Space: The Ultimate Money Frontier

by Lyndon H. LaRouche, Jr.

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It was the fair mid-1970s estimate, that the U.S. economy had received about 14 cents in benefits from each penny which the U.S. Federal government had spent on the U.S. Manned Moon Landing program.[1] So much for those hyperventilating, glassy-eyed, Mont Pelerin Society fanatics, who chant endlessly, that we must get the Federal government out of the U.S. economy.

The following identifies summarily each of the five sets of facts which any competent economist would have considered as background, before rendering judgment on those issues of space policy which are identified in Marsha Freeman's report. First, the general dependency of all sustainable profitability of a national economy upon energy-intensive, capital-intensive modes of investment in scientific and technological improvements of the per-capita productive powers of labor. Second, the division of responsibility between government and the private sector in providing this investment. Third, why the government's investment in military and aerospace technology has proven itself to be such a big winner in the fight to increase the real national income of the U.S.A. Fourth, how the proposed Mars-colonization proposals of 1985-1986 came about, and how they will benefit the U.S. economy. Fifth, how space science works to this effect.

1. The American System of Political-Economy

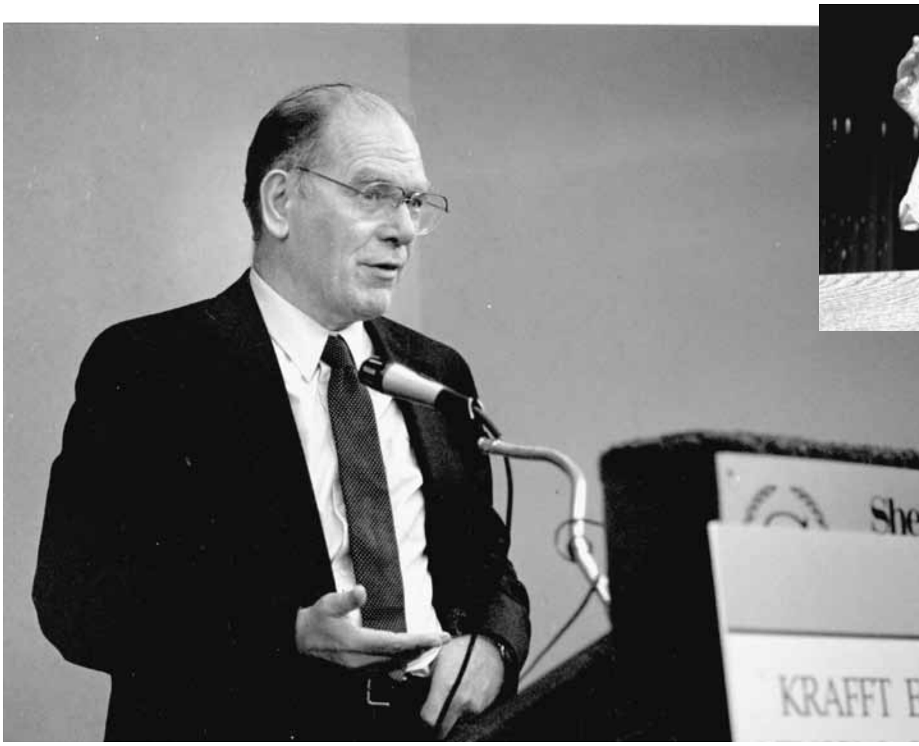
The "American System of political-economy," as that term was defined by President George Washington's Treasury Secretary, Alexander Hamilton, was imposed, implicitly, as an integral feature of the U.S. Constitution's **Preamble** and *Article I*. At that time, 1787-1789, it was conceived, and received, as a remedy for the nearly fatal economic sickness of "free trade," with which the nation had been infected through the compromises embedded within the Articles of Confederation and in the 1782-1783 treaties with the United States' mortal adversary, then and now, the British monarchy.

It was the understandable zeal for peace with both Britain, and also with Britain's U.S. admirers, which had brought about the nearly fatal corruption pervading the 1783-1789 U.S.A. The compromise with Britain had been effected, first, during 1782, with Prime Minister William Fitzmaurice Petty and his creature, British Foreign Service head Jeremy Bentham.[2] The 1763-1783 stay-behinds are found among both the strata of wealthy slave-owners, which later formed the oligarchy of Britain's American puppet-state, the 1861-1865 Confederacy, and New England and Quaker Tories. The Tories of North Atlantic states were typified by the treasonous, leading U.S. agent of Jeremy Bentham's British foreign-intelligence service, Aaron Burr: those families which profitted from the slave-trade, from the British opium trade, and as London-loving textile manufacturers working in partnership with the purveyors of slave-produced cotton.[3]

1. See box, page 16.

2. The first of these agreements was negotiated with Prime Minister Shelburne (William Fitzmaurice Petty), during 1783. Initially, that agreement was repudiated by Shelburne's successors, but realities obliged them to affirm it in fact in the proceedings of the 1783 Treaty of Paris. The adoption of the "free trade" policies of the British East India Company, the interest which Shelburne represented, was the condition of peace imposed upon both France and the United States in the negotiation of these treaties.

3. On the subject of the common purpose of the two American tory oligarchies, the New England abolitionists and the Confederacy's slave-masters, see Anton Chaitkin, **Treason in America**, 2nd edition (New York: New Benjamin Franklin House, 1985); H. Graham Lowry, **How The Nation Was Won**, Vol. I (Washington, D.C.: Executive Intelligence Review, 1987); and, the work which influenced President Abra-



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Lyndon LaRouche addresses the Krafft Ehricke Memorial Conference on June 15, 1985. Out of discussions of LaRouche's presentation to that conference, the author was prompted to publish a proposal, in 1986, for a 40-year mission orientation for establishing a science colony on Mars. The concept was presented in the form of a Presidential-campaign television broadcast, "The Woman on Mars," in 1988. Inset: Krafft Ehricke at a New York City forum, Nov. 28, 1981.

Protective Federal regulation of foreign and interstate commerce, a Federal government monopoly respecting the issuance and regulation of legal tender, a centralized common defense under Federal authority, the promotion of public works of infrastructure, and the fostering of scientific and technological progress in infrastructure, agriculture, and manufacturing, were leading considerations motivating, and reflected in the 1787-1789 Constitution.

This "American System," rooted in the economic and monetary successes of the pre-1689 Massachusetts Bay Colony, is the economic design famously associated with such names as Benjamin Franklin, Alexander Hamilton, the Careys, John Quincy Adams, Henry Clay, Friedrich List, E. Peshine Smith, and Abraham Lincoln's pre-Teddy Roosevelt Republican Party, and has proven itself the most successful model of economy which has been seen in any part of the world during the recent three centuries.

The United States, in particular, never had an economic depression, or kindred experience, during any part of the 1793-1995 interval, since Washington's first administration, which depression was not the result of deviating from the U.S. Federal Constitution, into the follies of both "free trade" and kindred British corruptions of our national monetary, banking, and economic policies.

The Mont Pelerin Society quack-remedies peddled lately by fellows such as Senator Phil Gramm and Speaker Newt Gingrich, are not the cure; they are the disease, like the corrupting influence of famous American tories such as Albert Gallatin, or Andrew Jackson, Wall Street banker Martin van Buren, Franklin Pierce, treasonous President Buchanan, British spies Judah Benjamin and August Belmont, and, after Lincoln's murder, Andrew Johnson, Teddy Roosevelt, Woodrow Wilson, and Calvin Coolidge. Since 1763—and even earlier—there have been only two parties of principle in the United States, crossing all other nominal political-party lines: the patriotic party of Cotton Mather, Benjamin Franklin, Washington, Lincoln, and Franklin Delano Roosevelt, *versus* that tory tradition of Aaron Burr, the Massachusetts Lowells, and Benedict Arnold, which Americans in the Winston Churchill-loving tradition, such as Henry Kissinger, George Bush, Phil Gramm, Newt Gingrich, and the rabid "free trade" Democrats, typify today.

As documented in other locations, the characteristic of differences in way of thinking, which divides the pa-

ham Lincoln, Henry C. Carey, **The Slave Trade, Domestic & Foreign,** Reprint of 1858 edition (New York: Augustus M. Kelley, 1967).

triots from the American tories, still today, is that the governing principles of the tories, are typified by the empiricist world-outlook specific to the kind of philosophical liberalism (and, also, fascism) associated with Thomas Hobbes and John Locke.[4] That point is underscored by the contrast between preambles of the respective constitutions of the U.S.A. and the pro-slavery Confederacy. The tories are followers of Locke; whereas, the ideas of the U.S.A.'s patriotic founders were shaped by the explicitly anti-Locke influence of Gottfried Leibniz in physical science, in philosophy, in political morality, and in principles of political economy. Treasury Secretary Hamilton's famous, December 1791 Report to the U.S. Congress, **On The Subject of Manufactures,** illustrates the governing influence of Leibniz's economic science upon the American System of political-economy.

Putting to one side the expenditure for administrative and regulatory functions of the Federal government: Under the American System of political-economy, the dividing line between government's role in the economy, and that of the private entrepreneur, is essentially threefold: the government is responsible for the economy of national defense, the maintenance and development of basic economic infrastructure, and the promotion of progress and investment in advances in science and technology. In each case, the responsibility undertaken by, and assigned to government addresses a primary need of the economy which the sum-total of private entrepreneurs could not fulfill competently without government's own special and natural role in the economy of any civilized modern nation.

The responsibilities of government for infrastructure, include, presently, national and regional water management and related programs of general sanitation, public transportation, the organization of large-scale power grids, general urban infrastructure. This also includes governmental responsibility, at the variously appropriate levels of national, state, and local government, for a quality of universal education essential to the development of a qualified citizenry, and for the fostering of generalized increase of the productive powers of labor through investment in scientific and technological progress. It requires governmental responsibility, similarly, for ensuring the existence of adequate health-care delivery systems to all of the citizenry. It includes programs of scientific and technological progress which must be undertaken on a scale beyond the reasonable scope of the private entrepreneurs, as the Manhattan Project, the post-Sputnik program of National Science Foundation educational grants, and the Manned Moon-Landing program of the 1960s, typify this distinction.

2. The Lesson of the Soviet Union as an Infrastructure Desert

Go back to the second half of the 1960s. Compare three sets of national economies: A) The leading industrialized nations, typified by Japan, West Germany, and the United States; B) The Soviet bloc of nations (Eastern Europe and the Soviet Union); C) China and India as typical of greatly underdeveloped nations. Use maps of infrastructural features (rails, highways, inland waterways, and power grids) as aids in comparing the conditions in Japan and in Europe to the west of Berlin, with the development of infrastructure in continental Eurasia to the east and southwest of Berlin. Recognize, that during the second half of the 1960s, the general level of technology of production employed, and productivity, in Japan, the Federal Republic of Germany, and the U.S.A. were nearly equal, but that those three economies differed greatly in their respective population-densities per square kilometer of usable land-area. The characteristic of the three latter, developed economies, is the approximate functional correlation between population-density and density of infastructure development.

By contrast with those three developed economies, the Soviet Union fell far short of being competitive, by virtue of lack of adequate development of basic economic infrastructure. On the same premise, China and India were economic disasters.

The principle involved, is, summarily, as follows.

The most characteristic distinction, which sets the human race absolutely apart from, and above all other forms of life, is the quality of *cognition*: the ability of the individual human mind to create valid, revolutionary changes in axiomatic principles of human control over nature, by means of which the *potential relative population-density* of society is increased. This gain is reflected not only in an increase of the size and density of the human population, but also rises in individual life-expectancy, lowering of rates of sicknesses by age-interval group, and increases in both the "market basket" of household consumption and in the per-capita production of the contents of those household market-baskets.

4. Cf. Anton Chaitkin, et al., "The Anti-Newtonian Roots of the American Revolution," **EIR,** Dec. 1, 1995 and "Leibniz, Gauss Shaped America's Science Successes," **EIR,** Feb. 9, 1996. On the subject of "characteristic differences," see Lyndon H. LaRouche, Jr., "How Hobbes' Mathematics Misshaped Modern History," **Fidelio,** Spring 1996.

Space Program Spending Paid for Itself Many Times Over

In April 1976, Chase Econometrics, a consulting firm associated with Chase Bank, released a study which estimated that for every $1 spent in the U.S. space program, $14 was returned to the economy in new jobs, new factories, and increased productivity from new technologies. The study also found that dollars spent by NASA were four times as effective in boosting the economy compared to other R&D spending, and that the effects in the economy of technology that had been developed by NASA were visible within two years of application.

There is no other *legal* activity that can claim that rate of return on investment.

While no listing of individual technology developments could add up to the economic impact of the mission to land men on the Moon, a survey does present examples of how such investments transform economic activity for the economy as a whole.

Agriculture: Observing the Earth from space has given farmers a tool with which to evaluate the health of crops, by determining infestation of pests, water stress, efficiency of fertilizers, and other factors. Threats to crops can be determined months before they would be visible from the ground, and action taken in time to avoid large-scale loss of food. Future applications of space technology in agriculture will include the use of automated and robotic systems being developed to grow food in Earth orbit and on other planets.

Medicine and health: Medical technologies that have benefitted from, or depended upon, NASA-funded research and development include fluid-flow studies for the artificial heart, miniaturized implantable insulin delivery systems for diabetics, remote monitoring of vital signs in intensive care units, rechargeable cardiac pacemakers, astronaut "cool suit" treatment for multiple sclerosis patients, implantable heart defibrillators, diagnostic tools and technologies, and thousands of other capabilities that have saved lives, improved the productivity of victims of many ailments, and helped prevent disease.

Energy: Many ideas for quantitative and qualitative improvements in energy technologies were initiated to enable the production of electricity under the constraints imposed by space flight and the space environment. They were under development to enable the colonization of the Moon, and travel to and development of Mars. Quantitative improvements included the development of compact, high-temperature nuclear fuel arrays for second-generation nuclear fission power plants. Qualitative breakthroughs centered around direct conversion techniques, such as applications of magnetohydrodynamics, and new energy production methods, notably, nuclear fusion.

Manufacturing: Industrial processes of every type have been pushed ahead through the use of new materials, computer control, non-destructive testing techniques, quality control methods, and thousands of individual innovations that were required in order to manufacture spacecraft that could withstand the space environment, and support both men and machines. Nastran, a computer software package, was developed at the NASA Goddard Space Flight Center during 1965-70, to analyze the behavior of elastic structures. In 1970, it was released for public use, and it was employed in aircraft and automobile manufacture, bridge construction, and power-plant modeling studies.

Transportation: The most significant increase in productivity in traditional transport systems, such as rail, since World War II, came from the application of computers. A dispatching and control system, originally developed by TRW for the Apollo guidance system, was adapted for ground transport, and used in the rail industry. Highly innovative transport technologies, from magnetically levitated vehicles to sub-orbital electromagnetic mass drivers, have benefitted from various space technologies, and will be deployed on a large scale on the Moon and Mars.

Scientists and engineers: During the 1960s, NASA provided the resources for thousands of college- and graduate-level students to pursue studies in science and engineering. Grants went to educational institutions to upgrade facilities, to faculty to support their research, and to students to encourage them to study the sciences. The peak year for NASA funding was 1965. The peak year for doctorates granted in the physical sciences (approximately 4,500) and in engineering (approximately 3,500), was in 1971, not because NASA paid for all of these degrees, but because there was great interest in joining in the space enterprise. At the start of the space program in 1960, the United States was graduating fewer than 2,000 Ph.D.s in the physical sciences. The number increased as NASA funding increased, and then declined, as NASA funding declined, with about a five-year lag time. —*Marsha Freeman*

Until the late Eighteenth Century, the overwhelming majority of the populations of sundry cultures was rural. At the time of the first census of the U.S. population, for example, more than 90% were still rural. The technological development of farming, forestry, and mining, was the foundation of mankind's production of the physical preconditions of existence. In the history of the early colonies in North America, and the young United States, the transformation of a relatively unfruitful wilderness into fertile, developed farmlands, was the foundation of progress in the human condition. Hamilton's 1791 **On The Subject of Manufactures** provides a prophetic, rather detailed description of the process by means of which the United States was to be developed into the world's leading agro-industrial power.[5] It was the fostering of manufactures, made feasible through such means as development of roads and canals, which made feasible the interdependent increase in the productivity of agriculture and urban industry, as Hamilton describes this process. This development of infrastructure, is to be regarded as a development of the economic fertility of the entire inhabited land-area of the nation, comparable to the measures by which a fertile farm is hacked out of an infertile wilderness.

Hence, the relatively desert-like quality of infrastructural underdevelopment, and corresponding economic infertility, of most of the habitable territory of the former Soviet Union.

During the Nineteenth Century, the repertoire of basic economic infrastructure required, was expanded, to include railways, steam power, and so on. In the history of our Federal republic, infrastructure was supplied, chiefly, as either an economic activity of government, or through the instrumentality of privately owned, but government-regulated public utilities. This included not only tangible forms of infrastructure, but also the leading role of government in providing the means for universal education, health-care systems, and the fostering of science and technology.

Relatively speaking, an ironical failure of the Soviet economy, is that it lacked that "socialist" institution most successfully developed in capitalist western continental Europe, Japan, and the U.S.A.: publicly provided basic economic infrastructure, the indispensable development of the potential economic fertility of the land-area of the nation. Similarly, the most conspicuous economic challenge facing nations such as China and India is, similarly, the development of a basic economic infrastructure adequate to foster urgently wanted increases in the potential productive powers of the nation's labor-force.

3. Military Spending and Space

Exploration as Infrastructure

In modern warfare, the per-capita effectiveness of the individual soldier depends upon the technology and related logistical support with which he and his unit are equipped.[6]

In the history of the United States, the premises of military achievement were the fostering of technological progress within the Federal arsenal system, combined with the civil engineering programs, copying those features of Gaspard Monge's 1794-1814 *Ecole Polytechnique* in France, at West Point and Annapolis. Under Presidents James Monroe and John Quincy Adams, the model for scientific development of the U.S. military capabilities was the military science-driver programs developed in France, by Monge and Lazare Carnot, during 1793-1814. Later, as post-1814 France's quality degenerated under the influence of Laplace, Cauchy, and the positivists, the U.S. national security apparatus, centered around Benjamin Franklin's great-grandson, Alexander Dallas Bache, turned to the Germany of Alexander von Humboldt and Carl F. Gauss for the shaping of U.S. scientific progress and related military programs.[7]

It should be noted, that Lazare Carnot assumed command of the military defense of France at a time when the British agents in Paris, Robespierre's Jacobins, were satisfied that the invading armies would soon effect the dismemberment of France.[8] Carnot, already

5. It should be stressed, that at the beginning of the Nineteenth Century, the average citizen of the United States had more than twice the literacy rate of the average subject in the British Isles, was approximately twice as productive, and had approximately double the standard of living. This advantage was not the "bounty of nature," but the fruit of combined educational policies and dedication to scientific and technological progress, beginning with the Seventeenth-Century Massachusetts Bay Colony.

6. The study of this development in modern warfare may be begun with reference to the relevant inventions of Leonardo da Vinci and the writings on warfare by Leonardo's ally Niccolò Macchiavelli.

7. See Anton Chaitkin, "Leibniz, Gauss Shaped America's Science Successes," *loc. cit.*

8. The direction of the French Jacobins was supplied from London by the Jeremy Bentham who had assumed direction of the British foreign

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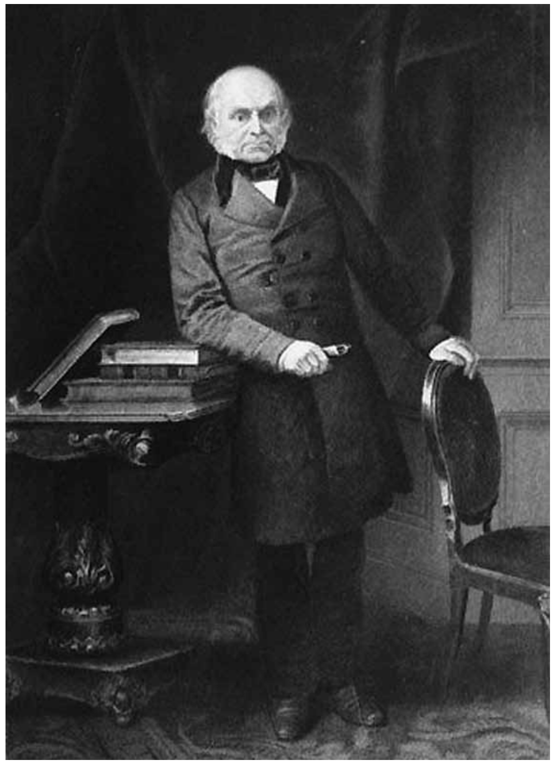

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President John Quincy Adams. "Under Presidents James Monroe and John Quincy Adams, the model for scientific development of the U.S. military capabilities was the military science-driver programs developed in France, by Monge and Lazare Carnot, during 1793-1814."

established as a genius in military science, and also a ranking scientist, assembled his friends of the Monge circle to effect a technological revolution in warfare, as part of his rebuilding the French military forces under his command. The deployment of newly designed mobile field artillery, and its use for massed artillery fire, was among the measures which revolutionized warfare. Under the Lazare Carnot who came to be celebrated as the "Author of Victory," French forces went, during months, from effective defense to appearing as the virtually irresistable military force of the continent of Europe, creating the great instrument so famously misused by the picaresque Napoleon Buonaparte. The intertwined efforts of the two collaborators, Carnot and the Ecole Polytechnique's Monge, established the model for what later efforts, such as the Manhattan Project and the German-American space-program, identify as science-driver forms of "crash programs."

Although we might trace the origins of the modern science-driver "crash program" to the Platonists Archimedes and Leonardo da Vinci, the conception of such programs is traced directly to Gottfried Leibniz's specifications for a science of physical economy, as developed through the work of such explicitly anti-Newton followers of Leibniz as the French 1793-1814 science community associated with Carnot and Monge.

During the Twentieth Century, most of the technological progress which has occurred, would not have occurred but for the impetus supplied by perceived military-strategic imperatives. Although space exploration lies as much outside the domain of military expenditure as within, the mid-1950s "moth-balling" of a Hunts-

intelligence service under Lord Shelburne. For example, the French Danton and the Swiss lunatic Marat, were both trained personally by Bentham, in London, and sent to France to take over leadership of the Jacobin Terror. The relevant point, in this text location, is that the assigned function of the Jacobins was not to lead France, but to arrange its destruction. Carnot was given leadership of the military, not to secure its success, but to assume the blame for a defeat which was presumed to be inevitable at that time.

ville capability for putting a satellite into orbit, typifies the ugly reality of our Hobbesian age. Had the Eisenhower administration been able to reach an "off" button, to stop the nagging beep of the Soviet Sputnik, put into orbit on Oct. 4, 1957, the U.S. space program would have been virtually choked to death by Arthur Burns' monetarist mothballs before the 1960s arrived.

For related reasons, the machine-tool activity centered in the arsenals has been the principal motor-force of modern investment in scientific and technological advances, in both improved qualities of products and increased productive powers of labor. Thus, although military products are essentially economic waste, throughout modern history, the greatest progress in the national income of nations has been won through that proliferation of new technologies which has occurred as a by-product of military investments in science and technology. As the Chase Econometrics study implies, government investment in space exploration has been the outstanding profit-producer for the taxpayer.

4. The 1985-1986 Mars-Colonization Program

My widely debated, 1985-1986 proposal for a 40-year mission orientation for planting a science colony on Mars, was prompted by Helga Zepp LaRouche's reaction to the December 1984 death of a dear friend and outstanding space-scientist, Dr. Krafft Ehricke. She assigned me to prepare a paper for delivery to an international scientific conference, convened in memory of Krafft, at Reston, Virginia, June 15-16, 1985.[9] Out of discussions of my presentation during that conference, I was prompted to produce the proposal which I presented for publication about six months later, at the beginning of 1986. That proposal attracted much wider recognition, and a still-raging controversy, when it was presented in the form of a half-hour presidential-campaign television broadcast, "The Woman on Mars," during 1988.

The manner in which this came about typifies the general rule in modern science. It is an account which need be told, if one is to understand the policy-framework within which U.S. space-policy is situated today.

True to the Twentieth-Century intertwining of military procurement and space science, my association with space-science, and my approach to space exploration had developed as a result of my contribution to what President Ronald Reagan named the "Strategic Defense Initiative" (SDI). I had first published that SDI design during August 1979, as a document of my 1980 campaign for the Democratic Party's Presidential nomination. That was brought into the Reagan administration through my 1982-1983 work, on behalf of certain Reagan administration agencies, in exploratory, back-channel discussions with the Soviet government.

One must glance back, to events few years earlier, to understand how this came about.

My own work in this direction had begun during 1975-1976. It started when I encountered a leaked report in the Hamburg newsweekly, **Der Spiegel,** on a pending NATO desk-operation of the Hilex series. This strange **Spiegel** report drew my attention to a piece of insanity which, I soon came to discover, was officially denoted as proposed NATO doctrine MC-14/4. These facts prompted my conviction that the developments in solid-fuel boosters and precision of targetting, combined with the urge toward forward-basing, were bringing us toward the threshold of potential first-strike nuclear warfare. When heads of superpowers are faced with the detection of a clutch of missiles a few minutes from one's territory, and the prospect that those few missiles might be capable of "pinning down" one's ability to kick back, the world were at the brink of a "first nuclear strike" potential. *Without an effective strategic ballistic-missile defense,* "first strike" would cease to be an unlikely strategic option.

The next step toward the idea which was to become known as SDI, was some 1977 discussions, held on my behalf, with the then recently retired, former head of Air Force intelligence, Maj.-Gen. George Keegan. Keegan suggested that scientists associated with me assess the evidence that the Soviet Union had the capability of developing a deployable, ground-based, ballistic-missile defense based upon what the 1972 ABM-treaty suffixes identify as "new physical principles." Keegan's concerns parallelled my own, in opposition to the regrettably stubborn, anti-scientist prejudices of former DIA head and (1980s) Heritage Foundation associate Daniel P. Graham.[10]

9. "Ehricke's Contribution to Global and Interplanetary Civilization," Proceedings of the Schiller Institute's Krafft Ehricke Memorial Conference, June 15-16, 1985, **Colonize Space!** (New York: New Benjamin Franklin House, 1985), pp. 27-51.

10. During late 1982, until after March 23, 1983, Lieutenant-General (ret.) Graham was a vigorous opponent of the policy which became the SDI. Even after he came around to professing support for the SDI by name, he insisted upon stressing "off-the-shelf" and related "kinetic energy" systems, deprecating "new physical principles," as he had during his earlier attacks upon me and Dr. Edward Teller.

My standpoint was different than many among the U.S. strategists who came to agree with the SDI simply as a sane choice of military technology. Winston Churchill's Britain had been all too successful in exploiting—early and often—the premature death of Churchill's deadly political opponent, Franklin Delano Roosevelt. Churchill's London had lured Washington and Moscow into that geopolitical balance-of-superpowers game, by means of which the tattered and smelly remains of the old British Empire could play off Moscow and Washington to London's profit, using the superpower conflict as a means of subordinating the sovreignty of every nation on this planet, to London's manipulating the relations between the two superpowers.

Unfortunately, by the late 1970s, very few among the relevant professionals, barring a relative handful of exceptions in Europe, recognized the significance of the fundamental strategic conflict between Roosevelt and Churchill. They did not comprehend the fundamental strategic significance of such follies of Averell Harriman's and Winston Churchill's Harry Truman, as Truman's firing and fraudulent defamation of Gen. Douglas MacArthur, an action which brought to an end the United States' true sovreignty as a nation-state, and ushered in those immoral forms of "cabinet" warfare pioneered in post-MacArthur Korea, and applied with a vengeance in 1960s Southeast Asia. So, by the late 1970s and early 1980s, only a dwindling handful among our military understood what was evil in Robert S. McNamara's and Henry Kissinger's pushing the Russell-Szilard, Pugwash dogmas of "détente."

My starting-point, was to view the mutuality of the danger posed by trends of both powers toward forward basing, as a premise for bringing about a strategically indispensable, axiomatic change in global economic policy. Since *effective* forms of strategic ballistic-missile defense could not be accomplished by any means less advanced than "new physical principles," U.S.-Soviet agreement to cooperation in developing such a strategic missile defense, could, in my estimate, not merely bring the immediate military problem increasingly under control, but would represent an international science-driver effort, which would accelerate the productive powers of labor throughout the planet, through the "spillovers" of military technology into the civilian economies of the world as a whole.

It was on that point that Dr. Edward Teller's 1982 references to use of these technologies to advance "common aims of mankind," and the offer of technological cooperation featured in President Reagan's March 23, 1983 announcement, coincided precisely with my views on the proper design of the proposed agreement between the superpowers.

These global economic implications of effective strategic defense, were the point of departure for my 1985-1986 development of the Mars-colonization proposal. My views on the military and political-economic impact of "new physical principles" approaches to strategic defense, were, and are central axioms of my Mars-colonization program.

The crucial strategic incompetence which General Graham and his factional allies would never overcome, was their inability to recognize that it is economically impossible to achieve assured preponderance of the strategic defense by use of "kinetic energy" means, within the domain of dense flotillas of rocket-launched nuclear warheads. One must change the geometry of that domain, the aerial battlefield, a change in the physical geometry of the problem, which only "new physical principles" could accomplish. In the political-strategic domain, the same principle prevailed: Peace could be achieved only through either the defeat, or collapse of one of the superpowers, or through a radical change in the political-economic geometry of the planet. The same "new physical principles," properly applied in a coordinated way, would accomplish the optimal result in both respects.

That is the quality of scientific and strategic thinking which is indispensable for competent formulation of space policy.

During 1982, my exploratory back-channel discussions with Moscow representatives, were parallelled by my briefings to relevant scientific and military institutions of other nations, including France, Germany, Italy, India, and Japan, on the type of policy which I was proposing (of course, without referencing my back-channel discussions with Moscow). Numerous among these professionals had significant backgrounds in space science and related fields. A wide assortment of valuable collaborators was brought together in this fashion. This activity overlapped the significant scientific competencies of the Fusion Energy Foundation, of which I have been a co-founder, and with which I was actively involved throughout the period. Out of this aspect of the work on what became known as SDI, came the foundations for the 1985-1986 design of the Mars-colonization program.

My 1985-1986 Mars-colonization policy was developed and promulgated to prompt the U.S.A., as then still the leading nation of this planet, to use its leadership position to launch a global economic-recovery program whose design was based upon the lessons of the marvelous economic success of the 1960s Manned Moon Landing "crash program."

The need for such a program was great, even within the United States itself. By the close of the 1970s, the United States had lost critical, large chunks of that technology, which we had had during the 1960s, which had been indispensable for the 1969 success of the Apollo program. Today, during the past thirty years, the per-capita *physical* value of the United States' economy has been shrinking at an average rate of more than 2% per year.[11] Around the world, moving from nation to nation, one of the most consistent pictures of the past thirty years economic history, is the vanishing of entire, vital sectors of technology and of those types of labor skills which would be indispensable in any effort at an actual economic recovery. In short, contrary to the prophecies of such loonies as Britain's Lord William Rees-Mogg, and his American protégés Alvin Toffler and Newt Gingrich, the human body can not live on a diet of software.

The need for such a Mars colonization policy is much greater today, than during the mid-1980s. Without a very large-scale, government-based, global "crash program" form of science-driver spur to global investment in advanced technologies, it will be virtually impossible to effect an early general recovery of this planet's ruined economies. The revival of lost machine-tool and labor-skills resources, the stimulus to reviving educational systems from their presently technologically and culturally moribund condition, require, on an expanded scale, the kind of stimulus which was provided by the crash aerospace program of the mid-1960s.

5. The Economic principles of Space Science

It is not sufficient to rely only upon the practical politics of the attention-getting fact, that there was a fairly estimated 14 cents return to the U.S. economy for each penny spent on the U.S. government's Kennedy space program. Just as a physician must prescribe no medication whose efficient principle is not known scientifically, costly governmental investments should not be risked on the opinions of political pragmatists. Since the relevant principles are presented in a significant number of published writings on my original discoveries in the science of physical economy, a summary suffices here.

The formal solution to the relevant, central problem of measurement in economic science, is set forth implicitly in Prof. Bernhard Riemann's widely circulated, but rarely understood habilitation dissertation of 1854.[12] To reduce any validated experimental discovery of physical principle to the appropriate form, that principle must modify the relevant set of axiomatic assumptions underlying the mathematical physics existing prior to that discovery. The result of such a modification of such a set of axioms, is what Plato, and scientists after him, Riemann included, identify by the term *hypothesis.* The formal product of applying any such hypothesis to a system of formal logic, such as a deductive mathematics, is an open-ended set of mutually consistent propositions, called *theorems,* constituting what is known as a *theorem-lattice.*

The relevant problem of hypothesis, which is central to economic science: Any change in the set of axioms underlying a theorem-lattice, produces a new theorem-lattice, none of whose theorems is consistent with any theorem of the previous lattice. Nonetheless, in every case of a valid discovery of principle, the result of the change in mathematical physics is measurable *in some way,* but not formally deducible from the standpoint of the old mathematics. What may be measured to such effect, is either a magnitude of extension, or, in the alternative, the clearly defined existence of the kind of mathematical discontinuity which marks the presence of what we term a *singularity.* In consequence of the preceding work of Carl F. Gauss, Riemann classified the general idea of those changes in yardsticks, brought about through valid experimental discoveries of physical principle, as *curvature* of physical space-time. The

11. The portion of this which is most readily measured, is shown by determining the increase in employment required to bring the output of each agricultural sector or industry up to the level of output needed to supply the same market-basket of goods, per household, which was average during the second half of the 1960s. In addition, we must consider the large amount of net disinvestment which has occurred in basic economic infrastructure and in productive and other physical capital goods of farms, industries, municipalities, and households, amounts which are not reflected in the deductions made by the Federal Reserve and government agencies, to arrive at estimated national Value Added. For these and additional reasons, the official estimates of National Product and National Income are essentially fraudulent, wildly overestimated.

12. Bernhard Riemann, *"Über die Hypothesen, welche der Geometrie zu Grunde liegen"* ("On the Hypotheses Which Underlie Geometry"), **Bernhard Riemann's Gesammelte Mathematische Werke,** Reprint of 1902 Teubner edition (New York: Dover Publications, 1953). See, Lyndon H. LaRouche, Jr., "Non-Newtonian Mathematics for Economists," **EIR,** Aug. 11, 1995.

term "curvature" is employed there in the same sense, that consistent errors in measurement of the shadows of sundials led to Eratosthenes' fair estimate of the curvature of the Earth's surface, about twenty-three centuries past.[13]

The relevance of Riemann's treatment of the metrical problem of hypothesis to economic science, is located in the essential distinction which sets man as absolutely superior to, and apart from all other forms of life. Man is the only species which can willfully increase its potential relative population-density, to such an effect that no principle of animal ecology can be applied competently to the study of human populations. We increase our species' potential relative population-density through that developable agency of the individual human intellect, which we recognize in such forms of expression as validated discovery of a new, higher principle of nature (i.e., the generation of a new hypothesis). The increase of potential relative population-density, is the yardstick used to measure those changes in the "curvature" of physical-economic space-time resulting from such efficient kinds of discoveries withn the domains of art and science.

We assimilate the individual such discoveries of other persons, by reenacting the original discoverer's mental experience of making that discovery, within our own minds. These mental processes, by which individuals make, or reenact original, valid discoveries in art and science, are recognizable by the term *cognition.* The term cognition, so defined in practice, is equivalent to the alternative term *creative reason,* creative reason as distinct from the qualitatively inferior mental activity of mere logic. The understanding which we acquire through those processes of cognition, constitutes that which deserves, uniquely, the term *knowledge,* as distinct from either sense-perception, mere deduction, or mere opinion. In other words, knowledge is limited to our accumulation of that body of valid original discoveries which we have made our own through either original discovery, or by reenacting the mental experience of original discovery.

This accumulation of knowledge is of the Riemann form of a series in which each given level of discoveries of principle, up to some point, designated by n, is superseded by an additional such discovery, designatable as the $(n+1)$'*th* discovery (dimension). The series of many hypotheses which is generalized by the symbology $(n+1)/n$, is a series whose transfinite quality is what Plato designates by the term *higher hypothesis,* or *Becoming.*

The validity of that series, as demonstrable by measurement according to the principle of curvature, is the demonstration that the universe is so designed, that nature is obliged to obey those individual powers of cognition which produce, or act upon the directing premise of valid discoveries of higher principle. This is usefully restated: The human species' manifest ability to increase its potential relative population-density practically, through successive breakthroughs in scientific and related knowledge, demonstrates, *experimentally,* that the universe is so designed, that its laws are expressed in the form of generalized human cognition, human creative reason, of cognition in the form of higher hypothesis.

From those considerations, we derive the following framework governing the principles of space science.

In the universe we encounter three distinct qualities of processes. Proceeding from lower to higher, these three are: those processes we deem non-living, those we recognize as living, and the processes of cognition. None of the characteristics of the higher processes can be derived in a formal way from the characteristics of the lower processes. Among these three, what Leibniz identified as the notion of universal characteristics, are adumbrated for all three domains by the principles of cognitive processes.

The limitations of our senses also apportion the universe in which these three qualities of processes interact, among three domains: microphysics, astrophysics, and macrophysics, the latter corresponding to processes which can be examined directly on the scale of the senses. Also, there is an order in the succession of relatively valid new hypotheses, an order fairly identified by the notion of an ordering of "necessary predecessors" and "necessary successors," in the sequence of valid discoveries of principle in art and science.

From applying these considerations of economic science to exemplary experience with fruitful "crash programs" from the past, the general notion of a successful design for a structurable "science driver" form of new "crash program" may be derived. The work of the Monge Ecole Polytechnique, the Manhattan Proj-

13. Determine the meridian by obvious stellar observations. Place a series of sundials at intervals along that meridian, in a south to north direction. The measurement of the change in noon-time angle of the sunlight's shadow, leads to estimates of the curvature of the Earth's surface, and hence the size of the Earth. By including the case of singularities, we are able to state that some kind of measurement is always available for recognizing a valid discovery of physical principle.

ect, and the Kennedy space program, are prominent among the convenient examples.

Firstly, the subsuming objective of any science-driver "crash program," must be to increase mankind's power, per-capita, over the universe. This objective inheres in the principles of such a program, as summarily identified, immediately above. Thus, axiomatically, any such space program will produce immediate benefits for mankind on Earth.

Secondly, the immediate objective of such a "crash program" is not one or several valid discoveries of principle, but an entire family of such discoveries. This means, that one has chosen as a central target for such discovery an issue which A) is within the reach of constructable experimental measurements, B) involves each and all of the six phases of nature identified above,[14] C) brings together a wide array of discoveries which must be resolved as the necessary predecessors for the centrally targetted discovery of the project as a whole, D) identifies a direction for later, further central objects of discovery, which are made reachable through realizing the initial centrally targetted discovery.

The primary objective of the 1985-1986 Mars-colonization project, was, and still is a broad-based family of fundamental and successive scientific breakthroughs which will revolutionize the practice of science and technology on Earth.

The highlights of the program are as follows:

The immediate target, to be reached within an estimated forty years lapsed time, is the establishment of a permanent "science city" colony on Mars, serving space research as the science city of Los Alamos served the Manhattan project: a base of operations as far distant from the noisy Sun as is reasonable within such a time-span. This "science city" on Mars is to provide a forward base of operations for very-large-aperture arrays and related research tools, for the intensive study of every designated crucial variety of physical anomaly in space which might be accessed by apparatus set into space near Mars orbit.

The preliminary steps to be completed as prerequisites for establishing a permanent base on Mars, are: 1) Establishing a family of Earth-orbitting space-stations; 2) Achieving radical economies in bringing weight to space-station orbit, through replacement of direct ground-to-orbit rocket, by an approach modelled upon the Sänger project;[15] 3) Establishing "automated industrial" activities on the Moon, as envisaged for the U.S.A. by such veterans of Hermann Oberth's original Moon-landing program as Krafft Ehricke; 4) The fabrication of the heavy components of interplanetary vehicles and of Helium-3 fuel components in industrial facilities on the Moon; 5) The establishment of occasional and then regular flights of flotillas of interplanetary space-craft between Earth-orbit and Mars-orbit, combined with the reorientation of space-exploration to operations based upon this Earth-Mars link. And, so on.

In conclusion, three additional points are to be summarized. First, there is virtually no instance of any observatories or probes sent into solar space, which did not provoke the discovery of at least one crucial-experimental quality of anomaly. The universe is heavily populated with astrophysical anomalies which we know to exist, but want the means to examine in a more efficient way. On this basis, alone, the number of new fundamental discoveries awaiting mankind from even the preliminary next steps toward Mars colonization is awesomely large; these anomalies alone would assure us of numerous major scientific breakthroughs in the practice of science upon Earth. Second, no principle of nature is proven, until it is demonstrated experimentally in respect to all three domains of astrophysics, microphysics, and macrophysics, and in respect to the characteristics of both non-living and living processes. From the remotest beginnings of scientific knowledge, in the ancient construction of solar astronomical calendars, long before riparian silt deposits produced lower Mesopotamia, astrophysics has been the origin of man's mastery of the principles of scientific knowledge. Without astrophysics, microphysics could not have been developed, nor a rational macrophysics rendered possible. It remains the same today.

Man yearns upward, toward the exploration of space, for one overriding purpose: the fuller development of mankind on Earth.

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14. I.e., non-living, living, cognitive processes, each and all examined on the scales of microphysics, astrophysics, and marcophysics.

15. The developed proposals for carrying out Eugen Sänger's design envisaged the pickabacking of a rocket plane upon the back of an approximately B-747-sized scramjet of between Mach 6 and Mach 8 capability. Since the scramjet would scavenge the heavier portion of its fuel—oxygen—from the air through which it travelled, the ratio of fuel consumption to net payload of the paired scram and rocketplane could be on the order of ten times as efficient as rocket ascent alone. This factor of cost is one of the prime barriers to reasonable economy and security in operations into nearby space.