arising from continuous action in the continuous manifold. That visual space should exhibit the harmonic characteristics considered by Kepler—and for microphysics by Arthur Sommerfeld, ceases to be a conceptual difficulty.

Eliminating the first sort of conceptual problem makes the deeper problem apparent. These problems at first appear to be two, but, upon adequate reflection, the two reduce to one.

The first problem is that the efficient action associated with the singularity-shadows of the discrete manifold is efficient. The second problem is that action in the discrete manifold has metrical characteristics, such that we must locate a corresponding existence for these metrical characteristics of the discrete manifold within the continuous manifold.

In brief, there is only one kind of continuous manifold in which singularities are efficient actors and the generation of projected metrical characteristics of a discrete manifold may occur. This is a continuous manifold in which the existence of the manifold is characterized by a going-over from any existing order of geometric degrees of freedom, n , to $n + 1$. In such a case, as integration of a singularity in a continuous manifold according to what Riemann names Dirichlet's Principle, the singularity is ontologically efficient within the continuous manifold, and projects the image of real, efficient action within the discrete manifold.

That is the kernel of Riemann's 1854 habilitation dissertation, and the kernel of Riemannian physics.

That dissertation is defective only with respect to its incomplete treatment of the notion of number. Cantor's work on the transfinite from the 1871-1883 period implies the remedy for that incompleteness.

It was at that point of progress that fundamental discoveries in science essentially halted with the contributions of Riemann and Cantor.

This accomplishment, and the work leading into it, was violently opposed by the British, by Augustin Cauchy and by Cauchy's posthumous German co-thinkers, such as Leopold Kronecker, Richard Dedekind and Hermann von Helmholtz. James C. Maxwell's fraudulent treatment of the work of Heinrich Weber and Riemann, Lord Rayleigh's incompetent criticism of Riemann's design of the shock-wave experiment, and the fanatical attacks on Riemann, Cantor, and, to only a lesser degree, Felix Klein and Max Planck, by the British Apostles Group, including the evil Bertrand Russell, typify the conditions responsible for the varying cases of dilution or outright outlawing of the Riemann-Cantor contributions during the latter nineteenth century and the present century to date.

However, all of the crucial developments in or verging upon relativistic plasma physics during the present century demonstrate that Riemannian physics is correct, and Riemann's opponents incompetent in respect of the grounds of their opposition.

The continuous manifold (universe) whose action is characterized by the geometrical notion of a going-over from each n degrees of freedom to $n+1$ degrees of freedom is a negentropic manifold. This geometric definition is the only properly rigorous definition of negentropy.

This, and the supporting forms of crucial-experimental proof of Riemann's physics, shows that the notions of "conservation of energy" and the related notion

that the universe is composed of a finite number of discrete calories, watts, or what-have-you, are absurdities superimposed upon science. What we view as energetic phenomena have a proper geometric interpretation within the context of a negentropic continuous manifold. That interpretation is the interpretation of the functions of ratio of free energy to energy of the system which coheres with the geometric view of such a negentropic manifold. The energy of the system reflects action characterized by functions of $(n + 1)/n$ in respect to space of order n . The transformation of the system to one of order $n + 1$ from one of order n is the only net work performed by the system, the free-energy of the system.

To attempt to adduce a unified field in terms of naive interpretations of the variables of the expression $E=mc^2$ is to exhibit the elementary fallacy of superimposing, exogenously, the misinterpreted metrical appearances of action in the discrete manifold upon the continuous manifold. What we must measure within the experimental terms of reference of the discrete manifold is not

$$ds = \sqrt{\sum_{i=1}^n dx_i^2}, \text{ but the value of } d^2s \text{ for the condition}$$

that the physical phase-space of action increases its order from n to $n + 1$. This is the only aspect of the discrete manifold whose metrical projective characteristics could be in congruence with the characteristic form of action in a continuous manifold.

To Christian theology, such developments within science are matters of old knowledge. Riemann's standpoint reflects the arguments against the fallacy of the "big bang" portrayal of creation by Philo of Alexandria. The action of n into $n + 1$ defines the universe as a continuing creation, in which the principle of creation is continually efficient, and is ordered in a manner comprehensible to mankind as lawful, rational. This action is subsumed by a higher principle, transfinite with respect to all subsumed actions of the series, in Cantor's definition of transfiniteness. Yet, all this is nothing but the theological comprehension of the ontologically primary, highest ontological order of that which expresses the perfect consubstantiality of the Trinity.

The task of ordering of development of society is that of ordering the progress of development of human labor to such effect that man's willfully ordered practice is brought into accord with that perfect consubstantiality. Although it is readily demonstrated, in the manner we have indicated, that the perpetuation of

human existence requires submission to the injunction to be fruitful, to multiply and to exert dominion over nature, the ultimate purpose of this mode of perpetuation of human existence is to develop the individual into a more perfect state of accord with the principle of consubstantiality.

It is from that vantage-point, and only that higher vantage-point, that the practice of statecraft is adequately informed.

Application

The case for Riemannian physics as the author has summarized the most crucial points here, informs us properly that such physics is an approximation of the notion of the hypothesis of the higher hypothesis. Therein, from that standpoint, lies its proper application.

If one attempts to describe an economy in terms of post-war varieties of input-output analysis, it becomes clear to the careful observer very quickly that no analysis of an economy in terms of systems of simultaneous linear equations is competent. To the extent such input-output mappings of the economic process have any empirical applicability, those mappings are limited to relative short intervals. Thus, in the case of a developing economy, for example, analysis requires a series of input-output models. Designating any arbitrary such model by the denotation a_i , for the series 1, 2, 3, . . . , i , . . . n , we have the series of successive input-output tables $a_1, a_2, a_3, \dots, a_i, \dots, a_n$. Each of these is distinguished from the others by a different composition of the totality of rows and columns, and different values for the coefficients associated with each common row or column. Hence, actual economic processes are described as “non-linear.”

What we require, to solve such a “non-linear” problem in analysis, is a method for adducing a constant “factor” of change determining the transformation of the economy from congruence with one to the next of such a series of input-output tables. That “factor,” that adduced principle of ordered enumerability, is the transfinite we have defined as technology. It is only when we refine the proper usage of Leibniz’s notion of technology as a transfinite in that sense that the notion of technology acquires the quality of “nameability,” of conceptual definiteness as a conception, we require.

The notion of the function of $(n + m)/n$ as related to potential relative population-density, the equivalence of a function of $S'(C + V)$ as we have indicated that function, and the required rise in energy-density

per-capita and energy-flux-density of heat-sources, is the approach required to adduce the notion of technology.

But, wait! To what result are we leading by such inquiry? We must situate such a notion of the economic process within the universe, within the lawful ordering of the universe.

When mankind increases its productivity, its potential relative population-density, man is demonstrating an increased power over nature. He is demonstrating a more perfect mastery of the lawful composition of the universe. Yet, each definite phase of progress in knowledge for willful practice in this sequence is in and of itself an imperfect ephemeral. Truth does not lie in ephemerals. Whence lies truth in scientific progress, if no one, ephemeral phase of such progress represents truth in and of itself?

Truth lies only in that adducible ordering-principle efficiently common, as a principle of hypothesis, to successive advances in the power of human practice. Truth lies only in those adducible principles of sufficient reason which underlie successive successful scientific revolutions, as a notion of hypothesis which is transfinite with respect to each and all of the scientific revolutions it subsumes.

What, from the vantage-point of such a transfinite principle of sufficient reason, is the lawful composition of our universe? What is it that we must master to increase our mastery over nature?

Science, so defined, and technological progress, as the predicate of science in the form of human labor, are congruent. The principle of sufficient reason and the principle underlying technological progress are reflections of one and the same principle.

To analyze the economic process, therefore, we must analyze the efficient action of technological progress as a reflection of the negentropic ordering of the universe as a whole. Conversely, since increase of mankind’s potential relative population-density is the only possible form of proof of what we called scientific knowledge, the lawful ordering of the universe must be nothing other than what technological progress in increasing the potential relative population-density of society proves to us must be the lawful ordering of the universe.

Economic science, so construed, is the highest expression and authority for physical science.

There may be other values some might choose to project upon the economic process, but they are false and immoral in consequence as guides to the policy of practice of the human species.