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DISCONTINUOUS!
p. 56

In Defense of Strategy

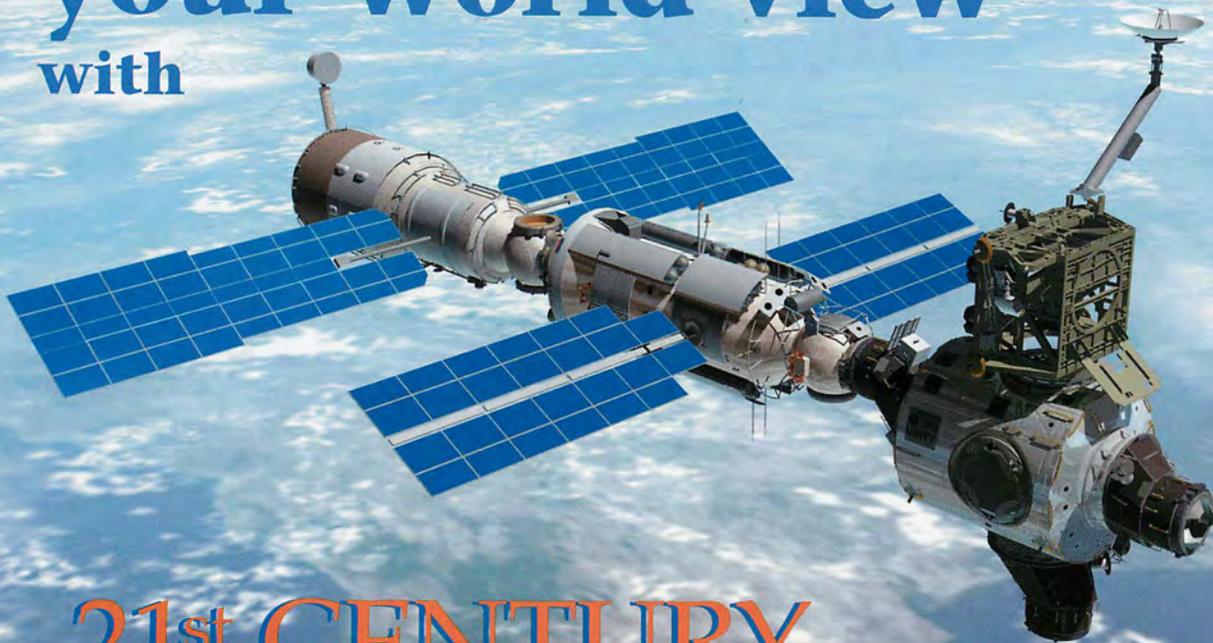


LaRouche on Missile Defense

- Cascade Mountain Uplift
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21st CENTURY SCIENCE & TECHNOLOGY

Vol. 13, No. 2

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In order that society might enjoy the benefits of discovered universal physical principles, it is essential to engage cooperation among the higher, cognitive processes of individual persons. The modern concept of "information," embedded in today's educational and scientific practice, makes such further advancement of cognition, and therefore of science, impossible. Such are the kind of underlying matters which must be addressed, to grasp the flaw in the arguments surrounding today's missile-defense debate.

44 It's Time to Tell the Truth About the Health Benefits of Low-Dose Radiation *James Muckerheide*

Low-dose radiation is documented to be beneficial for human health but, for political reasons, radiation is assumed to be harmful at any dose. Radiation-protection scientists, and others, who cover up the data that contradict present policy should be investigated for misconduct.

56 Russian Discovery Challenges Existence of 'Absolute Time' *Jonathan Tennenbaum*

Russian scientists discover unexpected regularities in radioactive decay, linked to astronomical cycles



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Genetically Engineered Crops
Can Feed the World!

Dr. Channaputra S. Prakash

66 BOOKS

Genetically engineered crops can help feed the world, and, as Dr. C.S. Prakash states bluntly in the Viewpoint (p. 10), it is irresponsible and immoral for the well-fed to spearhead fear-based campaigns against the technology.

On the cover: A strategic flank that changed the world: Washington Crossing the Delaware, Christmas Day, 1776, as depicted by Emanuel Gottlieb Leutze, Courtesy of the Metropolitan Museum of Art, New York City. Cover design by Alan Yue.

Science vs. The Human Genome Hype

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The sequencing of approximately 90 percent of the human genome has been hailed by President Clinton as a great breakthrough of our time, and has been compared to the discovery of a "Book of Life" by most of the popular press. Well, the President could have called a press conference a few years ago, saying we had sequenced 60 percent of the genome, so what has changed, why now is it a "breakthrough"?

The Human Genome Project is not a scientific breakthrough at all. Lost in all the hype, is the reality that we don't know what 97 percent of the DNA already sequenced means. A breakthrough in science signifies that a new principle has been discovered that changes our previous assumptions. The sequencing of the DNA of the genome has been going on for decades, yet no new principle about living systems has been learned from it alone. The identification of gene sequences that are involved in inherited diseases has been useful for early screening and treatment of people at risk, although the development of treatments has come from entirely different areas of research. The Human Genome Project is basically a brute-force application of automated DNA sequencing techniques, which have become quicker and more sophisticated over the years.

Behind the hype is a more devastating error of method, associated with the reductionist assumptions of Information Theory that dominate nearly all scientific thinking today. Just as Information Theory applied to the human mind can never describe the generation of a new thought, the sequencing of the so-called *DNA code* can never describe life. The radical reductionist view of the Human Genome Project rests on genetic determinism: whatever happens in the cell is said to be "all in the genes."

This view turns living processes upside down, and views the cell as *existing for the sake of the DNA*. How-

ever, this approach runs into an insoluble problem in accounting for the regulation of gene activity, by creating an endless string of kinetic events of enzymes binding to DNA sequences, and DNA being transcribed into enzymes. By this logic, the cell is reduced to a complex series of chemical reactions, that in principle are no different from a machine. The Human Genome Project is dominated by this type of linear assumption, which then asserts itself onto the intrinsically non-linear living process, mentally blocking off the chance for real discoveries about what makes living processes unique.

Although it will be useful to have a two-dimensional map of the sequence of the genome, it doesn't tell us anything about the function of any of the genes. What a gene actually does can only be learned from real experiments, examining the activity of the gene in a living cell.

3-D Structure, for Example

One example of how limited is the usefulness of the linear sequencing that has been accomplished, can be seen by considering the problem of three-dimensional position. The activity of a gene is controlled first by its three-dimensional structure and location within a chromosome. The familiar double-helix structure of a single DNA strand is actually wound around myriad proteins, and packed and reshaped at several levels of organization within a chromosome. DNA can be wound up into loops, or structures resembling an electrical solenoid. When DNA is packaged very tightly, it is in an inactive state, and cannot be transcribed by enzymes into messenger RNA, the first step toward making a protein based on the gene sequence. None of the gene's activity, or three-dimensional structure can be known from the linear sequence.

A classic example of the importance of the three-dimensional structure regulating gene activity comes from the

hemoglobin gene family, which is developmentally regulated. In human beings, the genes that code for the protein are found in the same region of the chromosome. Looking at the DNA in a linear way, scientists assumed that the regulatory region of the DNA for the hemoglobin family would be in close proximity to the gene sequences, but it was not found there.

After research revealed that the three-dimensional structure and location of the hemoglobin family was crucial to its regulation, researchers discovered that the DNA region that regulates the pattern of expression of the genes was very far away in the two-dimensional sequence, but was actually in a position three-dimensionally that exerted control over the entire structure of the hemoglobin gene region.

The Basics: What Is Life?

The sad part of the genome issue is that all of the attention and funding of the human genome project, has detracted from the very research which

would give us the kinds of breakthroughs that may make the DNA sequence information useful. For example, how many researchers are looking at the electromagnetic characteristics of living systems, or the potential of three-dimensional DNA structure to act as an electromagnetic transmitter and receiver? Where is the research looking for the fundamental differences between living and non-living processes? Most of it has been sidelined, while private research efforts, like that of Celera, are conducted for the purpose of "privatizing" the use of the human genome, through patents and other means. The privatization efforts have gotten so out of control that many biotech companies recently were submitting patents for fragments of human gene sequences, for which they had no clue as to their function!

It may play on Wall Street or the NASDAQ marketplace, where the much overvalued speculative bubble thrives on such hype. But are any scientists in

the field fooling themselves into thinking that this type of "speculative" research will lead to a breakthrough, which even if found, will ever be used for the benefit of the health of the public? The next time someone tries to sell you a "Book of Life," it would be wise to ask who the author is.

For clarity, we should add that we do not in any way endorse the argument that because advanced genetic research could be used for extremely evil purposes, it should therefore be stopped. Horror scenarios could be, and are, conceived in connection with nearly all areas of science—nuclear research, space, and so forth. The quickest way to make such scenarios a reality is to stop the progress of science.

Yes, the genome sequences could be useful as a first step toward medical breakthroughs, but only if other research does not suffer from the same linear, reductionist view of living systems that plagues the Human Genome Project.

—Colin Lowry

Letters



An Elegant Solution to Two Basic Problems: Dark Matter and Redshift

To the Editor:

Congratulations to *21st Century Science and Technology* for calling attention to Professor Paul Marmet's elegant solution to two basic problems that have plagued physics during most of the past century ("Discovery of H₂ in Space Explains Dark Matter and Redshift," Spring 2000, p. 5).

The first arose from the discovery by Hubble that there is a redshift of light from astronomical objects that increases proportionally to their distance from the Earth. This was immediately hypothesized to mean that all visible objects are rushing away from any point of observation, so the redshift is a Doppler effect. This in turn spawned the Big Bang model of creation, which

immediately came into conflict with known laws of physics. Those had to be boldly set aside in favor of another hypothesis known as "inflation." And so on. Hypotheses built on failed hypotheses. Nothing could be predicted, only postulated and thence retrodicted. Such attempted predictions as that of the degree of anisotropy of the cosmic background radiation failed repeatedly clear down to levels of a part in 10⁵, where the perpetrators of this kind of "physics" are doubtless still busily hypothesizing.

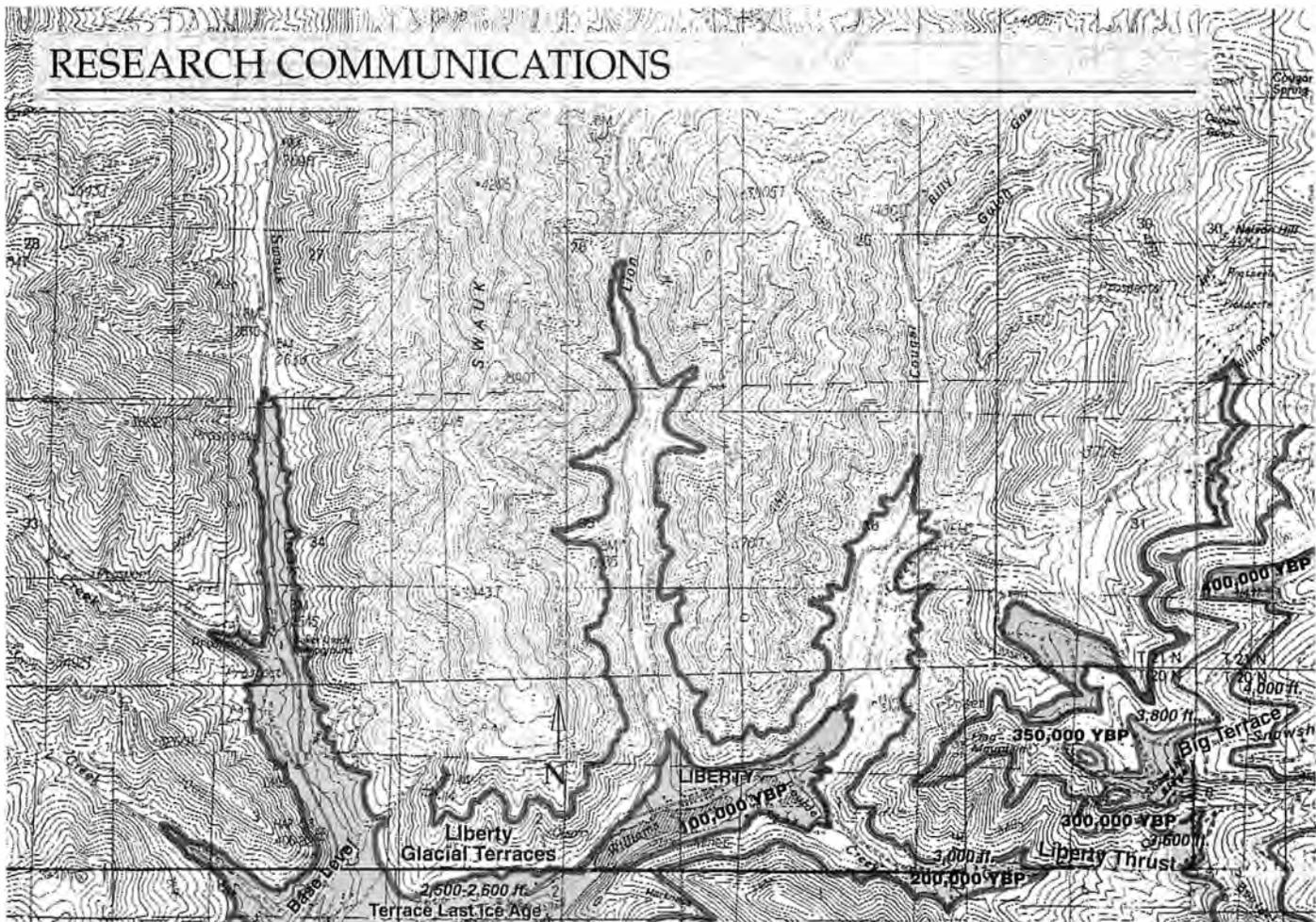
The second problem area was that of galactic dynamics, which observably conflicted with macro-mechanics, as known since Newton, unless a lot of invisible mass were present. So, it was hypothesis time again, and all sorts of weird ad hoc inventions were promptly forthcoming to account for the necessary "dark matter," such as WIMPs, massive photons or neutrinos, and quark McNuggets. (In a few more years our politically correct breast-beaters and Chicken Littles will doubtless be blaming NASA space garbage.) In this new Disney World of Science all it takes is an hypothesis and, voilà, instant professorship for life and world media acclaim for 15 minutes.

Now comes Marmet and spoils all that. What a killjoy! It turns out—as any schoolboy should know and most physics professors don't—that molecular hydrogen (unlike atomic hydrogen) is electromagnetically practically undetectable: It is the perfect prototype of "dark" (transparent) matter, and it is filling space by the bushel and peck, in consequence of its being formed exothermally (semi-irreversibly) when two H-atoms meet under the right conditions . . . and H-atoms have been meeting and mating in space for billions of years.

What's more, long before the presence of all this "dark" transparent matter in space was recognized, Marmet had the temerity to predict its existence on the basis of his own sport hypothesis: that photons traveling long distances through tenuous transparent matter are accurately forward-scattered, so that stellar images are not distorted, but are slightly "reddened" because of a tiny loss of energy in each scattering event. This agreed with the classical optics of transparent media.

Marmet calculated how much hydrogen had to be in space to

Continued on page 7



Cascade Mountain Uplift May Explain Strengthening Ice Age Cycle

An examination of the Cascade Mountain concordant summit elevated Pliocene peneplain at 6,000 feet as an uplifted erosion surface, produced by Pleistocene uplift since 800,000 years before present.

by Jack Sauers

Deep-sea core data over the past 800,000 years show a strengthening of the recurrent cycle of Ice Ages, provoked approximately every 100,000 years by the Milankovitch eccentricity cycle of the Earth's orbit. Our field geologic studies suggest that the strengthening of glaciation in recent cycles, is very likely a result of the major neotectonic

uplift which we have detected in the Cascade Mountain range (and which extends north to Alaska and south into Oregon and California), over that time frame.

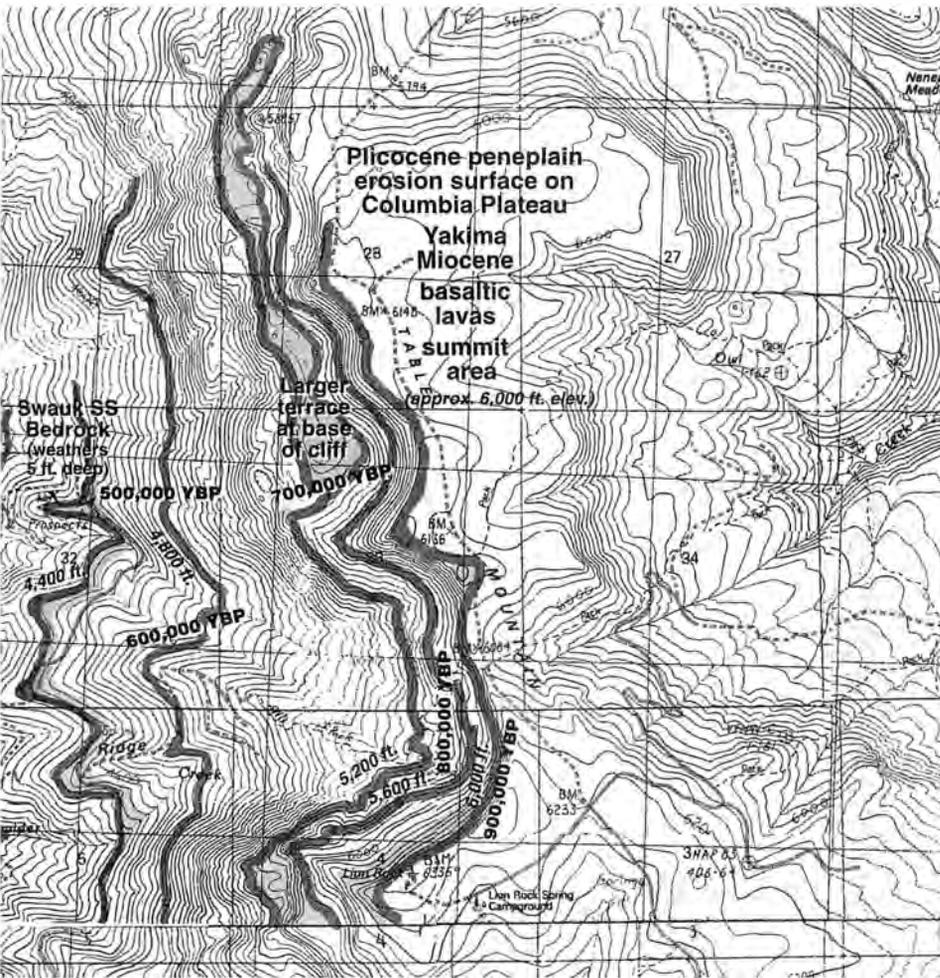
The observed uplift of glacial terraces is strongest in the last four glaciations: about 400 feet for three of the last four cycles, with the last one, over the past 100,000 years, far exceeding all others.

We suspect that the increasing height of this Western mountain range contributes to the changes in atmospheric circulation that permit the southward movement of glacial masses down the North American continent during Ice Ages.

The Milankovitch Cycles

Long-term climatic change is driven by three solar astronomic cycles: the *precession of the equinox* (~ 20,000 years, when adjusted for advance of the perihelion), variation in the axial tilt, known as *obliquity* (~ 40,000 years), and change in the *eccentricity of the Earth's orbit* (~ 100,000 years). These relationships and their correlation with a recurring cycle of Ice Ages, over approximately the last 1.6 million years (known as the Pleistocene epoch), were first worked out by Alfred Wegener and Milutin Milankovitch in the first decades of the 20th century.

For reasons not completely understood, the variation in eccentricity has been the dominant cycle, producing periods of extensive Northern Hemisphere



GLACIAL TERRACES FROM THE LATE PLEISTOCENE

(up the West Side of Table Mountain Liberty Area, NE of Cle Elum, Wash.)

Major glacial terraces in the Liberty area of the Cascade Mountains in Washington state are found uplifted at roughly 400-foot intervals of elevation, corresponding to the 100,000-year Ice Age glaciation cycle, caused by change in the eccentricity of the Earth's orbit.

Source: Composite from U.S. Geological Survey 7.5 Minute Topo Quadrangles of Blewett Pass and Liberty. Contour Interval 40 feet, 1:24,000 scale on the originals.

glaciation and global cooling known as an Ice Age. Periods of glaciation covering most of the northern parts of the United States, Western Europe, and Asia, of approximately 100,000-year duration, have been followed by a thaw of about 10,000 years duration, known as an Interglacial. We are approximately 10,800 years into the present Interglacial (known as the Holocene), leading informed climatologists to suspect that the Earth is entering a new Ice Age.

Glacial Terraces on the Peneplain

Eight glacial terraces are developed along the west side of Table Mountain at the old gold-mining Swauk Creek Mining District northeast of Cle Elum, Wash. The summit of the *peneplain* (an area reduced almost to a plain by erosion), at around 6,000 feet, is likely present on the top layer. However, magnetic polarities of the wind-blown *loess* on the top may be the reverse of today, because uplift has taken place over the past 800,000 years, as can be seen from the increasingly strong glacial terraces visible every 400 feet down

the west side of the mountain from the 5,600-foot elevation to the 2,500- to 2,600-foot elevation.)

The 400-foot-stepped glacial terraces are related to the 100,000-year Milankovitch eccentricity cycle driving the cycle of glacial advance and retreat. This gives a rate of uplift of 400 feet/100,000 years, or 40 feet/10,000 years, which corresponds to the 40-foot contour interval on the 7.5 minute topographical quads of the U.S. Geological Survey, which reveal the terraces quite well. This also amounts to 0.4 feet/100 years, as produced by the glacial ice erosion of the Ice Distributive Glacial Sys-

“Continued uplift . . . will cause even greater global cooling over the decades ahead, from the added orographic (mountainous) effect on atmospheric circulation.”

tem, which has been present more than 90 percent of the time during the past 800,000 years.

Interglacials, like the present one, have occurred over only 10 percent of the time period. Conditions of deteriorating Little Ice Ages, as we have experienced over the past 650 years, indicate that the current Interglacial has been over for some time. These Little Ice Ages have come in even-numbered centuries (in the 1200s, the 1400s, the 1600s, and the 1800s), and will be producing great climatic weather extremes in the 2000s. The 2000s will be more severe, because the longer climatic cycles will add to the effects in the terminal Holocene.

One can also see from analysis of sea cores that the last 100,000-year cycle was the most extreme of all the Pleistocene glaciations, reaching a maximum at around 18,000 years before the present (YBP). Continued uplift at the above rate during the Holocene will cause even greater global cooling over the decades ahead, from the added orographic (mountainous) effect on atmospheric circulation; this will add to the blocking high effect of the atmospheric circulation, which is already like that of the last Little Ice Age.

Western Side Uplift

Along the western side of the Cascade Mountain fault block range, the neotectonic uplift is more than 1,600 feet, running across the Mt. Si fault zone between the 2,600- to 2,500-foot elevation and the 1,000- to 800-foot elevation of the rivers of the Puget Lowland, such as the South Fork Snoqualmie River, coming down off the Snoqualmie Pass which is at the 3,000-foot elevation developed back in time 200,000 years before present. That fault zone,

visible on aerial side-scan photo mosaics, runs also as a Pleistocene Volcano Line from Mt. Baker volcano to Mt. Si's fault scarp east of Seattle, to Mt. Rainier, and thence to Mt. Hood.¹

Similar uplift relations also exist in the Leavenworth area, west of Wenatchee, with uplift of the Pliocene (the epoch preceding the Pleistocene glacial age) concordant surfaces to 6,000 feet in elevation from the 1,200- to 1,000- to 800-foot elevation of the valleys, over the past 800,000 years. The largest nested, U-shaped cross valley profile is the largest there is in the area for the last 100,000 years. Similar ones are found across the Mt. Si fault zone on the west side of the Cascade range; the valleys of the Snoqualmie River, North, South and Middle Forks; and, the Skykomish River Valleys, Sillaguamisth Forks, and Skagit and Nooksack River Valleys.

At Leavenworth, the 6,000-foot elevation residual peneplain is present on the west side of the Leavenworth Fault, as well, although there were hills and low mountains above it to more than 3,000 feet in elevation that were not bevelled by peneplanation, but were subjected to early Pleistocene glaciation before 800,000 YBP. That is in Mt. Stuart and peaks going to the north in the Pre-Tertiary root zone of the central Cascades. In some cases, there may have been regeneration of thrusting to Mid-Cretaceous thrusts in the early Pleistocene, such as the Jack Mount and Shuksan thrusts that happened in the Himalayas.

That holds for areas west of the Chiwaukum *graben* (a lowered portion of the Earth's crust bounded by faults), bounded by the Leavenworth Fault, where concordant summits are present at 6,000 feet in elevation over huge areas, which can be seen on innumerable U.S. Geological Survey quads that I have studied over the past 50 years.

The Chiwaukum graben is bounded on the east by the Entiat Fault zone. East of that, the Entiat Fault Block includes the 6,000-foot concordant summits of an old peneplain that slopes to the east towards a North-South fault going down the Columbia River, and is still seismically active (like the Leavenworth and Mt. Si fault zones), as uplift still proceeds on these fault zones. The Columbia River is incised into the North-South Columbia River fault zone visible on photos; it is both antecedent to rising structures across it, and superposed from old basalts of Miocene Age—the



Bob Symonds/U.S. Geological Survey

Mt. Baker volcano in the Cascades range, with a tent in the foreground.

Columbia Basin Plateau Basalts, so extensive over Eastern Washington.

Uplift on the Mt. Stuart Block

On each side, and south of the Mt. Stuart quartz-diorite granitic block or massif, one finds a zone of *serpentines* (hydrous magnesium silicate) around the granitic block. There is a graben on the west side of the Mt. Stuart block, and uplift over the past 800,000 years has occurred mostly outside the serpentines on a northerly trending neotectonic fault in the position of an earlier Tertiary fault along the east side of which it has also brought up the Mt. Stuart block, shedding granitic sediments into that graben.

On the south side of the Mt. Stuart block, although there is a basal nonconformity with a relic magnetite laterite on the serpentines, evidence of a thrust fault is seen from overturning to the north in Swauk formation sediments that overlie the basal nonconformity which trends in an east-west direction. Though thrust to the north in Tertiary times, there is also an indication that the northern side had upward normal faulting in the later Pleistocene.

The North-South Leavenworth fault likely may have had the serpentines lying on the granitic block, dipping to the east originally with normal faulting on it. But later compression from the west may have overturned the fault to the east, giving a high-angle reverse thrust fault dipping steeply westward. Uplift on it was at least 4,500 feet in the last neotectonic uplift of the past 800,000 years, and is still continuing

with quake epicenters located on it.

I place the rate of uplift at 400 feet/100,000 years on the Mt. Stuart block, except for the last glaciation, which I estimate at about four times that. Beautiful terraces developed alongside both the Wenatchee and Columbia Rivers as those rivers downcut through the Pleistocene, and the fault blocks rose in the Cascades, and are still rising, as we go into this next major glaciation of the Pleistocene, driven by the Milankovich orbital cycles, whose effects have been increased by tectonic uplift over the past 1.6 million years.

I'm preparing for an Ice Age.

Jack Sauers (6240 5th NW, Seattle, WA 98107-2121) is a retired field geologist with 50 years experience exploring in the Cascade range. His article "New Ice Age Looms" appeared in 21st Century, Winter 1997-1998, p. 4.

Notes

1. That fault zone might have geothermal power on it. (However, in view of the "Save the Earth" preservationist syndrome, I doubt that much geothermal exploration will be done on it until the Ice Age becomes more acute.) Another locus for geothermal power would be the right-lateral Mt. St. 8/Mt. Hood Fault zone striking N 23° W. This is the zone which showed explosive activity in 1980, which may also correlate with the 150-year solar retrograde cycle of Little Ice Ages, as suggested by evidence from GISP2 ice cores, and oxygen-isotope data from tree rings in California.

My extensive research reports on Mt. St. 8 are in the archives of the Mt. St. 8 Collection, North-west Collection, University of Washington Library; the archives of the U.S. Geological Survey, Geophysics Laboratory, Division of Geology, Olympia, Wash.; and the Foundation for the Study of Cycles.

Letters

Continued from page 3

account for the Hubble redshift. The figure was about 10 times more than astrophysicists at the time wanted to believe in . . . but now it turns out to be about right, when interpreted in terms of the molecular hydrogen densities needed to account for galactic dynamics *sans* WIMPs, and for redshift *sans* Bang.

What's more, I have a private suspicion that this new "tired light" mechanism may account for Halton Arp's widely ignored observations which make it plain that quasars are not in general situated at cosmic distances but are much closer, hence less impossibly energetic, than has been supposed on the basis of the assumed Doppler-redshift mechanism; and that quasars are physically associated with galaxies, as he says, wherein they may be surrounded locally by higher-than-average-density clouds of molecular hydrogen—which impart anomalous redshifts as a result of localized light-tiring.

Physicists have come to depend on these two major problem areas for everything from theses to tenure to Hawaiian junkets. How tragic, to have to say Aloha to both simultaneously. And what turns the knife in the wound is that Marmet has used only such elementary physics that the WIMPs and quarks, far from being in a position to do their customary architectural fix-it thing, by building more stately hypotheses, now have to reckon with the hypotheses they have long since accepted as gospel, going back to Maxwell's equations and beyond. Before they can justify making shiny new postulates, they have to show that their grubby old ones do not suffice. But will the Professors accept this? I think not. It is against their scholarly religion to solve problems, rather than perpetuate them.

In the kingdom of the self-blinded, the one-eyed man is ignored.

P.S. By the way, your editorial in the Spring 2000 issue quotes Leibniz as referring to "mere mathematicians." You might be interested that Edgar Allan Poe, in "The Purloined Letter," uses the same phrase. I think somewhere near the end of that tale, he says something to the effect that the mere



European Space Agency

New data from the Infrared Space Observatory (ISO) show huge amounts of molecular hydrogen in space, as predicted by Paul Marmet, a decade ago. Here, an artist's drawing of the ISO.

mathematician "cannot be trusted out of equal roots" (referring to quadratic equations).

Thomas E. Phipps, Jr.
Urbana, Ill.

Kepler's Laws and Extrasolar Planets

To the Editor:

As reported in the very good article by Marsha Freeman on the compelling search for planets around other stars ("The Growing Evidence of Planets Beyond Our Solar System," Spring 2000, p. 46), the astronomers now discovering these new planets are focusing on their very unexpected mass. The planets are as large as Jupiter or larger, gaseous, yet relatively very close to their stars; this anomaly preoccupies the planet-hunters.

In another way, however, these very anomalous planets are quite lawful. In the Upsilon Andromedae system, the only star-with-multiple-planets confirmed so far, it is evident that the *orbits* of the three planets around this star, obey the Keplerian constraints of plane-

tary motion, by which Johannes Kepler first showed the lawful ordering of our Sun's Solar System. Specifically, for planets B and C (Upsilon Andromedae), the ratio of the cubes of their distances from the star, and the ratio of the squares of their orbital periods, are both approximately 1/2,600. For planets C and D (Upsilon Andromedae), the ratio of distances cubed, and the ratio of periods squared, are both approximately 1/28.

No doubt the planet-hunters are aware of this, and are using these Keplerian constraints in calculating the orbital distances of the new planets in the Upsilon Andromedae system. But perhaps it should remind them, that the *mass-ratios* among Earth, Mars, Jupiter, Saturn are less essential characteristics of a solar system, than are Kepler's laws of the *orbits* of those planets. The fault we're finding with these newly discovered planets, may lie "not in our stars, but in ourselves."

Paul Gallagher
Leesburg, Va.

Marsha Freeman Replies

The real challenge to astronomers, with the discovery of these extrasolar planets, are their large masses and unusual orbital positions, which cannot be explained through conventional planet-formation theories.

Dr. Alan Boss Replies

Mr. Gallagher notes that the orbital periods and distances for the three planets in the Upsilon Andromedae system obey Kepler's third law. This does not constitute independent confirmation of Kepler's third law in another planetary system, however, because Kepler's third law was used to convert the observed orbital periods into the orbital distances.

The radial velocity technique used to detect these planets yields only their orbital periods, not their orbital distances, and astronomers are so confident that Kepler's third law will apply in other systems that it is routinely used to convert orbital periods to orbital distances.

Dr. Alan P. Boss, the author of Looking for Earths: The Race to Find New Solar Systems, is a theoretician at the Carnegie Institution of Washington.



Courtesy of ANC

South African President Mbeki: "Every year in the developing world 12.2 million children under 5 years die, most of them from causes which could be prevented for just a few U.S. cents per child. They die largely because of world indifference, but most of all, they die because they are poor."

SOUTH AFRICAN PRESIDENT ON AIDS: 'THEY DIE BECAUSE THEY ARE POOR'

South African President Thabo Mbeki shook up the 13th International AIDS conference by stressing in his welcoming speech that "the world's biggest killer and the greatest cause of ill-health and suffering across the globe, including South Africa, is extreme poverty." In reviewing the AIDS crisis in Africa, along with other killer diseases, Mbeki told the 11,000 delegates on July 9 that one of the consequences of this [health] crisis is the deeply disturbing phenomenon of the collapse of immune systems among millions of our people, such that their bodies have no natural defence against attack by many viruses and bacteria. . . . I came to conclude that we have a desperate and pressing need to wage a war on all fronts to guarantee and realize the human right of all our people to good health."

UNSCEAR CHAIRMAN CHASTISES U.N. FOR SCARE REPORT ON CHERNOBYL

Dr. Lars-Erik Holm, the chairman of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), sent a detailed letter to U.N. Secretary-General Kofi Annan June 6, protesting the lying report on Chernobyl issued by the U.N. Office for the Coordination of Humanitarian Affairs (OCHA). The report, titled "Chernobyl—A Continuing Catastrophe," he said, "is full of unsubstantiated statements that have no support in scientific assessments." Dr. Holm, who is also the Director-General of the Swedish Radiation Protection Institute, tells Annan that there are only about 1,800 cases of childhood thyroid cancers, not the more than 11,000 stated in the OCHA report. He also reiterates the statement in the UNSCEAR report released this week that apart from the increase in thyroid cancer in children, "there is no evidence of a major public health impact attributable to radiation exposure 14 years after the Chernobyl accident." As for other assertions by OCHA, Dr. Holm writes, "It is highly remarkable that an organization in the United Nations system can publish such scientifically unfounded statements."

PLASMA ROCKET, UNDER DEVELOPMENT, COULD CUT MARS TRAVEL TIME

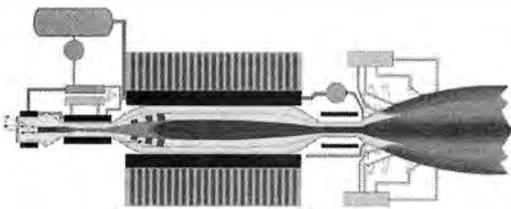
The Advanced Space Propulsion Laboratory at NASA's Johnson Space Center signed a contract with MSE Technology Applications, Inc., of Butte, Montana, in June to develop technologies for a plasma rocket, which could be the precursor to a fusion rocket. The laboratory director, Franklin Chang-Diaz, is a NASA astronaut with a doctorate in applied plasma physics and fusion technology, who has enthusiastically supported the concept since 1979. The Variable Specific Impulse Magnetoplasma Rocket (VASIMR) "provides a power-rich, fast-propulsion architecture," Chang-Diaz said, and would cut in half the time required to reach Mars (three months instead of seven to eight months).

Unlike chemical rockets, which can only produce thrust at a constant rate for a short amount of burn time, the VASIMR technology has the capability of modulating the plasma exhaust to maintain a constant but variable thrust. Among the new technologies being developed for the concept, are magnets that are superconducting at space temperatures, compact power-generation equipment, and compact radio-frequency systems for plasma generation and heating.

In its first-generation application, VASIMR would require a 10-megawatt nuclear reactor to produce the radiowave heating of the plasma. The ultimate goal is to use the plasma in a fusion reactor directly.

SIX NEW EXTRASOLAR PLANETS DISCOVERED BY EUROPEAN ASTRONOMERS

A cache of six newly discovered planets outside our Solar System was announced on May 4 by a European team of astronomers working at the Southern Observatory's facility in La Silla, Chile. The leaders of the group, Michel Mayor and Didier Queloz, announced the first discovery of an extrasolar planet in 1995. Since then,



NASA

THE VASIMR ROCKET CONCEPT

The VASIMR engine consists of three linked magnetic cells, the first of which ionizes the main injection of a propellant gas, such as hydrogen, creating a plasma. The middle cell acts as an amplifier to further heat the plasma, using ion cyclotron resonance heating. In this process, radiowaves heat the plasma. The rear cell is a magnetic nozzle, which converts the energy of the plasma into directed flow which is then magnetically exhausted to provide thrust.

more than 30 such bodies have been found, most of them by the American team led by Paul Butler and Geoffrey Marcy. Because of the limits of the detection methods used, most of the extrasolar planets that have been discovered so far are at least the mass of the planet Jupiter. But the European team has found one planet, in orbit around star HD 168746, that is estimated to have a mass of only 80 percent that of Saturn—only the third star to have such a relatively small-mass planet. (See the Spring 2000 issue of *21st Century* for background.)

NEW DANISH BRIDGE CONNECTS SCANDINAVIA TO CONTINENTAL EUROPE

The 10-mile long Øresund Fixed Link, a bridge, tunnel, and artificial island, opened July 7, linking Copenhagen, Denmark, with Malmö, the largest city in southern Sweden. The \$3-billion bridge project has two levels, a four-lane highway on top and a rail link below, which run 5 miles over the Øresund sound, descend onto a 2.5-mile artificially made island, and then into a 2.3-mile tunnel, at the Danish end. For residents of southern Sweden, Brussels is now nearer than the Swedish capital, Stockholm.

The bridge is one of the three major infrastructure projects Denmark planned in the beginning of the 1990s. The first to be completed was the Great Belt Fixed Link, which connects the eastern and western parts of the country. The third project, still in the planning stage, is an 18 km-long rail and road bridge in the western part of the Baltic Sea, connecting southern Denmark with northern Germany.

ECO-TERRORISTS ESCALATE VIOLENCE ON THE U.S. WEST COAST

Two bombs were discovered in Eugene, Oregon, on May 30, at the Tyree Oil Company, that could have wiped out a four-city-block area and killed hundreds of people, had they not been defused by police. The bombs had been placed on top of the gas tanks of two large tanker trucks, and were discovered when a bomb fell off one of the tankers as it started to move. According to private investigator Barry Clausen, the two devices were identical to the bombs used by the Earth Liberation Front in the firebombing of a ski resort under construction in Vail, Colorado, and at the Monmouth, Oregon, arson fire at Boise Cascades, which destroyed a factory on Christmas Day 1999. Blueprints for building these type of bombs can be found at the web sites of both the *Earth First! Journal* and the Animal Liberation Front (ALF).

According to Clausen, the FBI has imposed a complete blackout of news of this attempted bombing.

ELECTRICITY DEREGULATION CAUSES EARLY BLACK- AND BROWN-OUTS

The increasing deregulation of the electric utility industry is leading to a shortage of generating and transmission capacity, which is now endangering the reliability of the nation's electricity supply. Even before this summer began, supply shortages in California caused interruptions of service, while the combination of aging equipment and lack of sufficient capacity in New York forced Con Edison to shut off electric power to entire neighborhoods in the city.

In response to the shortage, prices for a megawatt-hour of electricity have zoomed from \$30 to more than \$3,000 in some instances, as speculators in the spot market hold consumers hostage to their profit making. This chaotic state of affairs has driven some statewide Independent System Operators, responsible for operating the electric grid, to appeal to state and federal agencies to place a cap on the price that can be charged for reserve peaking power. The U.S. Senate recently passed a bill to mandate rules to ensure the integrity of the interconnected grid system, because the utility industry has warned that full-scale collapse of fragile systems is not out of the question, as utilities "compete" for business, rather than cooperate to ensure reliability.



Jan Kofod Winther/PhotoArchives of the Øresund

The 16 km-long bridge over the Øresund, the narrow strip of water separating Denmark and Sweden.



"Now, where did I put that ad for choosing a cheaper power company?"

Genetically Engineered Crops Can Feed the World!

Anti-technology activists accuse corporations of "playing God" by genetically improving crops, but it is these so-called environmentalists who are really playing God, not with genes but with the lives of poor and hungry people. While activist organizations spend hundreds of thousands of dollars to promote fear through anti-science newspaper ads, 1.3 billion people, who live on less than \$1 a day, care only about finding their next day's meal.

Biotechnology is one of the best hopes for solving the food needs of the poor today, when we have 6 billion people in the world, and certainly in the next 30 to 50 years, when there will be 9 billion on the globe.

Products from biotechnology are no less safe than traditionally bred crops. In fact, they may be even safer, because they represent small, precise alterations with the introduction of genes whose biology is well understood. Often these genes are derived from other food crops. Further, genetically improved products are subjected to intensive testing, while conventional varieties have never been subjected to any such regulation for food safety or environmental impact.

Traditional methods of developing crops involve wild crosses with weedy relatives of crop plants, and many characteristics, such as resistance to disease and pests, have been routinely introduced into crop plants from their weedy and distant relatives over hundreds of years. Hundreds of unknown genes, of whose traits we have little knowledge, are also introduced into these food crops through these conventional plant breeding methods.

This cross-breeding has posed no serious threat to the environment in terms of crop invasiveness, gene flow to weeds, or biodiversity. Yet, these fears are invoked for genetically improved crops, which possess similar traits but which are developed through rapid genetic-modification processes.

Many of these "concerns" are tech-



by Dr. Channaputra S. Prakash

nical issues that could be addressed through appropriate research, and not through emotional debates or militant activism. But public perception is being manipulated by fringe groups opposed to progress and being taken advantage of by politicians.

The Real Benefits

People, who battle weather, pests, and plant disease to try to raise enough for their families, can benefit tremendously from biotechnology, and not just from products created by large corporations. For example, public-sector institutions are conducting work on high-yield rice, virus-resistant sweet potato, and more healthful strains of cassava, crops that are staples in developing countries.

Biotechnology improvements are in development that would allow hybrid rice to be colonized by bacteria that fix nitrogen from the atmosphere. Plants that are able to fix nitrogen improve productivity in the absence of synthetic fertilizers (which are typically unavailable to poor farmers). Further, improved tools such as cryopreservation, developed by biotechnologists, will help in the *ex situ* preservation of biodiversity, while creative techniques, such as gene shuffling, will help create more biodiversity and, perhaps, will even re-create extinct crop traits.

Molecular biology techniques, such as the use of DNA markers and genomics, are providing valuable

insights into the dynamics of biodiversity in crop plants, and thus helping our efforts to understand crop evolution and relatedness between different varieties, thus enabling the intelligent use of the available biodiversity.

The anti-biotech activists incorrectly suggest that the integration of chemical pesticides and seed-use has led to lower returns for farmers. To support that argument, they point to one obscure study, while ignoring other, far more comprehensive and respected studies that report increased net returns and reduced chemical use.

To take one example of lowered costs: Improved production economics, the introduction of crops spliced with a gene that causes them to produce a natural insecticide (Bt), and herbicide-resistant crops, have forced tremendous competition in the herbicide and insecticide markets. Prices of many herbicides and insecticides have been slashed by more than 50 percent in these markets. Such price reductions have led to significant discounting of weed and insect control programs and have even benefitted farmers who have not yet adopted biotechnology crops.

None of these benefits will be realized, however, if Western-generated fears about biotechnology halt research

Dr. C.S. Prakash is a Professor of Plant Molecular Genetics and the Director of the Center for Plant Biotechnology Research at Tuskegee University. He oversees the research of food crops of importance to developing countries, and the training of postdoctoral scientists, graduate students, and undergraduate students in plant biotechnology. The founder of AgBioWorld (see <http://www.agbioworld.com>), which has been active in promoting the benefits of bio-engineering and countering the lies of overzealous environmentalists, Dr. Prakash recently organized more than 2,000 scientists to sign a statement supporting agricultural biotechnology (see box, p. 12).

funding and close borders to exported biotech products. Anti-biotechnology activists argue against Western-style capitalism and for boutique markets that sell organically grown, biotech-free foods. But their arguments are not relevant to the issue of meeting human needs or developing a sustainable and diverse ecology.

The Right Way to Biodiversity

The preservation of biodiversity will be critical to the sustained success of agriculture. Contrary to the hysteria of the elitist environmentalists, we must develop a healthy working relationship among governments of developing nations, scientists, and multinationals.

For example, in the case of India, the government's Department of Biotechnology, and other scientific agencies, have done admirable work to deal with safety issues of genetically improved crops by developing a strong, reliable, and trustworthy regulatory mechanism to meet the rightful concerns of the Indian public about the possible impact of genetically improved crops on the environment and human health. The existing biosafety framework now requires that

all genetically modified organisms must undergo a rigorous review and safety assessment prior to their import, field testing, or release. The government should also enhance its legal system by instituting penalties for those who do not follow the regulations, strengthen and enforce its anti-trust laws to prevent monopolies, and impose product-liability laws to force corporate responsibility.

Scientists and companies involved in genetically improved crop development, on their part, have an obligation to be transparent about their affairs and make efforts to communicate with farmers and the public about the nature of their products and any inherent risks they pose. Multinational companies have vast resources, with a huge edge in their knowledge base, and can play a constructive role in India's progress. Few Indian companies have such resources or a willingness to invest in long-term projects, with little hope of immediate revenues, in the face of political and economic uncertainty.

'Royalty Free' Licensing

The multinational biotech companies, on their part, should soften their position on intellectual property by



Scott Bauer/Agricultural Research Service

More nutritious rice is expected from the descendants of these plants, whose ancestors were grown by Gideon Schaeffer from tissue-cultured cells specially selected for their high lysine content.

providing "royalty free" licensing of their core technologies for use by public institutions such as ICAR (the Indian Council for Agricultural Research) on noncommercial and orphan crops of importance to Indian farmers and consumers such as bajra, thur dal, horsegram, and ragi. Further, these companies should consider voluntarily establishing a trust fund from the profits generated by genetically improved crops, to promote biodiversity conservation and public awareness of biotechnology.

There is also a need to foster research into the social, ethical, economic, and environmental impact of emerging technologies in agriculture as this will not only help predict any negative ramifications of such interventions, but also evolve strategies to deal with them.

The Real Hysteria

A frequent fear invoked against the use of genetically improved crops is their possible impact on the environment. But what can be more environmentally friendly than a crop variety that requires little or no pesticide? How



Agricultural Research Service

Corn that can combat anemia is in the works. Here, geneticist Victor Raboy examines a plant from a new line of corn he developed, which may help the body to better absorb and use iron. The grain from the new corn is designed to be 95 percent lower in phytic acid, a compound that reduces nutrient absorption during human digestion.

can a crop variety that is three times as productive—and thus decreases the pressure to cut down forest lands for agricultural expansion—be against nature? Yet, one hears that “biotechnology is incompatible with nature” and is “not natural.”

We need to remember that agriculture is inherently an “unnatural” activity!

Human beings, since the dawn of civilization, have been meddling with nature to provide the needed food, fiber, and shelter for the sustenance of humankind. None of our present-day crops resemble their weedy relatives. Nor would they survive in the wild, as they have all been altered substantially through selection by farmers over thousands of years to be more adaptable and productive.

A similar situation exists with livestock and poultry and, for that matter, even our pets—dogs and cats. Genetically improved crops are a logical extension of this human activity, and thus are no more unnatural than what has been

practiced for eons. Suman Sahai of the Gene Campaign, New Delhi, has rightly reminded us that we should harvest the power of science and technology to improve the living conditions of our people, and our most ethical drive is in alleviating poverty, hunger, and starvation death.

The full weight of scientific research supports the safety of biotechnology. David Aaron of the U.S. Commerce Department recently told the Senate Finance Committee that “13 years of U.S. experience with biotech products have produced no evidence of food safety risks; not one rash, not one cough, not one sore throat, not one headache.” Also recently, a panel of entomology experts has questioned the only seemingly legitimate (and certainly most media-hyped) environmental issue raised to date—the alleged threat to monarch butterflies.

Yet, activists continue to look for a new cause, a new evil in this technology. While these well-fed folks jet

around the world plotting ways to disrupt the technology, they cannot, or will not, see the conditions of millions who are at grave risk of starvation. These activists resist development of longer-lasting fruits and vegetables, at the expense of Third World people who have no refrigeration to preserve their foods.

Critics of biotechnology invoke the trite argument that the shortage of food is caused by unequal distribution. There’s plenty of food, they declare; we just need to distribute it evenly. That’s like saying there is plenty of money in the world so let’s just solve the problem of poverty in Ethiopia by redistributing the wealth of Switzerland (or maybe the United Kingdom, where the heir to the throne is particularly opposed to companies “playing God” with biotechnology).

Agricultural Development Key

The development of local and regional agriculture is the key to addressing both hunger and low

Continued on page 15

Scientists in Support of Agricultural Biotechnology

This statement was initiated by Dr. Prakash and circulated by the organization AgBioWorld (<http://www.agbioworld.com>) in March, to coincide with Bio2000, an international biotechnology conference held in Boston. More than 2,000 scientists have signed the statement.

We, the undersigned members of the scientific community, believe that recombinant DNA techniques constitute powerful and safe means for the modification of organisms and can contribute substantially in enhancing quality of life by improving agriculture, health care, and the environment.

The responsible genetic modification of plants is neither new nor dangerous. Many characteristics, such as pest and disease resistance, have been routinely introduced into crop plants by traditional methods of sexual reproduction or cell culture procedures. The addition of new or different genes into an organism by recombinant DNA techniques does not inherently pose new or heightened risks

relative to the modification of organisms by more traditional methods, and the relative safety of marketed products is further ensured by current regulations intended to safeguard the food supply. The novel genetic tools offer greater flexibility and precision in the modification of crop plants.

No food products, whether produced with recombinant DNA techniques or with more traditional methods, are totally without risk. The risks posed by foods are a function of the biological characteristics of those foods and the specific genes that have been used, not of the processes employed in their development. Our goal as scientists is to ensure that any new foods produced from recombinant DNA are as safe or safer than foods already being consumed.

Current methods of regulation and development have worked well. Recombinant DNA techniques have already been used to develop “environmentally-friendly” crop plants with traits that preserve yields and allow farmers to reduce their use of synthetic pesticides and herbicides. The next gen-

eration of products promises to provide even greater benefits to consumers, such as enhanced nutrition, healthier oils, enhanced vitamin content, longer shelf life and improved medicines.

Through judicious deployment, biotechnology can also address environmental degradation, hunger, and poverty in the developing world by providing improved agricultural productivity and greater nutritional security. Scientists at the international agricultural centers, universities, public research institutions, and elsewhere are already experimenting with products intended specifically for use in the developing world.

We hereby express our support for the use of recombinant DNA as a potent tool for the achievement of a productive and sustainable agricultural system. We also urge policy makers to use sound scientific principles in the regulation of products produced with recombinant DNA, and to base evaluations of those products upon the characteristics of those products, rather than on the processes used in their development.

AIDS and Infectious Diseases Declared Threat to U.S. National Security

by Colin Lowry

Finally, more than a decade after being warned that the AIDS epidemic would threaten the existence of entire nations if left unchecked, the U.S. National Security Council has recognized that AIDS and other infectious diseases pose a threat to the security of the United States. The announcement followed the public release, at the end of April 2000, of a report by the U.S. Central Intelligence Agency, estimating the devastating impact of infectious diseases, particularly in Africa, Asia, and the states of the former Soviet Union.¹

This admission is a welcome sign of reality, but now the question is whether the United States will take the appropriate actions to stem the crisis, and face the fact that this government should have listened to voices of sanity long before the world reached this crisis point.

In 1985, Lyndon LaRouche, Jr., declared his candidacy for the 1988 Democratic Presidential nomination, stating that he was starting his campaign two years earlier than normal, because of his concern about AIDS becoming a global pandemic. Later, during 1988, he produced a half-hour documentary on the AIDS epidemic and the potential directions for a crash research program to cure the disease. This program was broadcast nationally on network television in June 1988.

Also in 1988, the *Executive Intelligence Review* published a special report which is still valid today as a roadmap for finding a cure for AIDS. At the time, EIR worked with leading epidemiolo-

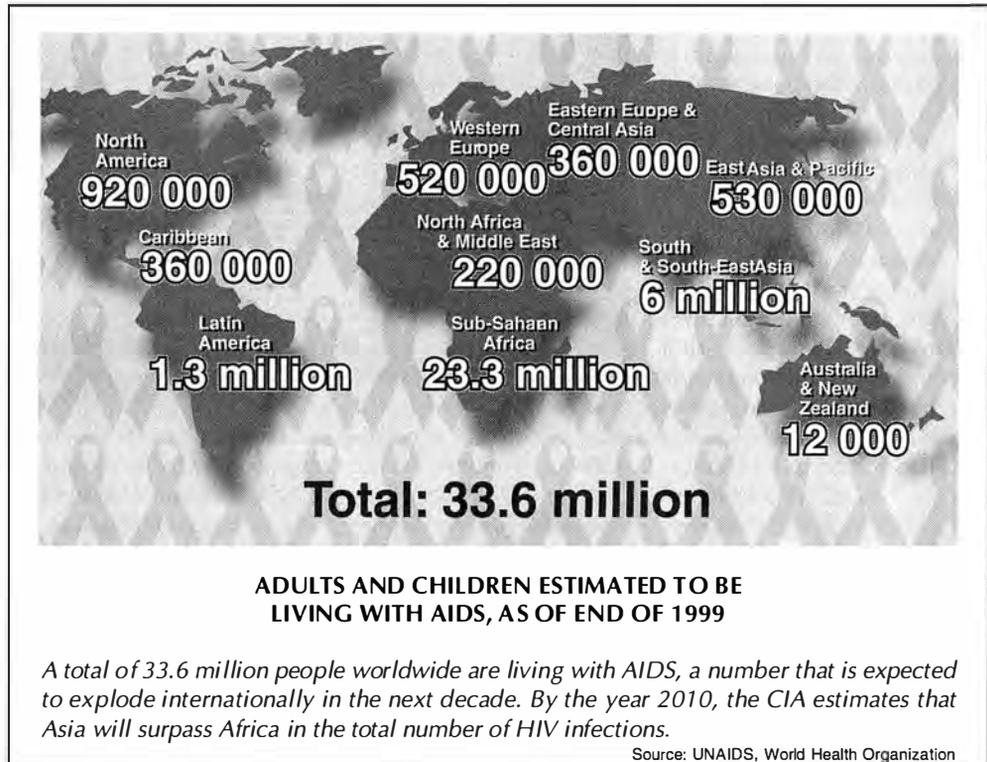
gists, including Dr. Mark Whiteside, of Florida, and Dr. John Seale, of England, who recognized that AIDS was not simply a sexually transmitted disease. (Dr. Whiteside's documentation that AIDS was spreading among migrant workers via biting insects, earned him dismissal from the Centers for Disease Control.)

When the EIR report on AIDS was sent to the Centers for Disease Control, warning that the epidemic was a global threat, comparable to the bubonic plague of the 14th century, that agency responded officially that AIDS "represented no such threat."

More than a decade earlier, in 1974, LaRouche had proposed that an interdisciplinary scientific task force examine the effects of the continuation of austerity policies of the World Bank and International Monetary Fund upon Third

World nations, with the thesis that those austerity policies would lead to a resurgence of old epidemics and the emergence of new diseases. The report of this task force concluded that the continued destruction of adequate levels of nutrition, sanitation, and medical care would lead to a "biological holocaust," seen first in the eruption of old epidemics such as tuberculosis and malaria, particularly in Africa. Also, the task force projected that by the mid-1980s, new diseases would emerge in the Third World and spread rapidly into the industrialized nations.

The current CIA report confirms what LaRouche has been warning, since 1974, would happen if the appropriate changes in policy were not adopted. The report contains some frightening estimates and scenarios: For example: it



says that one-quarter of the entire population of Southern Africa will die of AIDS over the next decade, and projects that by 2010, Asia will likely surpass Africa (which currently has 23 million infected persons) in the total number of HIV infections. Add to this the lack of response to the epidemic so far, the increasing incidence of drug-resistance among other pathogens, such as tuberculosis, malaria, and pneumonia, and you have a situation where the control of infectious disease may become impossible.

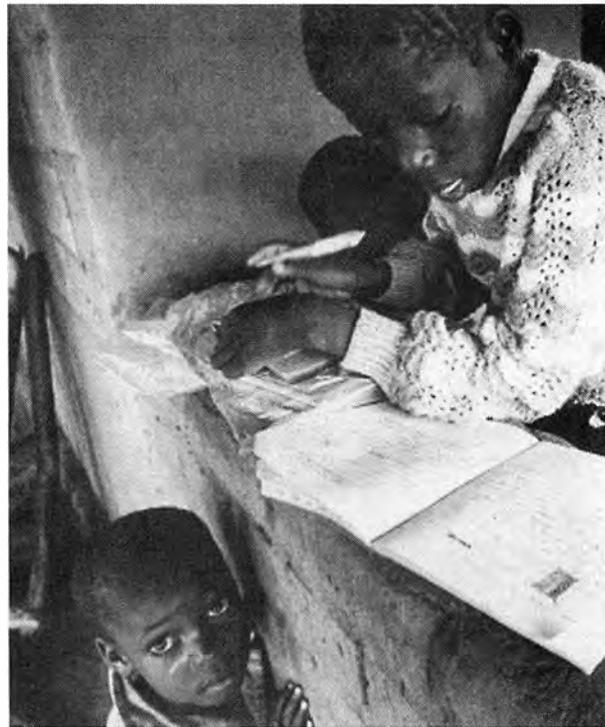
A Rapidly Spreading Pandemic

The AIDS epidemic today has surpassed all previous official estimates in its rapid spread globally. The United Nations group UNAIDS reports that there were 33.6 million people infected with HIV at the end of 1999, and that deaths caused by AIDS were 2.6 million for the year. The World Health Organization/World Bank estimates made in 1996, predicted that AIDS deaths would peak in 2006 at 1.7 million, a figure that was already surpassed by 1998.

Sub-Saharan Africa has been the hardest hit by AIDS. Since the epidemic began, nearly 13 million people have died. In the nine countries of southern Africa, infection rates range from 10 to 26 percent of the total population. In most of these countries, young people under the age of 25 account for 60 percent of new infections.

Life expectancy has been slashed by 20 to 30 years as a result of the impact of AIDS. For example, life expectancy in Zimbabwe, without AIDS, would be 69 years, but is now only 39 years, because of the epidemic. Infant mortality rates in all of the countries with a high HIV prevalence have doubled or tripled in the last decade.

The prospects for the next generation's health are dim, as the number of infected women has now surpassed that of men in Africa. In Zimbabwe, 40 percent of pregnant women are HIV infected according to studies from pre-natal clinics. In Kenya, 21 percent of pregnant girls 15-19 years old are



UNICEF/93-BOUO494/Andrew

An AIDS orphan in northern Malawi, does his homework at his grandmother's home, accompanied by two younger brothers. UNAIDS projects that 42 million children in Africa will become orphans in the next decade, because of the death of parents from AIDS.

also infected with HIV. In Dar Es Salaam, Tanzania, AIDS is responsible for 48 percent of women's deaths. In South Africa, young women of child-bearing age between 15 and 25 years old account for 60 percent of new HIV infections, and at least half of these are expected to die before age 35; therefore, an entire generation may be lost.

The loss of parents from AIDS is creating a huge number of orphans, and there are at least 10 million orphans currently in Africa alone. In some countries, 20 to 25 percent of all children are orphans, because of AIDS. Zimbabwe is expected to have 1.1 million orphans by 2005, out of a total population of only 12 million. Within the next decade, UNAIDS projects that 42 million children in Africa will become orphans, because of the death of parents from AIDS.

A Workforce Catastrophe

The impact of the AIDS epidemic on the struggling economies of Africa already is killing off up to 10 percent of the workforce in skilled jobs, and much

higher percentages in agricultural and lower skilled work. Now, a new report by the International Labor Organization² projects a catastrophe not seen before for countries with high HIV infection rates. The ILO report forecasts a loss of 61 million people from the workforce, by 2015, as a result of death or sickness from AIDS. This would be accompanied by a drop in economic output by at least 25 percent.

In South Africa, 1 in 5 workers in the mining sector is HIV infected. In many countries, companies are hiring and training two or three employees for one job, expecting only one to survive. Projections for South Africa for the year 2020 are that 17 percent of the workforce will be eliminated, with a heavy impact on companies with experienced and highly skilled employees, who will be difficult to replace.

Also, costs of health care, funerals, training of new workers, and loss of workers who have to care for sick family members cannot even be adequately calculated by any model. According to a study by Harvard University, referenced by the CIA report, the direct and indirect costs of the AIDS epidemic worldwide have already reached \$500 billion.

A Looming 'Dark Age'

In addition to the picture of the AIDS epidemic, the CIA report looks at the threat from re-emerging diseases, such as tuberculosis and malaria.

Since 1973, at least 30 previously unknown diseases have been identified, for which no cure is available, including HIV, Ebola, hepatitis C, and Nipah encephalitis virus. Over the same period, 20 known diseases, including tuberculosis, malaria, and cholera, have re-emerged and spread, often in new and more virulent drug-resistant forms.

Tuberculosis is now the number one killer of HIV-infected persons in the world. Multi-drug-resistant tuberculosis infections are increasing along with a growing epidemic worldwide, concen-

trated in Africa, Asia, and the states of the former Soviet Union. Russia is estimated to have 1 million tuberculosis cases, with possibly 10 percent of those multi-drug-resistant, which is lethal in 90 percent of patients there. Drug-resistant strains of tuberculosis have been spreading rapidly since 1993, and are now found in more than 100 countries. Tuberculosis killed more than 1 million in Asia alone in 1998.

Malaria was eliminated from many parts of the world, and was well controlled in the developing sector nations by 1970. However, since then, largely as a result of the unwarranted ban on DDT by the United States in 1972, malaria infection rates have increased by 40 percent in sub-Saharan Africa. Drug resistance is also a problem, and in some African countries, 40 percent to 60 percent of malaria parasites are resistant to the two standard treatments. Malaria still infects up to 300 million people worldwide, with 1.1 million deaths from the disease in 1998.

Hepatitis B, and the more deadly hepatitis C virus, caused at least 600,000 deaths in 1997. The World Health Organization estimates that 170 million people were infected with hepatitis C by the end of 1997, and that 25 percent of those infected would die of cirrhosis and liver cancer within 20 years.

Diarrheal diseases are still a major killer, especially in the developing sector nations, with cholera, rotavirus, and *E. Coli* killing 2.2 million people in 1998. Considering that 3 billion people lack adequate sanitation, and 1 billion still have no access to clean drinking water, conditions are ripe for a sharp increase in infectious disease deaths.

Catastrophes

The two scenarios the CIA report lays out as the most likely for the next 20 years, are both estimates for a "demographic catastrophe," and "social upheaval" for Africa, India, and most of Asia. The report warns of the impending destabilization of governments and militaries in countries suffering from the impact of AIDS and other diseases.

For Africa, the estimates are for 25 percent of the population to die off from AIDS and other diseases for the next 20 years, coupled with an increas-

ing number of orphaned children, and a downward economic spiral of at least 25 percent.

India currently has the largest number of HIV cases in Asia, and the epidemic is booming. A study in a city in southern India found that 30 percent of street children were HIV infected. In Tamil Nadu state, 11 percent of the women tested at clinics for sexually transmitted diseases were also HIV positive. Thailand, Cambodia, and Vietnam have serious epidemics, with high HIV prevalence in the militaries. The HIV epidemic in China is growing at a rate of 30 percent per year, and there are estimates of at least 600,000 cases by the end of this year. The CIA estimates that by 2010, Asia will surpass Africa in the total number of HIV infections.

The report also mentions the problem of increased drug resistance, and the fact that the development of new medicines and vaccines has not kept up with the mutating microbes.

WHO Estimates More Frightening

The World Health Organization's annual report on infectious disease,³ released in June 2000, after the CIA report, paints an even more frightening picture of microbial drug-resistance. The WHO warns that the world may soon lose the valuable drugs and our opportunity to control many infectious diseases because of increasingly drug-resistant pathogens. For example, Thailand has completely lost the use of three of the most common anti-malaria drugs as a result of resistance. In India, 60 percent of cases of leishmaniasis are resistant to first-line drugs. In New Delhi, three drugs that were effective against typhoid 10 years ago, today are useless. For the small percentage of the population of India that can even get the drug AZT to treat AIDS, a growing number are showing primary resistance. Even in the United States, a small percentage of patients who were given the "triple cocktail" treatment including protease inhibitors to fight HIV, show resistance to the drugs after three years.

Responses to the Pandemic

Since the release of the CIA report, some officials in the United States have made some strong statements showing that they understand the severity of the health crisis they now find themselves

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Viewpoint

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income. Genetically improved food is "scale neutral," in that a poor rice farmer with one acre in Bangladesh can benefit as much as a large farmer in California. And that farmer doesn't have to learn a sophisticated new system; he only has to plant a seed. New rice strains being developed through biotechnology can increase yields by 30 to 40 percent. Another rice strain has the potential to prevent blindness in millions of children whose diets are

"For the well-fed to spearhead fear-based campaigns and suppress research for ideological and pseudo-science reasons is irresponsible and immoral."

deficient in vitamin A.

Edible vaccines, delivered in locally grown crops, could do more to eliminate disease than the Red Cross, missionaries and United Nations task forces combined, at a fraction of the cost. These are some of the benefits that the Church of England saw when church leaders recently issued a position statement on "playing God" through biotechnology: "Human discovery and invention can be thought of as resulting from the exercise of God-given powers of mind and reason; in this respect, genetic engineering does not seem very different from other forms of scientific advance."

More recently, the Vatican director on bioethics, Bishop Elio Sgreccia, criticized the "catastrophic sensationalism with which the press reports on biotechnology" and he rejected the "idea of conceiving scientific progress as something that should be feared."

So, if scientists who are developing biotechnology are not "playing God" in the eyes of these religious leaders, what are we to think of those self-appointed guardians who would deny its benefits to those who need it most? We have the means to end hunger on this planet and to feed the world's 6 billion—or even 9 billion—people. For the well-fed to spearhead fear-based campaigns and suppress research for ideological and pseudo-science reasons is irresponsible and immoral.

GIULIANO PREPARATA (1942-2000)

A Physicist in Dialogue with Nature

by Emilio del Giudice, Ph.D.

On April 24, 2000, the Italian physicist Giuliano Preparata, one of the leading physical theorists of our day, died in Frascati, Italy, where he was directing a broad research effort to understand and unravel the mysteries of cold fusion, and thus to make a new source of energy available to humanity. He was still young, only 58 years old; he had been combatting cancer for several months.

The name of Giuliano Preparata, a member of the Scientific Advisory Board of *21st Century Science and Technology* magazine, was connected with many branches of physics. He started his career in the 1960s by making an important contribution to the understanding of the dynamics of hadrons, a field which was emerging from the study of deep inelastic scattering of electrons off protons. This dynamics originated from the strange and elusive physical objects, the quarks, which were clearly visible inside the protons, but were absolutely not extractable from there.

This bizarre phenomenon struck Giuliano deeply. Physics had discovered an object, the quark, which was unable to appear on the physical playground as an individual! Atoms can be split into nuclei and electrons, nuclei can be split into protons and neutrons, which are then shown, by interaction with electrons produced in modern accelerators, to be made of quarks; however, quarks cannot be separated!

The physics community at large was not deeply impressed by this fact. The large majority of scientists have been educated to play with numbers and follow the rules of the game without questioning when confronted with a new, strange and unusual fact, through which Nature tries to tell us about some



Stuart Lewis/EIRNS

Giuliano Preparata at the offices of 21st Century Science & Technology in 1990.

deeper, inner secret.

The Quantum Field

Giuliano had a classical education, trained in Greek and Latin at the Lyceum in Rome. He tried always to engage in a dialogue with Nature, and never allowed a hint from Nature to pass by unnoticed. The problem of quark confinement became an obsession for Giuliano for 15 years, until, in 1986, he found the solution, which struck deep into the heart of modern quantum physics.

Quantum physics differs from classical physics in that it cannot conceive of an object at rest! A quantum object always fluctuates, its fluctuations being

an essential part of its ontology, whereas a classical object can be deprived completely of its movement and still be conceived and measured. A quantum object has an inherent *horror vacui*, and this property is shared both by particles and force fields, which find a unifying principle in the *quantum field*.

A quantum field is an object extended in space and time, endowed with an inner rhythm, called a *phase*, and able to exchange energy and momentum with other systems in a discontinuous way, through packets called *quanta*. However these features are complementary, in the sense that the reduction of the field to a definite number of quanta, disturbs the internal rhythm so much as to spoil the notion of phase. Also, *vice versa*, the determination of the phase of the system, namely the dancing to the inner rhythm of the system, cancels out its depiction as a bunch of tiny balls, the quanta.

The mechanistic attitude of most scientists puts a premium on the physical system as an ensemble of balls, so that the alternate states of the system, where the phase is well defined, are generally neglected, except in particular cases such as lasers.

This is what happens in the systems made up of quarks: People are unable to give up the concept of quarks as classical particles.

The achievement of Giuliano was precisely to understand that quarks were allowed to settle only in those physical

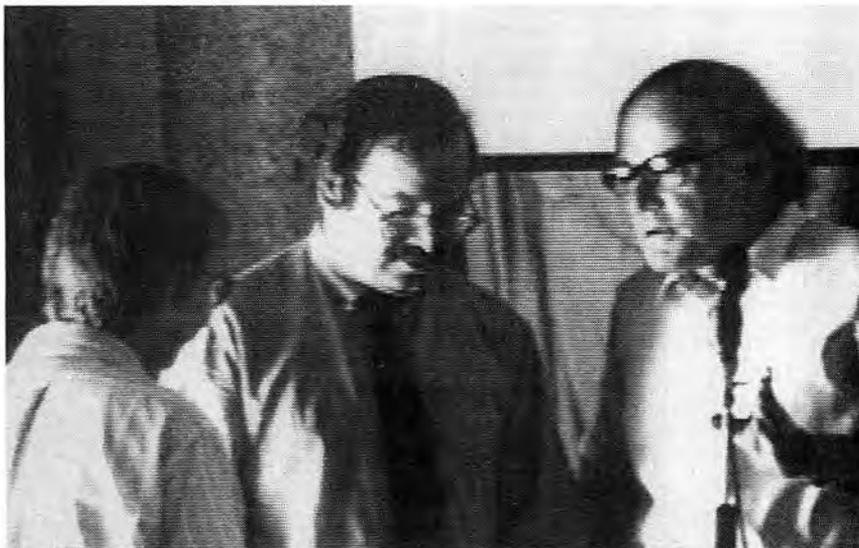
Dr. Emilio del Giudice, a member of the Physics Department of the University of Milan, was a long-time friend and collaborator of Dr. Preparata.

states where they were able to oscillate in phase with their interaction field, which had in turn a well-defined phase. In these states an enormous amount of energy would be necessary to liberate the quarks!

The understanding of the puzzle of quark confinement has opened the way to understanding the onset of the condensed states of matter, starting from the gaseous state. In the last 10 years, this problem has been carefully analyzed, and its solution emerges from the same pathway as in the quark case. When the density of particles in the system exceeds a threshold, it takes a smaller amount of energy to cause a common dance of all the particles in the same rhythm as a self-produced interaction (electromagnetic) field, than to have particles existing as estranged individuals in a vanishing field. (The latter is exactly the picture of an ideal gas, whose name is derived from a corruption of the word "chaos.")

The above result can be put in the frame of quantum concepts as follows. In the gaseous state, we have the energy allocated to the separated and independent fluctuations of both particles and electromagnetic field. In the condensed state these fluctuations tune together, there is a unique common fluctuation, where the motion of each component is simultaneously the cause and the consequence of the motion of all the other components. In the condensed state, the individual fades away, because it becomes unable to fluctuate independently of others, and its own fluctuation is a part of a general fluctuation; whereas in the gas, the other particle is perceived as an obstacle to its own motion, as a stranger.

Following the above lines, the problem of the formation of solids and liquids has been successfully tackled in recent years, and the results are summarized in Preparata's book, *QED Coherence in Matter*, published by World Scientific in 1995 (ISBN 9810222491). The word "coherence" means, in the jargon of physicists, movement in unison with the same rhythm.



Courtesy NOVA Resources Group, Inc.

Giuliano Preparata (center) with electrochemist Martin Fleischmann (right) and physicist Peter Hagelstein at the 2nd International Conference on Cold Fusion, Lake Como, Italy, in 1991.

Work on Cold Fusion

The concept of coherence was used by Giuliano to analyze the hotly debated phenomenon of "cold fusion," namely, fusion at room temperature of nuclei that are usually kept apart by very high electrostatic barriers. In this case, the goal (fusion) is also achieved by the collective and coherent work of very large ensembles of particles: Billions of electrons, by tuning their oscillations, create the situation where a nuclear reaction can become possible. Giuliano was just working at the task of making this nuclear reaction a safe ally of humanity when he died.

While in the hospital, he was exploring the possibility that a fraction of the nuclear fusion occurring in the stars might be "cold fusion-like." This could explain the anomaly that the detected neutrinos in solar radiation (which are produced in hot fusion) are many fewer than expected. Giuliano completed a paper on the subject in his hospital bed, just before entering surgery. "What hides at the center of the Sun?" was the question Giuliano was wrestling with, while facing the end of his life.

"What hides at the heart of Nature?" is the question he was always posing to his colleagues, disciples, and friends. We will keep Giuliano Preparata alive

and with us by posing this same question again and again.

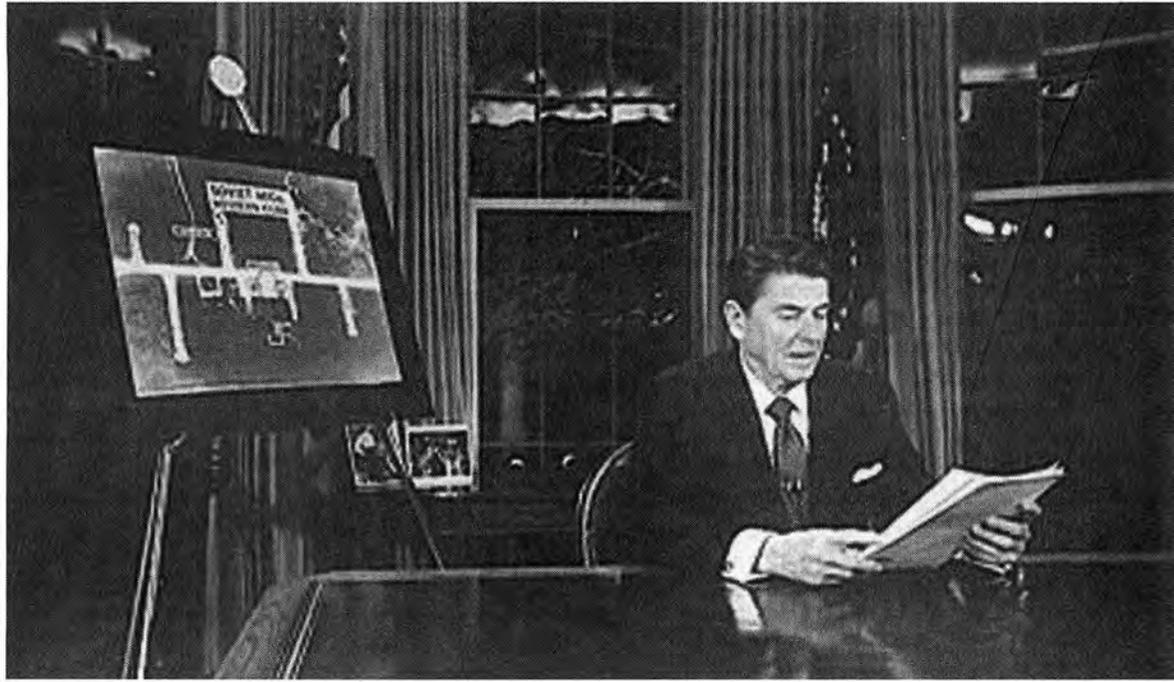
EDITOR'S NOTE

I first met Dr. Giuliano Preparata 10 years ago, while he was on a visit to the United States, accompanied by his colleague from the Physics Department of the University of Milan, Dr. Emilio del Giudice. A small incident that occurred the first day we met, showed me that here was a true man of science, and caused me to embrace Giuliano as a friend.

In the entry way to my house was a small framed reproduction of Rafael Sanzio's The School of Athens. The painting depicts the great thinkers of the classical world in their characteristic activities. On seeing it as he entered, Giuliano immediately expostulated: "Ah, Raffaello—you know that painting had a great effect on my life. As a boy in Rome, my father used to take me to the Vatican Museum, where I would look a long time at that scene. I decided at that time, that what I saw them doing there—that was what I wanted to do with my life."

The world needs more Giuliano Preparatas. We deeply miss him.

—L.H.



President Reagan, as he delivers his televised speech announcing the Strategic Defense Initiative, March 23, 1983.

National Archives

SDI REVISITED In Defense



Stuart Lewis/EIRNS

by Lyndon H. LaRouche, Jr.

In order that society might enjoy the benefits of discovered universal physical principles, it is essential to engage cooperation among the higher, cognitive processes of individual persons. The modern concept of "information," embedded in today's educational and scientific practice, makes such further advancement of cognition, and therefore of science, impossible. Such are the kind of underlying matters which must be addressed, to grasp the flaw in the arguments surrounding today's missile-defense debate.

Lyndon LaRouche addressing a Fusion Energy Foundation conference on his concept of strategic anti-ballistic-missile defense in Washington, D.C., April 13, 1983. Beginning in 1977, LaRouche played a leading international role in developing what President Reagan presented as his Strategic Defense Initiative.



Stuart Lewis/EIRNS

A demonstration supporting beam weapon defense, on the steps of the Capitol building in Washington, D.C., April 13, 1983, sponsored by National Democratic Policy Committee—the “LaRouche Democrats.”

of Strategy

U.S. President Bill Clinton’s recent proposals on missile defense, were delivered in Moscow slightly more than seventeen years after the March 23, 1983, announcement of the Strategic Defense Initiative (SDI). I focus upon certain crucial, current strategic issues of physical science posed by those U.S. proposals.

For reasons I shall explain, I shall relegate the core of my treatment of those scientific issues, to the closing portion of this report. I must first situate those issues of science itself, that at some unavoidable length, within the relevant political-strategic domain: *the form of strategic defense specific to the need to preserve the institution of the modern sovereign nation-state.*

If we limit attention to the appearance presented by the list of usual suspects from the precincts of the New York Council on Foreign Relations, the current crop of putative leading U.S. professional strategists, might be judged, as a whole, as worse than merely incompetent, even seemingly mentally and morally deranged. Fortunately, contrary to that general appearance, we should recognize, from other evidence, that the general situation is not quite that disastrous—not yet!

Behind the scenes, usually overlooked in the accounts of the leading news media, there are, among leading military and other professionals, significant numbers, in the U.S.A. and other nations, who, aside from their accustomed lack of willingness to risk taking controversial leading positions on the public record, can not only think, but are otherwise sane, essentially well-informed, morally sound, and competent, at least within the bounds of their areas of specialization. The

related fact is, that on evidence of performance, the leading news media currently prefer to mislead public opinion into believing that such a relatively less known stratum of competence, with its morality, and its opinion, does not exist.¹

Despite the false appearances created by government and the major media, the good news, which I wish to convey here, is, that were we to supply our less-heralded, competent specialists with the quality of leadership they require, leaders in the tradition of Abraham Lincoln or Franklin Roosevelt, the world has the chance—if no more than a good chance—to pull together the team needed to solve the most deadly threats menacing us now, thus to survive the present, global, economic and strategic crisis.

On this present occasion, as it happened to the little boy from Hans Christian Andersen’s fable, “The Emperor’s New Suit of Clothes,” it has fallen to me to take the personal risk, of making the important, necessary, leading statements, such as that little boy’s “But, he has nothing on”: statements which, otherwise, were not likely to be said publicly. As now, on the subject of strategic ballistic-missile defense, as in most among the relevant subjects in which I qualify as expert, I bridge what Britain’s C.P. Snow described, several decades ago, as the gulf of separation between physical science and culture, which has been adopted by our badly mistaken, current, all-too-credulous

1. To a citizen who denies the rumor that the Moon is made of green cheese, a relevant mass-media reporter, perhaps from *The Washington Post*, might snarl, “But, don’t you realize that none of your neighbors agree with you?” In many instances of a similar type, the neighbors in question chiefly do.

public opinion.² In this report, I bridge that division once again.

Specifically, beginning 1977, I came to play a leading international role in developing and proposing what President Ronald Reagan presented as his "Strategic Defense Initiative," in his televised address of March 23, 1983. It should be recalled here, that the Fusion Energy Foundation (FEF), of which I had been the leading co-founder, played a key part in those matters. During the past decade, *21st Century Science & Technology* has continued aspects of that work of FEF, as also the weekly *Executive Intelligence Review* (EIR).³ Then and now, all competent statements on the subject of missile defense, bridge the conventional, misguided separations of physical science from Classical culture.

Unfortunately, today, seventeen years after the March 1983 announcement, only a few among the leading, currently active political and military professionals, in any part of the world, choose to remember what President Reagan actually said. The voices in the world's mass media which are usually heard from among the spokesmen of today's U.S. Congress, the Bush campaign, and the Administration, thus find a credulous audience among an ill-informed, easily and readily duped public opinion, a public opinion which, so far, lacks any visible competence in judging the strategic and scientific issues posed by the subject of strategic defense.

Thus, what is being currently proposed on the subject of missile defense, from official Washington, is, in fact, medicine more dangerous than the disease it proposes to remedy. Among the large amount of evidence to support my characterization, there is little which could better demonstrate the childish incompetence of today's official Washington's missile-defense policy as simply and clearly, as the combined ignorance and turpitude with which today's major media establishment equates those current concoctions in the name of missile-defense, falsely, with the original SDI policy of March 23, 1983.

Seventeen years after President Reagan's announcement, today's currently popularized official delusions on this subject, reflect an utter disregard for the actual history of modern warfare. I mean "modern" in the sense of the history dating from the time since the mid-Fifteenth-Century recovery of Europe from a mid-Fourteenth Century "New Dark Age."⁴ Current U.S. officials usually show a corresponding, and related, and frankly utopian ignorance of, and indifference to, the elementary features of the history of progress of what actual missile-defense requirements underscore as being the strategically relevant features of modern physical science.

Consider the increasing numbers, both from the Republican Party's side, and in the Administration, who are presently proposing schemes and devices for missile defense. Examined

closely, none of these are consistent with the SDI policy announced by President Reagan's March 23, 1983, address. It is merely indicative, that some among the most energetic proponents of current schemes, are on record as having been opponents of the original SDI proposal back then. Today, much is heard through the major news media, as proposals for the early production and sale of the military hardware recommended. None among the voices generally recorded by those accounts, seems to be seriously concerned to show whether any of these expensive toys might actually work, or whether those proposed systems, whether they work or not, would actually accomplish any worthwhile purpose.

The present incompetence of both U.S. strategy, and NATO policy in general, is no less than *systemic*.⁵ To those who say, "Give us a chance, and, within five years, we will develop technologies which satisfy our requirements," our answer to such statements should be, that, even on bare scientific grounds, axiomatic grounds, there is no technology of that form, which could ever be discovered and developed, to meet the net performance requirements for the specific kinds of system which current Washington proposals outline.⁶

We must take into account the fact, that there is also a large amount of witting fraud behind the kind of missile-defense proposals which the United States has currently proposed, allegedly only against "rogue states." Behind such proposals for dealing "only with rogue states," there is the stated, geopolitical intent of some, such as that wild-eyed utopian Zbigniew Brzezinski and his associates, to bring about a military conflict in the Central Asia region adjoining the Caspian Sea,⁷ not with some "rogue states," but between NATO and a

5. This author's use of the term "systemic," signifies an axiomatically determined characteristic of the inherent design of the system as a whole. This signifies the use of "characteristic" in the sense of Bernhard Riemann's 1854 habilitation dissertation, ["Über die Hypothesen, welche der Geometrie zu Grunde liegen," in *Bernhard Riemann's Gesammelte Mathematische Werke*, H. Weber, ed. (1902): (New York: Dover Publications [reprint], 1953), or (Vaduz, Liechtenstein: Saendig Reprint Verlag, Hans R. Wohlend)], and of Riemann's consequent definition of what Gottfried Leibniz defined as *Analysis Situs*.

6. Notably, the destruction of President Reagan's SDI policy, from the inside, was done chiefly through the late Lt.-Gen. (ret.) Daniel Graham, who insisted that only "kinetic" interception systems, essentially of "off-the-shelf" designs, be allowed. The current proposals are based chiefly on that same, "double dippers' " Heritage Foundation dogma. Notably, the destruction of President Reagan's SDI policy, from the inside, was done chiefly through the late Lt.-Gen. (ret.) Daniel Graham, who insisted that only "kinetic" interception systems, essentially of "off-the-shelf" designs, be allowed. The current proposals are based chiefly on that same, "double dippers' " Heritage Foundation dogma.

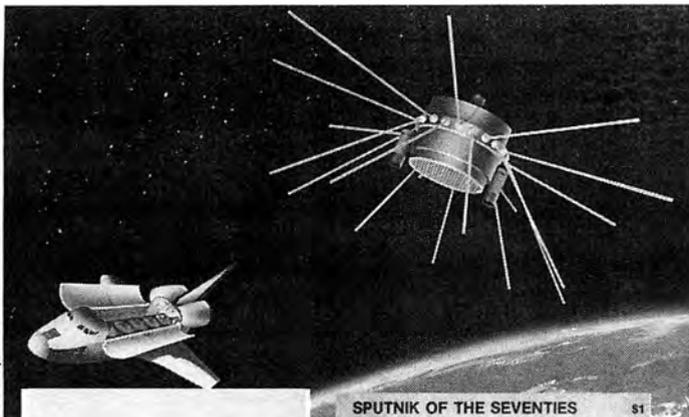
7. Zbigniew Brzezinski, *The Grand Chess Board: American Primacy and Its Geostrategic Imperatives* (New York: Basic Books, 1997). In this book, Brzezinski specifically revived British geopolitical theorist Halford Mackinder's 1905 "Geographical Pivot of History" and his 1919 *Democratic Ideals and Reality*. In his 1997 book, Brzezinski referred to the Trans-Caucasus region as the "Eurasian Balkans," which he envisioned as the flash point for conflicts that would, ultimately, lead to the break up of Russia, and the grabbing up of the petroleum and other strategic raw material reserves of Central Asia by Western cartels.

These very same lunatic ideas are being aggressively promoted by a newly created Mackinder Forum, reviving the writings of the early 20th century geopolitician. On June 30, 2000, a conference was held at Oxford University, launching the Mackinder Forum. In preparation for the event, two prominent Mackinder advocates, Geoffrey Sloan and Colin S. Gray, published an edition of Halford Mackinder's core writings, under the title *Geopolitics, Geography and Strategy*. The essays they selected focused on the Russian landmass as the "fulcrum" of Eurasia. The editors echoed Brzezinski's focus on Russia, and particularly the Trans-Caucasus region, reaching to the Caspian Sea, as the central point of conflict on the Eurasian land mass. All of this highly provocative gibberish, targeting Russia for break-up, ignores one fundamental reality: Russia's nuclear ballistic-missile arsenal could still overwhelm the existing defenses of the U.S.A.

2. C.P. Snow, *Two Cultures and the Scientific Revolution* (London and New York: Cambridge University Press, 1993 reprint).

3. During March 1973, I wrote a memorandum to a circle of my associates. This memorandum, which underscored such matters as Soviet Academician Vernadsky's argument concerning the relationship between living and non-living processes, defined the mission assigned to what was then named "the science file" of our news service. Two multiply-connected special topics were set into motion by that memorandum: the economics-driven threat of a long-term global biological holocaust, and the need for accelerated research aimed at the mastery of controlled thermonuclear fusion. The subsequent founding of the Fusion Energy Foundation (FEF) was a direct outgrowth of those combined initiatives. *21st Century Science & Technology* has continued the legacy of the FEF on these accounts.

4. Cf. Barbara Tuchman, *A Distant Mirror: The Calamitous Fourteenth Century* (New York: Alfred A. Knopf, 1978)



President Reagan's SDI proposal intended to free the world from the grip of "revenge weapons," by cooperative scientific research to develop technologies which would end the terrifying age of Mutually Assured Destruction; it was premised on a strategic proposal advanced by LaRouche.

Inset: Among the relevant documents are the 1982 pamphlet authored by LaRouche, "Only Beam-Weapons Could Bring to an End the Kissingerian Age of Mutual Thermonuclear Terror," and the 1977 pamphlet, put out under LaRouche's guidance by the U.S. Labor Party, "Sputnik of the Seventies: The Science Behind the Soviets' Beam Weapon." The illustration is of an X-ray laser, a beam-defense weapon based on new physical principles.

1.

The Treaty of Westphalia

The crucial issue posed by today's discussion of missile defense, is the following.

The history of European civilization since Charlemagne, has been hammered into shape by wars and other catastrophes caused by the recurring efforts of the would-be "globalizers," such as imperialist Venice's Thirteenth-Century Guelph League, which were intended either to prevent the emergence of the modern nation-state, or, as today, to destroy it.⁸ After more than a century of religious and related warfare, over the interval 1513-1648, the adoption of the 1648 Treaty of Westphalia, established those agreements on which all issues of strategy, and related matters of statecraft, had been centered, until such Twentieth-Century catastrophes as Ku Klux Klan fanatic Woodrow Wilson's Versailles Treaty, and U.S. President Harry Truman's folly in ordering the militarily unnecessary, August 1945 nuclear bombing of an already defeated Japan.⁹

So, with the collapse of the Soviet system, beginning during 1989, the principal three occupying powers with continued authority over Germany—Thatcher's Britain, Mitterrand's France, and Bush's U.S.A.—launched the imposition of a neo-feudal, imperial, "new world order," called "globalization," based upon the stated goals of "free trade" and "world government." This latter



Russia which is still a real, if badly tattered nuclear superpower. At that level of the Anglo-American establishment, the proposals for missile-defense systems, are predominantly, even wildly dishonest. Nonetheless, it is important and otherwise useful to examine the proposed schemes as if they had been sincere, if foolishly mistaken proposals. That I do, as much as facts permit, in the following pages.

The Fusion Energy Foundation, of which LaRouche was a leading founder, played a key role in organizing for beam defense, from the late 1970s on. Here, one day after President Reagan's televised SDI address, the Foundation's executive director, Paul Gallagher, appears on CBS evening news, to explain the concept of beam weapons. He is pointing to a painting of a chemical laser beam defense weapon, produced for the Foundation by Christopher Sloan.



Stuart Lewis/EIRNS

8. Venice's Fourth-Crusade conquest of Byzantium, was a crucial part of its rise to imperial power during the early Thirteenth Century. Venice's launching of the Guelph League campaign to destroy the Holy Roman Empire of Emperor Frederick II, and Charles of Anjou's bestial occupation of Sicily, typify the Venice operations leading into the mid-Fourteenth-Century collapse of Europe into a New Dark Age.

9. The fairy-tale, that that bombing "saved a million U.S. lives," is simply an outright lie woven into the litany of standard, hyperinflated utterances ever since. Absent Truman's folly, U.S. strategy had been based upon earlier negotiations from Japan, through the Vatican; the policy was to wait out the effects of a highly successful U.S. naval and aerial blockade, until Japan's recalcitrant generals were compelled to bend to the Emperor's desire for peace. No U.S. forced invasion of Japan was required.

has been, in effect, an attempt to return to not only the state of European civilization prior to the 1648 Treaty of Westphalia, but to return, in spirit, to those Guelph League policies of the Thirteenth and Fourteenth Century, the which had collapsed the number of parishes and population of Europe by approximately one-half. That latter was the greatest catastrophe experienced by western Europe since the collapse of the Latin Roman Empire, the Fourteenth Century's so-called "New Dark Age."

Thus, the crucial issue of strategic defense, as I have posed it, and as President Reagan's March 23, 1983, address did, is not a matter of pure and simple military countermeasures, but, rather, is the issue of the choice between military "balance of power"-style countermeasures, in the sense of feudal warfare, on the one side, and defense of the continuation and further development of the institution of the sovereign nation-state, on the opposing side.¹⁰

To refresh your memories: In the simplest terms, the essence of what President Reagan announced as SDI, was a proposal, as directed to the Soviet government, as also to our own nation and its allies, with the intent simply to free the world from the grip of "revenge weapons." He proposed, that science, aided by cooperative efforts among nations, could develop technologies which would save the world from a situation in which thermonuclear ballistic-missile barrages were the virtual ultimate weapon, a purely terrorist weapon, which held the politics of the world hostage to its threat.

In effect, what the President thus proposed, was a commitment to return the practice of statecraft to a saner time prior to the 1945 nuclear bombing of Hiroshima and Nagasaki, and thus return world politics and strategy to the President Franklin Roosevelt standard of the pre-August 1945 domain of rational behavior.

The hard kernel of President Reagan's March 23, 1983, announcement, was, in effect, the intent to undo that terrible threat to civilization as whole, which was represented by the policy set forth in the doctrine of nuclear-terrorist Bertrand Russell's Sept. 1946 issue of *The Bulletin of the Atomic Scientists*. Mr. Reagan's clearly implied argument, as delivered directly to the Soviet government during those weeks, was that if we can cooperate to bring "revenge weapons" under control, we may be able to find that pathway back to rationality, in which peaceful solutions to leading strategic issues could be negotiated and adopted.

The first thing to consider, in studying any among the current U.S. proposals for missile defense, is the fact, that President Reagan's proposal then, was directly and plainly opposite in purpose, in the deepest sense, to everything which is presently being proposed by the current advocates of missile defense as an instrument of "globalization."

10. Had Wallenstein and Gustavus Adolphus been allowed to continue their efforts for peaceful solutions, what became the later, most ruinous phases of the 1618-1648 Thirty Years War, would have been prevented. The assassination of Wallenstein, by those determined to prevent the alternative offered by Wallenstein and Gustavus Adolphus, unleashed the preventable full horror of the assassins' strategic folly. It is the establishment of stable and peaceful relations among sovereign nation-states, which has been, since 1618, the primary objective of modern civilized warfare. In other words, the proper object of war is durable peace; the sovereign nation-state, and its defense as an institution is an essential pre-condition for such peace, and is therefore that principle which warfare must defend.

One thing that the present warfare has brought about, is that there can never be secure peace on this planet anywhere, while any single power has the ability to prepare, more or less secretly, an air attack upon its neighbours. Whatever else this war may bring about, it will bring no abiding peace, unless all the world contrives to set up one single, permanent, world air commission, having absolute authority over civil, private and public aviation, over all air-ports, over the manufacture of aircraft of all sorts. This much of federation there must be, and given a united demand only from America and Russia that this should be so, it is an entirely practicable thing to set up—a united demand from America and Russia, if that can be brought about. If this war, and the exhaustion of the belligerent countries, goes on at its present pace, and if these two powers keep their strength intact, they will be in a position to dictate the conditions of the ultimate armistice and they will be able to establish peace in the air for ever. It will be far easier for the combatant countries to consent to aerial disarmament, if they have not to do so to a victorious antagonist. Armistice, relinquishment of air power, also have representative organisations must be set up in the world. It must not be left to the various powers, but it must be controlled, staffed by an international inspectors and the like. To control the air, then the world must also be federalised. The world of drugs and poisons would be far easier for a world government to take over the whole world, to monopolise it, and to arrange that a world big-game-keeper may be appointed as a weapon of any sort for such things in



Courtesy of the Institute of International Education

Secretary of State Madeleine Albright, speaking at the Institute of International Education in New York, Oct. 14, 1999, identified her roots in the "one world" government faction of Bertrand Russell and H.G. Wells. In the background is a page from Wells's utopian conclusion to his *Outline of History*, where he argues for a world federation government, to replace the republican conception of a "community of principle" among sovereign nation-states.

However, since 1983, especially since the close of 1989, the world has changed radically. Then, in 1983, President Reagan, as typical of one who had been, politically, an ordinary patriotic veteran during the course of time of the Great Depression and World War II, typified thus a generation whose views of U.S. strategic interest were still based upon the conception of the United States as a perfectly sovereign nation-state republic.

Now, since the 1989-1991 process of disintegration of the Soviet system, a new era, which President George Bush dubbed "a new world order," has been declared by many voices of the Anglo-American establishment, as the allegedly inevitable and irreversible overturning of the age of the sovereign nation-state, establishing a radically new age of "free trade," "globalization," and the rule of "supranational" institutions of radically positivist, and capricious forms of imperial law.

Unlike the Reagan of 1983, and, rather, like the Bush Republicans, and the Carter-Mondale Democrats, who had opposed SDI in 1983,¹¹ the Bush Republicans moved, in 1989-1992, to avow their intent to destroy the institution of the sovereign nation-state. Thus, the present advocates of missile-defense are, in fact, like former Carter National Security Advisor Zbigniew Brzezinski, demanding a return to the state of affairs which ought to be remembered from the Thirty Years War, or, earlier, the so-called Fourteenth Century New Dark Age.

What has been clearly intended by such circles, since 1989, and what is said with ever more shameless openness today, is a commitment to what Bertrand Russell's nuclear-weapons policy intended, the eradication of the sovereign nation-state, to make way for what Russell termed plainly, and repeatedly, "world government."

Thus, to restate and summarize the crucial point: where President Reagan's SDI proposal was intended to save the form of civilized relations among sovereign nation-states, as the 1648 Treaty of Westphalia defines such relations, the current draft proposals for limited ballistic-missile defense, are premised upon the directly opposite purpose. There, in blurring that fundamental difference in purpose, lies the kernel of confusion underlying all current proposals for missile defense. The present proposals express a determination to impose "world government" by aid of the Roman-empire-style police-force of the "new NATO": a return of the world to that century of catastrophe known as the Guelph League's plunge of European civilization into the Fourteenth Century's "New Dark Age."

Albright and the Wells of Doom

In contrast to the Reagan SDI of March 1983, the opposing missile-defense strategies of today's Governor George W. Bush, Vice-President Al Gore, and U.S. Secretary of State Madeleine Albright, reflect a different generation's political base than that of Presidents Kennedy, Johnson, Ford, and Reagan. Since Reagan's 1984 re-election, our governments have found their new political base chiefly in a shrinking ration of the population, constituted chiefly of social strata "likely to vote," which are representative of a class of persons harking back to the ultra-decadent "flapper" ideology of the Coolidge 1920s, who are vicious opponents of the American intellectual tradition. In fact, political figures such as Governor George Bush, Vice-President Gore, and U.S. Secretary of State Madeleine Albright, represent, axiomatically, the peculiar interest of a *species* alien to our own.

Secretary Madeleine Albright is by no means the author of this state of affairs, but she typifies the currently leading, implicitly treasonous threat to the sovereignty of the U.S.A. Perhaps, she does not intend to be treasonous; but, perhaps, "treasonous" is not a choice of term strong enough to express the depravity of her folly. Perhaps, there are extenuating circumstances for her case. Perhaps, for reasons of family upbringing, and related influences, she simply knows no better; perhaps, speaking clinically, she is incurable on this account.

She typifies that utopian concert of efforts to establish world government, as that current is also found among all too many of today's spokesmen for both the present Administration and

the U.S. Congress. To appreciate the sheer lunacy of the more popular variety of current versions of efforts to abolish the sovereignty of nations such as the U.S.A., it is convenient to focus upon the coincidence of the policies of Mrs. Albright and Vice-President Al Gore. Focussing upon this side of the matter, also clarifies the same utopian tendency, expressed under different trade-marks, as the policies of certain of the caretakers for Republican pre-candidate George W. Bush, Jr.

On this account, Mrs. Albright exposed herself most flagrantly, in an address she delivered, on October 14, 1999, in New York City, to an organization known as the Institute of International Education (IIE).¹² Not only did she identify the roots of her policy, as those of utopian fanatic and Bertrand Russell confederate Herbert George Wells, but the organization before which she chose to unbutton herself in this fashion, the IIE, had been founded, in 1919, as an habituated, key promoter of policies such as those of Wells and Russell inside the U.S.A.¹³ On that same occasion, she identified her U.S. career, and that of her father, former Central European diplomat Joseph Korb, as a notable beneficiary of the IIE's support, both for her and for those views of Wells.¹⁴

These policies of Wells identified by Albright in that address, are fairly summed up in two typical Wells locations, his *The Outline of History*¹⁵ and his famous, 1928 *The Open Conspiracy: Blueprints for a World Revolution*.¹⁶ There is no part of the policies attributable to the personal influence of

12. In her address to the IIE, Albright defended the very "public diplomacy" program of the State Department and other U.S. government agencies, that had caused such a proliferation of warfare, and the spread of illegal drugs and weapons, during the George Bush/Oliver North Iran-Contra fiasco. What is worse, she defended those criminal policies by invoking the name of H.G. Wells, one of Britain's leading social engineers of the late 19th and 20th centuries, who advocated a world government based on a scientific dictatorship. Albright told the audience, "About the time the IIE was founded, British author H.G. Wells wrote that 'history [is] a race between education and catastrophe.' Helping people to value democratic principles of tolerance and openness is a good way to aid us all in winning that race." Albright singled out non-governmental organizations (NGOs) for special praise, in her speech, providing the audience with a laundry list of recent instances where her State Department backed NGOs in efforts to destabilize sovereign, nation-state governments all around the world.

13. IIE was founded in 1919 by Nicholas Murray Butler, the President of Columbia University; Elihu Root, the former Secretary of State; and Stephen Duggan, head of the Carnegie International Institute for Peace, ostensibly to foster international educational exchange programs. Prior to President Franklin Roosevelt establishing diplomatic relations with the Soviet Union, the IIE was one of the most prominent "back-channels" between the Wall Street and State Department circles and Moscow. Working with *The New Republic's* Michael Straight, IIE was behind John Dewey's lengthy trip to the Soviet Union in 1926, from which he published a series of glowing reports about the high quality of Soviet education. In the 1930s, the IIE formed the Emergency Committee for Displaced German Scholars, through which, the entire Frankfurt School apparatus of social revolutionaries and subversives was brought to the United States, and placed in American universities and research centers. The Emergency Committee was run by John Dewey and Egbert Roscoe Murrow (later known to the world as Edward R. Murrow), and was modelled on an earlier agency established in Britain, called the Academic Assistance Council, headed by one of H.G. Wells's leading protégés, and world government fanatics, Leo Szilard. In the 1940s, Stephen Duggan was replaced, as head of the IIE by his son Laurence, who was later exposed as a member of the extended Anglo-Soviet espionage apparatus of Noel Field and H. Kim Philby.

14. Joseph Korb, a former official of the Eduard Benes government of Czechoslovakia, served as the academic godfather of George W. Bush advisor Condoleezza Rice. Sometime Albright political godfather Zbigniew Brzezinski, is a son-in-law of the same Benes. Together, the Korbels and Brzezinskis represent outgrowths of the pro-feudalist bureaucracy of decadent and fallen Central European states, a species steeped in the same quality of cultural pessimism out of which Twentieth Century European fascist currents were spawned. Albright is redolent with that specific type of cultural pessimism.

11. For example, Vice-President George Bush's circles.



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America-hater Bertrand Russell (1872-1970) used the threat of nuclear arsenals to promote his plan for world government. Through his proxies, such as Leo Szilard, Lord Russell authored the U.S. development of the nuclear bomb, and effectively directed nuclear-arms-control policies, into his 90s. Here Russell addresses a world disarmament rally in London, in September 1959.

Mrs. Albright, inside the Clinton Administration, nor those of Vice-President Al Gore, which are not coherent with the most disgusting elements of the policies which Wells and Russell adopted in common, as their schemes for eliminating the sovereign nation-state and establishing world government.

Nor is there anything inconsistent between those Wells policies and the impact of the IIE in U.S. life since its founding. Nor are there truly significant points of difference between the political philosophy of IIE-sponsored Albright and such IIE-sponsored, existentialist, avowed haters of the American patriotic intellectual tradition, as systemic irrationalists Max Horkheimer, Theodore Adorno, and Hannah Arendt.¹⁷

Nor should anyone be astonished by the fact that the views attributed to George W. Bush, Jr.'s pre-candidacy, are consistent, like candidate Gore's, with that commitment to a Wellisian form of world government, as expressed by former President George Bush's proclamation of "world government," as a "new world order."¹⁸ Between the policies of Governor

15. H.G. Wells, *The Outline of History: Being A Plain History of Life and Mankind* (Garden City, N.Y.: Garden City Publishing Co., 1920, 1931, 1940).

16. H.G. Wells, *The Open Conspiracy: Blueprints for a World Revolution* (London: Victor Gollancz, 1928)

THE BULLETIN

OF THE ATOMIC SCIENTISTS



4 minutes to midnight

The "Doomsday Clock" logo of the *Bulletin of the Atomic Scientists*, which was set at seven minutes to midnight in June 1947. The one-world-government Pugwash group moved it forward or backward according to its estimation of "international tensions"—the Mutually Assured Destruction concept of Lord Russell. Here, the clock is shown at four minutes to midnight in 1981, when, the *Bulletin* stated, "both superpowers develop more weapons for fighting a nuclear war."

George W. Bush's present pre-candidacy, and those of Albright and Gore, there are secondary differences in matters of style, but not in ultimately implied goals.

On these and related matters, as Russell wrote in 1928, there are no important differences between the "Open Conspiracy" policies of Wells and Russell, on the one hand, and those of such present-day followers of President Theodore Roosevelt, President Woodrow Wilson, Wells, and Walter Lippmann, as Al Gore and Albright. The genetic heritage is the same axiomatically; the differences aggregated by processes of mutation over successively intervening generations and degenerations, are essentially slight; the differences are merely stylistic, and the novelties chiefly psychedelic.

In addressing the matter of ballistic-missile defense, we are obliged to emphasize the role in which reports of British Empire scientists Rutherford's and Soddy's work on nuclear fission, led Wells, in 1913.¹⁹ It is from that standpoint, that

17. T.W. Adorno et al., *The Authoritarian Personality* (New York: Harper, 1950). All of these Frankfurt School followers of Georg Lukacs were, like Nazi Philosopher Martin Heidegger and Karl Jaspers, fanatical advocates of the policy that truth does not exist, only existentialist forms of opinion. Merely typical of this moral degeneracy is Hannah Arendt's series of books on totalitarianism.

18. President Bush spoke to Congress Sept. 11, 1990. He gloated over the then-onrushing collapse of the Soviet Union, which removed any hindrance to "concerted United Nations action" so that the "crisis in the Persian Gulf . . . offers a rare opportunity to move toward . . . a new world order. . . ." (*Washington Post*, Sept. 12, 1990).

19. See, Frederick Soddy, *The Interpretation of Radium and the Structure of the Atom* (New York: G.P. Putnam & Sons, 1922), and H.G. Wells, *The World Set Free* (London: Macmillan, 1914), dedicated to Soddy. Publicist Wells is the putative inventor of the term "atomic bomb." Notably, although Wells had publicly acknowledged this debt to Soddy in his own 1914 *The World Set Free*, no suitable reference to a matter so important appears in his own 1934 autobiography. Soddy, whose most significant apprenticeship, in study of the disintegration of radioactive elements, occurred under Ernest Rutherford at Montreal's McGill University, is among the first known, during 1908-1914, to have proposed the feasibility, and prospective power of fission weaponry. After Soddy had received his 1921 Nobel Prize in chemistry for related discoveries, his 1908 lectures, on which Wells had relied chiefly for his 1914 proposal of a nuclear balance of power, were published as a book.

Wells, already in 1913, was able to foresee the development of weapons based upon nuclear-fission principles, as sufficiently terrible to force existing nations to capitulate to a return to the intended kinds of world government, forms of world government which we might remember from ancient Babylon, Rome, and European feudalism.

As Wells himself, from 1928 on, situated the combined work of the world-wide confederates of himself and Russell, he conceived of this role of nuclear terror as a second phase of the Fabian conspiracy from the pre-World War I decades, which he identified by his choice of title for his manifesto: *The Open Conspiracy*. It was under Wells' crony Russell's political direction, that the development of nuclear-fission weapons occurred, and it was through the policies of Russell and such Russell devotees as Leo Szilard, John J. McCloy, McGeorge Bundy, Henry Kissinger, et al., that the diplomatic architecture of today's drive for a world government modelled upon the tradition of pagan Rome, has been launched.

I have documented elsewhere the leading features of the development of the Wells-Russell doctrine of nuclear weapons, as a means for abolishing the sovereign nation-state and establishing a neo-Roman Empire of world government.²⁰ Therefore, here, I need but summarize the crucial, relevant points of that development.

Fabian Society figures Wells and Russell had both been key figures of Lord Alfred Milner's Coefficients (for example, Round Table) organization, the association which contributed a key role in the British monarchy's planning of what became World War I. Russell had walked out of the Coefficients in a petulant aristocrat's temperamental fit, whereas plebeian Wells remained with King Edward VII's Lord Cecil, Milner, Mackinder, et al., and became a leading political-intelligence figure of the British imperial establishment for that war.

Later, during the 1920s, Wells and Russell patched up their war-time differences, consolidating their not inconsiderable world-wide political-intelligence resources, in support of what Wells's defined as "The Open Conspiracy." The larger portion of the general naughtiness and nastiness of the recent century, can be put to the account, directly or indirectly, of the included, leading contributions of this pair and their accomplices. At the center of that business, was the Wells-Russell plot to bring about world government through the development of nuclear arsenals, a policy which Russell continued to the end of his wretched existence.

America-hating, British aristocrat Russell, using such among his acquired devotees and lackeys as physicists Leo Szilard and Eugene Wigner, actually authored the U.S. development of the nuclear bomb, and effectively directed British and

U.S.A. nuclear-weapons and nuclear-arms-control policies throughout the entirety of his life thereafter.

It was, for example, the Russell-Wells policy of world-government, as established through the threat of nuclear arsenals, which prompted the nuclear bombing of Japan by President Truman, and which guided Arms Control and Disarmament Agency (ACDA) chief John J. McCloy and such McCloy clones and Golems as McGeorge Bundy and Henry A. Kissinger. It was the same Russell who had demanded, publicly and repeatedly, a preparation for nuclear attack upon the Soviet Union, beginning 1946, who opened the mid-1950s channel to Stalin successor N.S. Khrushchev, leading to the establishment of the Pugwash Conference and to the Cuba Missiles Crisis of 1962. It was the sequence of developments marked by Russell's role in mediating between Moscow and Washington during the Missiles Crisis, and the assassination of President John F. Kennedy, which locked London, Washington, and Moscow, into the "detente" track of Kissinger's 1972 negotiations of SALT I and the Russell-designed Anti-Ballistic-Missile (ABM) treaties.

The long drive toward world government, came proximate to its goal, with the collapse of the Soviet system, over the interval 1989-1991. The virtual elimination of the chief military challenge, that of the Warsaw Pact alliance, to the combined powers of the NATO forces, was taken by the London and New York backers of this, the then-deceased Russell's design, as the occasion for brushing aside most among the pre-1989 allies of London and New York, such as continental Europe's NATO members, and establishing a form of world government, representing rentier-financier interests, since then run, jointly, and more or less exclusively, by the Anglo-American powers. Thus, President George Bush proclaimed a Roman imperial style in Anglo-American world government: his, rather than Adolf Hitler's "new world order." The final assessment of the actual differences between the two schemes has yet to be made.²¹

As a lapsed-time portrait would help us to see clearly the result of this drive toward world government through nuclear terror, over the span of the past fifty years—especially since the untimely death of President Franklin Roosevelt, the characteristic feature of the efforts of those behind the Anglo-American domination of the world today, is nothing different than what Wells set forth in his 1928 *The Open Conspiracy*. Read Wells's frankly satanic program from that book, and weep for today's imperilled mankind:

1. The complete assertion, practical as well as theoretical, of the provisional nature of existing governments and our acquiescence to them;

2. The resolve to minimize by all available means the conflicts of these governments their militant use of individuals and property and their interference with the

20. Lyndon H. LaRouche, Jr. "On The Subject of Strategic Method," (Bad Schwalbach, Germany, address of May 26, 2000) *Executive Intelligence Review*, June 2, 2000, pp. 20-35. See also, Lyndon H. LaRouche, Jr., "The Becoming Death of Systems Analysis," *Executive Intelligence Review*, March 31, 2000, pp. 10-73; LaRouche, "When Andropov Played Hamlet," *Executive Intelligence Review*, April 21, 2000, pp. 14-31, and LaRouche, "Information Society: A Doomed Empire of Evil," *Executive Intelligence Review*, April 28, 2000, pp. 36-55

On this subject of the Wells-Russell collaboration, see a book produced under my design and direction during the last years of the 1970s. Although I set forth the thesis and mapped the principal features of the book, the detailed work was done by a rather large number of my associates, and published as Carol White, *The New Dark Ages Conspiracy* (New York: New Benjamin Franklin Publishing House, 1980).

21. It should be emphasized, that it was President George Bush's father, and Governor George W. Bush's grandfather, Prescott Bush, who played a key role in funding Adolf Hitler's appointment as Chancellor of Germany. See, Anton Chaitkin and Webster Tarpley, *The Unauthorized Biography of George Bush*, (Washington, D.C.: *Executive Intelligence Review*, 1992). None of those connections to Hitler's regime are merely coincidental for the understanding of the history of the U.S.A. and the world during the current year and the next.

establishment of a world economic system;

3. The determination to replace local or national ownership of at least credit, transport, and staple production by a responsible world directorate serving the common ends of the race;

4. The practical recognition of the necessity for world biological controls, for example, of population and disease;

5. The support of a minimum standard of individual freedom and welfare in the world;

6. The supreme duty of subordinating the personal life to the creation of a world directorate capable of these tasks and to the general advancement of human knowledge, capacity, and power.

If one assesses those six points against the background of Wells's strongly argued social theories, before and after that 1928 publication, Wells and his proposals, and avowed Wells follower Albright, are to be regarded as a form of universal fascist dictatorship containing, axiomatically, all of the evil features of Hitler's regime, and much more besides. This is precisely what Russell himself had proposed, independently of Wells, earlier, and later. This is the pedigree of the "Third Way" policies of London's new Mussolini Tony Blair, today, and his leading U.S. devotee Al Gore. This is precisely what



Illustration by Christopher Sloan

"The functionally defined difference between mankind and the beasts, is that ours is the only species of living creature which is capable of willfully increasing its specific potential relative population-density." Without a Classical humanistic education, as LaRouche demonstrates, society produces people who think like beasts.

Secretary Albright's perverse performance, "in service of democracy," on record, as in Africa and South America, represents to date; that is precisely what is represented by those who deploy her on behalf of such policies.

This is what Secretary Albright, and her policies, represent. With declarations such as her October 14, 1999, New York address, she has placed herself on the public record, as consciously motivated by a passion, not only to wipe the sovereign nation-state permanently from the world's map, but to sink all of civilization into the kind of doom prescribed by the wildly Romantic utopians Wells and Russell. The fault for this lies less with what she herself does, than with those in government who wittingly, and revealingly, tolerate or even encourage her song and dance.

2. Science, Society, And Strategy

Since the exemplary reforms of Solon of Athens, the principles of strategy associated with the history of globally extended European civilization, have reduced the essential issues of statecraft, including warfare, to an axiomatic difference between two axiomatically incompatible notions of society.²² The one, the Classical republican notion, expressing the Classical Greek tradition in science and art, has been the policy of promoting a truthful and just promotion of the general welfare of all persons and their posterity, that by means of mankind's increased power over nature.²³ The opposing, so-called Romantic view in statecraft and art, that of ancient Babylon, Tyre, the Delphi cult of the Pythian Apollo, and pagan Rome, has been the rule of a relative few, an oligarchy and its attached retinues of lackeys, over a majority of a mankind degraded to the status of virtual human cattle.

The modern sovereign nation-state republic, as typified by the 1776 U.S. Declaration of Independence and the 1789 Preamble of the Federal Constitution, belongs to the first type; the British Empire since the accession of George I, has typified the second. The effort, typified by the Wells-Russell *The Open Conspiracy*, to bring world government and "globalization" into being, is the inevitable yearning for a return of the world to the idea of world empire of the figure which London opinion then regarded as the leading Venetian of late Eighteenth Century Britain, Lord Shelburne. Shelburne, the British East India Company's chief controller and sponsor of the careers of Adam Smith, Edward Gibbon, and Jeremy Bentham, and many other British notables of the time, led in causing this imperial perspective to be adopted by the British monarchy. This created the imperial model, continued by the British monarchy to this day, adopted out of the British East

22. LaRouche, *op. cit.*

23. "Truthful and just" signifies the use of *agapē* in Plato's *The Republic*, and the Apostle Paul's *I Corinthians* 13. This is in direct opposition to the denial of the existence of truth by the empiricists, Immanuel Kant's *Critiques*, and such neo-Kantian existentialists as Adorno, Jaspers, Arendt, and sometime Arendt intimate and Nazi philosopher, Martin Heidegger. The denial of truthfulness, as Kant, Jaspers, and IIE's Frankfurt School existentialists militantly denounced truthfulness, is key to understanding the mind-set of Secretary Albright and her confederates today.

India Company's envy of the example of ancient pagan Rome.²⁴

That low-comedy, music-hall spectacle, the 1989 capture of President George "Trilby" Bush by Prime Minister Margaret "Svengali" Thatcher, illustrates the point. That 1989-1991 capture of the U.S. government, under circumstances of the fall of the Warsaw Pact system, as a virtual "free trade" lackey of the London financial center, was used, as Bush himself described this, to establish a "new world order." This was intended to become a Romantic world empire, implicitly modelled upon that of pagan Rome, and based upon a symbiotic condominium of the tattered military power of the U.S.A. and the decadent financial and political power of the British Commonwealth.

Under this post-1989 arrangement, the other nations and peoples of the world, including those of continental Europe and the United Nations Organization generally, have been degraded since to the status of either mere auxiliaries, or simply hapless victims, of an overreaching, Roman-style, Anglo-American imperial overlord. Since then, like the Roman arena under the Claudian emperors, this has become a global farce turned gruesome.

This state of affairs, brought into being over decades, chiefly by aid of the Wells-Russell use of nuclear arsenals to bring world government into being, identifies the crucial change which underlies the difference between President Reagan's original proposal of SDI, and the lunatic follies of the U.S. missile-defense proposals of today. The former, Reagan's SDI, appears to have been the last attempt, from the U.S.A., to save that system of sovereign nation-states which the United States had been founded to establish. The latter is a nakedly geopolitical attempt, to enforce the total rule over all of this planet, by an Anglo-American financier oligarchy's "new Roman Empire."

The best way in which to demonstrate the follies inhering in both Mrs. Albright's and kindred bestialities, is to examine the matter from the standpoint of a rational, republican view of the same strategic issues. To that purpose, we can not avoid summarizing the most crucial issue separating the Classical republican view of man, society, and nature, from that of today's "globalizing" apostles of the financier-oligarchical imperialism, as expressed by creatures such as Mrs. Albright, her Vice-President Gore, the caretakers of Governor George W. Bush, and Britain's Mussolini-lookalike Tony Blair.

This brings into focus the crucial relevancies of physical



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The American System of political economy, which ensured that the United States would become an industrial, science-based culture, was based on the Classical, anti-empirical notion of "action," as understood and practiced by Benjamin Franklin, Alexander Hamilton, Abraham Lincoln, and Lincoln's economic advisors, Mathew and Henry C. Carey. Here, a depiction by Theodore R. Davis of the Corliss engine exhibit at the 1876 Centennial Exhibition in Philadelphia, which celebrated America's emergence from a colony to a leading world economy.

science for modern republican strategy.²⁵

Science and Culture

From the experimental standpoint of animal ecology, the functionally defined difference between mankind and the beasts, is that ours is the only species of living creature which is capable of willfully increasing its specific, potential relative population-density. The exemplary expression of this specific capability, is the way in which individual members of our species are capable of generating, not deductively, but cogni-

24. The conflict between the Classical and Romantic traditions, is the central feature of Eighteenth Century European politics and art. It was the Classical faction, as typified for Germany by Leibniz and Bach defenders Abraham Kästner, Gotthold Lessing, and Moses Mendelssohn, who rallied for the cause of the independence of the U.S. republic. It was the Romantic tradition, typified by the so-called British and French Enlightenment, who formed the hard-core of the pro-British faction. Thus, followers of the Classical faction of Lessing and Mendelssohn, such as Goethe, Schiller, and the Humboldts, like Keats and Shelley for England, typify the pro-American faction, whereas the Romantic current formed the hard core of the pro-British faction in late Eighteenth and Nineteenth Century Europe.

25. The term "republican," as used in the Classical Greek sense here, is equivalent to "American Whig." This signifies the Carey-Clay-Quincy Adams-Lincoln legacy, and the revival of the American Whig legacy by President Franklin Roosevelt. Today, and since 1976, the present writer is the leading political representation of that legacy inside the U.S.A.

tively, as individuals, experimentally validatable, original discoveries, and rediscoveries, of universal physical principles.²⁶ Primarily, it is through the application of such experimentally demonstrable universal physical principles, as new technologies, to the effect of transforming mankind's relationship to the physical universe, that mankind's power in and over the universe, is increased, as measurable per capita, and per square kilometer of the Earth's surface area.

This explicitly physical expression of our species' uniqueness, has an essential, cognitive complement. The ability to replicate the cognitive action of experimentally validatable discoveries of universal physical principles, requires a similar, cognitive, mode of discovery for those also validatable, universal principles which we associate with Classical artistic modes of composition. The latter are typified by Classical Greek tragedy, the revolution in painting by Leonardo da Vinci and Raphael Sanzio, and the revolution in musical composition and performance by J. S. Bach and such followers of his anti-Romantic, polyphonic method, as Haydn, Mozart, Beethoven, and Brahms. Under Classical artistic composition, we must include related forms of study of the principles of history and of the related practice of statecraft. The latter include modern Classical military strategy as a combined product of Classical methods in science and artistic composition.

Today's public opinion has been brainwashed into belief in an axiomatically irrationalist, hermetic separation of science from art, as that separation was decreed by the empiricists, the existentialists, and by the similarly avowed pathological liars Immanuel Kant and Karl Savigny. Against that induced, popular delusion, the multiply-connected integrity of Classical science and art must be emphasized here.

In order that society might cooperate to enjoy the benefits of discovered universal physical principles, it is not sufficient to bring individual persons into merely deductively logical forms of cooperation. It is essential to engage cooperation among the higher, cognitive processes of individual persons. The methods of Classical humanistic education, typify the cultivation of such higher forms of functional literacy. Such methods are opposed to the inherently stultifying mere learning of so-called "information."

It is not the competent educational practice of civilized societies, to train the majority of individual persons as if they were merely a sub-human form of life. We must despise, as bestialized, an educational policy which emphasizes the conditioning of the victim to repeat a learned procedure, or derive theorems, as if at the blackboard, only by formalists' deductive methods. The essential superiority of the human being to the lower living species, is demonstrated clearly, only when the individual mind is prompted to reenact, successively, the cognitive processes by means of which mankind earlier had generated each among its existing accumulation of experimentally validatable discoveries of universal principles.

The principles which the individual must rediscover, are

26. That is to emphasize the difference between reductionist methods of mere deduction and induction, and cognition, otherwise fairly described as the difference between mere logic, which can be performed by a digital computer, and actual human reason, of which a digital computer is axiomatically incapable.

both known universal physical principles, and also the Classical artistic principles associated with Classical forms of artistic composition. We must include, under Classical artistic composition, the mastery of history and statecraft from the standpoint provided by broad and deep education and experience in both Classical forms of science education and also Classical forms of artistic composition. Otherwise, the student can not become literate in either science or history and statecraft. The essential form of republican education of the citizen, is not mere learning, but, rather, the cultivation and refinement of the individual's cognitive powers for generating and validating universal discoveries of principle, either as original discoveries, or, more often, as replications of earlier original discoveries.

From these and related evidence, we derive a functional notion of the existence of man within the universe, a notion of man's specific, unique nature, as a living creature which has the essential self-interest, and also the means, to increase its power within and over that universe willfully, and to transmit that increased power to future generations. It is from this standpoint, so just described, that the essential axioms of Classical strategy are derived. It is from this standpoint, that we are able to show the absolute differences setting the

"My proposal to shift the approach to strategic defense, to the forced-draft realization of revolutionary *physical-economic* breakthroughs along known pathways, proffered a solution to a problem which was *axiomatically* insoluble within the characteristic curvature of then presently accepted definitions of the problem."

March 23, 1983, SDI policy into total and irreconcilable opposition to the folly of that pathetic parody of SDI which President Clinton recently presented to Russia's President Vladimir Putin.

Economy and Strategy

In contrast to Mr. Clinton's recent blunders in Moscow, my own 1977-1983 development of the case for what President Reagan presented as SDI, was pivoted, upon my preceding original discoveries within that branch of physical science known, since Gottfried Leibniz's work of 1671-1716, as that science of *physical economy* upon which Benjamin Franklin et al. premised the *American System of political-economy*. The only meaning of that term, *American System*, among literate persons world-wide, still today, is the usage employed by U.S. Treasury Secretary Alexander Hamilton, Mathew and Henry C. Carey, and Friedrich List.

This is the same anti-British "free trade" system, the American System adopted extensively in Germany, Russia, Japan, the Americas, and elsewhere following the gathering of international admirers at Philadelphia's 1876 Centennial Exposition. This is the American System which the circles of pre-candidates Bush and Gore, for example, are fanatically



Gottfried Leibniz (1646-1716)



Bernhard Riemann (1826-1866)



Vladimir Vernadsky (1863-1945)

"What makes a truly creative scientist, is not the accumulation of what he or she has learned. Rather our concern should be, what will he be able to discover when faced with the challenge of the unknown?" LaRouche contrasts the Leibnizian approach to science, exemplified by Riemann and Vernadsky, to the "fanatically empiricist" approach of Russell.

committed to suppressing and eradicating, not only inside the U.S.A., but throughout the world.

My own original discoveries within this branch of science, made use of the work of Bernhard Riemann, although I went far beyond Riemann in a relevant, crucial feature. This incorporation of Riemann's work as a way of situating my own earlier original discoveries, is, with an eye cast toward a crucial observation by Russia's great, polymathic physical chemist Vernadsky, the key to understanding my extensive crucial contribution to what became the original SDI proffer, and to defining the continuing relevance of the March 23, 1983, announcement for today.²⁷

The result of my part in shaping that initiative, was the use of certain critical features of modern physical science, to define a method for out-flanking a strategic scale of thermonuclear ballistic-missile salvos. This was the kernel of my published work on the subject of strategic ballistic-missile defense, over the interval 1977-1983 and beyond.

It is indispensable that I now put a certain technical point on the record, even if the significance of those terms is not yet fully clear to most readers at this stage of the report. The point I now introduce is sophisticated, but crucial. It is more than well worth the added, continuing effort required to understand it.

To address the challenge of thermonuclear barrages, it was, and is necessary to introduce a certain shift in the conception of the so-called principle of the flank, as that had been previously defined, for example, by the Classical work of General

Field Marshal Graf von Schlieffen.²⁸

On the level of physical science as customarily defined, the solution to the problem of ballistic missile defense, was implied by Bernhard Riemann's revolution in physics, as an application of what is known as his principle of multiply-connected manifolds.²⁹ Yet it was indispensable to carry these considerations to a still higher level, the level of "psychology," as the science of physical economy defines "psychology." This means psychology as defined and ruled by the same principle of cognition expressed by valid discoveries of universal physical principles, and also associated with Classical artistic metaphor. It was that higher appreciation of the strategically relevant implications of Riemann's work, which defined my approach to the problem. I shall make the significance of those terms clearer at the proper stages of discussion below.

Contrary to what British imperial political geographer Halford Mackinder et al. termed "geopolitics," geography as such is not the pivot of history, but only its animal environment. The famous, commonplace point of military doctrine, respecting the ability to dispose forces to control terrain with relatively greater efficiency, is important for animals and for the animal side of military behavior, but, for human affairs, is a subordinate issue, not the primary one.

For example: The way in which Alexander the Great defeated the Persian Empire at Issus, in Cyrenaica, at Tyre, and on the plains outside Arbela, anticipated the celebrated actions of Hannibal against the Romans at Cannae. In all the great flanking actions of history, including Gaugamela, Cannae, Lazare Carnot's transforming inevitable defeat into absolute victory during 1792-1794, von Schlieffen's example

27. Vernadsky's rebuttal of those who proposed to derive the existence of living processes from the chemistry of non-living processes, was that life represented a higher order of existence in the universe than non-living processes as such. To this I agreed; but, I added, that, similarly, cognitive processes are of a higher order than can be adduced from living processes other than mankind. My argument is consistent with that of Nicholas of Cusa, that inferior species may participate in higher orders, as a dog participates in a child's life through a common play-drive, but that the existence of the higher order is not to be deduced from the principles which are apparently sufficient to explain the internal dynamics of the lower.

28. Alfred von Schlieffen, *The Theory of the Flank* (Leavenworth, U.S. Army translation). Also, *Generalfeldmarschall Graf von Schlieffen: Die taktisch-strategischen Aufgaben aus den Jahren 1891-1905* (Berlin: Siegfried Mittler und Sohn, 1937). The extensive collection of maps included in the latter work is of notable interest.

29. *Op. cit.*

of the victory of Frederick over the Austrians at Leuthen, von Wolzogen's historically researched design for the successful defeat of Napoleon in Russia, the vast superiority of General MacArthur's performance as a theater commander during World War II, and President Franklin Roosevelt's relatively awesome strategic genius as Commander in Chief, *the higher principle of the strategic flank, is to be found, not in the terrain, but only within the domain of the sovereign cognitive powers of the individual mind.*

It could not be otherwise. The proof lies in the characteristic feature of the human species' unique relationship to all "geography," man's functional, not simply geographic relationship to the physical universe. That relationship is not one of "action at a distance," but the way in which *man's form of action upon the universe* may be transformed to such effects as nullifying what have seemed to have been tried and true, conventional ways of acting.

The crucial point is, as already stated here, that *only the human species is capable of willfully increasing its characteristic potential relative population-density.* The key to defining the principle of the strategic flank for the nuclear age, is, therefore, man's capability of "outwitting," for example, a threatened strategic salvo by flotillas of thermonuclear-armed ballistic missiles. The term "outwitting" as used here, has the same essential connotations as in Alexander outwitting the Persians, and Frederick as outwitting the Austrians at Leuthen. The "wit" in such "outwitting," is located in changing what Riemann's work defines as physical dimensions: not as geography defines dimensions, but as a Riemannian geometry redefines the meaning of physical dimensions. *One outflanks the problem, by appropriately redefining the physical dimensions of the apparent problem posed for a plan of action.*

For this purpose, we must focus upon the issue of the need to redefine radically the meaning of the word "action," getting beyond the silly but popular notions associated with usages such as "action at a distance." Instead of asking what the textbook teaches us on the use of this term, ask, what *should* the word "action" signify, not for the empiricists and kindred mathematical formalists, but for the experimental physicist engaged in the discovery and validation of universal physical principles? ³⁰

If we were to accept a naive, but widely taught and popular misconception of Euclidean geometry, such as those of the typical empiricists Galileo and Newton, for example, or Descartes, then the universe we inhabit is for us a fixed universe, in which "action" is defined by the belief in a fixed set of simply linear dimensions according to aprioristic notions of extension in space and time. Such, for example, is the notion of "action" employed by Galileo, and, later, by Leonhard Euler's factional ally, the celebrated hoaxster Maupertuis. From the standpoint of Riemann's elaboration of a Gauss-Riemann multiply-connected manifold, a very clear alternative presents itself. Add my additional qualification, and the

30. The question, posed in that form, was not original to Bernhard Riemann; Gottfried Leibniz's unique definition of a universal principle of least action had already posed the problem to followers such as Lazare Carnot and Carl Gauss. Riemann's revolution in the definition of physical geometry, simply posed the question afresh, in the needed way. I had come to this matter of defining "action" years before I considered Riemann's work, led to that conception as an adolescent student of the work of Leibniz on this account.

relevant notion of a strategy of "action" appears.

Ask yourself: *What is the form of action upon the universe, by means of which mankind increases qualitatively our species' potential relative population-density?* How does that notion of action differ from the commonplace use of the same term, *action*, by the ideological followers of empiricists such as Galileo and Newton? What do the successive contributions of Gauss and Riemann show respecting Leibniz's notion of a principle of *universal least action*?³¹

In terms of the usages of Riemann, the increase of mankind's potential relative population-density, occurs solely through the validatable discovery of a new universal physical principle. This discovery generates a new physical space-time manifold, $n + 1$, superseding manifold n (of n universal physical principles).³² The result of the practice of such a discovery, in the experimentally derived form of technology, changes the nature of man's generalized action upon the universe; this change is expressible as a change in the characteristic curvature of the relevant physical-space-time of practice.³³ Thus, within this framework, the notion of a *universal principle of action*—such as Leibniz's notion of a *universal principle of least action*—signifies such a physically measurable change in characteristic curvature, as Riemann defined this problem of experimental physics.³⁴ That is the deeper physical meaning of the way in which valid discoveries of new universal physical principles lead to an increase of mankind's potential relative population-density.

This notion of the proper definition of the term *action*, implicitly defines a strategic flanking *action*, as I applied such a notion to the problem of defeating a threat of a strategic ballistic-missile salvo. It means, as it does implicitly in Riemann's posing of the problem of characteristic curvatures, that instead of acting within a physical space-time of a fixed curvature overall, we act to change the universe (that is, multiply-connected manifold) to such effect that the characteristic curvature in which the task is situated, is radically changed.³⁵

31. For reference of those who might consider themselves, mistakenly, as critics of my statements respecting least action: The modern chain of developments, which resulted in the validation of the work of Kepler by Gauss, Riemann, et al., is customarily traced from Fermat's discovery of a principle of "least time," thus refuting Kepler opponent Galileo's concoction of the arbitrary notion of "action at a distance." The issues of isochronicity, especially as associated with the development of the refutation of Newton's false views on light by Fresnel, Arago, et al., lead into those notions of electrodynamics which present us a Riemannian universe, rather than a universe which might be supposed to be "Euclidean in the infinitesimally small." Leibniz's reflections on the work of Leonardo da Vinci, Kepler, Fermat, Pascal, Huyghens, et al., led him from the simple notion of "shortest time," to a more adequate appreciation of a principle of universal least action.

32. For example, Wilhelm Weber's proof of the existence of the electrodynamic principle of the Ampère "angular force," an addition which revolutionizes electrodynamics otherwise defined.

33. "Experiment," in this case, does not mean a mere classroom demonstration experiment. To prove a universal physical principle, one must show, by measurement, that the principle is indispensable to accounting for crucial behavior within a manifold within which that principle is considered to reside.

34. *Op. cit.*

35. Typical is, once again, the case of Wilhelm Weber's experimental proof, of the "angular force" principle of electrodynamics—as Weber was encouraged and advised in this success by Gauss and assisted by Riemann. The deeper significance of this is made clear by recognizing the nature of the collaboration among those, Fresnel, Arago, and Ampère, who disproved absolutely Newton's foolish presumptions respecting the propagation of light. The essential point here, is to recognize the common, Leibnizian conception of physical geometry which subsumes under a single conception, Fresnel's discovery for light, and Ampère's for electrodynamics.

That fundamental progress in science, out-flanks the problems it solves. The same applies, in a cohering way, with the need to flank the technological challenges of a military strategic situation.

So, my proposal to shift the approach to strategic defense, to the forced-draft realization of revolutionary *physical-economic* breakthroughs along known pathways, proffered a solution to a problem which was otherwise *axiomatically* insoluble within the characteristic curvature of then presently accepted definitions of the problem.

Physical Economy Was Crucial

The crucial test of validity of a proposed strategic ballistic missile defense, had to be based on those principles of physical economy which are banned from all those classrooms which are devoted to apologies for so-called "free trade" doctrines, systems analysis, and so on. The test of the validity of any proposed such defense was: *Is the effective cost of producing and deploying countermeasures less than that of expanding the assault against the "defensive screen"—supersaturating the defense?* This is not, as some misguided fellows proposed, a matter of financial accounting; it is the type of problem of policy-shaping which can be competently addressed only within the province of a science of physical economy.

Therefore, the definition of physical space-time curvature applicable to this problem, can not be situated competently within the narrower phase-space of physics as ordinarily defined in today's classroom. The definition of curvature must be situated within the domain of physical economy as such.

A crucial point must be stated again, at this specific juncture.

Many of the most important problems of policy confronting mankind, reflect the popular delusion, that living processes are, in the worst view of this matter, epiphenomena of physical processes, as today's conventional mathematical physics usually views this topic. In other words, the currently conventional doctrine is, that, ultimately, we must justify the existence of life at the blackboard, so to speak. This means, to advocates of that view, that we must discover the mechanisms by which living processes are generated entirely from non-living ones. The analogy is the increasing popular, tabloid-style delusion, that digital computer techniques are leading to the replacement of the human individual by robots with "artificial intelligence."

One contrary view, the Classical Greek view adopted in a modern form by Vernadsky, is the so-called *hylozoic* view: that the universe already contained a principle of life from the outset, as from whatever might be assumed to be "the beginning," and that non-living processes are, in effect, subsumed by those superior, more universal processes, which correspond to the general characteristic of living organisms.³⁶

It was the central feature of my original discoveries, decades ago, that I had taken this same issue a step further. The fact, that only the human species, among living species, is capable of willfully increasing its potential relative popula-

tion-density, places living processes categorically into the same position, relative to human cognition, in which the hylozoic view places non-living processes. The fact, that whereas mankind obeys the universe's known laws, in one case, but is also able to command the universe to change its lawful response to human intervention, as through validation of newly discovered universal principles, indicates, that cognition is not an epiphenomenon of living processes in general, but is a functionally higher, therefore more elementary form of existence, than merely living processes as such. (That is, of course, to put this profoundly important point of all scientific method, in terms as relatively simple as possible, but not in error.)³⁷

By the standards of experimental method, this higher function of cognition can be conclusively demonstrated in but one way: within the domain of the science of physical economy. Thus, it was necessary to pose the issues of ballistic missile defense within the relevant terms of that science.³⁸

The answer provided by this approach produced answers on two successively higher levels.

On the relatively lower, simpler level, the question took two forms of successive approximation. Can the method elected for proposing to neutralize a ballistic missile salvo, effectively "kill" the warhead's function more cheaply, as measured in physical-economic terms, than the cost of deploying increments of the attacking system, that latter in the effort to overwhelm ("supersaturate") the defense? Second, we must also factor in the effects ("cost"—human and other losses) of every failure to prevent an attacking warhead from completing the function assigned to its mission.

On the relatively higher level, I shifted the emphasis, to the impact of the ongoing process of continued, evolutionary development of the respective attacking and defensive systems. That aspect of the study became meaningful, if and when we abandoned the proposal to develop a fixed design of defense, in favor of a "crash program" of forced-draft, successive scientific discovery of principles. In this latter case, the "spill-over effect," from experimental validation of a *continuing generation of newly discovered physical principles*, reached, relatively soon, a level at which the superiority of the defense would emerge as absolute.

Why should the Soviet Union have accepted that proposition, as stated to it, by me, during the period of approximately a year of U.S.-Soviet back-channel discussions, between February 1982 and February 1983? My point was, that on the condition that the United States and others viewed such a process of rendering MAD obsolete, as a science-driver for raising the standard of productivity and physical income in and among the developing nations, through spill-overs of technological by-products, both the U.S. and Soviet economy, among others, would undergo a revolutionary technological upshift in their internal technological composition of employment, production, and related foreign trade.

In other words, the benefits to the people and economy of the Soviet Union, would include a unique solution for an

36. Hence the axiomatic differences in definition of physical principles as such, among biophysicists such as Chicago's Rashevsky, Russia's Oparin, and Vernadsky.

37. This agrees with strong Christian theology, but, having noted that fact so, we may move on.

38. This means that the physical universe, otherwise defined, is axiomatically a sub-phase-space of the inclusive, higher, living domain, and that that living domain is a sub-phase-space of the cognitive domain.

increasingly deadly internal problem of physical economy which that state was otherwise unlikely to overcome. *Peace must always be conceived as of great advantage to each and all among the participating nations.* The advantage from the non-military, spill-over features of SDI, as originally proposed, would have been earth-shaking, and would not become available in any other available way.

The only influence which could effectively prevent the thermonuclear missiles from flying, would be the overriding common interest in the benefits of cooperation in such a program for effectively freeing mankind from the continued threat of MAD. We would, in due course, reach the break-even point, at which new systems of defense would be able to overwhelm the threat of MAD. However, it was my expressed belief then, as now, that the shift of relations among the nations of NATO and the Warsaw Pact, by replacing the institutions of MAD established since approximately 1962-1963, would generate a political-economic factor which would prevent nuclear warfare, by uprooting the issues which might prompt it, and that this happier state of affairs would be already in effect years before the desired mode of strategic ballistic missile defense had been perfected.

This confidence is reenforced in an elementary way, by noting that the British monarchy's motive for orchestrating what became World War I, was to set the 1877-1901 admirers and partners of the Lincoln-Carey American System at one another's throat. It was a war, launched by the British monarchy, to prevent a global coalition of Eurasian and Americas admirers of that Lincoln-Carey model, from becoming the securely hegemonic determinant of general relations among the peoples of the world. The British monarchy acted to organize World War I, because, had it not succeeded in causing that war to occur in that way, the impact of the American System would have led, as President Franklin Roosevelt had later intended, to eradicate the last vestiges of Portuguese, Dutch, British, and French imperialism from this planet.

The style of American republican model associated with the Lincoln Whig legacy, was and is, the historically defined, model precondition for realizing a general exit of the planet to peace under conditions of modern times. The additional reason for this optimistic view is supplied at a later point, below.

Look at this same matter of physical economy, from the standard of the fanatical faith which a typical dupe of Galileo's empiricism, applies to the notion of laws operating within a physical universe which is everywhere assumed to be simply Euclidean in its fixed (*a priori*—"ivory tower") definitions of space and time. The misguided, anti-Leibniz fanatic Leonhard Euler, for example, looked at the universe in this pathetic, empiricist's way. In such an imaginary universe as that of the empiricists, the universe is run under the regulation of fixed laws, governing both percussive interactions, and also action at a distance. In such an empiricist's perverted state of mind, the definitions of both "action" and of "physical laws" are congruently misdefined in common.

However, once we recognize that a valid discovery of a new universal physical principle, changes the curvature of our action within the universe, as such curvature defines "action," we must assign an entirely new meaning to not only the term "action," but also the connotations of the term "physical law."

Most elementary: since it is only through the valid discoveries of universal physical principle, that mankind is able to change his species' relationship to the physical universe, it is only the manifestly successful such qualitative—for example, Riemannian—changes which can be regarded as *efficiently* expressing universal physical laws.³⁹ It is only those forms of action, which define a new such conception of a manifold of such laws, which deserve the name of *action*. As I have emphasized above, the nature of human existence requires, that the measurement of that action, that change of curvature, must be located in the terms of physical economy.

The notion of physical lawfulness then becomes the following. From this vantage-point, discoveries of universal physical principle cease to be regarded as isolated individual discoveries. Instead, we must proceed in a way specifically contrary to the central sophistry of Kant's series of *Critiques*. From close examination of the way in which students, as in a well-arranged Classical-humanist education, re-experience, successively, original acts of past discoveries of validated universal physical principles, we should become aware of the existence of an attainable, well defined, "synthetic" method of cognitive action, which underlies such an ordering of successive educational and analogous experiences. Directly contrary to the avowed enemy of truthfulness, Immanuel Kant, for example, we recognize that such qualities of education bring forth in the student a qualified cognitive, "synthetic-geometric," rather than deductive, "algebraic," way of thinking about the way in which successive such discoveries of universal principle are ordered with respect to one another.⁴⁰

What makes a truly creative scientist, for example, is not the accumulation of what he or she has learned. Rather, our concern should be, not what has he learned, but what will he be able to discover when faced with the challenge of the unknown? In other words, by taking this approach, the issue is transformed from the simplistic notion of valid individual discoveries of principle, to the discovery and mastery of a reliable "synthetic" method for generating an ensuing series of valid discoveries of new universal principles. This "synthetic" method is a method of "change," in the ontological sense of the use of the notion of "change" by both Heraclitus and in Plato's *Parmenides*. For which of two different qualities of such graduates, the pedantic formalist (Kantian) or the cognitive thinker, such as Leonardo, Kepler, Leibniz, Gauss, Wilhelm Weber, and Riemann, would you choose to employ a person to solve the need for a yet-undiscovered universal physical principle?⁴¹

It is the same in matters of education in Classical artistic

39. This signifies an ontological definition of "change," a definition consistent with both the famous aphorism of Heraclitus, and the crucial ontological paradox of Plato's *Parmenides* dialogue.

40. "Synthetic geometry," as employed in connection with Gauss's work on the notions of general principles of curvature, and Riemannian geometry, has the connotations of "anti-Euclidean geometry," rather than "non-Euclidean," as this distinction was emphasized by Gauss's teacher Kästner. This is, of course, closely related to the work of Gaspard Monge, as well as Riemann's geometry teacher Jakob Steiner.

41. The difference between the pedant and the creative personality is most commonly expressed as the latter's wont for a certain, almost compulsive type of playfulness. This playfulness, expressed in a cognitive form, is the mode of human individual creativity. Thus, stodgy "professionalism" often proves to be a cloak of relative intellectual sterility.

composition and performance. A recent set of conference presentations on the subject of the method of composition represented by J. S. Bach's *The Art of the Fugue*, is appropriate reference.⁴² It is by reliving the discoveries of principle, as these permeate and underlie the compositions of the greatest Classical composers, notably Bach and such successors as Haydn, Mozart, Beethoven, et al., that, through years of maturing experience, the greatest performers move closer to the ability to replicate the intent embedded within such works.

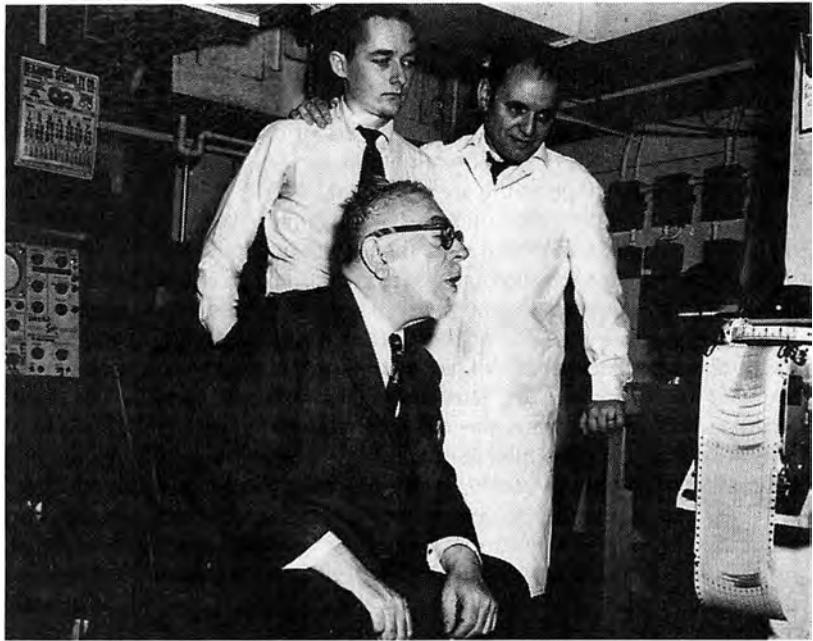
Thus, rather than interpreting the notes of the score, they perform that music for which the score serves merely as a mnemonic device for the aid of the literate musician. It is not simply a matter of getting the notes right, in a pedant's sense of the matter; it is a matter of discovering the ideas lurking among the lawful contrapuntal "dissonances"—the Classical metaphors—of the heard chorus of polyphony. It is a matter of hearing the ideas which are there, but would be otherwise lost from the performance, without breaking free of the stultifying habits of feigned, grumpy "seriousness" of all entrenched overtone-eavesdroppers and kindred Romantic formalists.

These Classical, cognitive approaches, define the specifically anti-Kantian, anti-empiricist, Classical humanist methods in science and art, the same methods of education employed, in combination, for competent education in history, and in military science as other arts of statecraft. What such methods accomplish, is a relatively high rate of cultivation of those creative (non-deductive, cognitive) powers of mind, by means of which validatable original discoveries of universal principle are fostered within the affected population.

These methods of study and education typify the method of education and general practice appropriate for a society with a mission-orientation toward scientific and related progress. The more immediate military implication of such a mission-orientation, is that such a society has a relatively high rate of potential for being mobilized for great, even perilous, but often successful, otherwise impossible undertakings.

My emphasis on the proper definitions of "action" and "physical law" here, is to be considered as a way of conceptualizing the development of such a mission-orientation potential. This itself, is a crucial military-strategic potential, under appropriate circumstances; it is also the standpoint from which to conceptualize the principle underlying what President Reagan presented as an SDI task-orientation, in his March 23, 1983, address.

Ironically, but not accidentally, this deep and fundamental philosophical difference between my Leibnizian use of the



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Mind in the very small: Empiricists like Russell and his information-theorist followers, John von Neumann and Norbert Wiener, insist that there can be no existing physical principle that could not be constructed at the blackboard, by deductive methods, or on a computer. For them the universe is linear in the very small. Here, Norbert Wiener studies the record of his own brain waves, emerging from a newly developed "auto-correlator" computer, in 1955.

term *action*, and Russell's fanatically empiricist misdefinition of the same term, is classic.

Russell's Mind in the Very Small

By his nature, Bertrand Russell, for example, would have denied, with the kind of hysteria typical of him, even the scientific possibility of what President Reagan introduced as SDI. Russell would have shuddered with nervous embarrassment at the crude 1976-1983 anti-SDI ravings of the former U.S. Defense Intelligence Agency (DIA) chief, the Heritage Foundation's Lt.Gen. (ret.) Daniel Graham; but the gist of their arguments was common.⁴³ The so-called scientific issue was Russell's hysterical defense of his thesis, that physics could and must be created by formalist mathematicians, as if at the blackboard, the same view adopted—variously, explicitly or implicitly—by such Russell devotees and hoaxsters as information theory's Norbert Wiener and systems analysis's John von Neumann.⁴⁴ If we discount the crude defense-con-

43. Graham had opposed the idea of a ballistic missile defense based on new physical principles already during the mid-1970s. Later, during the summer of 1982, he launched a nationwide campaign of personal venom against me, and then also against Dr. Edward Teller, on this same matter. After President Reagan's announcement of SDI, Graham switched positions, pretending to support SDI, on the condition that it be limited to simplistic "kinematic" systems which could be purchased off the shelf of existing Wall Street-owned defense contractors. Graham's role was key in turning the SDI program into a double-dipper's boondoggle.

44. Both Wiener and von Neumann, were expelled from David Hilbert's Göttingen University on charges ranging from incompetence to fraud. In von Neumann's case, there was a charge of plagiarism involved, but the scientific issues of the expulsion involved Wiener's and von Neumann's stubbornly fanatical adherence to the radical conceptions and method they had adopted under Russell's influence.

42. The referenced speeches from the Bad Schwalbach, Germany, conference of the Schiller Institute are transcribed in "Cognition vs. Information, Panel I and II," *Executive Intelligence Review*, June 23, 2000, pp. 5-52.

tractor-style greed permeating Graham's rhetoric, the whole crew of the defenders of the notion of "the exclusive primacy of kinetic interception," can be efficiently characterized as impassioned foes of the very idea of the existence of those creative powers of mind—those powers of ontological "change"—by means of which validatable new discoveries of universal physical principle are generated.

In other words, the common stand of the empiricists, was their insistence that, axiomatically, there is no quality of the human individual which sets our species apart from and above the beasts. They insisted, that no physical principle could exist which could not, and should not be constructed, by deductive methods, at the blackboard—or, as so-called virtual reality, on today's digital computer. Russell's, Wiener's and von Neumann's argument to this effect, can be reduced to Russell's insistence that nothing existed in this universe which could not be explained, if but ultimately, as the product of a universe which is "euclidean in the very small." That was Wiener's axiomatic premise for "information theory," and von Neumann's for his hatred against Kurt Gödel's 1930 demolition of the central thesis of Russell's *Principia Mathematica*.⁴⁵

In the history of today's globally extended European civilization, the issue of this quarrel with impassioned hoaxsters like Russell, is very old. Take the case of Plato's *Timaeus*, for example.

Not only had Plato's Academy at Athens shown, that only five fully regular solids could be generated by action within a spherical universe. The fact that the Golden Section so determined, is characteristic of living processes, pointed, inclusively, to the fact, that a universe containing living processes could not be "Euclidean in the very small."⁴⁶

This argument formed the kernel of the founding of modern experimental physical science, by Nicholas of Cusa and his successors Luca Pacioli and Leonardo da Vinci. The same conception was central to the founding and initial development of astrophysics by Johannes Kepler. The work of Fermat, in discovering a principle of least time, rather than least distance, underlying the refraction of light, led to the work of Huyghens and Leibniz on light, isochronism, and Leibniz's principle of universal least action.

The work of Abraham Kästner's pupil Carl Gauss, in proving Kepler's thesis for a missing planet located between Mars and Jupiter, and the refutations of Newton by Fresnel, Arago, and Ampère, among others, pointed to the mounting evidence, that not only was it impossible to derive universal physical principles by deductive methods at the blackboard, but, as Riemann insisted, that it is mathematics which must adapt itself to experimental physics, rather than the other way around.⁴⁷

Despite this evidence, various mathematicians, including Helmholtz, Rayleigh, and Russell, insisted, that physical prin-

ciples must be implicitly derivable at the blackboard, that according to the arbitrary, "ivory tower" assumption, that the universe is "Euclidean in the very small." All of the products of Russell's devious mind, like those of his devotees, are reducible to a mentality which is itself "Euclidean in the very small." Indeed, in all of his published writings on science and mathematics, Russell himself, like his acolytes Wiener and von Neumann, insisted on that point.⁴⁸

The deductive-inductive method of all empiricists, Russell notably, is based implicitly upon the fatally vulnerable presumption, that existence is limited, in effect, to objects which are, in and of themselves, echoes of human sense-perception.

As Galileo's mathematics pupil Thomas Hobbes emphasized, in his proposal to ban the existence of metaphor, the dogma of the empiricist does not wear well when compared with what is, in fact, human experience as a whole. Hence, Hobbes proposed to outlaw metaphor, thus to suppress the evidence that such uncomfortable ontological paradoxes existed.

There are certain kinds of experiences, whose efficient existence can not be denied, but which reflect conditions which do not conform to the empiricists' and materialists' definitions of sense-phenomena as such. Such troublesome evidence includes the non-trivial distinction between living and dead persons, the subtleties of astronomy,⁴⁹ and those controllable processes, reaching even beyond the microscope, which, by their nature, are beyond the direct reach of the senses. It is not sense-perceptions as such which define reality, but rather the power of the mind to impose willful choices of new orderings upon the domain reflected by sense-perception, especially as the new orderings represent the validation of a discovered universal physical principle. Man's certainty of knowledge lies not in his observation of nature, but his increase of his power to master it.

Most important of all, are experimentally validatable conceptions generated by individual cognition, cognition being a process lying entirely beyond the control of mere deductive operations. Hence, the empiricist's efforts either to ban metaphor, or to degrade it to the intellectually inert quality of mere symbol-mindedness.

Despite those pro-empiricist hysterics by both the empiricists and the Kantians, the evidence is, that validatable new discoveries of universal physical principles do occur, as willful productions of individual human cognitive processes. I think it important to repeat the point, that, as Riemann insisted upon the implications of Leibniz's and Gauss's discoveries, in Riemann's 1854 habilitation dissertation, and in his additional work on Leibniz's (and Abel's) posing of the challenge of *Analysis Situs*, it is deductive mathematics which must adapt itself to the implications of such experimental demonstrations, not the other way around.⁵⁰

At root, on this point, the source of energy expressed in the hysterical outbursts by Russell and such devotees as Wiener

45. See Kurt Gödel's 1930-1931 works "On Formally Undecidable Propositions of *Principia Mathematica* and Related Systems" and *Discussion on Providing a Foundation for Mathematics, Collected Works*, Vol. 1 (New York: Oxford University Press, 1986). This is also the formal axiomatic presumption underlying the interrelated, currently popular lunacies of "artificial intelligence" and "information economy." Axiomatically, both fads depend upon blind faith in the dogma that the physical universe is mathematically euclidean in the infinitesimally small.

46. Note, respecting the account of these solids within *Euclid's Elements*, that Euclidean geometry itself was created by the mind of a living creature.

47. Bernhard Riemann, *op. cit.*

48. Sometimes, after the publication of his *Principia Mathematica*, Russell made evasive concessions to physicists on the matter of Leibniz's notion of an *Analysis Situs* existing in physical reality outside the domain of mathematical analysis, but never actually confessed his own error on this point.

49. For example, the altogether anomalous Crab Nebula and its apparent role as the source of Earth's receipt of cosmic-ray showers.

50. Bernhard Riemann, *op. cit.*



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The oligarchical view of mankind, expressed by Russell, Wells, and their modern co-thinkers, is that human beings are cattle, to be herded and culled like beasts, and that science exists to assist in herd management. Here, H.G. Wells, shown with some stills from his 1936 film, "Things to Come." The film, based on his book *The Shape of Things to Come*, portrays a future world at war, with pestilence raging. The world is later rescued by the "Great Air Dictator," who arrives in a modern airplane from the "World Council" at Basra, to demand an end to national sovereignty and submission to the international force.



and von Neumann, lies not within the practice of science, but, rather, as Wiener emphasized in his *The Human Use of Human Beings*,⁵¹ in the insistence that the definition of science must be limited by the view adopted by the oligarch and his lackeys, that the purpose of science is to assist in managing the generality of the human herd in the same sense that a farmer breeds, uses, and culls herds of cattle. The idea that mere "human cattle," the mere subjects of oligarchical rule over the human herd, might have a quality which sets each person above the beasts, is anathema to an oligarch such as Russell, or mere oligarch's lackeys: such Leporellos as H.G. Wells, Wiener, or von Neumann. H.G. Wells's 1896 *The Island of Dr. Moreau*, already typifies that lackey's view of humanity in general which he continues to the end of his miserable life.⁵² The promotion of psychedelic practices by such Theosophy-linked cronies of Aleister Crowley, H.G. Wells, and Russell, as Aldous Huxley, and the related role of the circles of Russell acolytes Gregory Bateson and Margaret Mead, typify this satanic view of people as merely human cattle.

The question is: *is humanity created to exert dominion within, and over the universe, or, on the contrary, as Adam Smith argues, is man assigned a more modest place, the administration of the many human cattle by the few?*⁵³ Russell's 1931 and 1951 published utterances on policies for culling the undesirably intelligent specimens of the lower common herd, are blatant, and express exactly the root of

Mrs. Albright's pro-genocidal policies toward sub-Saharan Africa and elsewhere.⁵⁴

Once we take into account the fact that the universe is obliged to obey commands expressed as validatable discoveries of universal physical principles, the significance of the distinction in definition of the two qualities of action comes more clearly into view. The cognitive *action* which enables man to increase our species' power in and over the universe, through discovery of a new universal principle (for example, Leibniz's principle of universal least action), is to be distinguished from the lower quality of *action* expressed by applying previously established principles as if mechanically, deductively. The latter expresses the curvature of physical space-time in terms of a deductive view of previously known universal principles; the former represents the action of generating a new principle,

54. See, for example, Bertrand Russell, *The Prospects of Industrial Civilization* (London: George Allen & Unwin, 1923), p. 273:

"Socialism, especially international socialism, is only possible as a stable system if the population is stationary or nearly so. A slow increase might be coped with by improvement in agricultural methods, but a rapid increase must in the end reduce the whole population to penury . . . the white population of the world will soon cease to increase. The Asiatic races will be longer, and the negroes still longer, before their birth rate falls sufficiently to make their numbers stable without help of war and pestilence. . . . Until that happens, the benefits aimed at by socialism can only be partially realized, and the less prolific races will have to defend themselves against the more prolific by methods which are disgusting even if they are necessary."

See also, Bertrand Russell, *The Impact of Science on Society* (New York: Simon and Schuster, 1953), pp. 102-104.

51. Norbert Wiener, *The Human Use of Human Beings* (Boston: Houghton Mifflin Co., 1950).

52. New York: Berkeley Publishing Co., 1973.

53. Adam Smith, *The Theory of the Moral Sentiments* (1759).

resulting in a change in the effective physical-space-time curvature *within our action upon* the universe.

Consider the March 23, 1983, SDI announcement in these terms. *In terms of the principle of the flank, as viewed from this higher standpoint, can the discovery of an unending series of new universal physical principles, enable us to attack the essential principles of strategic thermonuclear ballistic salvos from the flank of a higher order of physical space-time?*

Such questions typify the difference between mere rhyme, and metaphor-driven Classical poetry, the difference between a silly Rameau and a genius such as J. S. Bach. Such, as a matter of cognitive principle, was the difference between the Roman generals commanding a physically superior military force against Hannibal, at Cannae, and Hannibal's virtual obliteration of the Roman force by his double-flanking assault, or, the way in which Frederick the Great, with vastly inferior numbers, doubly outflanked an attempted double-flanking operation by the Austrians at Leuthen. Hannibal, as Frederick at Leuthen, outflanked the minds of the opposing commanders.

In the case of my proposal for the SDI, our flanking attack, for which Reagan and I sought the cooperation of the Soviet leadership, was against the scientific bankruptcy of Bertrand Russell and his world-government policy. Our proposed line of march—our action—was, like Hannibal's double-flanking of the foolish, ram-like deployment of the doomed Roman forces, through dimensions of physical space-time which our adversary, Russell and his accomplices, could not bring themselves to admit existed.

To summarize the crucial point made thus far:

The action by means of which the human species is enabled to increase its potential relative population-density willfully, is the higher form of action, that corresponding to Leibniz's notion of a universal principle of least action. This notion is specifically distinct from the action taken according to a pre-existing manifold: cognitive actions, as distinct from, and superior to action according to a deductive form.

In this view of the subject-matter of physical science, the principal features of universal action are, in descending order, first, the cognitive powers of action associated with the human mind; second, the superiority of the principle of living processes over the non-living (as Vernadsky argued for this); third, and lowest in rank, non-living processes. The cognitive power of the human mind, is the only means by which man is enabled to cause the universe to submit increasingly to the human will. Thus, there, in cognition, lies the highest known expression of lawfulness. For reasons ably identified by Vernadsky, the universe of living creatures is, as some notable ancient Greeks insisted, *hylozoic*. It is a universe in which the principle of life reigns over non-living processes, rather than being an epiphenomenon of non-living processes. The evidence on these accounts, is elementary; only self-blinding hysteria, such as empiricism, denies such evidence.

In this configuration, what we are accustomed to regard as physical science, corresponds to those forms of universal action corresponding to validatable universal physical principles: man's mastery over nature, as implicitly measurable in demographic characteristics of populations, per capita and per square kilometer of the Earth's surface.

However, in order to share and apply this knowledge, we must bring the individual cognitive processes of the members

of society to that degree of development of socialized cognitive relations, that the cognitive processes of discovery of principle are themselves efficiently engaged as the primary form of social relations. This condition can be realized only through those modes of cognitive relations associated with Classical forms of artistic composition, and with those studies of the principles of history and statecraft which are, in fact, the natural extensions of valid forms of Classical artistic composition and performance.

3. The Legitimate Object of War

It used to be elementary competency in the training of modern civilization's higher military ranks, as typified by General Douglas MacArthur, that the object of warfare, is to produce and offer to one's opponent the circumstances in which his own moral conception of his self-interest efficiently requires him to cease war-fighting. Such, as I have already stated, once again, in this report, were among the crucial lessons which modern, pre-Versailles Treaty Europe had learned from the 1648 Treaty of Westphalia. Such had been, earlier, the practical implication of the Augustinian principle of justified warfare.

However, there has never been a known instance of a durable application of this principle under any form of society corresponding to what "globalization" represented under the ancient Babylonian and Roman empires, European feudalism, or a region of the world under the hegemony of the Anglo-Dutch imperial model of modern financier-oligarchical rule, up to the present time.

Therefore, it is the proper leading concern of the strategist, to ask himself: Under what conditions, is there no likelihood of willingness on the side of the attacker, to relent, or his target to submit? Such expressed conditions, either in a distinctly military form, or otherwise, are the circumstances under which the existing society will probably destroy itself through either continuing or recurring warfare, rather than that the war be concluded by that society.

Such were the perpetual wars of the ancient Mesopotamian dynasties, the Roman Empire, European feudalism, the lunatic prolongation of the U.S. war in Indochina, the continuing genocidal warfare against the people of Iraq, and the contemptible folly of Tony Blair's and Madeleine Albright's—in fact—continuing warfare against the Balkans as a whole. Such is the implied outcome of the present strategic and related "globalist" dogmas and strategies of the currently reigning Anglo-American power.

On the one side, the fact that the object of warfare should be an early exit to a durable peace, should be clear to any rational, literate, and intelligent person, especially to those who have studied the history of such matters. The evidence, that powerful civilizations, such as those of Mesopotamia and Rome, have preferred to destroy themselves, and much of mankind as well, rather than enjoy available benefits of peace, poses the kind of issue of strategic policy-making which is of the utmost, overriding importance today. *Pax Romana* always meant endless war, as long as that policy per-

sisted. Comparing those cases to the way in which Alexander the Great established, so suddenly, a new system, ending the millennial nightmare of chronic warfare specific to Mesopotamian imperialism, is a case in point.

The starting-point for such comparative studies, should emphasize the notable successes of the modern European civilization on this account, as during the period 1648 to 1901, in contrast to the general failure, on the same account, of all civilization prior to the Fifteenth Century emergence of the first modern sovereign nation-states, the conclusion of the Hundred Years War by Louis XI's France, and conclusion of the Wars of the Roses by England's Henry VII.

Why, on balance, has the modern sovereign nation-state been, relatively speaking, a successful institution in its search for durable peace, relative to all known earlier forms experienced by the recent 2,500 years of globally extended European civilization? Why, in contrast, despite that superiority of the modern sovereign nation-state on this account, have such horrors as Portuguese, Dutch, British, and French colonialism persisted—actually, recently escalated in the name of “globalization” and “rule of law,” up to the present moment of writing; and why did European civilization allow itself to become enmired in the plot of Britain's Edward VII to drown much of civilization in World War I? Why, after the lessons of 1914-1917, did the 20th Century continue to be the kind of recurring nightmare which World War I typified, as characteristic of the history of that century as a whole?

To restate the same point in the most relevant terms, *it is a flat lie, if also popular fools' babble, to say that the existence of the sovereign nation-state is the root of the impulse toward war.* It is the opposition to the sovereign nation-state, which has been the principal cause of warfare and related pestilence, throughout the history of globally extended European civilization.

For example, the history of globally extended European civilization, during approximately 2,500 years to date, shows that the mere existence of those impulses associated with the post-1945 drives toward what Russell et al. defined as “world government,” represents a condition which ensures the perpetuation of forms of warfare, such as the continued, senseless, genocidal bombing of Iraq, and the recent NATO war against Yugoslavia. That pattern of conditions, unless overturned, as the 1648 Treaty of Westphalia did, can have no ultimate outcome but a “new dark age,” such as the collapse of the Roman Empire in the West, the Fourteenth Century “New Dark Age,” and the 1618-1648 Thirty Years War.

That is precisely the pattern of doom which looms as an immediate menace before this planet as a whole, unless the current fads of “globalization” are now abruptly obliterated.

Indeed, because of the new kinds of epidemiological and related conditions existing world-wide today, the eruption of a “new dark age” as the result of the kinds of policies currently advocated by Prime Minister Tony Blair's United Kingdom, or the U.S. candidacies of Governor George W. Bush and Vice-President Al Gore, typifies the greatest potential threat to mankind since at least the beginning of modern civilization in ancient Classical Greece.

Notably, all of the major European wars of the Sixteenth and early Seventeenth centuries, were wars organized by Venice's financier-oligarchy and its allies, in the effort to sup-

press the effects of the Fifteenth Century Golden Renaissance, and to prevent the rise of modern forms of sovereign nation-states, such as those which had been established provisionally under Louis XI in France and Henry VII in England. The religious wars which erupted, at the instigation of Venice and Padua, in the wake of the defeat of the League of Cambrai, religious wars which thereafter dominated all of Europe until the 1648 Treaty of Westphalia, were nothing but products of the same impulse which the Venice-modelled financier oligarchy of London and the Netherlands launched, in their effort to abolish technologically progressive forms of modern nation-states, such as the wars launched from William of Orange's and Marlborough's Netherlands and Britain during the late Seventeenth and early Eighteenth centuries.

The latter was a pattern of imperial warfare conducted at the instigation of the Anglo-Dutch-centered financier oligarchy, a pattern extended over the entire span of time following, up to the presently escalating, genocidal campaigns for looting and recolonization of the territories of the former Portuguese, Dutch, British, and French colonies, today.

As I have summarized the matter in my recent Bad Schwalbach address, “On the Subject of Strategic Method,” since the Roman subjugation of the higher form of Hellenistic civilization, at the outset of the Second Century B.C., until the present, the only factor which ever lifted globally extended European civilization up, from the plunging cultural degeneration represented by the Babylonian tradition of pagan Rome, was the so-called “neo-Platonic” current defined by the Christian Apostles' adoption of the legacy of Plato's Athens Academy, as an integral part of the cultural resources adopted by Christian civilization. The murder of the Apostles Peter and Paul by pagan imperial Rome, like the earlier crucifixion of Jesus Christ under the order of the Capri-based Emperor Tiberius's son-in-law Pontius Pilate, typifies the central issue of all European civilization and its legacy, the conflict between the respective Classical and the Romantic legacies of pagan Rome and the latter's corrupting principle of *vox populi*—the degenerate Walter Lippmann's *public opinion*, from then to the present day.

The crucial feature of strategy which provides for a durable form of exit from war to peace, is the same principle enthroned in the opening paragraphs of the 1776 U.S. Declaration of Independence and the Preamble of the Federal Constitution. The appearance of that principle in the U.S. struggle against the force of evil represented by the British monarchy then, was a product and reflection of a long struggle rooted in the work of the early Christian Apostles. It was an expression of the revolutionary policy introduced by France's Louis XI and copied by England's Henry VII; it appeared in the Declaration of Independence as a perfected expression of the same motive which inspired the architects of the 1648 Treaty of Westphalia to bring to an end more than a century of religious warfare. Just as the United States was conceived as a republic, to promote the general welfare of all of its people and their posterity, so the principle of the general welfare had exerted its rightful higher authority over factitious religious issues, and over the claims of supranational governments' interests, in the Treaty of Westphalia.

The only durable basis for peace, is the commitment of victor and vanquished to the common purpose of the general

"The currently ruling political authority in the United States today, despite its widespread, fashionable, and baldy hypocritical 'anti-nuclear' and kindred protestations against so-called 'weapons of mass destruction,' does not desire, either to end the reign of the nuclear-missile threat, or to secure a peaceful state of relations among all, or any, of the existing nation states." Here, some examples of the ruling "generalized warfare faction," past and present.



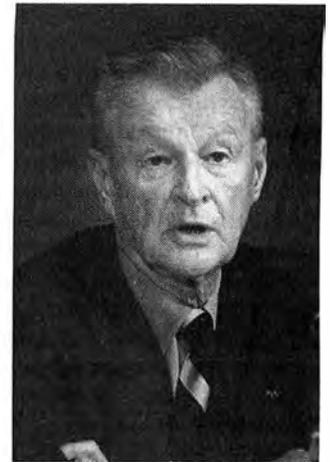
Stuart Lewis/EIRNS

McGeorge Bundy



Stuart Lewis/EIRNS

Henry Kissinger



Stuart Lewis/EIRNS

Zbigniew Brzezinski

welfare of each and all equally. Thus, according to that principle, President Abraham Lincoln, at the conclusion of an awful civil war, in his final public address, shortly before his assassination by a British intelligence service's operation, proclaimed that each and all of states briefly associated with the cause of the treasonous Confederacy, should be returned to the union as if they had never left it.⁵⁵

In contrast to the nobility of Lincoln's stated "exit" from warfare, consider the morally degraded, hate-brimming politics of revenge of the victor, of reparations and retribution, such as the legacies of Versailles; the recent NATO war against Yugoslavia, and the genocidal measures against the population of Iraq still continued by the U.S.A. and the United Kingdom, are the marks of governments of victor-nations which, among their other offenses, are neither Christian nor civilized in any meaningful sense.

The policy of the founders of the U.S. republic, the policy of my fellow American Whig Abraham Lincoln, was not an inclination peculiar to some U.S. patriots. It was the aspiration of all of the greatest souls of modern Europe, notably those figures from all Europe's nations, who have contributed what they might to bring forth in North America, the kind of republic, committed to the general welfare, which they desired to spread back into aching, oligarchy-oppressed Europe. The basis for durable peace lies within the victor's commitment to the freedom and general welfare of the vanquished, that as much as for himself. That was Wolfgang Mozart's reworking of the script for his *The Abduction from the Seraglio*, and is also the implicit lesson of the Treaty of Westphalia.

The problem is, that the legacy of our republic's deadly adversaries, is a powerful force of anti-republican financier oligarchy, within our nation today, as it is world-wide. Thus, among the nations of Europe and the Americas, and Asia and Africa, too, the desire for a durable peace represents a still-viable charter for the application of the lessons of the 1648 Treaty of Westphalia to world affairs. However, that peace

will never exist, until we defeat its opposition; that fight for peace, against the continuation of oligarchical rule; that is the only legitimate pretext for justified warfare.

That opposition, which is to be defeated, is represented by the oligarchical forces—chiefly, today, the London-Wall Street-centered financier oligarchy—rallied behind the neo-imperial cause called variously, "globalization," "free trade," "rule of law," and "world government" today. We can not have peace anywhere on this planet, until we remove from power those specific types of oligarchical forces, merely typified by the followers of H. G. Wells and Bertrand Russell, which remain fervently dedicated to imposing the institutions of a "New Age" of world government, even at any cost to humanity as a whole.

Locate the solution to this paradox in the domain of science-driven strategic thinking.

Science: The Power for Peace

From a moral standpoint, it were virtually impossible, to repeat the following point too often:

The essential folly underlying all official U.S. discussion of missile defense today, is that the currently ruling political authority in the United States today, despite its widespread, fashionable, and baldy hypocritical "anti-nuclear" and kindred protestations against so-called "weapons of mass destruction," does not desire, either to end the reign of the nuclear-missile threat, or to secure a peaceful state of relations among all, or any of the existing nation-states. Quite the contrary, the current policy of the United States is, still today, that announced by Governor George W. Bush's father nearly a decade ago, and avowed by Vice-President Al Gore today: a neo-Romantic's new world order.

That intended new world order, is still, today, a parody of the old pagan Roman Empire, under whose reign no nation is sovereign. As under the ancient Caesars Tiberius, Claudius, Caligula, and Nero, and as seen in the foreign policy of practice of Mrs. Albright, all peoples are subject to the caprices of whatever so-called "globalization" decrees in the name of "universal rule of law" the presently ruling Anglo-American financier oligarchy happens to concoct, as pretext, at that moment.

55. Address at the White House, April 11, 1865; *Collected Works of Abraham Lincoln*, Roy P. Basler, Ed. (New Brunswick: Rutgers University Press, 1953, Vol. VIII, pp. 399-405).



Stuart Lewis/EIRNS

George Bush and Margaret Thatcher



Christopher Lewis

Tony Blair



Stuart Lewis/EIRNS

Al Gore

As we have seen above: in the proposals for missile-defense against a threat to peace from alleged "rogue states," what the authors of that rhetoric intend, as Zbigniew Brzezinski and other present-day Mackinders have insisted, is to settle the last obstacle to permanent Anglo-American imperial power, by preparing to go to, or beyond the brink of geopolitical war, over the issue of their lust for control of the raw materials in the region of Central Asia bordering the Caspian Sea. Just as Adolf Hitler cried "Peace!" when he intended to seize Czechoslovakia on the road to an intended world war, so today's would-be Anglo-American Caesars cry "Peace," or "rule of law," or "missile defense," when their intentions could have no outcome but generalized warfare.

Nor are these presently hegemonic oligarchical circles motivated by concern for the welfare of the population of even the U.S.A. itself. As we see from the consistently worsening secular trend in the welfare of the lower eighty percent of U.S. family-income brackets, since the time of President Jimmy Carter's 1977 inauguration, there is no intent on the part of the presently reigning Anglo-American financier oligarchy, to satisfy the welfare of the general populations of even the imperial U.S.A. and United Kingdom themselves. Indeed, as the U.S.A. itself plunges toward the deepest world depression in more than a century, the current Congress and Administration are seized by an obscene zeal to remove all of those protections of our people, such as the Glass-Steagall Act, which were adopted, under President Franklin Roosevelt, as lessons in law learned from the brutish debacle of the last depression.

These would-be mad mass-murderers of today and tomorrow, are like the modern Caesars, Napoleon Bonaparte, Benito Mussolini, and Adolf Hitler before them, or Tony Blair today. They are the old pagan ruling class of Rome in modern plebeian disguise. Today's Blairs and their like, are the Caesars who proclaim themselves, once again, as Hitler did, the humble-as-Uriah-Heep, dutiful servants of the popular will, of inevitable, remorselessly unstoppable current trends in public opinion, as innocent instruments of the *Zeitgeist*, *Weltgeist*, and *Volksgeist*, of the fateful spirit of the age: *The New Age*. "We, who are about to die, salute you!" "Duce! Heil Hitler!" Nietzsche hailed the Anti-Christ, who, perhaps,

had been Tiberius lurking on Capri. So, the pattern unfolds. The cry is often different; but the evil is the same.

Let us end the reign of ideology over the empty minds of the sightless crowd of what Wells follower Walter Lippman defined as manufacturable public opinion. It is time to trash that glitter of cheap tinsel called today's popular opinion. People should cease cheering for slogans, and examine instead, the issue of what those slogans mean in practice. When we speak of security, whose security do we mean? What kind of security do we mean, provided by whom, and for whom?

What, then, are the essential elements which must be brought together for the sake of peace?

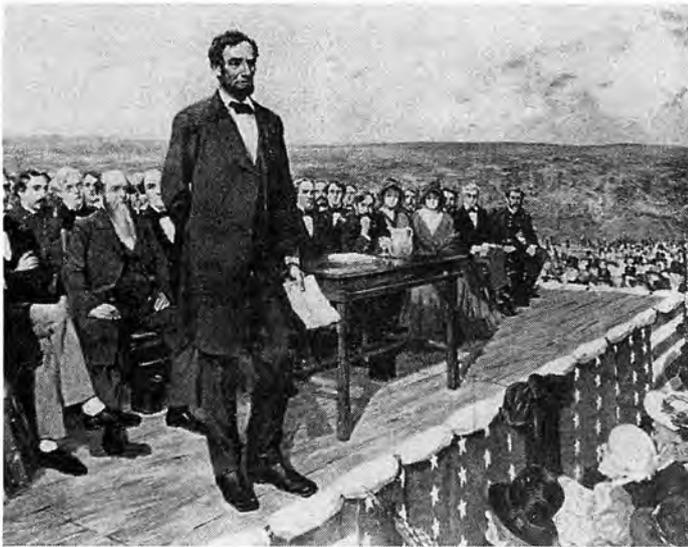
First, there must be the desire for true peace, a desire which is stronger than other motives.

Peace requires not merely the bare desire for peace from both the prospective victor and vanquished alike. It requires an efficient form of such desire. There exists no efficient desire for peace among any of the leading powers of the world today; there will be no peace, until that condition is radically, and suddenly, changed. The very early resignations of Mrs. Albright, Vice-President Gore, and Tony Blair, might be merely a suitable, token first step in that blessed direction.

The state of mind of both victor and vanquished, which elevates "peace" above the level of self-righteous hypocrisy, is a belief, by both parties, especially the victor, in the general welfare of all mankind. It means, therefore, a state of mind which has rejected what the modern English-speaking tradition recognizes as the Hobbesian conceptions of human nature, power, and conflict. Unless those preconditions are satisfied, peace will come, if at all, falsely, like hyenas at night, like Christians being slaughtered in the Roman arena, solely as the death-like subjugation which those too powerful impose upon those too vulnerable.

Granted, my subject here is the role of science in strategic defense; but, only a fool could avoid the challenge of asking and answering the question: *who will bring such peace, by what means, and, above all, out of what personal motivation?*

Peace could never come, except to the degree that the rule by oligarchy is outlawed, as the opening paragraphs of our 1776 Declaration of Independence and the 1789 Preamble of



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Lincoln at Gettysburg. "The true peacemakers do not merely act; they act to raise mankind to a higher state of relationship to the universe at large."



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President Franklin Roosevelt in 1941, looking at a Norman Rockwell illustration of the Four Freedoms. "Even if great public works, and so forth, were not otherwise needed, we must provide them, even if no other reason for that effort were proposed, but the uplifting moral effect of constructing them."

our Federal Constitution prescribe. As long as oligarchy's claims are tolerated—whether Babylonian, Spartan, Roman, feudal, or financier, there is no peace on this planet, and can be no peace, except that of the grave.

Second, therefore, there must be the all-too-rare individual peacemakers.

View this matter of motive from the vantage-point of what Plato defined as *agapē*, as this is presented in *I Corinthians 13*.

Peace is not the artefact of a legal contract. Peace is not a utopian's set of rules. *Peace exists only to the degree it is brought into being, over the opposition of a corrupt popular will, by those rare persons rightly known as the peacemakers.*

The study of history should have informed the literate, that, contrary to popular, foolish paeans to the empyreal delights of "democracy," the true peacemakers are not popular opinion, but the still rare individuals of each relevant time of crisis. These peacemakers are, like our memory of the officially martyred Rev. Martin Luther King,⁵⁶ the egregious personalities of their time, who act, not out of what they enjoy from the immediate fruits of mortal life, but what will satisfy them about their having lived, when they think of one's future identity as one deceased. These exceptional individuals, the peacemakers, express a natural quality of human nature, a quality which appears only when a certain maturity has taken over their being.

So far in history, instances of such individual moral maturity have been relatively rare.

That heretofore rare, but only normal concern of a morally matured, redeemed member of our species, is that defined by the nature of our species, as distinct from that of the lower forms of life.

Moral maturity means to reconcile the fact of individual mortality with some special sort of joyful reward which might

surely endure in some efficient way, even after all of the pleasures of sense-perception have vanished into one's grave. So far, in the known history of cultures, only a tiny fraction of the individual members of society has grown to the moral maturity of that point of view. It is upon such still rare individual leaders, that the effective leadership of society for times of great peril has always depended. These, sometimes described by Plato as our "philosopher kings," are the only true peacemakers for times of great peril to entire cultures, or mankind in general.

The fate of mankind, in such moments, depends not upon the blind instinct of masses, but upon the heretofore exceptional existence of such individual, usually egregious peacemakers, and the role they attempt, and are permitted to play in opposition to such creatures of Mephistophelian evil as Bertrand Russell and Madeleine Albright's H.G. Wells.

Such is personal motive of the truly great and moral physical scientist, for example. The peacemakers are those, who, above everything else find the meaning of their personal mortal lives in their contribution to the future peace and welfare of humanity as a whole. They are what are sometimes described as men and women "of Providence," as the great Classical tragedian Friedrich Schiller presents the case of the Jeanne d'Arc who made Louis XI's reconstitution of France possible. Only such leaders of society, the Solons and Platos of their time, are to be entrusted by the people with making the policies which, in times of greatest crisis, will prejudice the future welfare of mankind.

These true peacemakers have an additional distinction. Their moral maturity enables them to see that the true form of action, is that which raises the human condition to a higher level of power within the universe, as valid discoveries of universal physical principle do. The true peacemakers do not merely act; they act to raise mankind to a higher state of relationship to the universe at large.

Third, the peacemakers must bring what is called an "exit strategy" from warfare.

56. The echo of *Murder In The Cathedral* comes to mind among those who have studied the still-continuing record of official complicity in the case of Reverend King's assassination.



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Martin Luther King in Arlington Cemetery. "It is, thus, if and when mankind acts according to that perceived immortal self-interest of the mortal individual, that recognized self-interest impels us to embrace the general welfare of mankind as the most intimate and compelling interest of each and all among us."

For example: several times, but in one ironically notable moment, President Bill Clinton has attempted to play the part of a peacemaker. Unfortunately, he failed to live up to that promise.

This Classically tragic failure of U.S. President Clinton, was expressed, and typified by his failure to adhere to the exit strategy he had outlined a few weeks prior to the close of NATO's war against Yugoslavia. This case aptly illustrates the point. What Mr. Clinton had proposed, from the time of his notable address on this subject, to a group of West Coast journalists, had been a well-considered "exit strategy" for that war, a policy which was in accord with the 1648 Treaty of Westphalia. Suddenly, at the close of the bombing, he changed: disaster! Vengeance and retribution transformed the cessation of ill-conceived and bungled NATO hostilities, into a farce which threatens, a year later, to ignite the tinder remaining in the war-torn underbelly of Europe, into a spreading holocaust worse than the recent Balkan wars themselves.

What was required, instead of that tragic turnabout, was, as the President had strongly implied, a "Marshall Plan" style of generalized reconstruction for the Balkan region as a whole. The physical means for such an undertaking existed, in fact, if not in the will of the NATO member-nations as a whole. What had been done in war-torn post-World War II Europe, notably in France, the western part of Germany, and Italy, under the provisions of the 1945-1958 Bretton Woods system, could have been repeated, promptly, in the Balkans as a whole.

Consider, as an example of the point about strategic defense we are developing here, the way in which such an "exit strategy" could have produced, rather quickly, a condition throughout the Balkan region better, for each and all, than had existed since the war there had first been provoked and unleashed by the Anglo-American circles associated with the preceding "Desert Storm" adventure. Look at this example, first, and then compare the implications of that example with both what I and President Reagan had proposed as SDI cooperation with the Soviet Union, and the contrasting farce of the missile-defense proposals being emitted from the U.S.A. today.

Consider three aspects of the implementation of such an "exit strategy."

1. It has the general effect of tending to shift the axiomatic world outlook of increasing portions of all those nations, and their benefactors, too, from a pathetically Romantic, Nietzschean-like bestiality, deeply imbued with murderous, vengeful cultural pessimism, into an opposite direction, that of pro-Classical cultural optimism.

The post-war moral decline of the populations of that region, relative to the earlier moods, even during the heat of those wars, is sickening; but, it is merely a lawful expression of the consequences which the NATO allies have imposed upon each and all of the nations of both the Balkans and the immediately adjoining regions of the Danube and eastern Mediterranean. The promotion of Hobbesian-like conflicts among nations, ethnic groups, and so forth, tends to transform men and woman so affected, into feral beasts, beasts whose every reference to "my interests" resonates like the cry of a predatory hyena.

2. The most general consideration, in adopting the kind of "exit strategy" which President Clinton had advocated prior to his reversal of that policy, is located in the effect of two contrasting forms of labor upon the mind of the individuals and households engaged in that labor. As we in the United States should have learned from observing the American family farmer and the industrial operative, when a spirit of technological progress, and increased physical productivity of the economy arises, the cognitive factors tend to predominate.

First, the operative whose work calls upon his or her cognitive potentials, rather than merely repetitive, cattle-like labor, is more culturally optimistic, more moral, less likely to beat his wife and children routinely. Second, even if the form of labor does not produce significant tangible benefits for the individual operative, the fact that the society is visibly on an upward track, fosters optimism about each individual's participation in the work which promises a better future for coming generations.

3. Great public works, as typified by the effects of the Tennessee Valley Authority upon the population of that region of Tennessee and Alabama, have an important, most positive philosophical impact upon the culture of all affected. These kinds of enterprises, hold up the mirror to mankind, reflecting an optimistic image of man in the universe. The net result, is the tendency of the individual to think, less of what he or she is acquiring, than as the importance his or her existence assumes as a contribution to the benefits enjoyed by a larger humanity, that of the course of generations yet to come.

Thus, even if great public works, and so forth, were not otherwise needed, we must provide them, even if no other reason for that effort were proposed, but the uplifting moral effect of constructing them. It is as Benjamin Franklin's early mentor, the great American patriot Cotton Mather, once warned, the axiomatic root of remedies for nearly all human afflictions, is the simple passion "to do good."⁵⁷ Science, as I have defined it

57. Cotton Mather, *Essays to Do Good* (1710), as cited by H. Graham Lowry, *How The Nation Was Won: America's Untold Story* (Washington, D.C.: Executive Intelligence Review, 1988).

in this report so far, is the appropriate example of the motivation otherwise to be described as the commitment to do good.

Fourth, the commitment to do good must be defined not as commitment to take a specific action, but as a principle of continuing action. Here, on this point, we touch the core of the issue, the issue of the role, and the corresponding, corrected definition of science. We must supply a relevant correction for the popularized misdefinition of science.

For reasons already given above, today's customary definition conflicts with two sets of facts. First, in the relatively lesser degree, it conflicts with the hylozoic view, as echoed by Vernadsky. Second, it ignores the fact that so-called physical science itself, to the extent it has any experimental validity, is a product of human cognition.

On this latter account, it should be acknowledged, that the categorical separation of knowledge from a standard of truth is false, and, similarly, that the separation of so-called physical science from Classical forms of artistic composition, is the common fraud of such Romantics as the empiricists and Kantians. Thus, to summarize this point: the required functional redefinition of science, subordinates what present convention terms "physical science" to the higher authority of Classical artistic composition.

Once science is so properly redefined, then we are able to say that science, and scientific progress, are the form of action which constitutes the essence of human nature, the essence of the distinction between mankind and lower forms of life.

This has crucial implications for defining appropriate policies respecting war and peace.

From this corrected view of science, it follows, that morality, as *I Corinthians 13*, for example, rather than a set of shibboleths, defines morality, requires the individual, and society, to act in all matters in a specifically human way. By human, one should signify scientific progress, as I have corrected the definition of science here. That is to say, that morality is to practice scientific progress, as I have corrected the definition from the standpoint of a science of physical economy, for its own sake.

In other words, mankind must follow its own nature, this nature, as I have just defined it. It is to the degree that this is done, that mankind progresses, and that present generations find in the future they help to bring forth in a fully practical way, the immortal importance of their individual mortal lives.

It is, thus, if and when mankind acts according to that perceived immortal self-interest of the mortal individual, that recognized self-interest impels us to embrace the general welfare of mankind as the most intimate and compelling interest of each and all among us. It is to the extent, that we respond to all problems of society by a scientific imperative of the quality I have identified here, that the natural compulsion for peace will assert itself in a most durable way.

It is by practicing that scientific way of life, that we embrace the moral impulse called *agape*, the impulse accessible to us. If we reject the impulse, or simply fail to nurture it, we lose a practical sense of that which sets us apart from inferior forms of life. If we affirm that impulse in practice, we affirm our true nature, affirm the immortal, universal interest of our mortal individual selves. We may then take joy in being ourselves, joy in experiencing the discoveries of universal physical principle, and their application, and joy in that Classical artistic

composition which expresses the essence of cognitive relations among human beings.

In this connection, the very nature of science, so correctly defined, demands the primacy of the role of the perfectly sovereign form of nation-state republic. Since the relations among cognitive individuals are primarily, axiomatically of a Classical-artistic form, the role of language, in the most general sense of the development and use of language, has the dominant role of the medium through which cognitive relations are developed and maintained. Hence, a language, defined and viewed more or less as Dante Alighieri specified the necessity of nation-states premised upon a literate development in popular language, becomes the foundation for the moral existence of political society.

The essential feature of a literate language, has nothing in common with mathematical or related forms of symbolic deduction. The essence of the cognitive function of language, as expressed typically by great Classical poetry, or by the paintings of a Leonardo da Vinci and Raphael Sanzio, is Classical metaphor. It is the posing of ontological paradoxes, by means of Classical forms of language—in the broadest definition of language—and the sharing, similarly, of the discoveries of principle which overcome those paradoxes, which is the essentially, specifically human, cognitive quality of language, to which Dante's imperatives refer.

Hence, the sovereign nation-state does not separate humanity as much as it is an essential instrument for uniting peoples. It is in the translation, for practice, of the metaphors posed and shared within one language, with the speakers of another, that the common efforts of humanity are united in a specifically human way. Thus sovereignty does not divide humanity, but, rather, is the only efficient way to unite it, through the medium of the interstices among its sovereignties.

Thus, to dissolve the sovereignty of the nation-state, is to bring on a descent into the barbarism of a Tower of Babel, such as those of "information society." Such has always been, and will always be the case.

It is for the cultivated state of affairs among the sovereign nations of mankind, and that alone, that we are allowed, and sometimes compelled, not only to make, but to win war, when war were necessary, that with nothing but that goal, that "exit strategy," in view.

Thus, on that account, strategic ballistic missile defense, as I have defined it, as President Reagan proposed on March 23, 1983, is essentially nothing differing from the most natural expression of a properly cultivated, moral way of life. The proper motive for all important policies, is not limited to a specific calculable proximate outcome; the proper motive for every policy, for action, is to affirm, constantly, continuously, being a person, and part of a society, acting in accord with the special moral nature of a member of the human species.

Lyndon LaRouche is the leading exponent of the American System of physical economy in the world today, and author of the policy known as Strategic Defense Initiative, which was briefly adopted by the Reagan Administration. A member of the 21st Century Science & Technology scientific advisory board, he submitted this article on June 5, 2000. LaRouche, currently a candidate for the Democratic Presidential nomination, won 22 percent of the Democratic vote in the recent Arkansas primary.

It's Time to Tell the Truth About the Health Benefits of Low-Dose Radiation

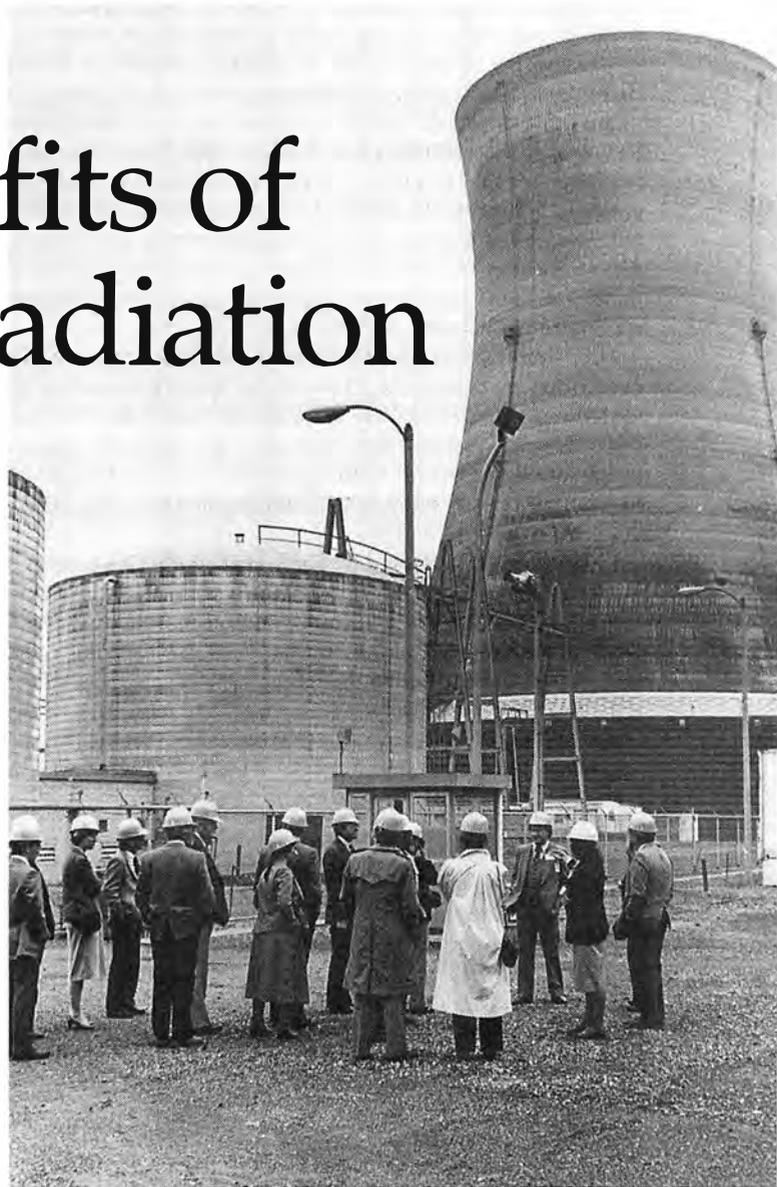
Low-dose radiation is documented to be beneficial for human health but, for political reasons, radiation is assumed to be harmful at any dose. Radiation-protection scientists, and others, who cover up the data that contradict present policy should be investigated for misconduct.

by James Muckerheide

Low-dose radiation has been shown to enhance biological responses for immune systems, enzymatic repair, physiological functions, and the removal of cellular damage, including prevention and removal of cancers and other diseases. Research on low-level radiation has also shown it to have no adverse effects. Yet, current radiation protection policy and practice fail to consider these valid data, instead relying on data that are poor, ambiguous, misrepresented, and manipulated.

With no regard for the cost to scientific truth, and to taxpayers, radiation policy is based on the linear no-threshold (LNT) concept, that holds that radiation at any levels above zero is deleterious. In the LNT view, the known damaging effects of high-dose radiation are linearly extrapolated down the dose scale. LNT contradicts the scientific evidence, which shows that there is a radiation threshold, below which there is no harm and, in fact, there is benefit for human health, a process known as hormesis. In defiance of this evidence, radiation-protection policy relies on falsification of the actual science research and reporting. Such malfeasance warrants scientific misconduct investigations for the results promulgated by some radiation protection-funded scientists.

If we are to contribute to the health of the world's population, we need to apply the data on the benefits of low-dose radiation in clinical settings. Unfortunately, the research funded by the U.S. Department of Energy (DOE), and other research in the area of radiation-protection fail to address these essential biology and medicine objectives. Therefore,



Metropolitan Edison

The myth that radiation is dangerous no matter how low the dose, has scared people about all things nuclear. Here, a tour of the Three Mile Island nuclear plant.

research and data assessments must be conducted by independent researchers and organizations that are not dependent on radiation-protection-controlled funding, directed to address the health and medical science.

In particular, the U.S. National Institutes of Health Study Section on Radiation Research reviews, and therefore controls, most of the Federal radiation-related research, instead of relevant research being controlled by the specific disciplines, for example, immunology, genetics, and so on. Since this Study Section is made up of current radiation protection-

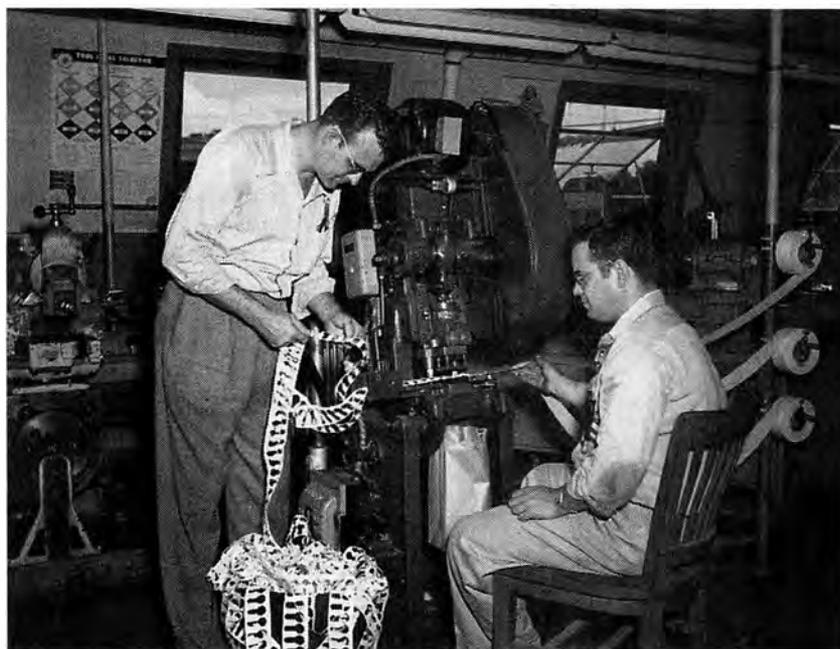
oriented researchers, it has substantially rejected research that pursues the relevant topics on the role of radiation in medicine, biology, and health. It must be disbanded. Biological and health research on radiation should be considered in the relevant biology and medicine research areas. It is necessary to have organizations doing radiation research whose primary interest is in the health and successful treatment of real patients. Further, independent assessment of the data must incorporate the scientists and analysts who have documented *for decades* that radiation health effects data cannot be linear. Rule-makings by government agencies must be conducted where conclusions on radiation health effects can be accountable, instead of hidden in unaccountable proceedings that fail even to respond to critical science and scientists; such rule-making must also be subject to formal appeals for "arbitrary and capricious" agency decisions.

The beneficial results of low-level radiation can be readily confirmed by researchers committed to understanding the underlying role of radiation in health and medicine. But radiation research journals and their peer-reviewers, dominated by radiation-protection-funded scientists, constrain publication of results that contradict radiation protection objectives.

Scientific Data Biased by Early Health Physics Goals

The bias against recognition of the benefits of low-dose radiation is not new. In a March 1996 meeting at the U.S. Nuclear Regulatory Commission (NRC), Charles Willis of the NRC stated, as reported in the transcript:¹

. . . [I]t's clear to many of us that we are not seeing the predicted ill effects at low doses, as has been pointed out to you. I personally came to this hormesis observation



Oak Ridge National Laboratory

At an early point in radiation research, some policy-makers began to suppress the data on low-dose radiation. Here, health physicists at Oak Ridge National Laboratory in the early 1950s, stamping out smear tabs from a strip of filter paper. The tabs were used to collect samples of radioactivity.

fairly late in the game. It wasn't until 1958 that I was working with the laboratory [Oak Ridge National Laboratory] situation where we were doing experiments with below background levels of radiation, taking the potassium-40 out and seeing what the effects would be on the cellular level when we saw that the cells looked good but they didn't function. So we couldn't publish the results, another ill effect of the paradigm about the linear hypothesis.

Potassium is an element that is essential to life. However, about 0.012 percent of natural potassium is a radioactive isotope, potassium-40. Potassium was processed to separate the potassium-40 from natural potassium at Oak Ridge to conduct radiobiology experiments in the 1950s. Dr. Willis confirms that radiation research, funded for radiation-protection objectives, supported the linear no-threshold concept by suppressing contrary scientific data, and that this activity dates back more than 40 years, to the 1950s. At that time, animal studies using separated potassium were also conducted. The animals were stated to have "done poorly," but they recovered when the extracted potassium-40 or natural potassium was added.

Such potential bias in radiation protection-based research and results should be confirmed or refuted, if we are serious about putting to use the benefits of low-dose radiation for human health. The organisms placed in the potassium without potassium-40 were biologically deficient. This finding is consistent with those of a numerous and wide variety of experiments with organisms that have been shielded from background radiation. For example, organisms grown on glass slides were repeatedly found to grow differently. It was eventually found that those grown on slides that had lower thorium content, and hence lower radiation, were deficient. The LNT precludes this "accident" from being known. But, it will be known. And those who suppressed the knowledge will also be known.

It has been extensively and consistently confirmed that supplemental radiation, above the natural background level, stimulates organisms, enhancing their growth and increasing their mean lifespans. These experiments confirm that any data that contradict the LNT have not been adequately considered by radiation protection agencies and scientists. In addition, many scientists who have been interested in conducting such research, and in publishing such results, were constrained in their efforts. Such experience was reported by Dr. Jake Spalding of Los Alamos National Laboratory to Senator Pete Domenici in 1999.² Such experience was also reported by Prof. Dr. Gunnar Walinder, the pre-eminent Swedish radiation scientist, about the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in his 1995 book.³ Walinder stated bluntly: "I do not hesitate to say that the LNT is

the greatest scientific scandal of the 20th Century."⁴

Among the many experiments showing the benefits of low-dose irradiation were those with laboratory animals that had whole immune systems; it was found that at doses below tens of rads, to doses of thousands of rads, the animals had increased average lifespan and no adverse effects. For example, Dr. Egon Lorenz of the National Cancer Institute reported in Manhattan Project records that mice

were irradiated with 4.4, 1.1, 0.11, and 0.044 [rads] per 24-hr day. . . . Male mice conceived and living continuously under exposure to 4.4 r/24-hr day up to total doses of over 2,000 r are comparable with non-irradiated mice as far as weight, coat, and activity are concerned. Mammary tumor incidence is not significantly changed in mice exposed for 10-15 months to doses ranging from 4.4 to 0.44 r per 24-hr day. . . .

Subsequent generations, Lorenz said, living "under exposure of 1.1 and 0.11 r per 24-hr day show no damage to chromosomes as evidenced by the raising of 5 to 6 generations with normal litter size and an apparently normal life span."⁵

Notwithstanding this reality, by 1950, Dr. Lorenz states: "It is well-known that absorption of ionizing radiation by tissues is connected with damage, no matter how small the dose," in a study that showed that whole mice had *longer* lifespans than controls in research that exposed the mice to chronic radiation at 0.11 r/day, or about 40 r/year.⁶

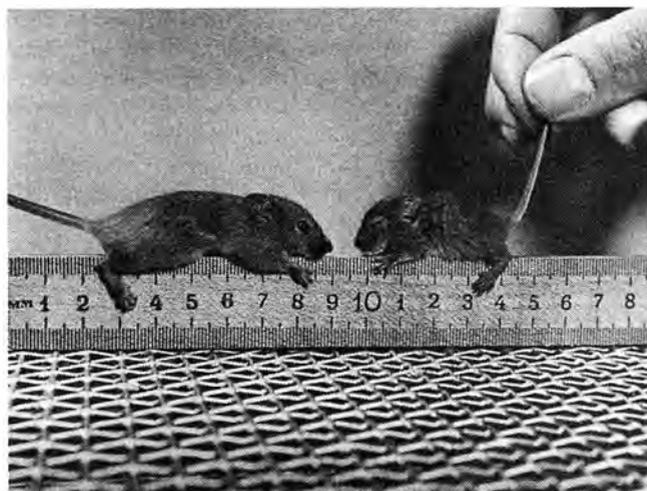
Marshall Brucer, M.D., states with respect to the Manhattan Project:⁷

Their first experiment, raising mice in an atmosphere of uranium dust, showed exposed mice lived longer than controls. They set up an arbitrary Maximum Permissible Dose (MPD) after proving that mice in radiation fields 10 times the MPD lived longer than controls.

After World War II, Brucer writes, about 20 articles per year mentioned hormetic effects but:

Health Physicists soon learned that their livelihood depended on scaring the pants off Congress. Every Genetics budget meeting opened its request for funds with an anti-nuclear litany. During the 1960s and 1970s about 40 articles/year described hormesis. In 1963, the AEC [Atomic Energy Commission] repeatedly confirmed lower mortality in guinea pigs, rats, and mice irradiated at low dose. In 1964, the cows exposed to about 150 rads after the Trinity A-bomb in 1946 were quietly euthanized because of extreme old age. In 1981, T.D. Luckey revived a very obvious radiation hormesis. No experimental evidence of damage at low doses existed; self-serving extrapolations from high dose-data dominated health physics.⁷

In the May 1961 *Journal of the American Medical Association* (JAMA), Dr. Hugh Henry, then at Oak Ridge, reported on all low-dose studies (defined as "to about 1 rad per day"!), saying that the results show consistent life-lengthening vs. neither life-shortening, nor genetic effects.⁸ He reports on early



© Corbis

The mice that lied? *Whether deliberate or not, the control group data on radiation and mice were tampered with. Here, mice from the experimental colony at Oak Ridge National Laboratory in the 1950s, used for examining the long-term hereditary effects of radiation.*

animal studies that had hormetic effects from internal doses, for example, for uranium and plutonium injections, and feeding of uranium compounds, and for external (gamma and X-radiation). Life-lengthening was regularly found, and radiologists and others with relatively high doses had no adverse health effects. Henry concludes:

The preponderance of data better supports the hypothesis that low chronic exposures result in an increased longevity than it supports the opposite hypothesis of decreased longevity. . . . Increased vitality at low exposures to materials that are toxic at high exposures is a well-recognized phenomenon.

Voluminous, credible peer-reviewed scientific literature data exist. Dr. T.D. Luckey, Professor Emeritus of the University of Missouri School of Medicine, presents a great deal of that literature, with more than 2,000 references.^{9, 10} Yet, the regulatory agencies ignore this evidence.

How the LNT Myth Was Supported

In 1996, the Department of Energy investigated allegations about the now-accepted fact that the Oak Ridge National Laboratory mega-mouse studies presented false data on genetic effects, starting in 1951. The lab under-reported the numbers of mutations in the control animals. International programs have now abandoned the mouse data, and are assessing the potential effects of radiation for genetic diseases—something that was never before indicated.

An Oak Ridge geneticist and statistician, who is a member of UNSCEAR, and who had access to the original data and the expertise to analyze them, identified these deficiencies. This geneticist also alleged that the misrepresentations of the data seemed to have been intentional. This allegation was rejected by Oak Ridge. However, the other instances of failing to report scientific data indicate possible confirmation of prac-

tices of misrepresenting research in the 1950s. The U.S. Nuclear Regulatory Commission, the Department of Energy, and the Congress, should formally inquire about these allegations, and whether contrary data were adequately considered in reviews, research results, and support for research.

In 1971, after the Federal Appeals Court “Calvert Cliffs decision,” that found the Atomic Energy Commission (AEC) Environmental Impact Statement to be inadequate, the AEC contracted for the “Argonne Radiological Impact Program,” to improve the basis for assessing low-level radiation health effects. Dr. Norman Frigerio analyzed U.S. cancer rates by average background radiation doses for each state, applying the linear no-threshold models. His results were found to contradict the LNT: There were consistently lower cancer rates in high-background-radiation states. This finding has since been consistently confirmed.¹¹

In 1973, although Dr. Frigerio had been contracted by the AEC itself to address the regulatory issues of low-level radiation effects—in response to a court action—AEC and radiation science policy interests terminated the study, and the results were not published. This study was presented at a 1976 conference on natural radioactivity, sponsored by the International Atomic Energy Agency (IAEA).¹² But, Dr. Walinder reports, these results were suppressed in the 1977 UNSCEAR report. The same results were similarly arbitrarily dismissed in the report of the Biological Effects of Ionizing Radiations Committee (BEIR III) in 1980, with no scientific inquiry.

The AEC termination of the Argonne National Laboratory’s radiation program should be investigated. The program plan was to continue, to obtain more accurate radiation dose data, to apply the analysis at the more definitive correlation at the county level. The result was expected to confirm the preliminary inverse correlation results. Dr. Frigerio and others stated that it was because of the nature of the results, contradicting the LNT, that the study was terminated. Total populations with significant dose differences are the ideal test of the LNT, but here, again, we see that analysis is suppressed.

The results of the Argonne study, however, have been confirmed in analysis of EPA radiation data of high versus low background radiation states. Conferences on natural back-

ground radiation consistently report the lack of health effects, and even the existence of beneficial effects, in high-background exposed populations. The high-background whole-body radiation doses show no adverse health effects, to take just one example, in a stable Chinese peasant population of more than 70,000, living for generations in high radiation areas. The natural radioactivity source in high background areas is *millions of times greater*, it should be noted, than the radioactivity allowed to be released from nuclear facilities or nuclear waste sites. The cost to the public for this “overprotection,” is massive.

Radon: Misrepresenting the Data

In the 1980s, Dr. Bernard Cohen, at the University of Pittsburgh, personally undertook natural background radiation studies similar to those terminated by the Atomic Energy Commission in 1973 (and by AEC’s successors, ERDA and later DOE, and the NRC). He tested the LNT using the significant lung cancer data compared with variations in residential radon. Initially, he found that lung cancer incidence in the high-radon area of Cumberland County, Pennsylvania, was lower than the Pennsylvania average.¹³ Many other studies found similar results.

Because radon data did not exist at the county level, Dr. Cohen obtained at least 100 radon measurements in the 16 large counties with the lowest lung-cancer rates, and the 25 counties with the highest rates.¹⁴ He also found identical results in the various random counties in which 450 university physics professors at 101 universities supported his effort to obtain residential radon measurements.

Dr. Cohen then succeeded in a private effort to do, for radon and lung cancer, what the U.S. government had terminated with the Frigerio study—measuring radon in 272,000 homes in the most populated U.S. counties. These data also consistently found inverse results, in dozens of independent studies of, for example, “all-rural” counties, “all urban” counties, and so on.¹⁵ Dr. Graham Colditz of Harvard University, a world renowned epidemiologist, contributed to an interim analysis of the data by counties. He confirmed the validity of the epidemiological analysis of these data.¹⁶

Dr. Cohen also acquired all Environmental Protection Agency and state radon data. These data showed an inverse relationship: the higher the radon levels, the lower the incidence of lung cancer. In the full data set, the inverse correlation exceeds 20 standard deviations, compared with the predictions of BEIR IV. The chance of error is equivalent to one in all the electrons in the universe! Any confounding factor must be: (1) much greater than smoking, (2) inversely correlated with radon, and (3) unrecognized. This is inconceivable—except for one postulate: Radon doses at the range of normal background levels stimulate lung tissue functions to protect against lung cancer.

Radiation-protection interests ignore the confirmed results of Cohen et al. by alleging simply that “they are ecological studies”; these critics provide no scientific basis to refute the data. In fact, there is no documented scientific criticism of Dr. Cohen’s results, just general rationalizations of highly unlikely reasons why one study might not be valid. In fact, Dr. Cohen as produced dozens of separate studies that are consistent. Nevertheless, radiation protection interests use unfounded

How Radiation Is Measured

Radiation “dose,” or “exposure,” is a measure of energy absorbed per unit of mass. There are two sets of units used, the older units having been renamed.

For equivalent tissue damage from different types of radiation, the rem was defined as “rad equivalent man”—or rad times a quality factor. For gamma and beta radiation, the quality factor for most significant energies is 1, so “rad” and “rem” are taken as equal in these cases. For alpha rays and neutrons, the quality factor is greater, indicating that there is more damage from the same absorbed energy.

New unit	Old unit	Equivalent used here
1 gray (Gy)	= 100 rad	= 100 cGy (centi-gray)
1 sievert (Sv)	= 100 rem	= 100 cSv (centi-sievert)

statements to misrepresent to the public that Dr. Cohen's data have been refuted.

Dr. Kenneth Bogen at Lawrence Livermore National Laboratory independently compared 1950-1954 lung cancer mortality for women of ages 40 to 80 and 60 to 80 (who had smoked little), by county, with EPA county environmental (not residential) radon data. He also confirmed the inverse correlation between lung cancer and radon. Dr. Bogen's biological model applies cellular response data to show that the inverse relationship is consistent with known biological responses.¹⁷

Prof. Dr. Werner Schuttman, of the former East Germany, and Prof. Dr. Klaus Becker of Berlin, Germany, both documented research results that show that women in the very high radon uranium mining areas of Saxony, Germany, who have negligible smoking, have significantly lower lung cancer rates than women in lower radon areas.¹⁸ The *Health Physics Journal* denied publication of the Schuttman and Becker article, however, as a result of comments by reviewers that contained such non-scientific statements as, "this is just another ecological study," and "everyone knows that Dr. Cohen's studies are erroneous."¹⁹

LNT supporters erroneously claim that "case-control" studies are "better." However, the accuracy of such studies is completely dependent on the ability to know individual doses. This is true in most case-control studies where doses/exposures are measured and controlled. However, in most radon case-control studies, individual doses are poorly known. Residential radon measurements are used. Therefore, "dose groups" are only statistical estimates, without knowing individual doses. Further, with the small numbers in the sample, combined with the uncertainty of the correlation, there are wide errors. Unlike large population studies, case-control cannot produce accurate or replicable dose-response results. In fact, in contrast, the nature of statistics provides statistical power in large ecological studies, because these apply rigorous statistics that more accurately represent mean doses compared with lung cancer rates.

In addition, the uncertain doses in most radon case-control studies produce much greater bias in the higher-dose region. The high-dose group is likely to include persons who have low-doses, while it is unlikely that the low-dose group will have persons with high-doses. Therefore, the high-dose group will have a bias toward excess cancers that will seem to be shown to result from low radon exposures. In addition, case-control studies do not adequately address cases in the very low-radon regions, where the well-documented effects in Dr. Cohen's data (as well as those in other, more definitive population studies), demonstrate that increased lung cancer is expressed. However, despite all the problems with case-control studies, it has been shown that they do not contradict the results reported by Dr. Cohen and others.

When using a small representative population to produce a substantive basis to apply it to a large population, there can be a reason, or reasons, why the small population does not accurately represent the whole population. This is a "confounding factor." For example, the age distribution of the small population might be different from that of the whole population. If the difference can be quantified, such as in producing an "age-adjusted" analysis, the "confounding factor" can be taken into account. Drs. Fritz Seiler and Joe Alvarez

have shown that a "dose-response model" specifying "confounding factors" is necessary to determine a risk (for example, the lung cancer risk from radon). In that case, a "model" with any "confounding factors" must correct for systemic errors in applying the specific small-population data to the whole population. However, Seiler and Alvarez demonstrate that Cohen's results, as confirmed by others, show the actual relationship for the whole U.S. population. Therefore, a precise "model" and any "confounding factors" are irrelevant to "predict" the relationship to the whole population.

EPA, and BEIR IV and VI, substantially misrepresent the data on the risk of residential radon for lung cancer in the United States and the world.

The Case of the Radium Dial Painters

In 1974, the pre-eminent radium health effects researcher, Dr. Robley Evans of the Massachusetts Institute of Technology, rigorously demonstrated in an article in the *Health Physics Journal*, that BEIR in 1972²⁰ had misrepresented the data on the health effects of radium in order to produce a linear no-threshold result from extremely non-linear data.²¹ On Evans's retirement in 1970, the Center for Human Radiobiology (CHR) was established at the Argonne National Laboratory.

In 1981, Dr. Evans gave the "Invited Summary" at an international conference in which it was reported that in thousands of cases of radium dial painters worldwide, there were still no occurrences of bone cancer or nasal carcinoma in individuals who had ingested less than 250 microcuries of radium-226, which produced an estimated dose of 1,000 rad to the bone. A report on these data was published in 1983.

Dr. Evans told the conference:²²

The studies of the radium cases during the past dozen years . . . have continued to show no radiogenic tumors, or other effects, in hundreds of persons whose effective initial body burden was less than about 50 microcuries of Ra-226, and whose cumulative skeletal average dose is less than about 1,000 rad.

In 1983, DOE initiated termination of this program, which had been established for the life of the dial painters, while more than 1,000 individuals were still alive. It may be that this message was received by the Radiation Effects Research Foundation (RERF), which was established to follow the Japanese A-bomb survivors for life. The reports of the RERF produce consistently biased data.

It is significant that systemic intake of 50 microcuries of radium-226 is about 125,000 times the annual ingestion of 5 picocuries/liter allowed by the EPA in its drinking water limits. The EPA is even proposing reductions in these limits, which will require even greater public water supply expenditures under EPA program control. If, instead, the EPA were to mandate a moderate revision in its limit by a factor of 4, this would essentially eliminate the need for monitoring for radium in drinking water, and eliminate significant unnecessary costs, while still providing a safety margin of 30,000 (times 50 picocuries) to a person who drinks 1.1 liters per day of that water.

In the 1990s, follow-up after "another decade" confirmed the original radium dial-painter health effects results. Dr.

Robert Thomas, a long-time radiobiology researcher at Los Alamos National Laboratory, a program manager at DOE, and the last Program Director of the Center for Human Radiobiology at the Argonne National Laboratory, showed that the log-normal distribution of cancers projected a threshold of 400 rad without even considering the total absence of cancers in the large population with doses below 1,000 rad.²³ Work by Dr. Evans, and Dr. Constantine Maletskos and others, similarly established that such a threshold was valid.²⁴ Further analysis by Dr. Robert Rowland, former Director of the Center for Human Radiobiology, has more conclusively determined that a threshold exists. Rowland states:²⁵

Today we have a population of 2,383 cases for whom we have reliable body content measurements. . . . All 64 bone sarcoma cases occurred in the 264 cases with more than 10 Gy, while no sarcomas appeared in the 2,119 radium cases with less than 10 Gy.

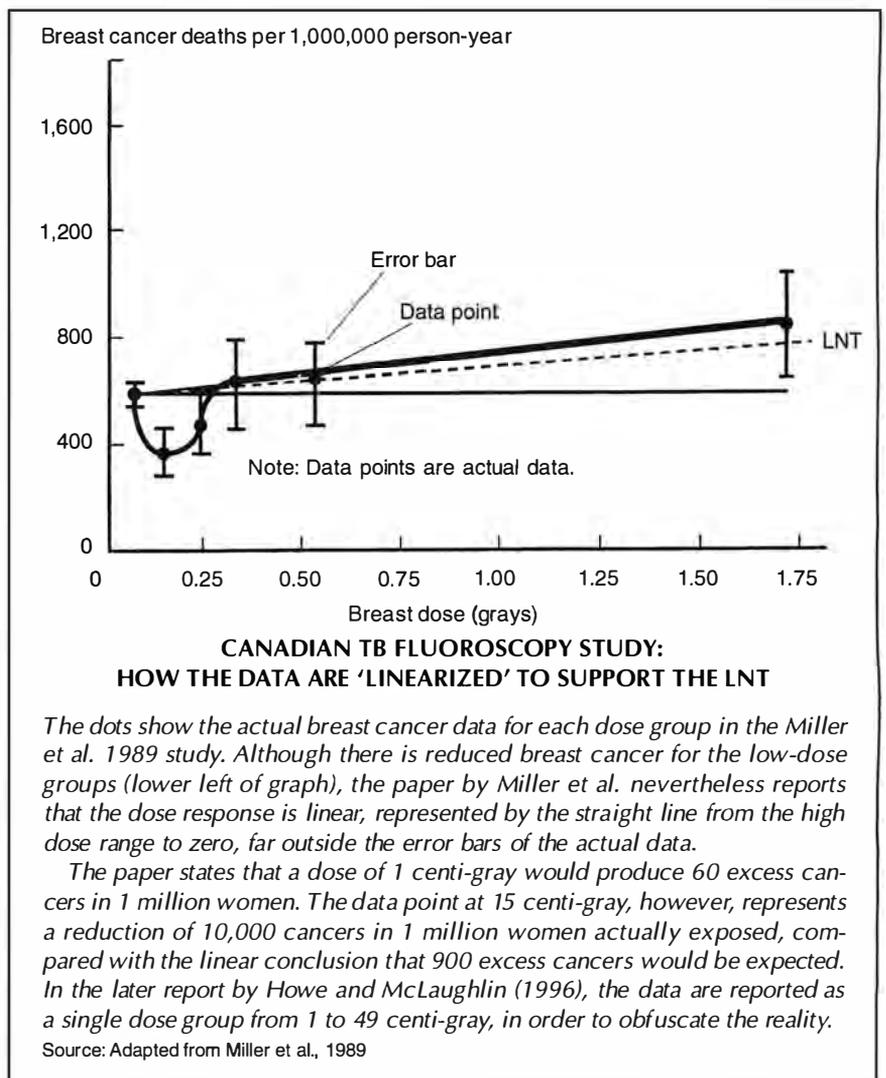
To contradict these objective results, in an analysis used in BEIR IV to misrepresent the actual data, Drs. Charles Mays and Raymond Lloyd selected, first, a wide low-dose group range that included no cancers, and, second, a wide dose-group range that included the lowest dose with cancer; from this, they manufactured a "linear" result.

In the *Federal Register* in 1991, the EPA explicitly favored duplicity in the matter, by responding to a recommendation by its Science Advisory Board (SAB) that the radium dial painter data be used to establish the radium limits in water, as follows:²⁶

EPA policy is to assess cancer risks from ionizing radiation as a linear response. Therefore, use of the dial painter data requires either deriving a linear risk coefficient from significantly non-linear exposure-response data, or abandoning EPA policy.

Simply put, science is irrelevant in this campaign to mislead the public about the hazards of radium, and radiation generally.

It was after a notorious radium poisoning case in 1932, that the Food and Drug Administration (FDA) achieved control of radiation from Congress. Well-known Philadelphia industrialist and socialite Eben Byers, died from a massive overdose of radium ingested in large quantities over three years. The Byers case had great publicity and created great public fear of radiation. The truth is that Byers did not die of cancer. Bone necro-



sis led to removal of his jaw and other interventions that put a gruesome image on the radiation effects. The FDA did not then assess the dose effects to the thousands of persons who had also used radium and other radiation sources in more moderate amounts; or acknowledge that Byers had been the victim of the equivalent of a drug overdose.

The amount of radium that Eben Byers ingested daily is about 2,000,000 times the current EPA limits, based on drinking 1 liter/day at 5 picocuries per liter (pCi/l). The threshold for latent bone cancers from ingesting radium by the dial painters is more than 125,000 times the annual limits from drinking water at 5 pCi/l.

After the Byers case, Dr. Edna Johnson, and others, suppressed well-known data on the stimulatory effects of low doses of ionizing radiation, especially, a 1936 report for the National Research Council, to claim that "radiation is harmful at low doses."

Occupational Studies Show No Adverse Effects

One of the largest and most thorough studies of the effects of low-level radiation on nuclear industry workers is the Nuclear Shipyard Workers Study, funded by DOE but never



National Archives

Nuclear Navy nurses examine a radiation survey instrument, used to measure the presence of radioactivity in the 1950s.

published. This 10-year, \$10-million study of 39,004 nuclear workers, carefully matched with 33,352 non-nuclear workers, from a population of 108,000 nuclear workers in a total population of about 700,000 workers, was completed in 1987.²⁷ After pressure on the DOE, which had chosen not to publish the data and conclusions, the Department finally, in 1991, issued a contractor's report on the study, with a two-page press release.

The radiation workers in the study were exposed to external cobalt-60. They had good radiation dosimetry and records in the Nuclear Navy program controlled by Admiral Hyman Rickover. They had limited confounding work experience. Nevertheless, these data were kept out of BEIR V, even though the Technical Advisory Panel Chairman for the Nuclear Shipyard Workers Study and the Chairman of BEIR V were the same person, Dr. Arthur Upton. Instead, BEIR V used other non-published sources, just as such sources have been used in the 1998 draft National Committee on Radiation Protection and Measurements (NCRP) SC1-6 report, also chaired by Dr. Upton.²⁸

In the summary, the Nuclear Shipyard Workers Study reports that the high-dose mortality rate of the nuclear workers was 0.76 that of the non-nuclear workers in the control group. Of special significance is the fact that the summary report did not include "all cancer," mortality, which is a most common factor, and of most interest in any such study. However, Myron Pollycove, M.D., of the Nuclear Regulatory Commission, documented that the "all cancer" mortality in the detailed tables is also statistically significantly lower among nuclear workers than among the non-nuclear workers.

After long negotiations, Dr. Genevieve Matanoski, Principal Investigator for the shipyard worker study, received another substantial contract from DOE in 1994, and retired as Head of Epidemiology at Johns Hopkins University. Now, more than 5 years later (and about 12 years since the completion of the study), no papers have been published. There is no report to

Congress, the shipyard workers, radiation protection agencies, or to the public. There is substantial concern about the integrity of the data, which have been kept under wraps. Further, this most definitive nuclear workers study was not included in a study of "all" U.S., U.K., and Canadian nuclear workers, contracted by DOE with the International Association for Research on Cancer (IARC).²⁹

The IARC study included only 95,000 U.S., U.K., and Canadian nuclear workers, and suppressed the more definitive nuclear shipyard workers study. IARC even misrepresents its own data to claim that its results support the LNT. This IARC study, using only the weaker, early nuclear worker data, was then proclaimed as a "definitive study," and a public relations campaign was launched, before the data were published, to claim that the IARC study is the "best evidence of the linear dose-response to low doses." (Ironically, this may be true, to the extent that the study shows, yet again, that no evidence exists for a low-dose linear dose-response!)

The IARC claim rests on data for one cancer, leukemia (absent chronic lymphocytic leukemia) with 119 deaths in a total of 15,825 deaths in the study. One data point in the small highest-dose group at "more than 40 cSv" (centi-sieverts) shows 6 observed deaths vs. 2.3 expected deaths. The 116 leukemia deaths in the six dose groups below 40 cSv show no excess leukemia. The IARC "analysis" discounts data points in the four data groups that are below the controls. This enables the IARC analysts to produce a "trend analysis" in which the 6 vs. 2.3 deaths data point alone causes a positive slope.³⁰

These data are then made to seem statistically valid by applying Monte Carlo modelling of 5,000 trials. The manipulated data are then used to support the LNT. This is highly questionable as science, as policy-making, or as ethics. The IARC, along with the international (IRCP) and national (NCRP) committees on radiation protection, and other radiation protection organizations, then mounted a public relations campaign to widely disseminate these conclusions, before the actual data were published. Once the report was published, reviewers found that the data do not support the claims. The NCRP and others know this fact. Actually, as Dr. Don Luckey has shown, the full data of the workers in this study demonstrate a *hormetic* effect, consistent with many other nuclear worker vs. non-nuclear worker dose-response studies.³¹

With small numbers of cases in dozens of specific cancers, it is more surprising that no other cancers reflect the 1 in 20 possibility of exceeding the normal range of statistical significance. Dr. Warren Sinclair, President Emeritus of the NCRP and a controlling influence in NCRP, ICRP, UNSCEAR, and the National Research Council/Board of Radiation Effects Research (BRER), however, misrepresents the IARC report as "vindicating" the LNT hypothesis. Not only does this misrepresent the data, but such a conclusion is contradicted by the lack of health effects in millions of people (1) exposed to moderate radiation doses, which are often much more well defined, especially from medical workers and patients, and (2) to high-dose natural background radiation sources. However, the NCRP and radiation protection interests claim that

this is "the best study" to confirm that the LNT is valid. The ICRP/NCRP/BRER group would not use it so consistently if there were any obviously better studies to support the LNT hypothesis. On that basis alone, the LNT can be seen as refuted.

Dr. Luckey summarized the major nuclear worker vs. non-nuclear-worker studies. He shows that the nuclear workers have 52 percent of the cancer rate in comparable non-exposed workers, in 7 million person-years of exposure!³²

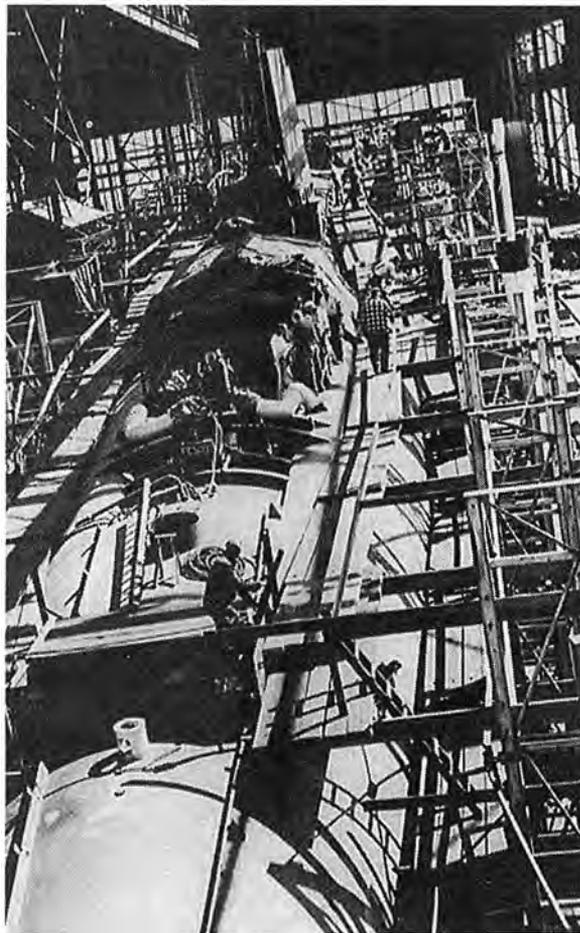
Dr. Luckey notes that, as with other natural nutrients (for example, vitamins and minerals), supplementation is warranted to provide for deficiencies that affect human health. In this case, supplementation of a "radiation deficiency" is warranted.³¹ These data further indicate the need to confirm the beneficial effects of low-dose radiation. Unfortunately, such research objectives are not supported, and in fact, are constrained, by the radiation-protection interests.

The Case of BEIR V, 1990

It is important to consider that BEIR V primarily relies on the Radiation Effects Research Foundation Japanese survivor studies.³³ Six other primary studies are identified as "used

for model fitting" (pp. 162-3), and these studies are claimed to support the LNT. However, even these few studies have substantial contradictory evidence that BEIR V does not address. Some have internal contrary data. Some are criticized in the literature. For some, other equivalent populations show contradictory results, and stronger studies of other populations produce contrary results. In some cases, arbitrary non-scientific statements dismiss contradictory data without justification. Some populations, especially medically exposed persons, have greater doses than those that BEIR V identifies as "data sets used for model fitting," but they are not included in the BEIR analysis, as they are now not included in the draft NCRP SC1-6 report. Many do not have high-dose effects to project a straight line to zero dose.

Finally, some significantly exposed populations, especially medically exposed populations, of potential significance to assessing radiation health effects, are not studied by the radiation-protection interests; for example, populations who live in areas of high natural background radiation, and persons who use and work at radium and radon spas.



U.S. Navy

Nuclear workers have lower cancer rates than non-nuclear workers, as documented in the suppressed Nuclear Shipyard Workers Study. Here, shipyard workers put the finishing touches on the nuclear submarine Nautilus at the Electric Boat Division of the General Dynamics Corporation at Groton, Conn.

tion. Use of the RERF results for the assessment of health effects is well known to be inappropriate, because the exposure does not apply to radiation protection for workers or for the public exposed to chronic and highly fractionated and low dose-rate radiation, especially for extreme costly cleanup and decommissioning standards.

Virtually all analysts, including the RERF researchers (as expressed at the November 1997 International Atomic Energy Agency conference in Seville, Spain), have stated that the instantaneous gamma and neutron atomic-bomb-exposed population is not relevant to the assessment of effects for low-dose rate and low-dose exposures. In his book mentioned above, Dr. Gunnar Walinder also reports on the "expectation" of UNSCEAR members that the RERF data would be manipulated to produce "expected" results that support the LNT.³

It is also common knowledge that BEIR V states that there are no adverse effects below a high dose, but then presumes a straight line from the high dose to zero. For example, for colon cancer, BEIR states that: In the atomic-bomb survivors there is no excess cancer "evident in doses below about 1.0

Japanese Survivors Study

The Radiation Effects Research Foundation (RERF) studies of Japanese atomic bomb survivor data at low doses have been substantially questioned, without resolution. This is especially true since the Department of Energy's arbitrary reassignment of the RERF from the National Academy of Sciences to a DOE-recruited and selected investigator at Columbia University. Many independent studies of the RERF data contradict the RERF analyses, even when limited to using the RERF's own processed data in the absence of the ability to access the raw data. Even BEIR V consultants were unable to obtain the data to undertake an independent analysis.

Some of the RERF data show more evidence of hormetic effects than adverse effects at low doses. However, critical analyses are not considered by radiation protection interests in BEIR V or NCRP SC1-6. Certainly however, in the first instance, the conditions of doses to persons exposed directly to an atomic bomb, and confounding factors of survivors, both before and after the bombing, are of no significance to the assessment of the health effects of chronic low-dose exposures to environmental contamination.

Gy." Nevertheless, BEIR applies the linear model down to zero. This presumes effects of radiation to doses of less than 0.0001 Gy, with a radiation protection policy specifying that even 0.00001 Gy should not be ignored in assessing collective dose and regulatory controls (for example, as in the NCRP Report 121).

Relative to significant populations with good dosimetry and relatively unconfounded results—for example, among medical patients and practitioners—the Japanese survivor results are both highly questionable and largely meaningless to the assessment of low-dose, low-dose-rate radiation health effects for radiation-protection policies. They do indicate some agreement with high-dose rate exposure results in animals and humans, which have demonstrated beneficial effects at low to moderate doses.

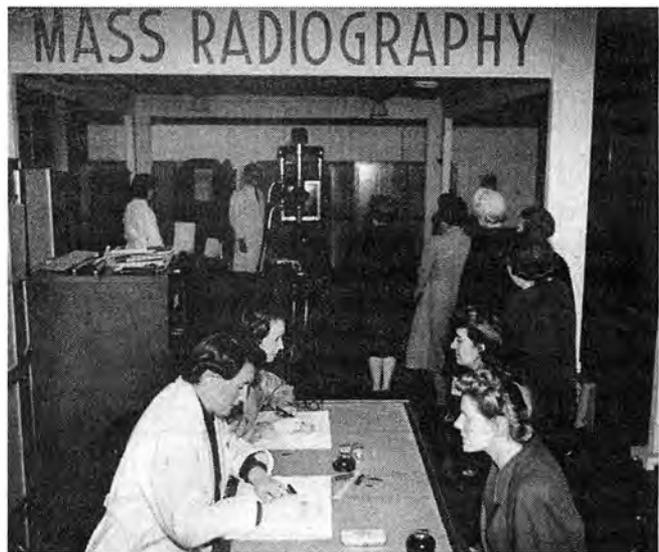
More Misrepresentation: Fluoroscopy of Women with TB

The individuals in the Canadian fluoroscopy study of breast cancer in women with tuberculosis, by Miller et al.,³⁴ is the second largest exposed group listed in the BEIR V data sets as the set "used for fitting the data." As noted, this study explicitly misrepresents its own data to report a linear dose-response in the literature and BEIR V. A plot of this data was presented to the NCRP annual meeting by Dr. E.W. Webster in April 1992. It has been published elsewhere in the literature, and is contained in the Radiation, Science, & Health "Data Document,"³⁴ and in the 1995 *Nuclear News* article,³⁵ both of which are referenced in the draft NCRP report. Below about 30 cGy (centi-grays) there is a highly statistically significant reduction in breast cancer. This reduction is by one-third in the largest group with a mean dose of 15 cGy, which is 2.7 standard deviations below zero risk. This equates to 10,000 fewer cancers in 1 million women at 15 cGy, instead of the false statement that 900 excess cancers are expected. (This is consistent with other evidence of reduced breast cancer from low-dose radiation exposure, for example, in the studies by Makinodan.³⁶)

In the Canadian study, a straight line is projected from the high-dose data through zero. This forces a linear relationship, despite the data—a consistent way data have been misrepresented in many studies. (See figure, page 48.) Nevertheless, BEIR V also applies this false straight line in its report, which is presumably the reason to use the Canadian study at all. BEIR does not include more substantial studies that fail to show any adverse effects that can be claimed to support the LNT.

NCRP members continued to claim that this study supports the LNT in 1995 and 1996, using this widely known false straight line to zero. An inquiry is needed to establish whether the authors intended to report the data inaccurately.

In 1996, an "update" of the study was published by Dr. Geoffrey Howe, the second author of the original Canadian study.³⁷ (DOE recruited Dr. Howe to Columbia University, and reassigned the Radiation Effects Research Foundation study to him from the National Academy of Sciences.) Howe then claimed that the data now fail to show the hormetic effect. However, in Howe's analysis, the large low-dose groups are collapsed to one low-dose group of 1 to 49 cGy. This effectively obfuscates the data from the largest groups at 15 cGy (10 to 19 cGy) and 25 cGy (20 to 29 cGy) and 0-9



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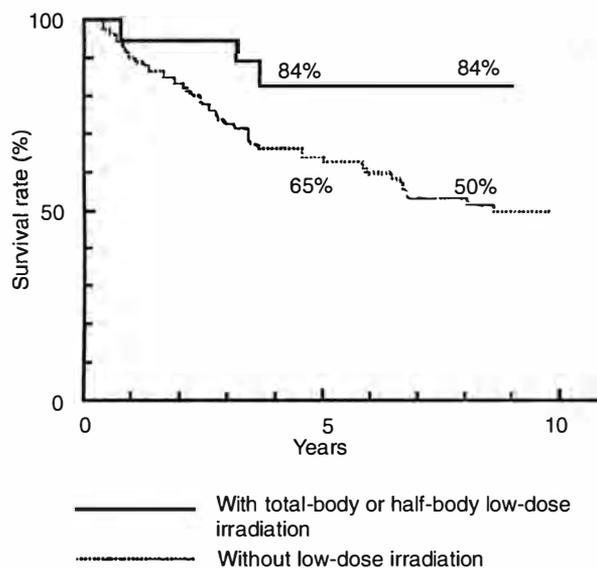
The billions of dollars that are spent on unnecessary cleanup of nuclear sites, or overprotection from nonexistent radiation "dangers," could be channelled into programs to make use of the benefits of low-dose radiation, including treatment of disease. Here, a 1944 experimental program in Glasgow, using chest X-rays to make an early diagnosis of tuberculosis.

cGy, and from the 30-39 cGy, and 40-59 cGy groups. When challenged on this conclusion at a meeting at the National Academy of Sciences in 1997, Dr. Howe stated only that the low-dose groups were "not informative." He responded similarly at a meeting at Chalk River, Canada. However, the low-dose groups in the Canadian study had the largest number of cases, with the smallest errors. The draft NCRP SC 1-6 report states that the later paper by Howe "refutes" the 1989 study. It also states that this is confirmed by a yet later paper by Howe (cited as "1998, in press"), but the report does not provide an explanation or scientific basis for this statement. It was later determined that the paper was never published and was never "in press."

The NCRP report makes this uninformative, dismissive comment to this most significant study (judged so even by BEIR V, which has the same person as chairman as the NCRP SC 1-6), which has been extensively assessed and referenced by scientists who question the LNT, and who introduced it explicitly to the NCRP Committee.

The 1989 Miller study is even actively suppressed in the 1994 UNSCEAR Report, Appendix B, as described by Dr. Polycove in an NRC transcript. However, the NCRP report is filled with voluminous data of limited, or no applicability to assess adverse health effects, or even biological effects in whole organisms—all data, of course, to support the LNT.

Note also that Dr. Howe published an analysis of lung cancer in these women.³⁸ They have significantly lower lung cancer at doses below about 2 Gy (200 rad) than the low-dose group, consistent with many other studies, as presented by Drs. Harald Rossi, a member of the BEIR III committees and ICRP, and Marco Zaider, who reviewed all relevant data, finding that lung cancer is lower with exposure to low to moderate doses, from X-rays and other sources.³⁹



SURVIVAL RATES OF NON-HODGKIN'S LYMPHOMA PATIENTS WITH AND WITHOUT TOTAL- OR HALF-BODY LOW-DOSE IRRADIATION

These are the 9-year survival data reported by Sakamoto et al. of 23 low-dose radiation patients and 94 control patients with similar histological tumor grades. The survival rate of the low-dose radiation patients is 84 percent, compared with 50 percent survival of the control patients. The 12-year survival rate of the low-dose patients remains at 84 percent.

Adapted from Sakamoto et al., 1997, *J. Jpn. Soc. Ther. Radiol. Oncol.*, Vol. 9, pp. 161-175.

Evidence of Beneficial Effects Ignored or Suppressed

The data on the beneficial effects of low-dose radiation, including uses of radiation in the first half of the century, have not been studied or considered by the regulatory bodies charged with radiation policy making. The health and medical benefits to patients who receive significant low and moderate diagnostic exposures are not considered, as with the Canadian fluoroscopy breast cancer study. In order to properly assess low-dose effects, all studies should analyze the dose range *below* the level at which adverse effects are demonstrated.

The biological evidence that organisms in below-normal radiation background have demonstrated adverse health effects has also not been considered, or even confirmed and evaluated. But more important, the data on many organisms that have demonstrated beneficial effects from supplemental radiation, including the prevention and elimination of cancer and other diseases, are not considered.

The extensive evidence that low-dose radiation stimulates immune responses is not considered, including the many documented sources in the UNSCEAR 1994 report.⁴⁰ Such research has indicated the mechanisms of successful treatment of some cancers by stimulating the immune system

using low-dose radiation (both alone and in combination with traditional high-dose cancer therapy). Such results have been reported by Dr. Sadao Hattori⁴¹ from the work of Drs. Sakamoto and Miyamoto⁴² and Dr. Takai⁴³ in Japan, and others. As noted by Dr. Hattori, funding for this research is constrained by radiation-protection interests that prevent such government support of medical research.⁴⁴ Private investment in research is constrained by the lack of potential profits in medical applications that would potentially provide health care, and even cancer cures, by low-cost low-dose radiation treatments vs. pharmaceuticals, for example, for chemotherapy, "genetic research," and so on. These research opportunities can also produce highly successful research careers, whether or not there are successful and cost-effective treatments of real patients.

Low-dose total body irradiation and half-body irradiation has successfully treated and prevented some cancers, as documented in Japan and elsewhere. That breast cancer and other cancers have been prevented or treated should be data to be investigated, not suppressed. It is costing the public hundreds of billions of dollars in environmental cleanup alone, to control radioactivity sources that are far below natural background radioactivity. But this "radiation protection" policy may have even greater costs to women with breast cancer, and to millions of others with cancers and other diseases that may be readily preventable or treatable at low cost, with inconsequential "side effects," by low-dose radiation treatment. There is also substantial reason to believe that low dose radiation treatments will be effective against HIV/AIDS.

In addition, research is constrained on the millions of persons who have used radium and radon balneology for health and medical applications throughout the world. Such research that has been performed is not considered in establishing radiation-protection policy, as with the radium dial-painters and others with high radium burdens. The positive medical results of such practices are also not considered—at great cost and to the detriment of the public in resolving the role of radiation and health.

Stimulating Health Benefits on the Cellular Level

The biological justification claimed for the LNT model is that a single ionizing photon or particle can damage DNA in a cell, and that this damage can lead to cancer. But an adult body is impacted by about 15,000 nuclear rays or particles every second—there are more than a billion such events every day—from natural sources. And each day, the DNA in each cell loses approximately 5,000 purine bases, because the body's normal heat breaks their linkages to deoxyribose. More damage is caused by normal cell division and DNA replication. But the most damage—a million DNA nucleotides in each cell damaged each day—is caused by free radicals created in the normal process of metabolism, resulting from routine eating and breathing and the stress of heat and exercise.⁴⁶

Radiation causes more double breaks per event in the DNA than normal metabolism does, and these are harder to repair than single breaks. But even given this difference, the mutations (unrepaired or misrepaired damage) from metabolism outnumber those caused by natural radiation by 10-million-fold.⁴⁷ There are a large variety of anti-oxidants that prevent

“Hundreds of billions of dollars are now being uselessly expended, solely on the basis of LNT-justified radiation protection policies, while the public is misled to believe that these expenditures are protecting public health.”

damage, enzymes that continually repair damaged nucleotides in DNA, and removal processes to eliminate those it cannot repair.⁴⁸ Even high-level radiation adds only a few more mutations to the millions that are occurring from metabolism.

The effect of low-level radiation, which is not strong enough to degrade the body's tissue repair capacity, is suggested by how the body reacts to low levels of other potential toxins. When small quantities of disease bacteria or toxic metals are taken into the body, the result is to stimulate the immune system. One effect is that subsequent attacks by this toxin, in larger amounts, are more effectively countered. Radiation works in an equivalent way. Numerous studies have shown that low-dose radiation enhances immune functions, enzymatic repair capabilities, and cell removal functions, and stimulates cellular and DNA repair mechanisms. This improved immune response affects the entire spectrum of metabolic damage. Therefore, if and when the body's defenses are degraded, low-dose radiation improves the general protection, repair, and removal of damaged DNA and cells.

As discussed above, organisms and animals at low-level natural background radiation or sub-ambient radiation levels, consistently show higher cancer rates and other physiological deficiencies. They recover when returned to normal background radiation levels or when they are provided supplemental radiation from external sources.

Therapeutically, the work in Japan, and in the United States, has shown that 10 to 15 cGy full-body or half-body X-ray doses, delivered in 1 to 2 minutes, several days apart, stimulate the body's defense mechanisms. Specific immune responses were sufficiently definitive in animal studies to justify clinical trials for cancer suppression in human beings, by Dr. Sakamoto and associates. The patients were generally far-advanced cases, therefore not ideal candidates for immune function stimulation. However, individual cases were successful, and a long-term clinical trial on non-Hodgkin's lymphoma patients has confirmed that the group that received low-dose radiation substantially outlived the control group at 5 years and 10 years.⁴⁹ (See figure, page 52.)

New initiatives are under way to establish the role of radiation in health, rather than to maintain the constraints of committees and research committed solely to radiation protection. More is needed. However, existing voluminous radiobiology and epidemiology data provide sufficient bases to refute the LNT, and to find that low-dose radiation does not constitute a public health hazard, and to determine that it is beneficial. Directed research is necessary to better understand the precise mechanisms, to quantify the various levels and conditions at which these benefits exist, and to more precisely

establish the levels and conditions at which human exposure can be considered safe. But those levels are at least many multiples of average natural background radiation for chronic exposure.

Time for Extreme Corrective Action

Hundreds of credible scientific studies, reported in the peer-reviewed literature, during the 50 years since the Manhattan Project studies, demonstrate beneficial responses to low-level radiation. With more than 2,000 studies going back more than 100 years, research has consistently demonstrated beneficial health effects and biological responses.⁵⁰ The LNT has been substantially contradicted. However, these data are shown to be systematically ignored and actively suppressed, and their research terminated, by the radiation-protection interests that control radiation science policy and scientific reviews. To the contrary, no evidence of adverse effects for human beings exists in hundreds of studies in low-, moderate, and even high-radiation-dose populations that in any way confirm the LNT premise.

The LNT hypothesis is a fiction, maintained by a closed, biased, interest group at massive cost to the taxpayers, electric ratepayers, and medically insured public. Its cost will be even higher for future generations, because of the resultant constraints on the human benefits of nuclear technologies. Hundreds of billions of dollars are now being uselessly expended, solely on the basis of LNT-justified radiation protection policies, while the public is misled to believe that these expenditures are protecting public health.

Research Needed on Low-dose Radiation As a Treatment for AIDS

There is every indication that low-dose radiation could be successfully used to treat HIV/AIDS. Because AIDS is an immune deficiency disease, and because strong and enhanced immune response has succeeded in preventing full-blown AIDS in persons with HIV, it can be expected that the stimulating effect of low-dose radiation will suppress the development of AIDS in persons whose immune systems are degrading.

It is known that low-dose radiation, in conjunction with small amounts of inactivated tumor cell antigen, have dramatic successes in preventing and retarding tumor development. Such an effect can be reasonably anticipated, and should be researched, for use with HIV vaccines.

Another indication of success with immune system stimulation comes from a case in California, where a transplant patient received a low radiation dose to help prevent rejection of a transplanted organ from a baboon. Although the transplant failed, the patient was in remission for an extended period of time, which was hypothesized to be in response to the low-dose irradiation stimulation.

Appropriate extreme corrective actions are needed:

(1) There must be an immediate deferral of the massive expenditures of the site "cleanup" programs, pending an urgent preliminary scientific review, which must be led by persons who are not committed to, or who do not have conflicts of interest in, the funds that support the LNT.

(2) The numerous cases of "scientific misconduct" must be documented, and formal allegations made for adjudication.

(3) BEIR VII must be terminated, along with the NCRP SC 1-6 biased radiation protection policy reviews, and the NIH Radiation Research Study Section, and the Board of Radiation Effects Research of the National Research Council. Reviews and research must be conducted by experts within applicable specialized disciplines, in accordance with current epidemiological, medical, and biological knowledge and applications.

(4) The evidence exists to justify the conduct of low-dose radiation clinical trials, which should include HIV/AIDS applications; and research must be conducted to optimize medical treatment modalities and radiation doses.

(5) For radiation protection purposes, radiation "risks" must be objectively quantified, considering the fact that, like vitamins and minerals, ionizing radiation is essential to life, and that we live in radiation-deficiency conditions.

(6) Engineering design and operations must be revised to produce cost-effective and, therefore, highly economically competitive nuclear technologies, for energy (with heat, desalination, and other applications), and for medicine, industry, agriculture, space, and other applications, with special consideration for expedited applications for China and Second- and Third-World countries.

The indirect costs of constraints on nuclear energy, food irradiation, nuclear medicine, and other nuclear technologies essential to development of a sustainable world economy, including the suppression of health and medical benefits, are greater than the direct costs—that are estimated at greater than \$2 trillion worldwide. The benefits of radiation technologies can substantially alleviate pending conflicts over oil, food, water, and other resources. Such benefits can also reduce environmental degradation in a world population that is growing at the rate of the total U.S. population every three years, and can help fulfill the growing expectations for individuals in the developing world.

Knowledgeable scientists and analysts are providing the extensive evidence on the data and questioning the process of controlling research and results, and scientific reviews. Radiation health effects and radiobiology expertise and technologies must be reoriented to develop the enormous opportunities to provide the cost-effective health benefits and environmental and energy capabilities, and to reduce potential world conflicts, for the world our grandchildren will inherit.

Jim Muckerheide, the State Nuclear Engineer for the state of Massachusetts, is a founder and President of Radiation, Science, & Health, which is committed to establishing a radiation policy based on science. He is also Co-director of the Center for Nuclear Technology and Society at Worcester Polytechnic Institute in Massachusetts, which is working to establish a "level playing field" for decisions on the costs and benefits of nuclear technologies that are essential to human prosperity in the 21st century.

This article is adapted from a paper he presented at the 8th International Conference on Nuclear Engineering, held in Baltimore, April 2-6, 2000.

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- Sadao Hattori (interview), "Using Low-dose Radiation for Cancer Suppression and Revitalization," Summer 1997

A discussion of Japan's wide-

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ranging program of research into the health effects of low-dose radiation.

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- Zbigniew Jaworowski, "Hormesis: The Beneficial Effects of Radiation," Fall 1994

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Russian Discovery Challenges Existence of 'Absolute Time'

by Jonathan Tennenbaum

Russian scientists discover unexpected regularities in radioactive decay, linked to astronomical cycles

Prof. Simon Shnoll giving a presentation on his work at Second International A.G. Gurwitsch Conference, held in Moscow in September 1999.



Courtesy of Vladimir Voeikov

Two years ago, nearly unnoticed in the West, the Russian biophysicist S.E. Shnoll published a paper in the prominent Russian physics journal *Uspekhi Fisicheskikh Nauk*¹ summing up the results of more than three decades of investigations of anomalous statistical regularities in a wide range of physical, chemical, and biological processes, from radioactive decay to the rates of biochemical reactions.

The evidence points unambiguously to the existence of a *previously unknown relationship* between *fluctuations* in the rates of radioactive and other processes in the laboratory, and

major *astronomical cycles*, including the day, month, and year. The implication is, that many phenomena which until now have been regarded as purely *statistical* in character—such as the distribution of fluctuations in the momentary rates of radioactivity measured in a sample—are somehow controlled or at least strongly influenced by an astrophysical factor, which varies in time in the same way at all points on the Earth.

Vladimir Voeikov, a colleague of Shnoll, comments in the Spring 2000 issue of *21st Century*: “Shnoll’s work shows that time is heterogeneous. It is not a Newtonian time. Each

moment in time is different from another, and this can be seen in any physical process that you study."

Albert Einstein, who rejected claims by Niels Bohr and others that the fundamental microphysical processes are *essentially, irreducibly* random in character, liked to say that "God does not play dice." Einstein and others pointed to the arbitrary nature of Bohr's argument: Just because physicists in Bohr's time could not penetrate beyond the *apparent* randomness of radioactive decay and other microscopic processes, to find a deeper lawfulness and regularity underlying such processes, does not mean that science is doomed to remain in that state of ignorance forever!

By demonstrating the existence of a universal, astronomical factor influencing the fine structure of supposedly random fluctuations, Shnoll et al. have opened up an entirely new field of scientific investigation which is not supposed to exist, according to Bohr.

A Simple Experiment

We now give a very brief description of the basic phenomenon discovered by Shnoll and his collaborators. The phenomenon itself is so astonishingly simple, that it is amazing that it has not attracted more attention until now.

The simplest case is the measurement of radioactive decay, where Shnoll has conducted thousands of experiments of the following simple type. We take a radioactive sample, and place it in front of a suitable detector (such as a Geiger counter), which counts the individual acts of radioactive decay of nuclei in the sample by detecting the emitted particles. Assuming the half-life of the radioactive element involved is relatively long, the count-rate of the detector, in counts per second or per minute, will fluctuate around a certain *average* value, which is related to the number of radioactive atoms in the sample and their half-life.

This phenomenon of continual fluctuations in the number of counts per unit time, around a relatively fixed average value, is normally accounted for by assuming that the radioactive decay of any given atom is a random event, and the assumption that decay of a given atom occurs *independently* of the other atoms in the sample. Thus, each atom which has not yet decayed up to a certain moment in time, has a certain *probability* of decaying during the next minute—a probability which is fixed for any given isotope by the character of that isotope, and virtually independent of the temperature, chemical environment, and activity of neighboring atoms.

An extraordinary phenomenon emerges, however, when we examine the fluctuations more carefully, with the help of a histogram: We fix a certain period of time (10 seconds, or a minute for example), and record the number of counts during each of a series of consecutive intervals of the given length. This gives us a sequence of whole numbers. We construct a histogram, by plotting the *number of times* a given whole number appears in the sequence, as a function of the number.

Now, from the standpoint of simple statistics we would expect the histogram curve to have a simple bell shape, with a *maximum* around the number corresponding to the overall *average* number of counts, and then declining grad-

When the 'Scientific Method' Obstructs Science

Excerpts from the "Conclusion" of Shnoll et al., "Realization of discrete states during fluctuations in macroscopic processes," in Uspekhi Fisicheskikh Nauk, Vol. 41, No. 10, pp. 1025-1035.

Concluding this brief account of studies performed at our laboratory, we would like to anticipate some naturally arising questions. Forty years have passed since our first publication in 1958. Why then have there been no results from other laboratories? We believe that the main reason is that other researchers are too well aware of the "principles of science." We are talking of the "spread of readings" of measurements. The "spread of readings" is something to be eliminated rather than studied. When physicists or chemists get a scatter of data greater than anticipated on account of inaccuracies of individual stages of investigations, the physicist will reach out for his soldering iron and screwdriver, and the chemist will check the purity of reactants and the quality of distilled water.

Another reason is that the accepted methods of statistical data processing based on the central limit theorems are not suited for analysis of the fine structure of the distributions. The criteria of conformity of hypotheses just "overlook" this fine structure. The distributions are averaged and smoothed. . . . Moreover, the majority of problems do not require knowledge of the fine structure of the distributions.

A third reason is a lack of confidence that this phenomenon is at all possible. The scatter of data is associated with the concept of "error." We have spent many years looking for possible artifacts. Our main task therefore consisted in proving the "theorem of existence." This task may be deemed completed. The acceptance of the phenomenon itself—the realization of the discrete spectrum of allowed states, which at any given time is similar for processes of entirely different nature, and which is attributable to cosmophysical forces—requires some psychological effort. . . .

There are many interesting problems that have to be studied. A number of theorems need to be proved, and new computer techniques developed. Experiments must be performed on satellites and space stations. A network for simultaneous measurements at different geographical locations ought to be organized. Finally, and most importantly, we need to develop a theory that will explain the nature of this phenomenon. All this is to be done in the future. The task of this paper is accomplished—we have introduced the object of future research.

ually on both sides. Naturally, if the number of measurements is small, the histogram will look more irregular, owing to the effect of random fluctuations; but we would expect that as we increase the total time of measurement, the curve would become closer and closer to the ideal mathematical bell curve.

However, real measurements of radioactivity and many other processes, carried out by Shnoll and others over many years, give a completely different result! The histograms typically show several clearly defined peaks, which do not "smooth out" as we increase the number of measurements, but which actually become more and more pronounced!

In four histograms, each plotting the results of 1,200 consecutive measurements of the radioactivity of a sample of the iron isotope Fe-55, over 36-second intervals, the largest peak corresponds to the average count, of about 31,500 pulses per 36 seconds; but there are a number of other

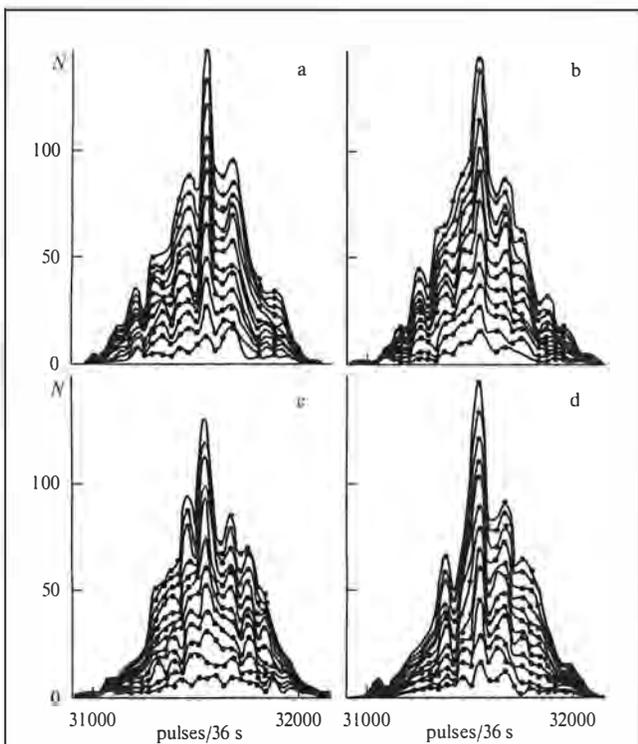


Figure 1
ILLUSTRATION OF NON-RANDOMNESS OF THE DISTRIBUTION OF MEASUREMENTS OF RADIOACTIVITY

Results of 1,200 consecutive measurements of an Fe-55 preparation show the non-randomness of the radioactivity. Layer lines are drawn after each 100 measurements. Instead of the expected bell-shaped curve, sharp peaks are found at certain pulse rates of the scintillation counter. The mean activity is about 31,500 pulses per second, but peaks are seen at other activity levels in the four separate trials of 1,200 consecutive measurements shown here.

Source: Courtesy of Shnoll et al., 1998. *Uspekhi Fisicheskikh Nauk*, Vol. 41, No. 10.

peaks, which we can see emerging more and more clearly as we follow the cumulative results of the first 100, 200, 300, and so on, measurements as "layers" under the main curve (Figure 1).

Change in Shape over Time

The histograms, made from more than two days from four successive 12-hour-long series of measurements, show another typical phenomenon discovered by Shnoll: The shapes of the histograms change over time (Figure 2). Most remarkably, the shapes of histograms for independent measurements taken over the same time period, tend to be very similar.

For example, simultaneous measurement of the reaction rate of ascorbic acid, dichlorophenolindophenol (DCPIP), and beta activity of carbon-14 show histograms of very similar shape.

These and a large number of other experiments carried out by Shnoll and his collaborators over many years, point unam-

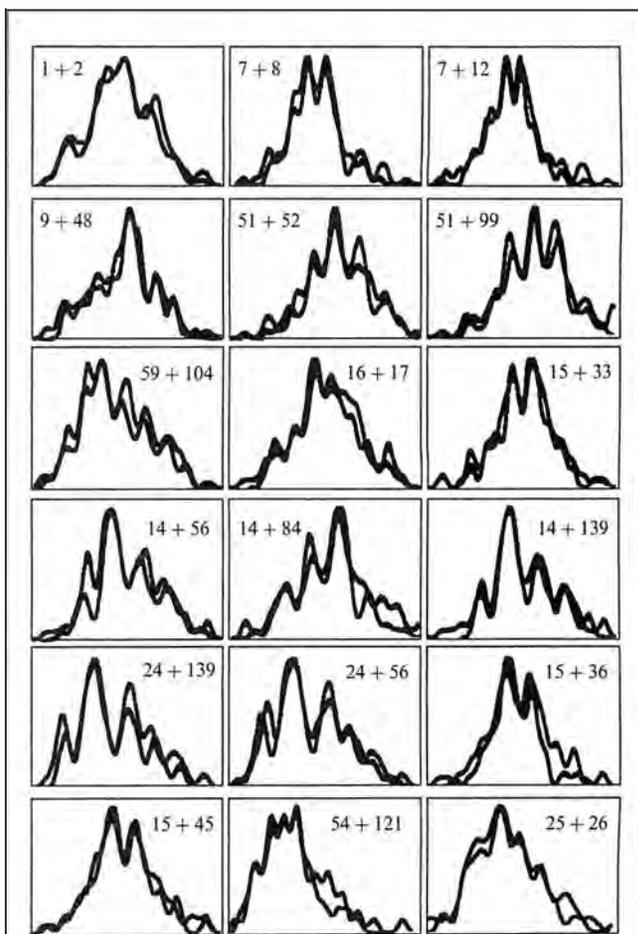


Figure 2
JUXTAPOSITION OF CERTAIN HISTOGRAMS

Juxtaposition of certain histograms in a series of measurements of the radioactivity of a Pu-239 sample, shows the similarity of certain patterns.

Source: Courtesy of Shnoll et al., 1998. *Uspekhi Fisicheskikh Nauk*, Vol. 41, No. 10.

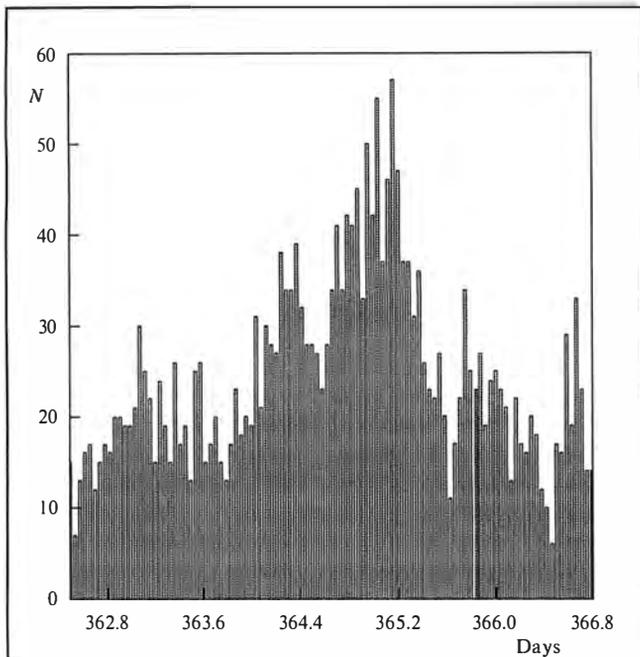


Figure 3
DISTRIBUTION OF INTERVALS BETWEEN
RECURRENCE OF HISTOGRAMS
SHOWING YEARLY PERIODICITY

The distribution of time intervals between recurrence of histograms of similar shape shows periodicities associated with the astronomical cycles of day, month, and year. Here, histograms plotted from 60 results of 6-second measurements of alpha activity of a Pu-239 preparation show sharp extremes after 364.4, 365.2, and 366.6 days.

Source: Courtesy of Shnoll et al., 1998. *Uspekhi Fizicheskikh Nauk*, Vol. 41, No. 10.

biguously to the existence of a *universal* factor influencing the shapes of histograms, and which varies in time. Furthermore, the Russian researchers have discovered well-defined *periods*, over which similar histogram shapes tend to recur (Figure 3).

To do this, they devised a computer-based algorithm for measuring the relative degree of "closeness" or similarity of histogram shapes, and on this basis carried out a computer analysis of hundreds of histograms taken over a long period. Examining the distribution of time intervals between "similar" histograms, they found strong peaks at 0 hours (that is, histograms made independently at the same time tend to be similar), at approximately 24 hours, at 27.28 days (probably corresponding to the synodic rotation of the Sun), and at three time intervals close to a year: 364.4, 365.2 and 366.6 days.

More recent data, just reported to the author, indicate that the "24-hour" period is actually slightly shorter, and corresponds quite precisely to a sidereal day! The latter would suggest, that at least one astronomical factor influencing histogram shape may originate *outside* the solar system, being associated with the orientation of the measuring station relative to the galaxy, and not only relative to the

Sun.

Shnoll concludes: "From the data presented above, it follows that the 'idea of shape'—the fine structure of distributions of results of measurements of processes of diverse nature—is determined by cosmological factors." He does not put forward a definite hypothesis concerning the nature of these factors, but suggests as a possibility the notion of a global "change of space-time structure," and notes that "a sound analysis of such a hypothesis will possibly require experiments under different gravitational conditions."

Clearly, these results should be intensively followed up by scientists around the world.

Jonathan Tennenbaum, based in Wiesbaden, Germany, is a member of the scientific advisory board of 21st Century Science & Technology magazine. He heads the Fusion Energy Foundation in Europe.

Notes

1. See S.E. Shnoll, V.A. Kolombet, E.V. Pozharskii, T.A. Zenchenko, I.M. Zvereva, and A.A. Konradov, 1998. "Realization of discrete states during fluctuations in macroscopic processes," in *Uspekhi Fizicheskikh Nauk*, Vol. 41, No. 10, pp. 1025-1035. A new paper is currently in preparation. Shnoll's group is based at Moscow State University.

Postscript

D.S. Chernavskii, editor of Physics-Uspekhi, added a postscript to the article by Shnoll et al., which is excerpted here:

The paper that you have just read is somewhat out of the ordinary. Professor Shnoll is a known biologist, but the paper deals not so much with biology as with pure physics—radioactive decay. Many years of experiments have led to the discovery of several (to be more precise, two) new phenomena.

The purpose of this comment is to discuss why these phenomena may be of interest to physicists, and what role they may play in the development of science. . . .

Two conclusions follow.

1. The histograms of S.E. Shnoll et al. contain new information about the nature of a random process which until now has passed unnoticed.

2. The postulate of measurement in quantum mechanics is at least not complete. Indeed, when we say that "alpha decay occurs at random, so that the probability of detecting . . . etc." we ought to specify what kind of randomness it is, and what chaos it is based upon. Otherwise we are not able to predict a number of phenomena observed. . . .

This proves the importance of the first phenomenon described in the paper. The second phenomenon consists in the periodical change of the fine structure of histograms. It is demonstrated that the fine structures of histograms for quite diverse random processes (physical, chemical, biological, etc.) are similar and vary in sympathy. Moreover, these periodical changes correlate with the changes in our solar system, and possibly in our universe. To evaluate properly this phenomenon we first ought to understand the cause and mechanism of the first phenomenon.

The authors do not suggest any explanation of the phenomena discussed, and make no hypotheses concerning their possible mechanisms, and quite rightly so! The reader must start thinking on his own, which certainly is the main intent of this publication.

Yes, the Ocean Has Warmed; No, It's Not 'Global Warming'

by Dr. Robert E. Stevenson

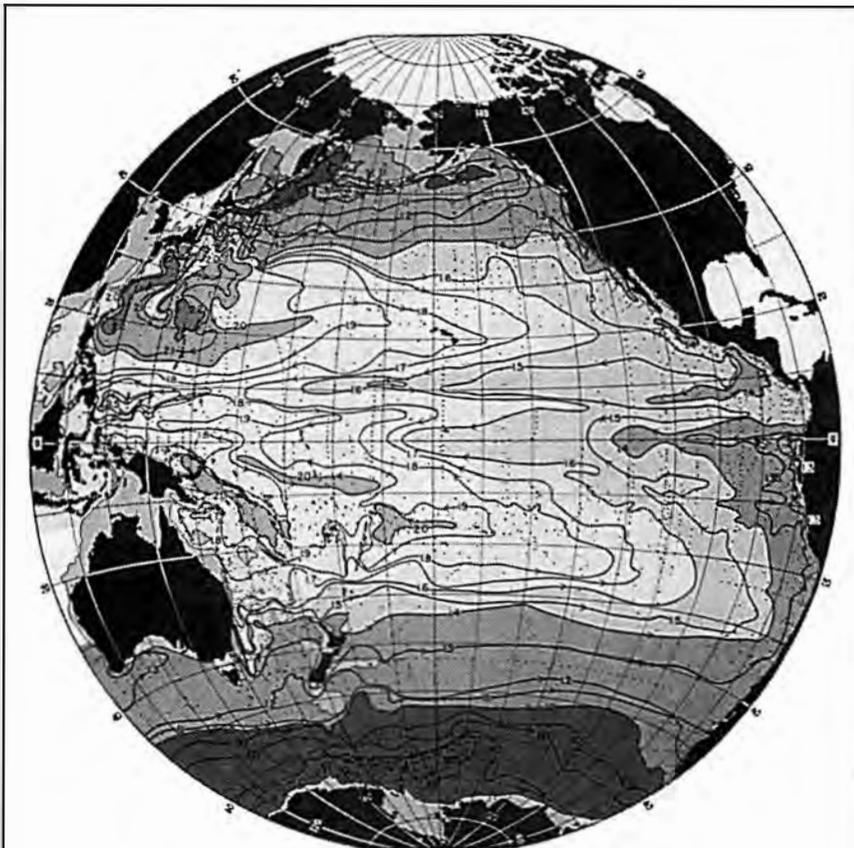
Contrary to recent press reports that the oceans hold the still-undetected global atmospheric warming predicted by climate models, ocean warming occurs in 100-year cycles, independent of both radiative and human influences.

At a press conference in Washington, D.C., on March 24, 2000, Dr. James Baker, Administrator of the U.S. National Oceanic and Atmospheric Administration (NOAA), announced that since the late 1940s, there "has been warming to a depth of nearly 10,000 feet in the Atlantic, Pacific, and Indian Oceans." "In each ocean basin, substantial temperature changes are occurring at much deeper depths than we previously thought," Dr. Baker said, as indicated by research conducted at NOAA's Ocean Climate Laboratory. He was referring to a paper published in *Science* magazine that day, prepared by Sydney Levitus, John Antonov, Timothy Boyer, and Cathy Stephens, of the NOAA Center.

For 15 years, modellers have tried to explain their lack of success in predicting global warming. The climate models had predicted a global temperature increase of 1.5°C by the year 2000, six times more than that which has taken place. Not discouraged, the modellers argue that the heat generated by their claimed "greenhouse warming effect" is being stored in the deep oceans, and that it will eventually come back to haunt us. They've needed such a boost to prop up the man-induced greenhouse warming theory, but have had no observational evidence to support it. The Levitus, et al. article is now cited as the needed support.

Science news writer Richard A. Kerr, in his "promo" article to get everyone excited about the new NOAA paper, asserts that "The ocean-induced delay in global warming also suggests to some climatologists that future temperature increases will be toward the top end of the models' range of prediction."

To complete the surge of enthusiasm, Dr. James Hansen of the Goddard Institute for Space Studies, argues: "Now the ocean-warming data imply that climate sensitivity [to the greenhouse effect] is not at the low end of the spectrum." He, and some others of United Nations fame, lean toward a climate sensitivity



MAPPING THE PACIFIC OCEAN, CIRCA 1967

Greenhouse radiation affects only the top few millimeters of the ocean. Here, dynamic heights of the winter Pacific Ocean were calculated above 1,000 meters depth, by Prof. Joseph Reid, Scripps Institution of Oceanography, 1968. From these data, Reid determined the Pacific's kinetic and thermal energy, but this was based on the assumption that the ocean was "stable." The black dots mark the location of hydrographic stations in the Pacific at that time.

of about 3°C or a bit higher, by the end of the century—the next century, that is.

The Levitus, et al. Study

In their paper, Syd Levitus and colleagues describe their efforts to quantify the heat content of the world ocean from the surface through a depth of 3,000 meters, over the years from 1948 through 1998. They calculate that there was an increase of about 2×10^{23} joules from 1955 to 1995, which computes into a mean warming of the ocean (from surface to 3,000 meters depth) of 0.06°C. The increased heat content of the global ocean, they note, indicates a warming rate of 0.3 watts/m² over the Earth's surface.

The authors conclude that substantial changes in heat content took place in the 300- to 1,000-meter layers of each ocean, and at depths even greater than 1,000 meters in the North Atlantic. From these changes, they determined that in the upper layer (0-300 meters), the mean temperature of the global ocean had increased by 0.31°C during the last half century.

Explaining the impetus for their study, they write: "[T]he role of the ocean [is] critical to understanding the variability of the Earth's climate system . . . because of the high density and specific heat of water." As a result, "the world ocean could store large amounts of heat and remove this heat from direct contact with the atmosphere for long periods of time."

Furthermore, Levitus et al. argue, "[T]he Earth system is not in local radiative balance, and therefore transport of heat from the tropics to the poles is required for the Earth system to be in global radiative balance."

To address these processes, Levitus and his colleagues began to accumulate historical, upper-ocean thermal data that were available in NOAA's archives. Gridded analyses of the existing data were prepared for the period of 1960-1990. They also used the World Ocean Data base to analyze temperature anomaly fields in the ocean.

Using techniques of statistical analysis that have long been in practice (Andersen 1974; Kaylor 1977; Preisendorfer and Mobley 1988), they prepared five-year running composites of all historical ocean temperatures from 1948-1996 (sic) at standard depths levels, from the surface through 3,000 meters. It was

necessary, they note, to construct multi-year composites of deep-ocean data for multi-year periods, *because of the lack of deep-ocean observations* (Amen, Charlie).

These time series were made for each ocean basin. Both of the Pacific Ocean basins (north and south) show quasi-bidecadal changes in the upper ocean heat content, with the two basins correlated. During 1997, the Pacific reached its maximum heat content (but the time period isn't noted).

"In order to place our results in perspective," the authors then report, "we compared the range of upper-ocean heat content with the range of the climatological annual cycle of heat content for the Northern Hemisphere" (Levitus and Antonov 1997). They determined that "there is relatively little contribution to the climatological range of heat content from depths below 300 meters!"

It seemed apparent, however, they write, that "the decadal variability of the upper-ocean heat content in each basin is a significant percentage of the range of the annual cycle for each basin." (This is as noted in the North Pacific by Moisan and Niiler 1998; Nakamura, Lin, and Yamagata 1997; Tanimoto, Iwasaka, Hanawa, and Tobe 1993; and Watanabi and Mizumo 1994.)

The Levitus group looked particularly at the data for the deep waters of the North Atlantic, choosing to address a depth of 1,750 meters. They learned that that ocean had warmed in the period between 1955 and 1974, and again between 1974 and 1988. The warming was not uniform, horizontally or vertically, but they determined that the changes were not small, and could have made appreciable contributions to the Earth's heat balance on decadal time scales. Maximum heat storage was at depths greater than 300 meters.

So, we have the added knowledge that the heat content of the North Atlantic is substantial at depths below 300 meters. The temporal variability of the South Atlantic differs from that in the North, the latter responding "to the deep ocean convective processes that occur." Regarding the World Ocean, they reported: "The Pacific and Atlantic have been warming since the 1950s, and the Indian since the 1960s. The delay in the Indian Ocean may be caused by the sparsity of data before 1960."

The NOAA Conclusions

The "bottom line" conclusions claimed by the NOAA study are these:

(1) The world ocean has exhibited coherent changes of heat content during the past 50 years, resulting in a net warming.

(2) There is no determination whether the observed warming is caused by natural variability or anthropogenic (man-induced) forcing.

(3) The warming supports the contentions of global-climate modellers that the planetary radiative disequilibrium, for the period of 1979 to 1996, may be the result of "excess heat accumulating in the ocean."

(4) Sea-surface temperatures have had two distinct warming periods over the past century; from 1920 to 1940, then a cooling period until the second warming began in the 1970s.

(5) In each period of warming, an increase in the ocean's heat content preceded the observed warming of the sea-surface temperatures. The NOAA scientists concluded that it could be the result of natural variability, or anthropogenic effects, or more likely *both*.

(6) It was speculated that the extreme warmth of the world ocean during the mid-1990s was caused by (a) the multi-decadal warming of the Atlantic and Indian oceans, and (b) a positive polarity in a possible bidecadal oscillation of the Pacific Ocean heat content.

(7) And a final point, regarding the large change in Atlantic heat storage at depths exceeding 300 meters: The convection in the Labrador Sea, by mixing the ocean through a 2,000-meter-deep water column, may keep sea-surface temperature changes relatively small, despite a large heat flux from ocean to atmosphere. Such convection must be addressed, especially when anthropogenic forcing is being considered.

So, How Does This Play in Hanalei?

(Considering that Hanalei, Hawaii is just down the hill from where I write, I thought I'd inject a little local color into my comments.) It sometimes seems as if I'm living in a "time-warp" in which some people, and scientists, are unaware that rational life existed before their birth—or before they got out of the sixth grade. Yet, we marine scientists did not enter the second half of the 20th century without a fair bit of understanding of the thermal ocean.

For example, Prof. Hubert H. Lamb, the premier European climatologist of the 20th century,¹ wrote in 1977 that “there has been a general warming of sea temperatures, by 0.5-1.0°C, from 1880 to 1965, defined from widely scattered points around the oceans of the world.” Lamb went on to say that “This general warming is known from the Gulf of Alaska, the eastern Pacific Ocean, the western Indian Ocean, the eastern and northern North Atlantic Ocean, and the tropics of both the Atlantic and Indian oceans.”

Within those 85 years, Professor Lamb noted that there were “minima in the periods of 1915-1925 and again between 1940 and 1950”—meaning that the rate of temperature rise went to zero, but temperatures did not decline to levels lower than they had already reached. For the Atlantic Ocean, 55°N to 40°S, the waters were cooler by 0.8°C to 1.0°C in 1780-1850 than in 1950. Now, the temperatures that Professor Lamb provides were certainly not taken as precisely, nor were they as many as we have acquired in the past half century. But, their existence is not trivial.

Sources of 20th Century Ocean Temperatures

I learned to deploy Nansen water bottles and reversing thermometers for deep-sea sampling in 1949. I spent the rest of the subsequent decade seagoing, for the most. I can’t remember how many bottle casts I made, or how many bathythermographs I deployed. There had to be thousands in the waters off coastal California. Other students and post-docs were doing the same farther offshore in the eastern Pacific, from the *E.W. Scripps*. In the westernmost Atlantic, a similar cadre worked from the *Atlantis*.

In the 1960s, more ships were out at sea: from Fisheries Laboratories, U.S. Coast and Geodetic Survey (now NOAA), and research institutions at Scripps (La Jolla, Calif.), Woods Hole (Massachusetts), Miami, and Texas A&M (in the Gulf of Mexico). The British sailed the new *Discovery*, the Germans the new *Meteor*, and there were small ships sailing from Denmark, Japan, and France. Many cruises were dedicated to the geophysics of the sea floor, where deep-ocean casts for water and temperatures were few and far between.

Surface water samples were taken

routinely, however, with buckets from the deck and the ship’s engine-water intake valve. Most of the thermometers were calibrated into 1/4-degrees Fahrenheit. They came from the U.S. Navy. Galvanized iron buckets were preferred, mainly because they lasted longer than the wood and canvas. But, they had the disadvantage of cooling quickly in the winds, so that the temperature readings needed to be taken quickly.

I would guess that any bucket-temperature measurement that was closer to the actual temperature by better than 0.5° was an accident, or a good guess. But then, no one ever knew whether or not it was good or bad. Everyone always considered whatever reading was made to be precise, and they still do today. The archived data used by Levitus, and a plethora of other oceanographers, were taken by me, and a whole cadre of students, post-docs, and seagoing technicians around the world. Those of us who obtained the data, are not going to be snowed by the claims of the great precision of “historical data found stored in some musty archives.”

I am more than a bit curious about the great “scavenger” hunt by the folks at NOAA/NESDIS (National Environmental Satellite Data Information System). In 1970, with the advent of the International Decade of Ocean Exploration, all institutions under contract with any governmental agency, and all governmental agencies, were required to send their data to the National Ocean Data Center; and that included data gathered before 1970. They were permitted a certain “lead time” to do that—about five years, as I recall. Those data were made more accessible by the GISST (Global Ice and Sea Surface Temperature) data set, put together by Folland and Powell in 1994 from the Hadley Center in England, and the bathythermograph data sets (BTs) put together by the Scripps Institution. Nearly all of the latter BTs were deployed through programs coordinated with NOAA, so I’m guessing that no one at NOAA had to look far for those data.

Some Basics of Marine Climatology

I wrote my first paper on the ocean’s influence on climate in 1958. The next year I was in England, working for the Navy to learn whether or not “microclimates,” as we called them, along

shores of the North Sea were determined by the adjacent coastal ocean. During the year, I visited all of the marine laboratories and research centers in western Europe.

It was in Germany, at the Seewetteramt (Marine Branch of the German Meteorological Office), where I met and began to work with two outstanding marine climatologists, Martin Rodewald, and Hans Markgraf, and the director, Dr. Hans U. Roll, the premier marine meteorologist of the time. They were looking at much larger areas than I—namely, the North Atlantic and the polar seas—and how they influenced the climate and weather over northwest Europe. It was a great education for me. I learned the processes by which the ocean and atmosphere work together.

The basics of these interactions start where oceans and atmosphere meet. More than 70 percent of the Earth’s surface is covered by oceans, seas, and lakes, and another 5 percent is covered by glaciers and ice caps. Just more than two thirds of this water area is in the Southern Hemisphere, and the oceans are 4 to 5 kilometers deep.

The atmosphere cannot warm until the underlying surface warms first. The lower atmosphere is transparent to direct solar radiation, preventing it from being significantly warmed by sunlight alone. The surface atmosphere thus gets its warmth in three ways: from direct contact with the oceans; from infrared radiation off the ocean surface; and, from the removal of latent heat from the ocean by evaporation. Consequently, the temperature of the lower atmosphere is largely determined by the temperature of the ocean.

Inland locations are less restrained by the oceans, so the surface air experiences a wider temperature range than it does over the oceans. Land cannot store heat for long, which is why hot days are quickly followed by cold nights in desert regions. For most of the Earth, however, the more dominant ocean temperatures fix the air temperature.

This happens through several means:

(1) The oceans transport heat around the globe via massive currents which sweep grandly through the various ocean basins. As a result, the tropics are cooler than they would be otherwise, and the lands of the high latitudes are warmer. The global circulation of heat

in the oceans moderates the air temperatures around the whole world.

(2) Because of the high density/specific heat of sea water, the entire heat in the overlying atmosphere can be contained in the top two meters of the oceans. This enormous storage capacity enables the oceans to "buffer" any major deviations in temperature, moderating both heat and cold waves alike.

(3) Evaporation is constantly taking place at the surface of the seas. It is greatest in the tropics and weakest near the polar regions. The effect of evaporation is to cool the oceans and, thereby, the surface atmosphere.

How the Oceans Get Warm

Warming the ocean is not a simple matter, not like heating a small glass of water. The first thing to remember is that *the ocean is not warmed by the overlying air.*

Let's begin with radiant energy from two sources: sunlight, and infrared radiation, the latter emitted from the "greenhouse" gases (water vapor, carbon dioxide, methane, and various others) in the lower atmosphere. Sunlight penetrates the water surface readily, and directly heats the ocean up to a certain depth. Around 3 percent of the radiation from the Sun reaches a depth of about 100 meters.

The top layer of the ocean to that depth warms up easily under sunlight. Below 100 meters, however, little radiant energy remains. The ocean becomes progressively darker and colder as the depth increases. (It is typical for the ocean temperature in Hawaii to be 26°C (78°F) at the surface, and 15°C (59°F) at a depth of 150 meters.

The infrared radiation penetrates but a few millimeters into the ocean. This means that the greenhouse radiation from the atmosphere affects only the top few millimeters of the ocean. Water just a few centimeters deep receives none of the direct effect of the infrared thermal energy from the atmosphere! Further, it is in those top few millimeters in which evaporation takes place. So whatever infrared energy may reach the ocean as a result of the greenhouse effect is soon dissipated.

The concept proposed in some predictive models is that any anomalous heat in the mixed layer of the ocean (the upper 100 meters) might be lost to the deep ocean. There have been a number

of studies in which this process has been addressed (Nakamura 1997; Tanimoto 1993; Trenberth 1994; Watanabi 1994; and White 1998). It is clear that solar-related variations in mixed-layer temperatures penetrate to between 80 to 160 meters, the average depth of the main pycnocline (density discontinuity) in the global ocean. Below these depths, temperature fluctuations become uncorrelated with solar signals, deeper penetration being restrained by the stratified barrier of the pycnocline.

Consequently, anomalous heat associated with changing solar irradiance is stored in the upper 100 meters. The heat balance is maintained by heat loss to the atmosphere, not to the deep ocean.

What about Thermohaline Circulation?

The fact that the surface ocean can become denser than the underlying waters, thereby sinking to depths of "density equilibrium," has been discussed since surveys of the physical ocean began in the second half of the 19th century. Certainly the concept was known before *HMS Challenger* sailed, in 1873, on its famous expedition. One of the multitude of suggestions made by members of the Royal Society at that

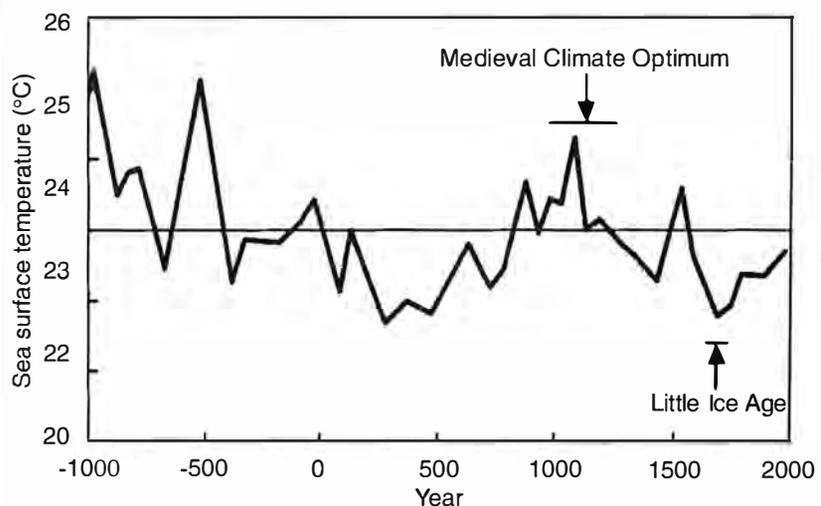
time was to investigate the "over-turning of surface waters caused by density differences."

Thermohaline circulation is responsible for the formation of the bottom-water masses in the world's oceans: the North Atlantic Deep Water (NADW) originates basically in the region of the Labrador Sea; the Weddell Sea is the source of the deep-water in the circum-polar Southern Ocean; and the Pacific Deep Water originates in the Ross Sea. In many other places in the oceans, and seas, as well, surface waters are carried into the depths by thermohaline circulation.

So, it is not surprising that those modellers who "need" to get warm surface waters to move into the depths of the oceans, and remain sequestered there for long periods of time, would turn to the physical mechanism of this vertical circulation system. Their hope (claim) is that there can be occasions when salinity, rather than temperature, is the prime determining factor in the density of the surface waters. Then, warm water, made dense by an increase in the sea's salt content, would sink.

It does not happen!

The primary physical factor in deter-



SURFACE TEMPERATURES IN THE SARGASSO SEA (1,000 B.C. TO 2000)

Surface temperatures in the Sargasso Sea, as determined by isotope ratios of marine organism remains in sediment at the bottom of the sea. The horizontal line is the average temperature for this 3,000 year period. Note the two most recent extended climate departures from the mean, both naturally occurring—The Little Ice Age and the Medieval Climate Optimum. The data are from Dr. Cesare Emiliani, University of Miami.

mining the density of sea water is the *temperature* (Sverdrup, Johnson, and Fleming, 1943). In the open ocean, top or bottom, salinity differences are measured in a few parts per thousand. Thermohaline circulation takes place where the surface waters become colder than the waters beneath. The large vertical movements occur in polar seas, where accelerated radiation makes the surface waters greatly colder than the deeper waters.

In these waters, surface water temperatures are about -1.9°C , the normal salinity of the water keeping it from freezing into ice. The deep waters, being warmer than such surface waters, rise to the surface, as the upper layers sink slowly into the dark ocean depths. Because only very cold surface water is able to sink, it is simple to understand that the deep ocean can never warm up, regardless of how warm the surface ocean around the world may become.



Oceanographer Bob Stevenson, on tour with the B-17G, "Sentimental Journey" of the Confederate Air Force, in Pocatello, Idaho, August 1998. Dr. Stevenson was an aerial navigator in World War II and flew from England in B-17s with the U.S. 8th Air Force.

No deep lying "thermal lag" is going to take place. It is clear that there'll be no Phoenix rising as a haunting specter.

The Big, Deep-Blue Sea

To one extent or another, I've been involved with the relationships of the oceans on climates, and vice versa for the past 50 years. It was when I became Secretary General of IAPSO, in 1987, to work closely with our sister associations of Meteorology (IAMAP), Hydrology (IAHS), and Volcanology (IAVCEI), all within our "mother union" International Union of Geodesy and Geophysics (IUGG) that I first had to face the claim coming from the United Nations Environment Program and World Meteorological Organization that global warming of the atmosphere was in full swing, induced by the over-enthusiasm of mankind to travel, keep warm, and feed themselves. By their desire to enhance their lives, human beings were increasing,

untenably, the CO_2 content of the Earth's "greenhouse." I was frankly surprised by this claim, and believed it not one whit.

As an oceanographer, I'd been around the world, once or twice, and I was rather convinced that I knew the factors that influenced the Earth's climate. The oceans, by virtue of their enormous density and heat-storage capacity, are the dominant influence on our climate. It is the heat budget and the energy that flows into and out of the oceans that basically determines the mean temperature of the global atmosphere. These interactions, plus evaporation, are quite capable of cancelling the slight effect of man-produced CO_2 .

In 1991, when the IUGG and its associ-

ations met in Vienna for their General Assembly, the presidents and the secretaries-general of the four associations I've mentioned, discussed the program we would propose to forward to the International Commission of Scientific Unions (ICSU) for consideration at the 1992 Rio de Janeiro Conference. We all decided not to prepare any programs!

In our joint statement, which I paraphrase here, we noted that "To single out one variable, namely radiation through the atmosphere and the associated 'greenhouse effect,' as being the primary driving force of atmospheric and oceanic climate, is a simplistic and absurd way to view the complex interaction of forces between the land, ocean, atmosphere, and outer space."

Furthermore, we stated, "climate modelling has been concentrated on the atmosphere with only a primitive representation of the ocean." Actually, some of the early models depict the oceans as nearly stagnant. The logical approach would have been to model the oceans first (there were some reasonable ocean models at the time), then adding the atmospheric factors.

Well, no one in ICSU nor the United Nations Environment Program/World Meteorological Organization was ecstatic about our suggestion. Rather, they simply proceeded to evolve climate models from early weather models. That has imposed an entirely atmospheric perspective on processes which are actually heavily dominated by the ocean.

So, where does the NOAA paper fit?

I was rather eager to read the article by Syd Levitus, and his colleagues. I was somewhat put-off by the headlines about "missing warming," but I figured that was just the usual hype by the media.

Yet, here I sit in the middle of the Pacific Ocean, surrounded by papers (peer-reviewed, I guess I should add) which conclude:

(1) For the past two decades at least, and possibly for the past seven decades, the Earth's true surface air temperature has likely experienced no net change;

(2) there should have been a sizable CO_2 -induced increase in atmospheric radiative forcing during that time, but there wasn't. That must mean that a suite of compensatory feedbacks overwhelmed the "greenhouse" impetus for

warming; implying, therefore,

(3) that the planet will not warm from any man-produced increases in CO₂; indicating

(4) any increases in temperature will likely fit the global trend of +0.048°C/decade, that is, about 0.5°C this century—the rate of warming that has existed since the Little Ice Age, centered around 1750 in Europe, South America, and China; suggesting

(5) that the heat storage in the upper ocean takes place in the upper 100 meters, and the magnitude provides a rise in temperature at those depths of 0.5°C in the past 50 years (in those parts of the ocean for which we have data);

(6) this global warming (and cooling) of the ocean occurs on biennial, ENSO, decadal and interdecadal period scales; thence,

(7) the ocean thermal changes on centennial-period scales, which appear as the warming trend through the past 50 to 100 years, can be explained by means of intrinsic internal modes of the Earth going through their normal cycle of warming and cooling, independent of both radiative and anthropogenic influences.

I guess what I'm really wondering is "Why did Syd Levitus, and his associates, write their paper in the first place?"

Robert E. Stevenson, an oceanography consultant based in Hawaii, trains the NASA astronauts in oceanography and marine meteorology. He was Secretary General of the International Association for the Physical Science of the Oceans from 1987 to 1995, and worked as an oceanographer for the U.S. Office of Naval Research for 20 years. A member of the scientific advisory board of 21st Century, he is the author of more than 100 articles and several books, including the most widely used textbook on the natural sciences.

Notes

1. Hubert H. Lamb was Britain's most outstanding meteorologist through and after World War II. What the British and American air forces accomplished in weather forecasts was the result of his work. He is the author of numerous papers and several exhaustive studies in historical climatology.

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Appreciating Man's Accomplishments in Space

by Philip R. Harris, Ph.D.

Challenges of Human Space Exploration

Marsha Freeman
Chichester, U.K.: Springer/Praxis
Publishing, 2000
Paperbound, 272 pp., \$44.95 (E-mail:
orders@springer-ny.com)

This well-crafted book reviews some of the principal human accomplishments in outer space during the last half of the 20th century. It recounts how foresighted people responded to the "lure of exploration" beyond the Earth's confines, emphasizing that such exploration is a high-risk enterprise in which 14 astronauts and cosmonauts have already died. The focus of the book's very detailed seven chapters is upon "manned" spaceflight and habitation aloft, making a telling case for using the International Space Station as an orbital laboratory.

The book begins with America's Skylab, the first real space station in orbit, and then examines the Russian experience that climaxed with the Mir station. Special attention is directed to the seven U.S. astronauts who were aboard Mir in the mid-1990s, giving them more long-duration spaceflight experience (945 days on Mir), than had been gained on the Space Shuttle during its 17 years of operation. The main emphasis of the book is upon the science accomplished on these two stations, as well as on NASA's shuttle fleet. (There is also a chapter on the lessons learned from the Russian orbital platform, over more than a decade.)

These achievements include the biorevolution through tissue engineering and space crystal manufacturing, laying the foundation for the future International Space Station (ISS) to become the 21st century scientific laboratory aloft.

There are also 104 interesting dia-

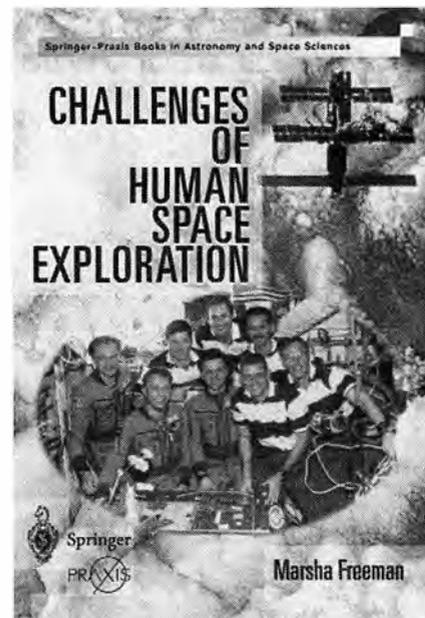
grams and photographs, some of which have never before been published. Three short appendices cover the American longer-duration missions on Mir, the psychological support these astronauts received, and the types of scientific investigations they engaged in while aboard the Russian craft. There is a comprehensive bibliography.

Making Space Understandable

The author is an Associate Editor of *21st Century Science & Technology* magazine, where she has specialized in producing excellent articles on many aspects of the space program and its innovators. She also is the author of *How We Got to the Moon: The Story of the German Space Pioneers*, published in 1993. Freeman brings to her current work 18 years experience as a science writer, which is reflected in precise and concise reporting in the *Challenges of Human Space Exploration*. She has a unique capacity for synthesizing relevant space materials, which she gleans from numerous journals and news reports, combining this with the results of her personal interviews with some of the key players in the space drama.

In this book, as in her hundreds of previously published articles, Ms. Freeman provides readers with interesting historical and technical perspectives. The reader is fascinated not only by her objective reporting of little-known aspects of her subject matter, but the way she makes complicated scientific research understandable.

For example, in her opening chapter, Freeman looks at Skylab as a prototype of future houses in space, and she looks at the legacy it contributed. She reviews the experience of its astronauts in this isolated, confined environment of microgravity, and why they went on "strike" against ground controllers who



over-programmed them.

Her account of the Russian station saga is balanced, relative to their contributions and problems, as well as to the unique resources they offer to ISS. Whether about a station or shuttle, Freeman meticulously tracks the human story in orbit in terms of its physiological, psychological, sociological, and operational aspects.

Critical Issues Explored

Freeman addresses eight critical issues faced by spacefarers:

(1) The interface between ground control and the astronauts/cosmonauts' off-world, pointing up the need for team-

Philip R. Harris, Ph.D., is president of Harris International. A management and space psychologist, he has been a consultant to NASA for more than 30 years. He is an Associate Fellow of the AIAA, and the author of Living and Working in Space, published by Praxis in 1992 and reissued in 1996.

“There is a danger that the new century may usher in an age of timidity, in which fear of risks and the obsession with cost-benefit analysis will dull the spirit of creativity and the sense of adventure from which new knowledge springs.”

—Michael E. DeBakey, M.D. (Director, DeBake Heart Center, Baylor College of Medicine), in his Foreword to *The Challenges of Human Space Exploration*.

work to counter problems of communications, scheduling of tasks, and lack of spaceflight experience by most controllers.

(2) The psychosocial problems of human groups in orbit, underscoring the need for more behavioral science involvement.

(3) The physical and medical requirements of people aloft, and the contributions which life science research can make to satisfying them.

(4) The value and advantages in the

microgravity environment for living and working there, along with the type of research needed to further long-duration missions and space settlement.

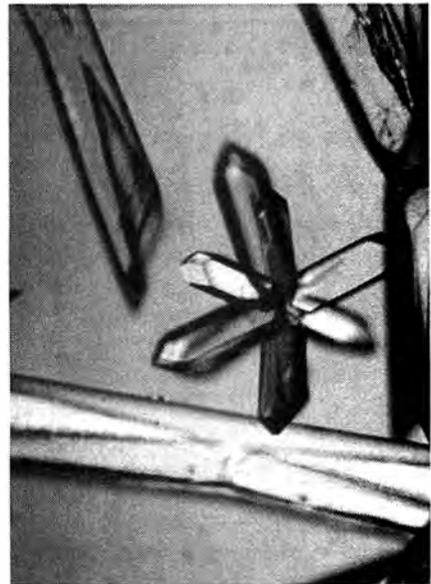
(5) The necessity for international cooperation in space development, and the implications for Russian/American synergistic relations.

(6) The limited experience during the last 50 years, relative to space habitation, based on the relatively short duration missions of elites, and the multi-disciplinary/multinational imperative for future mass migration and colonization.

(7) The human spirit of exploration, demonstrated in ground analogs and in space history to date, which is marked by daring, courage, ingenuity, and creative problem-solving.

(8) The necessity for continuous learning about how human beings can cope beyond this planet. Freeman’s synopsis lays out some of the space challenges facing our species, both perils and rewards—such as, provisions for keeping human beings healthy aloft, growing food in orbit with new technology, using this environment to solve some of humanity’s age-old problems.

My one criticism is that her coverage



NASA

A biorevolution in space: Here, a high definition crystal of insulin, grown aboard the Space Shuttle. Scientists hope to design new treatments for diabetes, making use of a detailed map of this complex protein.

is insufficient, relative to commercial activities and the potential of outer space—space is more than a place for science and scientists. She limits her reporting on many resources available off-world that could benefit humankind, such as on the Moon, and especially lunar solar power.

Overall, this is a fascinating read about elegant experimental research aloft, especially through collaborative scientific efforts, that deals with everything from growing food, to women’s health, to possibilities for organ replacement. Excluding the record of unmanned missions, Marsha Freeman’s book is otherwise a priceless recounting of what humans have achieved so far in the Space Age, so that we may better plan for further accomplishments in the new millennium. Throughout, she touches lightly on the research applications to Earth of what we have learned in orbit.

As a NASA consultant during the Apollo period, I have been involved with an annual publication on space technology spinoffs. I suggest that Freeman’s next book be devoted to further reporting on how humanity benefits from space technology and exploration!



NASA

Astronaut Robert L. Gibson (foreground), mission commander of the Space Shuttle STS-71, offers a handshake to his Russian counterpart, Mir-18’s commander, cosmonaut Vladimir N. Deshurov in July 1985. Gibson made his way through a special docking tunnel, which linked Atlantis to the Mir.

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Unnatural Capitalism

by John Hoefle

Natural Capitalism: Creating the Next Industrial Revolution

Paul Hawken, Amory Lovins, and
L. Hunter Lovins
New York: Little, Brown and Company, 1999
Hardcover, 396 pp., \$26.95

Reading this book reminds the author of one of those children's magic books, in which a fantasy world is created with its own set of rules, and where power flows to those who ignore the fundamental precepts of science in favor of some mystical force. It appeals to uneducated emotion, rather than to the power of reason.

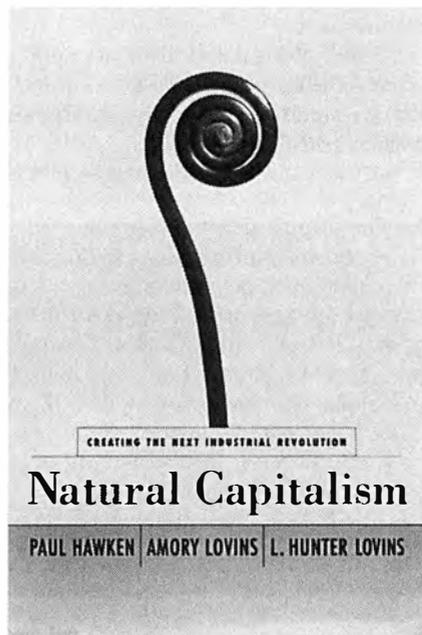
The book was called to our attention by the folks at Greenmountain.com, one of those alternate energy companies which purports to solve our nation's energy problems by generating "green" electricity. In a letter accompanying the book, Greenmountain.com claimed that the book supported the company's contention that "the ideas of Adam Smith and Rachel Carson not only can come together, but must and will come together."

One place where the ideas of Adam Smith and Rachel Carson have come together, is the continent of Africa, with disastrous, even murderous results. Smith was not an economist, but a public relations flack for the British East India Company, tasked with the job of concocting a pseudo-scientific rationale for the British Empire's savage looting of its colonies. Carson's lying assault on DDT and other pesticides was a similar P.R. job, laying the groundwork for today's pagan, anti-science environmental movement. The combination of the colonial looting of Africa, leaving a woefully underdeveloped continent, and the banning of pesticides necessary to eradicate the diseases which sweep the continent, has devastated Africa and its population. Adam Smith has indeed met Rachel Carson, and the result was deadly.

The claim by authors Hawken and the Lovinses that "natural capitalism" will lead us to the next industrial revolution is a similar bit of duplicitous sophistry.

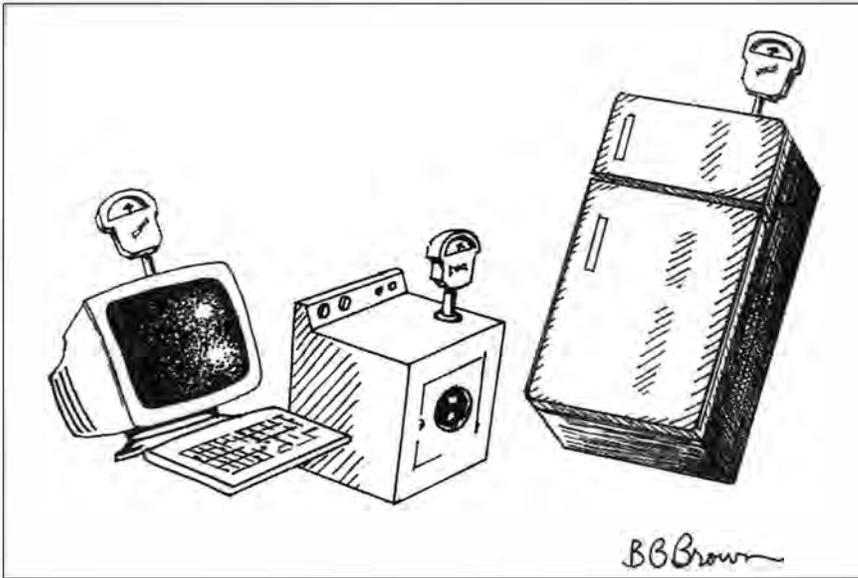
Natural capital, for those unfamiliar with the construct, includes, the book claims, "all the familiar resources used by humankind: water, minerals, oil, trees, fish, soil, air, et cetera. But it also encompasses living systems, which include grasslands, savannas, wetlands, estuaries, oceans, coral reefs, riparian corridors, tundras, and rainforests. These are deteriorating worldwide at an unprecedented rate."

In fact, the book asserts, "since the mid-eighteenth century, more of nature has been destroyed than in all prior history. While industrial systems have reached pinnacles of success, able to muster and accumulate human-made capital on vast levels, natural capital, on



which civilization depends to create economic prosperity, is rapidly declining." The authors even manage to assign a monetary value of "somewhere between \$400 and \$500 trillion" to the world's natural capital, "assuming the assets yielded 'interest' of \$36 trillion annually."

The authors assert: "There is no longer any serious scientific dispute that the decline in every living system in the world is reaching such levels that an



increasing number of them are starting to lose, often at a pace accelerated by the interactions of their decline, their assured ability to sustain the continuity of the life process."

The Best Lies

There is some truth to the authors' claims of environmental crisis, since the best lies always contain some truth as a hook, to sell the lie. Water is indeed becoming scarce in some areas, for example. Aquifers are drying up, seawater is infiltrating littoral fresh-water systems, and expanding populations are increasingly competing with farmers for water in some areas. But the solution to the problem, the authors assert, "is not to try to supply more," but for humanity to cut back on its water use. Rather than building nuclear desalination plants and managing water flows through projects such as the North American Water and Power Alliance, the authors advocate a return to "natural drainage control and water storage." Not only is "letting water flow wherever it belongs on the Water Planet a key part of the wisdom of natural capitalism," but natural capitalism "also avoids vast investments in storm drains."

The authors adopt a similar view of the automobile industry, which they describe as "arguably the highest expression of the Iron Age." They propose to replace the modern automobile and its "complicated assemblages of some fifteen thousand parts" with simple and reliable "ultralight "hybrid-electric hypercars" which "could be ordered

directly from a local factory, made to order, and delivered to a customer's door in a day or two."

In addition, the authors propose, we should "make parking and driving bear their *true* costs." Rather than provide free parking, they propose that employers "instead charge fair market value for parking and pay every employee a commuting allowance of equal after-tax value." "Drivers must start to pay the costs they incur," the authors insist, adding that "charging more to use roads, tunnels, bridges or parking areas when they're most crowded is easy with the kinds of electric passes that already debit drivers' accounts as they whiz through tollgates in roughly 20 states."

A Metered Existence

With the latter idea, we begin to close in on one of the authors' key messages, that of charging fees for "services" which have previously been free. They cite the work of Swiss "industry analyst" Walter Stahel and German chemist Michael Braungart in developing "a new industrial model" in which an economy where goods are made and sold is replaced with "a service economy wherein consumers obtain services by leasing or renting goods rather than buying them outright."

For example, "Instead of purchasing a washing machine, consumers would pay a monthly fee to obtain the *service* of having their clothes cleaned. The washer would have a counter on it, just like the office photocopier. . . . The concept could

likewise be applied to computers, cars, VCRs, refrigerators, and almost every other durable product that people now buy, use up, and ultimately throw away."

The vision of a society wherein the consumer owns nothing, but must pay a monthly fee for necessities, is not a new concept at all, but a very old one: feudalism. What the authors of *Natural Capitalism* are pushing is not progress, but a return to the pre-nation-state world, ruled by empires where the peasants are charged a fee for their existence. As such, the authors, indeed, stand in the tradition of Adam Smith.

Looting vs. the American System

The authors of *Natural Capitalism* display clever sophistry when they compare their model of society to modern industrial capitalism, by deliberately obfuscating the very real differences between the globalist looting which goes under the name "free enterprise," and the American System of Economics, which led large sections of humanity out of the prison of Adam Smith's colonialism.

That the young United States survived the attempts by the empires to crush it, was due, in large part, to the American System of Economics implemented by Treasury Secretary Alexander Hamilton, with its emphasis on self-sufficiency in agriculture and manufacturing, and a series of internal infrastructure projects to aid the production and transportation of goods. Hamilton understood that the nation would progress by increasing the productive power of human labor through a system that fostered scientific breakthroughs and deployed the resultant technological advances throughout the economy as rapidly as possible.

It is our failure to follow Hamilton's lead, that has created many of the problems of which the authors of this book complain. Had we developed nuclear fusion, we would have a safe and plentiful supply of electricity, and the capability to desalinate seawater and power magnetically levitated trains.

The history of man shows that science and technology, and the mastery of ever-higher energy flux densities, are essential for mankind to survive and thrive. This book, with its small-is-beautiful greenie philosophy, is antithetical to real science, and as such is a complete fraud.

John Hoefle is on the economics staff of Executive Intelligence Review.

A Flawed History of Radiation Protection

by John Cameron, Ph.D.

The Angry Genie: One Man's Walk through the Nuclear Age

Karl Z. Morgan and Ken M. Peterson
Norman, Okla.: University of Oklahoma Press, 1999
Hardcover, 240 pp., \$24.95

Dr. K.Z. Morgan, the subject and principal author of this biography, was a respected radiation protection scientist (health physicist), who died at age 92, shortly after this book was published. If his silent co-author had been a health physicist, instead of "one of the best trial lawyers in America," as the book jacket proclaims, the book would have had fewer errors.

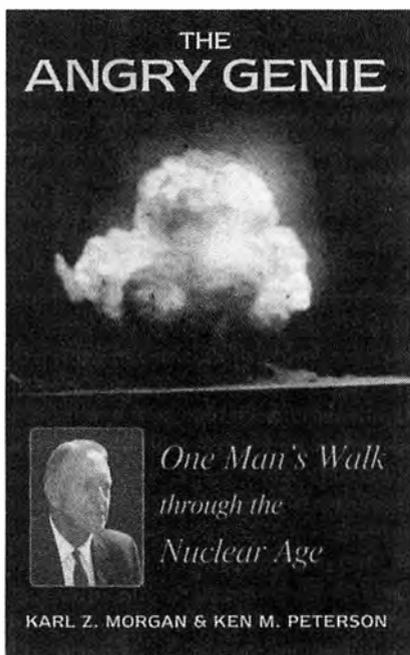
The preface indicates that the second author, Ken Peterson, served as editor of the book and contributed most of two chapters, which are not identified. The book is largely autobiographical, and reads as though it came from the pen of Dr. Morgan. This review is written, therefore, as though Morgan is the only author.

K.Z. Morgan (1907-1999) was one of a small handful of pioneers in radiation protection, beginning with the Manhattan Project during World War II. As a leader in the field of radiation protection, he founded the Health Physics Society in 1955, and the *Health Physics* journal in 1958. He was also the first president of the International Radiation Protection Association (IRPA) in 1966. For these contributions to the field of health physics, he should be honored. At some point in his career, however, Morgan turned to radiation phobia.

Scare Tactics

My main concern with this book is its apparent attempt to frighten the reader with large numbers about radiation danger. The author makes no effort to help the reader understand radiation, such as by expressing radiation in terms of Background Equivalent Radiation Time (BERT),¹ which would enable people to understand how minuscule a radiation dose comes from medical X-rays, for example, compared to the natural radiation one receives by living at a high-elevation.

An example of the use of big numbers



to scare people appears on page 140, where Morgan quotes from the testimony of radiophobe Dr. John Gofman in the Kerr-McGee/Karen Silkwood legal case. Gofman was giving testimony about the dangers of 1 nanocurie of plutonium in the body: "Two thousand times a minute these bullets, alpha particles are coming out . . . delivering 5 million of those volts of energy, each one. So, it's a fantastic projectile. The alpha particles in the lungs, it is hitting right through the cells of the lung with 2.5 million times more energy that you would get from a carbon burning. So you see, expecting that your cells are not going to be damaged by that would be the about the same expectation when somebody might talk to you and say 'Well, a small amount of this won't hurt you.' That is such an absurd nonsense notion that one wonders how anybody could think of it."

The reader is never told that our cells are being continuously bombarded by high-energy alpha particles in the lungs, and by beta and gamma rays from natural radioactivity throughout our body. There are more than a half-million such projectiles each minute in a 150-pound human being. Billions of our cells are

hit each day, and in a year, essentially every cell in our body has been hit. Yet, cancer is a comparatively rare disease, except in the aged. If cancer were completely curable, the average lifespan would only increase by three years.

In regard to alpha particles, which Gofman considers so dangerous, it has long been known that most of our background radiation is from the alpha-particle dose to the lungs from radon progeny. If this alpha radiation were a significant cause of lung cancer, we would expect the states with the highest radon levels to have the most lung cancer. The opposite is the case.

A study of lung cancer in three mountain states with radon levels five times higher than in three Gulf States showed that the lung cancer death rate was 40 percent lower in the mountain states.² Similar data were published by B.L. Cohen in 1995.³

Also, Morgan does not mention that cigarette smokers have much higher lung doses from the alpha emitters on the smoke they pull into their lungs. The dose to the lungs of smokers is estimated to be 8,000 to 16,000 millirem in a year. This is far greater than the lifetime dose of most radiation workers. It should also be compared to the effective annual dose to the body from all background radiation, including radon progeny, of only 300 millirem. One wonders why cigarette packages have never had a warning about their radioactivity.

The preface indicates that the book is intended for the general public, "but also as a challenge to those who are, or seek to be, health physicists." If it is indeed a "challenge" to health physicists, it is inappropriate for the general public. Most health physicists have a background with which to evaluate the exaggerated risk statements in this book. Most of the public will not.

The public is generally unaware that most radiation scientists do not believe that there is any risk from low-level radiation. They are also unaware that there is no evidence that even high levels of background radiation can cause cancer, and that, in fact, there is evidence that



Oak Ridge National Laboratory

K.Z. Morgan (1907-1999) was one of a small handful of pioneers in radiation protection. At some point midway in his career, for reasons not made clear in his biography, he became radiation-phobic.

high levels of natural radiation stimulate the immune system.⁴

'Disappointment and Anger'

The "genie" in the title refers to the release of nuclear power in the first atomic bomb test in July 1945, and is mentioned only a few times in the text. The "angry" part of the title, as the reader will become aware, is Morgan himself, who is angry for being ignored by the profession he founded. One can sympathize with him, but that does not mean one has to agree with him.

The anti-nuclear community will welcome this book, written by a distinguished scientist whose dominant theme is the great risk from ionizing radiation. For example, in discussing "unsafe" features of nuclear power reactors, Morgan writes in the Preface:

"I am left with a sense of disappointment and anger. The once proud profession of health physics that I helped create over fifty years ago and that was infused with high professional and scientific stature has sunk to a new low." Later, in chapter 7, "The Advance and Decline of Health Physics" he writes:

"For the past twenty years, health physics, in its mission to protect and defend persons receiving radiation

exposures, has sometimes fallen flat on its face. . . . I am convinced that health physics in recent decades has sacrificed its integrity. Certainly there remain some true professionals who will not shade the truth to appease their employers, but they are in the minority."

Many health physicists will read this book with interest because of its history of the early days of health physics, and they will appreciate the contributions of the author. But they will disagree with the author's index listing, "Health physics, careless scientists."

The author further demeans the field that he pioneered, by predicting many radiation deaths, although the book describes only a few actual deaths from radiation. In fact, as the book does not chronicle, medical and industrial uses of radiation and radioactivity have been exceptionally safe. Radiation accidents are so rare, in fact, that they receive a disproportionate amount of publicity when they do occur. For example, the minor criticality accident in Japan, Sept. 30, 1999, resulted, eventually, in 2 deaths, but the day after the accident, news about it occupied 44 percent of the front page of *The New York Times*. The next day, a commuter train accident in London resulted in 15 deaths, but was given only 13 percent of the *Times* front page.

Promoting Radiation Phobia

In addition to being disappointed with the health physics profession, Morgan is critical of the two major radiation protection organizations, which publish guidance in the field: the International Commission on Radiological Protection (ICRP) and the U.S. National Council for Radiation Protection and Measurement (NCRP). He was a member of both organizations for 21 years, from 1950 to 1971.

On page 117, Morgan writes, "Like the NCRP, the ICRP is not free of

the grip of the nuclear industry." Apparently, Morgan would want the nuclear industry (and even the medical profession) to encourage the ICRP and NCRP to adopt the policy that even the smallest amount of radiation can cause cancer. I consider this assumption to be basically unscientific and contrary to the interests of the public, the nuclear industry, and the medical profession. Such a wrong belief—that the smallest amount of radiation causes cancer—is a major cause of radiation phobia in the world.

This reviewer is not happy with the ICRP and NCRP for a different reason: The pronouncements of these organizations are partly to blame for the present worldwide radiation phobia. In 1977, the ICRP adopted the assumption that risk from ionizing radiation is proportional to the dose, down to zero dose, in order to simplify radiation protection administration. This assumption, known as the linear no-threshold (LNT) model of radiation risk, has become accepted as dogma, despite contradictory data now, and at the time it was adopted by



Oak Ridge National Laboratory

Oak Ridge workers around 1950, at the time Morgan worked at the lab, are here being checked for radiation contamination. The individual at left is checking himself with a hand and foot monitor, while the other worker is being frisked by a health physics technician.

the ICRP. Various other national radiation protection bodies, including the NCRP, followed suit and adopted the LNT model.

Both groups, IRCP and NCRP, are private organizations, which are not subject to oversight by any other body. They select their own members, who tend to agree with their stated positions. Their financial support comes from research contracts and thus does not always represent the public's interest. For example, they have made few recommendations to reduce unnecessary radiation from medical X-rays, the largest human-made source of radiation to the public.

From Threshold to No-Threshold

In 1943, when Dr. Morgan entered the field of radiation protection, he believed the then-accepted philosophy that radiation, like other toxic substances, was safe up to some threshold dose; this is called the threshold model of risk. Morgan does not explain why he reversed this view, and became a firm believer in the LNT model.

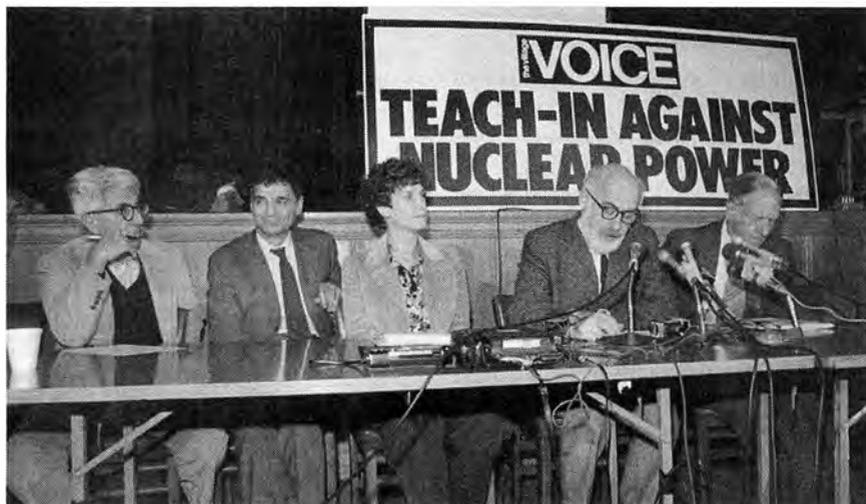
In chapter 2, in a section titled "Research at ORNL: Our Mistaken Belief in a Threshold Hypothesis," one might expect him to explain why he became a believer in the LNT assumption. He does not. Instead, he describes some of his research at Oak Ridge National Laboratory, and states merely, "Early on we all accepted the threshold hypothesis."

He then discusses his human radiation experiment, and he describes two instances of carelessness by the ORNL staff, but he gives no information related to the title of the section. Perhaps, at 91, when the book was completed, his mind drifted off.

There is a good reason why Morgan could give no evidence to support the LNT model of risk; it is theoretically impossible to do so! Even the Japanese atomic bomb survivors had a threshold for the induction of leukemia of about 0.25 Gy, a dose roughly equal to 100 years' accumulation of background radiation.

Genetic Effects

The area Morgan is most concerned with is the genetic effects of radiation. Certainly, fruit flies demonstrate radiation-induced mutations. However, fruit flies do not have the advantage of the p53 gene. In human beings and other



Bettmann/Corbis

Morgan's co-thinker, Dr. John Gofman (second from right), speaking at a Teach-In Against Nuclear Power at New York's Riverside Church in May 1979. With him on the podium are Barry Commoner (left) and Ralph Nader (second from left).

higher animals, the p53 gene signals damaged cells to die. A study of the 90,000 children and grandchildren of atomic bomb survivors in Japan found no increase in mutations. The genetic effects of low-level radiation are not a problem for society.

Morgan also mentions the health risk to radium dial painters early in the 20th century. These workers accidentally ate small amounts of radium as they touched the paint brush to their mouth, to give it a sharper point. He does not mention, however, that radium dial painters did not develop bone cancer from radium unless they had a very high skeletal dose—greater than 10 Gy (200 Sv). That is 10,000 times greater than the present recommended annual dose limit for radiation workers! Above that threshold, the dial painters had an incidence of bone cancer of about 28 percent, independent of the dose.⁵

Perhaps more remarkable is the finding that no dial painters who started work after 1925 developed bone cancer. That was the year the radium dial industry forbade the workers to touch the brush to their mouths.

Human Radiation Experimentation

The reader may be upset by the author's description of human radiation experimentation. Morgan recounts an incident about his colleague, Dr. Robert S. Stone, the associate director of health of the Manhattan Project who had an office next to his in Tennessee. Morgan writes:

"Health physics owes a debt to Robert S. Stone. . . . Stone insisted that we implement a conservative approach in determining accepted levels of exposure and accumulated radiation dose." In the spring of 1945, Stone entered Morgan's office and said, "Karl, you remember that black truck driver who had multiple fractures in an accident and we rushed him to the [military] hospital? . . . Almost all of his bones were broken and we were surprised that he was still alive when he got to the hospital, we did not expect him to be alive the next morning so this was a good opportunity we've been waiting for. We gave him large doses by injection of plutonium-239. We were anticipating collecting not just urine and feces but a number of tissues, such as the skeleton, liver, and other organs. This morning when the nurse went into his room, he was gone. We have no idea what happened, where he is, but we've lost valuable data we were expected to get."

Morgan writes a little later, "I heard nothing more about this until years later, when I saw in the Knoxville paper a death notice for the black truck driver, whose name I remembered."

It would appear that little effort was made to locate the missing "terminal" patient loaded with plutonium. My guess is that, the plutonium did not contribute to his death.

The author describes other examples of inappropriate and unethical studies using radiation and radioactivity. These

ethical problems were not caused by the fictitious “angry genie,” but by the faulty judgment of human beings who did the research.

A Question of Dose

Throughout, the author fails to discuss the importance of the *dose* in judging the ethics of radiation research on human beings. Medical science progresses by research. The only way to evaluate a new medical modality is to do research on human subjects. In such cases, it is the size of the dose that determines if there is a health risk. I doubt that more than a few human experiments described in this book shortened the life of the subjects. However, independent of the dose question, the subject always has a right to know if she or he is participating in a medical experiment.

In the 1940s, the attitude of medical doctors toward using patients for research was very different than it is today.

The Atomic Bomb Blunder

The author puts a sad twist on the history of the dropping of the atomic bomb on Hiroshima. Morgan writes: “Atomic power was used needlessly, I believe, and in revenge—to take the lives of hundreds of thousands of Japanese men, women, and children.” He continues this theme in Chapter 2, “The Truman Administration’s Greatest Mistake,” where he writes “. . . I remain firmly convinced that President Harry S. Truman and Major General Leslie R. Groves blundered in their decision to order atomic bombs to be dropped on Hiroshima and Nagasaki.”

Later, Morgan makes it clear that: “Both Byrnes [Secretary of State] and Stimson [Secretary of War] strongly favored bombing without warning. . . . Truman’s personal journal contains evidence that he favored a warning.” The author suggests that the second atomic bomb, which used plutonium rather than enriched uranium-235, was deployed because “the U.S. military saw Nagasaki as an opportunity to determine how the plutonium weapon rivaled the uranium device.”

Perhaps the most disastrous effect of the bomb on society was to produce the huge amount of radiation phobia today, which hampers the use of nuclear power and the medical uses of radiation. Most of the initial atomic bomb

victims died from heat and blast, the same as they would have from conventional bombs. The number of deaths from radiation was considerably smaller. The total deaths from the two atomic bombs was between 100,000 and 200,000—about the same number of casualties there were when the United States fire-bombed the center of Tokyo a few months earlier, leaving a million people homeless.

Most Americans don’t remember this, but the Japanese do. I don’t see a great difference in the ethics of fire bombing the center of Tokyo or the dropping of the atomic bombs. Both are wrong.

More Exaggeration

Morgan exaggerates the final number of fatalities from the atomic bombs. He writes: “If one adds the latent deaths from these two bombs, the total number of Japanese killed reaches a half a million.” The author fails to mention that more than 50 years after the atomic bombs were dropped, the total number of deaths from radiation-induced cancer is only about 400—an average of less than 10 deaths a year among the roughly 100,000 atomic bomb survivors.

An even more important statistic is that the atomic bomb survivors are liv-

ing longer on the average (even including these cancer deaths) than similar Japanese who were not exposed to the atomic bomb radiation. The large number of latent deaths are a fiction. Similar examples of exaggeration occur throughout the book.

On the positive side, Morgan gives a very reasonable recommendation for storing used nuclear fuel (nuclear waste). He writes (p. 157): “The best move for the present time is to let the fuel assemblies cool in the power reactor ‘swimming pools’ for at least three years to permit radioactive decay of some of the short-lived fission products and then ship them to a temporary and retrievable storage facility. Then it would be up to a future society to determine the best next step. It is my hope that 50 or 100 years from now, society will have advanced and will have arrived at the best long-term solution.”

Such a procedure is already in use by Northern States Power for its nuclear power plant in Minnesota. The old fuel is stored in “dry cask storage”—sealed in large double walled stainless steel containers on site. These are easily monitored and offer no risk to the public. The State of Minnesota limits radiation to the public from dry cask storage each

Putting Radiation in Perspective

In my bone research, in the 1960s, I exposed hundreds of human beings to ionizing radiation, including myself and my two daughters. The amounts of radiation were trivial. Our daughters received a hundred times more radiation while camping a few days in Glacier National Park.

I had invented the first accurate instrument (bone densitometer) in 1960 for measuring the amount of bone in the living body. There are now about 25,000 such instruments in the world used for diagnosing and evaluating osteoporosis.

The original instrument used a narrow beam of monoenergetic photons from lead-210, a natural radioisotope of lead, which was produced from old radon seeds. During the measurement, we moved the narrow beam across the forearm and meas-

ured the amount of radiation that came out the other side. The mass of bone can be accurately calculated from the reduction of beam, as a result of its absorption in bone.

The radiation dose to the subjects was roughly equal to the dose they receive from nature in a few hours—less than 1 percent of the exposure from an X-ray of the arm. These experiments on human beings were needed to determine the normal range of bone mass as a function of age and sex. The research was approved by the human-use committee of the University of Wisconsin Medical School.

All subjects (or their parent) had to sign a form saying they understood the risk and giving permission for the study. I have not the slightest feelings of guilt about these human radiation studies.

—John Cameron

year to 0.05 millirem—much less radiation than they receive from nature in a day or from one jet flight.

Overall, an Unbalanced View

In summary, this book has a large amount of interesting historical information on radiation problems relating to the atomic bomb project. However, it greatly exaggerates radiation risk, which will only increase the anxiety of many readers, and may even scare some patients away from having a needed mammogram or other radiation study. The theoretical or latent radiation deaths predicted by the authors can never be found. Studies of U.K. radiologists—the occupational group that receives the

most occupational radiation—show a reduced cancer death rate compared to other medical specialists.

The public deserves a book that gives a more accurate picture of the benefits of radiation.

John Cameron is a Professor Emeritus at the University of Wisconsin at Madison and a Visiting Professor at the University of Florida. An internationally known radiation scientist, he is considered one of the world's pioneers in medical applications of physics. In the 1960s, he developed thermoluminescent dosimetry, the basic method for measuring radiation received by nuclear workers.

Notes

1. See the author's article, "A New Radiation Unit for the Public," *21st Century*, Spring 1998, p. 5. See also, "Are X-rays Safe?" on the Internet: <http://www.medinfo.ufl.edu/other/cameron/rads.html>
2. J. Jagger, 1998. "Natural Background Radiation and Cancer Death in Rocky Mountain States and Gulf Coast States," *Health Physics* (Oct.), pp. 428-430.
3. B. L. Cohen, 1995. "Test of the LNT Theory of Radiation Carcinogenesis in the Low-Dose, Low-Dose-Rate Region," *Health Physics*, Vol. 68, pp. 157-174.
4. L.E. Feinendegen, V.P. Bond, and C.A. Sondhaus, 1998. "Low-level Radiation May Protect Against Cancer," *Physics and Society News* (April).
5. R.D. Evans, 1974. "Radium in Man," *Health Physics* (Nov.), pp. 495-510.
6. P.G. Smith and R. Doll, 1981. "Mortality from Cancer of All Causes Among UK Radiologists," *British Journal of Radiology* (March).

Riemann's Definitive Biography Is Yet to Be Written

by Bruce Director

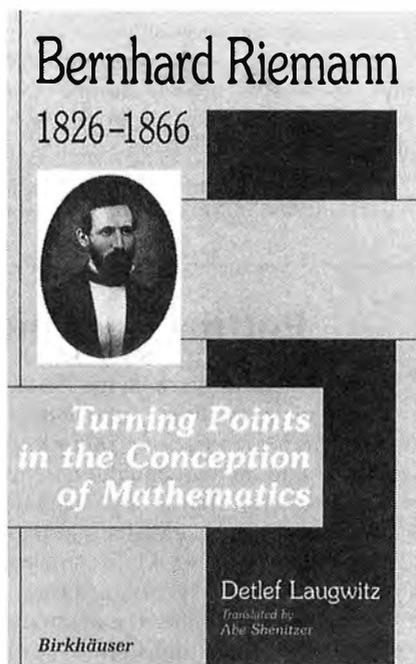
Bernhard Riemann 1826-1866: Turning Points in the Conception of Mathematics

Detlef Laugwitz (trans. by Abe Shenitzer)
Boston: Birkhäuser, 1999
Hardcover, 357 pp., \$79.50

Bernhard Riemann was a revolutionary thinker, whose discoveries in the domains of mathematics, physics, physiology, and philosophy, transformed human knowledge. It is the unfortunate fate of most such thinkers, that the results of their discoveries become widely known and applied, but their revolutionary origins are stripped away. Thus, the original discoveries remain dormant, like seeds planted in cold, dry, earth, until, a new revolutionary thinker comes forward, warms the surrounding soil, provides new light and nourishment, and the long sleeping seed can sprout to bear productive fruit.

In short, it takes a revolutionary thinker to understand another revolutionary thinker. Detlef Laugwitz, undoubtedly an admirer of Riemann's genius, is, nevertheless, no revolutionary. His biography, while full of interesting tidbits and summaries of Riemann's work, provides little insight into Riemann's thinking, and, in fact, obscures his most crucial contributions, by viewing them through the eyes of Riemann's epistemological enemies.

Laugwitz insists on casting Riemann



in the tradition of Newton and Euler, as opposed to Cusa, Kepler, and Leibniz. Such an error is common among 20th century academics, who, largely ignorant of history, are familiar with Riemann only through secondary sources. For someone, such as Laugwitz, who has made a study of Riemann's original published and unpublished writings, it is inexcusable. Either Laugwitz is blinded by his own adherence to modern mathematical formalism, or he is

deliberately perpetrating a fraud. What is most disturbing for the state of modern science, is that only a handful of specialists, would recognize this blunder.

The Revolutionary Riemann

This reviewer is in the fortunate position of having collaborated closely with a modern thinker who has taken the revolutionary approach to understanding Riemann's revolution in thought. Having made creative breakthroughs of his own in the science of physical economy, Lyndon H. LaRouche, Jr., later recognized the parallels of his own discoveries to those which Riemann made in geometry. It is thus useful to the purposes of this review to briefly reprise LaRouche's fundamental discovery.¹

Seeking the true source of value in economy, LaRouche identified the increase in *potential relative population density*, as the proper measure, and recognized that the only basis for such increase, also known as economic progress, is the individual human mind's capacity for discovery of universal principles. The nature of human creative discoveries, LaRouche showed, is akin to a willful change in the axioms, definitions, and postulates, of a Euclidean geometric system. Such revolutionary discoveries are not achieved by a process of deduction from the given set of axioms, definitions, and postulates



Library of Congress

Gottfried Leibniz
(1646-1716)



Carl Friedrich Gauss
(1777-1855)



Bernhard Riemann (1826-1866)

within that system. Rather, such discoveries are typified by the concepts of anti-Euclidean geometry, as expressed by Riemann.

Additionally, LaRouche made the unique discovery, that the same principles of human creative discovery apply both to discovery of valid physical principles, and to classical art. Riemann's concept of a multiply connected manifold, provided LaRouche with the form of representation for the relationship between these cognitive processes, and physical economic development.²

LaRouche's approach is the only competent one for the study of Riemann's work, as, Riemann must be viewed from Riemann's standpoint of continuing human creativity, not, as Laugwitz does, by revising Riemann's work to fit the acceptable formalism of today's modern classroom mathematics. Laugwitz is quite blatant about this, consistently rewriting Riemann's own conceptions, in modern mathematics formalism. Laugwitz recognizes this, stating in his introduction, "It is remarkable that the views of mathematicians in the early part of the nineteenth century were so different from our present conceptions. . . ."

The Missing Historical Context

To apply Riemann's method to the study of Riemann, one must first understand the historical-epistemological characteristics of the manifold of ideas in which he worked and lived. He was, in effect, a second generation student of Abraham Gotthelf Kästner, the 18th century's passionate defender of Kepler, Leibniz, and Bach. Kästner, a product of the intellectual circles around Leibniz,

played a crucial role in the history of science. As a professor at Göttingen University, his students included Gauss, Bolyai, Olbers, and Bartels. It is no coincidence that these individuals were the founders, of what later became known as "anti-Euclidean" geometry, a subject for which Riemann, in his famous habilitation paper, "On the Hypotheses That Underlie the Foundations of Geometry," provided the most thorough conceptions. Kästner, himself, was the first to write extensively on the subject, deriving his ideas directly from the work of Cusa, Kepler, and Leibniz. But, Kästner's work was broader. His focus was on expanding the use of the principles of classical metaphor in science. He was deeply involved in a project to make German a scientific language, and had a productive collaboration with Gotthold Lessing, the great German playwright, who, along with Moses Mendelssohn, led a vigorous defense of Plato and Leibniz, against the attacks by Euler, Voltaire, and the British-school followers of Newton. Gauss called Kästner a "Poet among mathematicians and a mathematician among poets." This Kästner-Lessing-Mendelssohn collaboration created the foundations for the flowering of the German classical period, that was marked by the great accomplishments in art and science, of which Riemann is exemplary.

Mathematics as Poetry

It is in this light that Riemann's work must be viewed. Like Gauss, Riemann's youthful interest in philology is reflected in all his mathematical work. In fact, Riemann's approach to mathematics,

was almost as a branch of philology. For Riemann, mathematics was the generation of metaphors that enable the human mind to comprehend the paradoxes that arise, from the investigation of the physical universe itself. The mathematical formalism, in which Riemann's thoughts are often cloaked today, was an anathema to Riemann. This is recognized even by Laugwitz, who notes that Riemann's work is free of the reliance on calculation and formulas required by today's academics.

This metaphorical approach to mathematics was stated by Riemann in his famous habilitation paper, and, also, in a posthumously published *Philosophical Fragments*.³ In the first part of the section entitled, "Attempt at a Theory of the Fundamental Concepts of Mathematics and Physics as the Foundation for the Explanation of Nature," Riemann states:

"Natural science is the attempt to understand nature by means of exact concepts.

"According to the concepts through which we comprehend nature, our perceptions are supplemented and filled in, not simply at each moment, but also future perceptions are seen as necessary. Or, to the degree that the conceptual system is not fully sufficient, future perceptions are determined beforehand as probable; according to the concepts, what is 'possible,' is determined (thus what is 'necessary' and conversely, impossible). And the degree of possibility (or 'probability') of each individual even which is seen as possible, in light of these concepts, can be mathemati-

cally determined, if the concepts are precise enough.

"To the extent that what is necessary or probable, according to these concepts, takes place, then this confirms the concepts, and the trust that we place in these concepts rests on this confirmation through experience. But, if something takes place that is unexpected according to our existing assumptions, i.e. that is impossible or improbable according to them, then the task arises of completing them or, if necessary reworking the axioms, so that what is perceived ceases to be impossible or improbable. The completion or improvement of the conceptual system forms the "explanation" of the unexpected perception. Our comprehension of nature gradually becomes more and more complete and correct through this process, simultaneously penetrating more and more behind the surface of appearances.

"The history of causal natural science, in so far as we can trace it back, show that this is, in fact, the way our knowledge of nature advances. The conceptual systems that are now the basis for the natural sciences, arose through a gradual transformation of older conceptual systems, and the reasons that drove us to new modes of explanation can always be traced back to contradictions and improbabilities that emerged from the older modes of explanation.

"The formation of new concepts, in so far as this process is accessible to observation, therefore takes place in this way.

"Herbart furnished the proof that concepts that allow us to comprehend the

world—those whose origin we can trace neither in history nor in our own development because they are delivered to us unnoticed through our language—can be derived from this source, in so far as they are more than mere forms combining simple sense images; and therefore these concepts need not be derived from some special constitution of the human mind which precedes all experience (such as Kant's categories).

"This proof of their origin in our ability to comprehend that which is given to us by sense perception, is important for us, because it is only in this way that their meaning can be determined in a manner satisfactory for science. . . ."

Riemann recognized that the paradoxes which force such new conceptions on us are discovered in the investigation of nonlinearity in the infinitesimally small. This puts Riemann clearly in the Socratic tradition of Cusa, Kepler, Leibniz, and Gauss and diametrically opposed to the Aristotelian linearization-in-the-small methods of Newton, Euler, and Cauchy.

This distinction is evident to anyone who knows the real history of science. A brief, partial summary is in order here to supply the reader with the context in which to judge Laugwitz's book.

Cusa Founded Modern Science

By the time of the 1440 publication of his work *On Learned Ignorance*, Nicholas of Cusa had already chal-

lenged the Ptolemaic-Aristotelian fixed universe, by reviving the ancient Greek/Egyptian knowledge of a heliocentric solar system, and hypothesizing that planetary motion was characterized by regular, non-constant curvature.

Following Cusa's teachings, Johannes Kepler sought to determine the exact nature of that curvature. In his *New Astronomy* (1609), Kepler showed that the three radically different systems of Ptolemy, Brahe, and Copernicus, while mathematically equivalent, nevertheless deviated from the actual observed motions of the planets. Through a detailed study of this discrepancy with respect to the motion of Mars, Kepler found that error to be their common assumption that planetary motion was characterized by constant, as opposed to non-constant, curvature. Presaging Riemann's more generalized approach to mathematical physics, Kepler demonstrated that the error was not located in the mathematics of Ptolemy, Brahe, or Copernicus, *per se*, but rather, in their insistence on deriving physical principles from mathematical models.

Such methods (similar to the discredited methods of today's systems analysis and information theory), Kepler showed, imposed on the physical universe, the underlying assumptions embedded in the mathematical model, in this case, constant curvature. In what amounted to a new revolution in mathematical physics, Kepler rejected this Aristotelian approach, deriving his mathematical formulations from an hypothesis about the physical motion of the planets. That physical hypothesis concerned the harmonic ordering of the solar system as a



Steven Meyer
Moses Mendelssohn
(1729-1786)



Christopher Lewis
Gotthold Lessing
(1729-1781)



The Granger Collection, New York
Abraham Gotthelf Kästner
(1719-1800)

whole. The characteristics within and among the planetary orbits, are determined by the principles underlying that harmonic ordering. Kepler demonstrated that these principles are accessible to human cognition.

Kepler's discovery is paradigmatic of the type that Riemann refers to as requiring the re-working of assumptions and axioms, so as to generate the new concepts necessary to improve our knowledge. Yet, Kepler's physical hypothesis found his mathematical conceptions wanting, in the inability to measure non-constant curvature in the infinitesimally small. Rather than alter his physical hypothesis so that it conformed to the weakness of his mathematical conceptions, Kepler demanded the creation of a new mathematics. In the penultimate pages of the *New Astronomy*, Kepler called on future scientists to provide the new concepts necessary to measure non-constant curvature in the infinitesimally small, the which was supplied by Leibniz's invention of the calculus.

Newton's Blunder

Isaac Newton, who was notorious for his belief in the occult, rejected Kepler's method altogether, resorting instead to purely mathematical formulations to describe planetary motion. Reviving the now discredited methods of Ptolemy, Newton claimed to make no hypotheses concerning the physical universe, a claim later ridiculed by Riemann.

As if to parody Kepler, Newton demanded that the physical world submit to the formal mathematical constructs, insisting that all physical action took place against a backdrop of Euclidean absolute space and time. Yet, such a requirement rendered Newton impotent to derive any knowledge of the physical world; hence, he resorted to an algebraic manipulation of the mathematical form of Kepler's physical principles, in order to construct his theories of planetary motion.

This error of Newton was well known to Leibniz, as expressed in the celebrated Leibniz-Clarke correspondence, and an understanding of it was transmitted to Riemann, by among others, Kästner and Gauss. That Riemann was well aware of this, despite several, seemingly positive, references to Newton in his published works, is evidenced by the very method Riemann employed in all his work, and by the emphasis Riemann

placed on Bentley's famous account of Newton's own admission that his principle of action-at-a-distance was philosophically absurd.

However, with the tremendous political backing of the British/Venetian oligarchy, the linear mathematical modeling methods of Newton and Euler gained currency during the 18th century.

From Gauss to Riemann

In 1801, Carl Friedrich Gauss re-established the authority of the method of Kepler and Leibniz with his determination of the orbit of the asteroid Ceres, from only a small number of observations. This accomplishment, deemed to be impossible by Euler, was thrust upon the 24-year-old Gauss, when all the established authorities in astronomy had failed in their attempt to locate Ceres, after Piazzi's initial observation. Their failure was the result of a deficiency in method; a dependence on the linearization-in-the-small methods of Newton and Euler. Gauss, utilizing Kepler's principle that the solar system was harmonically ordered, developed a method to measure that nonlinear harmonic ordering principle, in any infinitesimally small interval.

Gauss later took this same approach in the domain of geodesy, determining the geometrical shape of the Earth, as a function of physical measurement. Here again, it was Gauss's discovery that a virtually infinitesimal discrepancy, between the length of the meridian measured astronomically, and that same length measured along the Earth's surface, was the result of a matter of principle, not an error in measurement. Like Kepler, Gauss had the intellectual fortitude to know that this small discrepancy, (16 seconds of arc) required the reworking of assumptions and axioms. Gauss showed the impossibility of determining the shape of the Earth by imposing a predetermined mathematical shape, and then fitting the physical measurements into that shape. Again adopting the method of Kepler and Leibniz, Gauss created the mathematical shape from the physical principles on which his measurements were based. This led Gauss to the development of totally new concepts in geometry.

Underlying Gauss's work in astronomy and geodesy, was a deep conviction that the axioms and assumptions of

Euclidean geometry, did not characterize the real nature of space. Although he did not publish his complete thoughts on the matter, Gauss stated repeatedly in his private correspondence and notebooks, that he believed that Euclidean geometry was not the true one, and he strongly criticized the belief of Newton, Euler, and Kant, that an absolute Euclidean space underlaid the physical universe. Rather, Gauss understood that the axioms underlying the true nature of space had to be determined by physical measurement, and as such, were characterized by an "anti-Euclidean" geometry.

This work of Gauss had a profound influence on Riemann, as Riemann himself acknowledged in many locations. In addition to whatever private discussions the two men may have had, Riemann studied very carefully Gauss's works on curvature, geodesy, and number theory. Riemann stated publicly, what Gauss had only asserted privately about the anti-Euclidean nature of space, and then proceeded to investigate the implications of this concept, in the physical universe. This led Riemann to develop the new mathematical metaphors required to represent action in an anti-Euclidean domain, as reflected in his writings on functions of a complex variable, the hypergeometric function, Abelian functions, and other of his mathematical works. This same anti-Euclidean approach is also expressed in his work on physical and biological questions, such as his celebrated work on shock waves, or the physiology of the human ear.

Unfortunately, this view is lost on author Detlef Laugwitz, who makes the common mistake of dividing up Riemann's mind into separate parts, a theoretical, a practical, and a philosophical, thus rendering all Riemann's discoveries unintelligible.

Consequently, a competent conceptual history of Riemann's work is yet to be written.

Notes

1. The reader may find out for himself in LaRouche's "Riemann Refutes Euler," *21st Century*, Winter 1995-96, pp. 36-47, among other locations. LaRouche's piece serves as foreword to the only English translation of Riemann's *Philosophical Fragments* (*ibid*, pp. 50-62).
2. See, "The Becoming Death of Systems Analysis," *Executive Intelligence Review*, March 31, 2000, pp. 10-73.
3. See note 1.

A Thoughtful View of Edwin Land

by Stuart K. Lewis

Insisting on the Impossible: The Life of Edwin Land, Inventor of Instant Photography

Victor K. McElheny
Cambridge, Mass.: Perseus Books, 1999
Paperback, 511 pp., \$22.50

Although most know Edwin Land as the inventor of instant photography and the founder of the Polaroid Corporation, Victor McElheny's biography shows the much broader range of the inventor's work and thought. Especially interesting was Land's original work on light and vision, which challenged the validity of the classical theory of color derived by James Clerk Maxwell.

In addition to developing instant photography, and the requisite unique technology of the camera, which uses chemically complicated films, Land was also the inventor of polarizing filters, a technology which led to the liquid crystal displays in innumerable pocket calcula-

tors and digital watches.

Land was refreshingly honest about his method of discovery: Discoveries were made, he said, "by some individual who has freed himself from a way of thinking that is held by friends . . . but who have mastered the art of the fresh, clean look at the old, old knowledge."

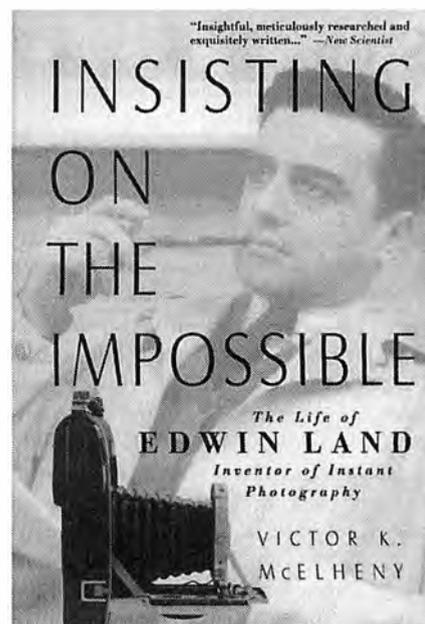
The book, of course concentrates on Land's development of the Polaroid instant film and the cameras to use it. The author details the complexity involved, noting that "the mere production of the SX-70 [camera developed by Polaroid in the 1970s] must already be counted as one of the most remarkable accomplishments in industrial history. The project involved a series of scientific discoveries, inventions, and technological innovations in the fields as disparate as chemistry, optics, and electronics."

Land got started on instant photography when his daughter asked him, after a photo had been taken, why she couldn't see the photo right away. Since there has been so much scientific innovation with instant photography, (Land is credited with more than 500 personal patents alone), one wonders whether Land could have made an even greater contribution to society if a relative had gotten sick and his daughter had asked, "why can't we cure cancer?"

Land viewed Polaroid as his line of business. But in his spare time, and then, later in his life, after the company he had founded threw him out, Land devoted his scientific interest to the study of light and vision. (The Polaroid Board voted Land out after the company lost millions of dollars by investing, on his insistence, in development of instant movies, at a time when video cameras were already on the market.)

Challenge to Color Theory

As author McElheny recounts, Land "continued to hold that classical theory, based on [James Clerk] Maxwell's three primary colors was inadequate. That theory focused on tiny points in a field of view. The color at each point was based on a ratio of the three wave-



lengths of light." Land believed instead that "a wider area had to be considered: 'Extended areas of the retina are significant in determining the sensation for each point in the image,' " Land said.

Land carried out experiments in which widely different shades of color were illuminated by exactly the same amounts of light of a particular wavelength, yet viewers reported that the shapes still kept their same colors. Land also observed that the eye was more than just a light receptor: "The photographer's light meter, Land said, cannot distinguish between a black cat in the sunlight and a white cat in shadow, but humans can. 'We tend to take for granted our ability to know that the shadowed portion is also white and not gray.' " The author later discusses scientific work by David Hubel and Margaret Livingstone that found brain cells in the visual cortex that responded to color.

Some of Land's other projects were Polaroid's involvement in war production during World War II, and his participation in advisory bodies that worked on the U-2, reconnaissance satellites after the 1957 Sputnik shock, and the SR-71 spy plane.

This book is worth reading for all the things you didn't know about Edwin Land. Although a good portion of the book, in careful detail, is about Polaroid films and cameras, the most interesting parts are Land's less well-known activities and thoughts on the scientific method.

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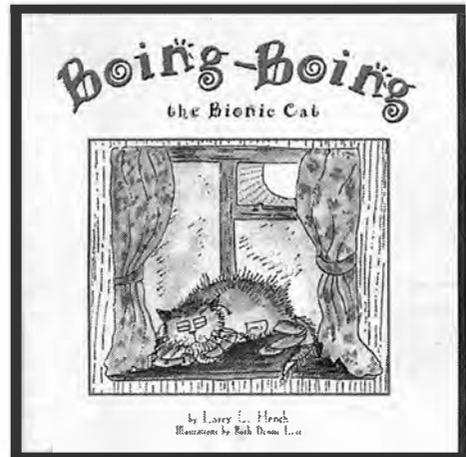
Boing-Boing is a welcome relief from the majority of children's "science" books, which promote environmental myths, glorify primitive society, or promote the idea that the aim of science is to protect Mother Nature from the depredations of that alien creature, man.

In this nicely illustrated story, published by the American Ceramic Society, a kindly professor helps out a cat-loving young neighbor who is allergic to cats, by building him a robotic cat—

complete with fiber-optic fur. It walks, it talks, and when it lolls in the Sun, its batteries recharge.

The author, a ceramics scientist, is the discoverer of the first man-made material to bond to living bone. A professor of ceramic engineering for 40 years, he now teaches at the University of London's Imperial College of Science, Technology, and Medicine, and is the director of the Imperial College Centre for Tissue Regeneration and Repair. Hench was inspired to write this book by his grandchildren, and further adventures of the bionic cat are planned.

Though science and the scientist are portrayed a bit simplistically, the message



is positive and optimistic. The only caveat: If you give this to a cat-loving child who is allergic to cats, you will probably be asked to construct your own bionic cat.

—Marjorie Mazel Hecht

AIDS and Infectious Diseases

Continued from page 15

in, but so far, very little action has been taken. In a press release the day after the report went public, Sandra Thurman, Director of the White House Office of National AIDS Policy, said: "As the National Intelligence Council's report warns, as goes Africa, so will go India, Southeast Asia, and the former Soviet Union. At the end of the day, this global pandemic will make the bubonic plague of the Middle Ages pale in comparison, unless our response is finally commensurate with the magnitude of this emergency."

The Clinton Administration has asked Congress for only \$250 million to fund AIDS efforts overseas for the 2000 budget, an amount that would not even scratch the surface of what is needed for treatment. There has been no discussion of how to address the lack of health infrastructure in Africa and in most of the developing-sector nations—infrastructure which must be built if the AIDS epidemic is to be stopped. The cost of starting adequate prevention efforts in Africa would cost at least \$2 billion and, according to UNAIDS, probably \$3 billion would be needed for treatment of AIDS in Africa, a figure that many Clinton Administration officials do not dispute.

The big question surrounding the

publication of the CIA report, and the acknowledgement by the National Security Council of the threat posed by the AIDS epidemic, is why did it take so long? Why were the warnings made more than a decade ago ignored? Helene Gayle, the Director of AIDS Prevention at the Centers for Disease Control, was quoted by *The Washington Post*, saying: "We saw it coming, and we didn't act as quickly as we could have. I'm not sure what that says about how seriously we took it, how seriously we took lives in Africa."

A Difference of Method

Why didn't government officials see that the result of clinging to their policies of austerity would create a global infectious disease catastrophe? How did LaRouche forecast this development 25 years ago? Surely the government had access to all of the same information that LaRouche's task force had, so why did the government fail? The answer has nothing to do with information, but with a difference in conceptual method.

In his original work in economics, LaRouche had found that the only true measure of economic value is the power of the human mind to discover new physical principles. The rate of growth of human society depends entirely upon expanding the creative powers of the individual mind; this is realized in economic progress as an increase in the potential relative population density.

He further recognized that human life

exists in a metastable condition *vis à vis* the surrounding biosphere. He recognized that the replacement of the guiding axioms of industrial society by the new paradigm of "information society" would mean a return in the economic sphere to looting of the society's prior investments in physical infrastructure. This decline in physical infrastructure, on a global scale, would favor the outbreak of both new and old forms of infectious diseases, which would appear first in the underdeveloped regions of the world economy.

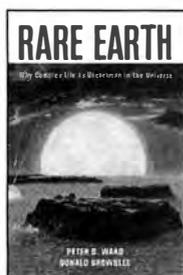
It was from this standpoint that LaRouche recognized that the dangerous shifts in policy in economics, medical care, and science that had been adopted as part of the "New Age" paradigm 30 years ago, would lead to disaster.

The challenge now for the Administration, and the scientific community, in particular, is to look at the research proposals, especially in optical biophysics, made by LaRouche in the early 1980s, and initiate crash programs not only of health infrastructure, but of basic medical research.

Notes

1. Central Intelligence Agency, "The Global Infectious Disease Threat and Its Implications for the United States," NIE 99-170, January 2000 (unclassified version released April, 30, 2000).
2. International Labor Organization, "HIV-AIDS: A Threat to Decent Work, Productivity, and Development," June 8, 2000.
3. World Health Organization, "Overcoming Antimicrobial Resistance," June 2000.

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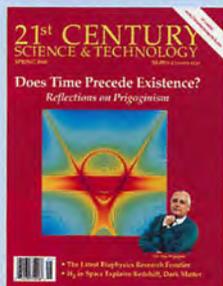
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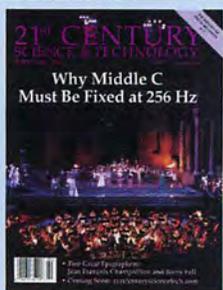
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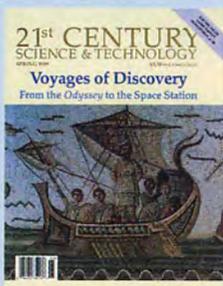
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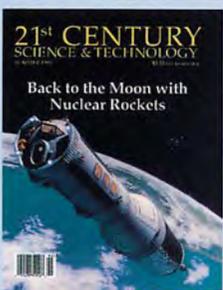
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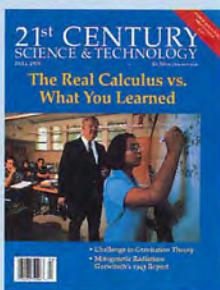


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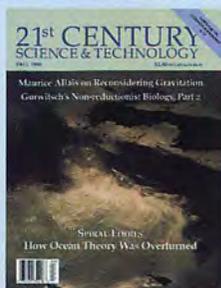
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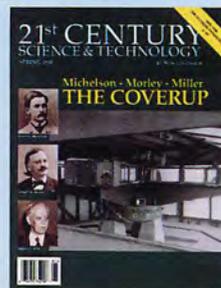
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In This Issue:

LOW-LEVEL RADIATION IS GOOD FOR YOU,

SO, WHO'S LYING THAT IT IS NOT?

Years of research have proven that low-dose radiation has a beneficial effect on human health, yet national and international radiation protection regulations maintain the fiction that radiation at any level is harmful. Leading nuclear engineer James Muckerheide reviews the evidence and names the scientific organizations that have fudged data in order to justify continued use of the "linear no-threshold" concept of radiation—at great cost to human health and the national economy.



Carlos de Hoyos

Part of the blame for radiation-phobia lies with the radiation professionals, many of whom promote the myth that the known radiation damage at high levels can be extrapolated down to the smallest dose. Here, a view of Three Mile Island.



NASA

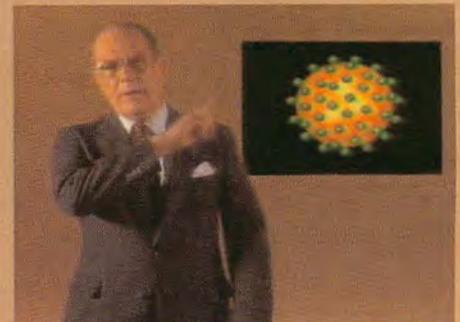
PUTTING OCEAN WARMING IN ITS CYCLICAL PERSPECTIVE

One of the latest arguments of the global-warming promoters, is that the oceans are storing the warming that has been predicted by climate modellers, but has never been measured in the atmosphere. Oceanographer Robert Stevenson reviews the latest data, and demonstrates that the general warming (and cooling) of the oceans follows long-term cycles, independent of radiative or man-made influences.

The oceans warm—and cool—according to long-term physical cycles, not man-made emissions. A view of the Alboran Sea (foreground) from the Space Shuttle, June 1991. Spain is at left, Morocco and Algeria on right.

MEETING THE NATIONAL SECURITY THREAT OF AIDS

After years of inaction, the U.S. National Security Council stated in April that the spread of AIDS and other infectious diseases poses a threat to U.S. national security. What took them so long? As Colin Lowry reviews in the Special Report, the devastation worldwide is staggering, with the worst yet to come. Now the question is, will the United States lead the way out of the crisis, with a massive international program to build the infrastructure for clean water, sanitation, nutrition, and medical care, and institute a Manhattan-Project-style research program in optical biophysics and other new approaches to understanding human health and disease? This is the program Lyndon LaRouche outlined nearly 30 years ago, when he warned that the austerity policies of the International Monetary Fund and World Bank would lead to biological holocaust.



Lyndon LaRouche, in a half-hour broadcast, June 4, 1988, on NBC-TV, "Nothing Short of Victory: War Against AIDS."