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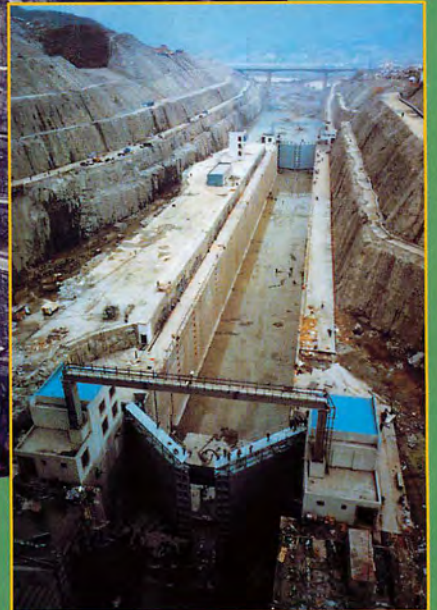
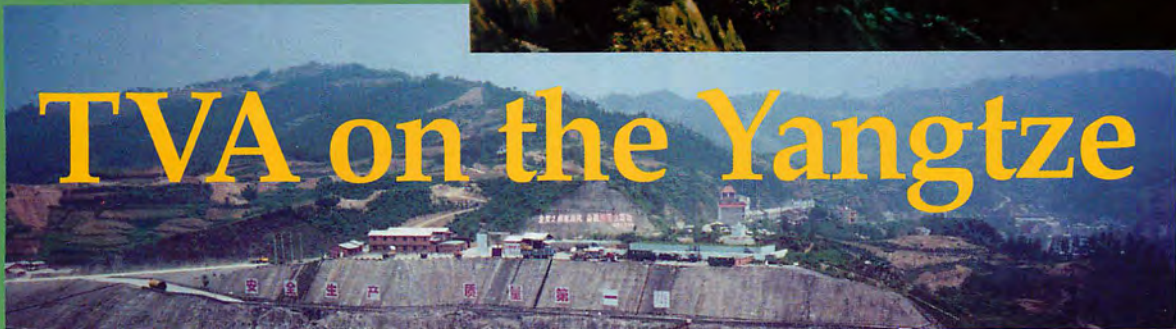
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On the cover: The Three Gorges Dam on China's Yangtze River. Artist's illustration (top) and inset on right, courtesy of the Yangtze Three Gorges Project Development Corporation; center photo and inset at left by Marsha Freeman; cover design by Alan Yue.

REFLECTIONS ON ARTIFICIAL INTELLIGENCE

Is the Mind a 'Thing'?

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Recently, *21st Century* received a manuscript from a senior professor of biology, apparently trained in neurophysiology and specializing in sleep research. He put forward a theory that the function of dreams was to reconstitute faulty "circuitry" in the brain synapses. I was somewhat surprised to note the amount of research that has gone into the biophysical aspects of brain function, as implied by his discussion. I was not shocked that his representations relied on analogies to digital computers, through concepts such as "long-term storage," and "memory processing." How should he be answered?

His thesis seemed to me questionable, even if novel. But I thought the question should be approached from fundamentals, rather than arguing the case within the framework of current knowledge—which for me would be to argue from very scant knowledge. I wished to write a short reply to the author, that would call his attention to some of the more fundamental assumptions underlying his thesis. Having just completed reading through a number of short works by Leibniz, and Plato's *Phaedo* dialogue, what was on my mind was the distinction between *soul* or *mind*, and *brain*. However, upon sitting down to write what I thought would be a short reply, I found myself in some difficulty.

The problem arose as follows. Recognizing that even the use of the word "soul" would most likely appear to my correspondent as either ridiculous, or at best, "non-scientific," in the context, I attempted to put myself into his mind, to see how I might establish the necessity for considering the distinction. Anticipating from what he had written, that he might accept my argument that the brain could not fairly be compared to a digital computer, but was a far more complex organism, I posed the problem as follows: I imagined some time far into the future, when the physico-chemical basis of brain activity might be well understood. Suppose it were possible to construct an apparatus by which one could observe the

brain in the process of creative thought.

The question then arises, whether any intelligible representation of thought, or mind, relying on the physico-chemical observations of brain and related organs (let's call the whole complex the *biophysical substrate of thought*) were possible. Is it possible, in principle, either to construct such an apparatus, or to interpret its results? If it were possible, then, it would appear, that the soul had disappeared, for the function of mind had been equated to a biophysical process. This was troubling.

One person with whom I discussed the problem, argued that it would be impossible to construct such an apparatus, because mind, a higher process, could never be understood by means of the lesser objects of which the apparatus is built. I replied that the apparatus was a construction of mind, even if its parts were made of lesser stuff. Another pointed out that the problem was similar to that proposed by Gottfried Leibniz in the analogy of the mill (*Monadology*, section 17). There Leibniz writes:

"It must be confessed, however, that Perception [do not confuse this with the modern psychologist's use of the term—LH], and that which depends upon it, are inexplicable by mechanical causes, that is to say, by figures and motions. Supposing that there were a machine whose structure produced thought, sensation, and perception, we could conceive of it as increased in size with the same proportions until one was able to enter into its interior, as he would into a mill. Now, on going into it, he would find only pieces working upon one another, but never would he find anything to explain Perception. It is accordingly in the simple substance, and not in the composite, nor in a machine, that the Perception is to be sought. . . ."

But the argument of Mr. Leibniz, in this case, did not seem to fully answer my concern. Granted, I could never experience the sensation of thought in any other way than having a thought. But I imagined my materialist adversary replying

that I was deceived into thinking that "I" had a thought. It was the biophysical substrate which was the reality, not "me."

Now I was getting disturbed. I could not seem to prove to the imagined materialist the most elementary thing. I began to wonder: Had I merely exchanged my old prejudice, materialism, for a new (actually, old), but more sanctified one? And if so, was this anything to be proud of? After all, if a young man should truly give up his attachment to materialism, and seek mortification of the flesh, it might be something to be wondered at—even if nearly all such efforts end in failure. But who is surprised if a middle-aged man, with spreading bald spot and paunch, should declare that he has given up the temptations of the flesh, and now seeks solace in the prejudice that his soul is immortal? Would he be any less ridiculous in his self-righteous prattling, than if he had gone the other way, and taken up chasing women? At least the latter might arouse the popular admiration, especially if he had not done so before. I make a joke of it, but I truly confess that I was troubled.

A More Successful Stab

While mulling over my difficulty, the following paradox occurred to me:

Let's assume we have successfully constructed the apparatus whose existence we had mooted above. Suppose now, that we are attempting with our mind to resolve some paradox, and simultaneously (or *post facto*) observing, with aid of this sophisticated apparatus, the biophysical substrate of our own mind, which we can now intelligibly represent, and perhaps even act upon wilfully. The solution to said paradox, must correspond to some new geometric configuration of whatever is the multiply-connected manifold by which we have represented the biophysical substrate, and we should be able to observe that new configuration. Further, *although we would not know in advance what it would be*, we could conceivably observe the biophysical substrate undergoing the change in configuration, which corresponds to its finding the solution to the posed paradox.

If that were possible, I was even further from my desired goal. It seemed that, by this exercise, I was only leading myself deeper into the camp of my adversary. But then I noted a certain paradox within this construction. Its appearance seemed, at

first, to be only a small thing. But on reflection over several days, my imagined materialist adversary was unable to account for it. Indeed he seemed to be trapped and silenced by it. What I noticed was that there were two parties, so to speak, in my internal musing, whose specific identities had to be distinguished. There was "I" the mind, and there was the biophysical substrate, "it," to which "I" presumably corresponds. "I" thinks that it is observing "it" in the act of thinking. The materialist counters that there is no "I"; there is only "it." But how does he then account for the appearance of this chimera, "I"? Before thinking better of himself, he might be tempted to employ the metaphor that "I" is merely a "figment of the imagination." But of whose imagination?—"Its"?

Now the materialist, who had wished to construct everything upon the hypothesis of matter (constructed of irreducible elementarities) and motion, is forced to acknowledge a type of "matter" which has an "imagination." But that is only the beginning of his difficulties.

We could now add another consideration. Let us suppose that the new idea created is such that its realization, in the way that economist Lyndon LaRouche has repeatedly emphasized, improves the potential relative population density of the species. Now, the materialist would have to admit that he is dealing with a unique form of matter, which does things that his ordinary conception of matter does not comprehend: It creates mental figments, and it changes itself for a purpose. Yet it even does many other things, which our simple example hasn't considered yet. Although it would take us beyond the confines of allotted space to examine these, we can reference for ourselves, for example: that it can only survive in community with other similar forms of "matter"; that it can only think by means of a long-chain, historical continuity of dialogue with this other "matter"; that it is only happy and productive when doing so; and, many other considerations.

If the materialist wishes to persist in calling all this "matter," let him. Such stubbornness will, however, cost him in clarity and precision of thought. He will soon find that he must distinguish this new type of "matter" from the other thing he wished to call matter, and that yet more troubles await him.

—Laurence Hecht



Letters

On Being 'Specifically Human'

To the Editor:

The Summer 2000 *21st Century* issue just arrived. Mr. LaRouche's "SDI Revisited: In Defense of Strategy" caught my attention, especially starting with page 39 through 42.

Since Lyndon is a scientist, I'm surprised that he implies relativistic terms in such phrases as "true peace," "more moral," and "to do good." Does he not believe in absolutes?

I do have trouble with comprehending his definition of science. As in ". . . the appropriate example of the motivation otherwise to be described as the commitment to do good." Also his statement on morality. As in, ". . . morality . . . requires the individual, and society, to act in all matters in a specifically human way." What does Lyndon mean by "in a specifically human way?" And "to practice scientific progress?"

Edward Marshall
Los Alamitos, Calif.

Lyndon LaRouche Replies

The customary definitions of absolutes, is the problem here. In competent physical science, the only "absolute" is the action which conforms to the aphorism of Heraclitus: Nothing is constant, but change. The adducible principle of change, thus replaces that naive notion of "absolute" popular among Aristotelians, empiricists, and modern logical positivists. My treatment of this matter of change situates change as "action," that in the sense implied by Riemannian manifolds.

Similarly, it is the action which generates good which defines what is good.

Similarly, a specifically human way, is a mode of action rooted in experimentally validated modes of cognition, a quality of action which exists only in human behavior.

A 'Great Idea of God'

To the Editor:

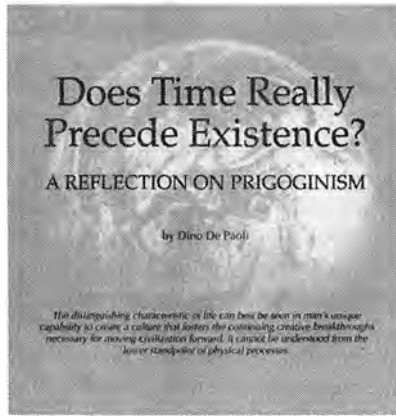
After reading Dino De Paoli's interesting article, "Does Time Really Precede Existence" [Spring 2000, p. 27], one has the sensation that everything is reduced to a sea of thoughts, points of views or opinions; nothing really rests in the proper place, if we can't properly define what space and time are.

Maybe the best guess to our limited knowledge of Nature would be that the whole universe is just a great idea of God, period.

Please explain the possibility of extrasensory perception and telepathy. Are they another creature of New Agers?

Keep up your intelligent communication level.

Paul Fleury
Buenos Aires, Argentina



The Earth as seen from one of a series of time-lapse images taken by the Galileo spacecraft, about 8.1 million miles away.

The Prigogine is a world renowned scientist who won the Nobel Prize in 1977 for his theory of dissipative structures and for, in 1981, his award for the discovery of the arrow of time. He is a part of a scientific paradigm which sees time as a linear progression. This includes many leading scientists in physics, chemistry, biology, and earth science.

Prigogine's view, the time paradigm, also means a complete discontinuity, which he thinks has occurred at or near the origin through the conceptual "reasonable time." The level of discontinuity contains a specifically Western idea of time, between nature and mind, according to Prigogine. This idea is that of a discontinuity, in the sense that the arrow of time is not a continuous progression of time, but a series of discrete steps. In the 1970s, Prigogine has produced an impressive list of papers, books, and lectures.

It would be to describe the view to the memory of the author, who is a scientist and a man who lived an excellent life and who lived a long life.

Dino De Paoli Responds

It is very possible to start from your point of view that "the universe is a great idea of God."

This was actually the implicit, or explicit, assumption from which Greek science was originally founded. This is the point of view of Kepler, and espe-

cially of Leibniz. This is also the implicit assumption of scientists like Riemann and Einstein. But from there, as Leibniz does, one has to derive a concept of space and time that is intelligible and powerful enough to include developmental processes like life and thinking human beings—a concept of space and time where man is sovereign and capable of willful acts.

My criticism of Prigogine, and especially of the New Age "process church," is precisely that they, *a priori*, axiomatically want to nullify the individuality, sovereignty, and moral responsibility of human beings in the world. They nullify it, by introducing a "valueless" process where it is fully indifferent what one does, or does not do. Oligarchical societies are always very happy to find scientific justification for their policies to reduce man to the level of a powerless cow.

Only a man who is intelligibly aware of his given power of discovery, of his dignity to exist, finds also an inner point where he is "on top of space-time." Only from there, and at different levels, can one share "God's great idea." It is only from that standpoint, that one can, and must, help to better the world.

As far as the last part of your letter is concerned, I can only say that if there are areas of our nervous system not yet explained by science, this should not be an excuse for New Age sects to manipulate people.

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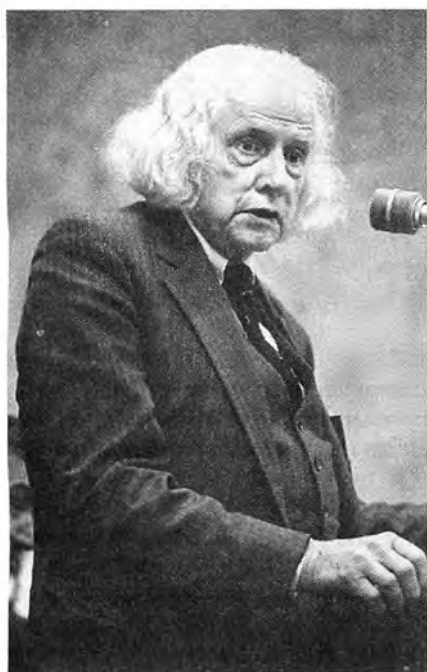
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Dr. Robert Moon, speaking in 1987 at Human Rights Commission hearings on the LaRouche case.

Advances in Developing The Moon Nuclear Model

by Laurence Hecht

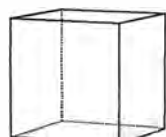
In the atomic nuclear structure hypothesized by Dr. Robert J. Moon¹ in 1986, protons are considered to be located at the vertices of a nested structure of four of the five Platonic solids (Figure 1).

Eight protons, corresponding to the Oxygen nucleus, occupy the vertices of a cube which is the first nuclear "shell." Six more protons, corresponding to Silicon, lie on the vertices of an octahedron which contains, and is dual to, the cube. The octahedron-cube is contained within an icosahedron, whose 12 additional vertices, now totalling 26 protons, correspond to

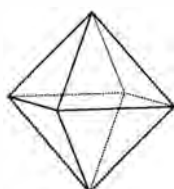
Iron. The icosahedron-octahedron-cube nesting is finally contained within, and dual to, a dodecahedron. The 20 additional vertices, now totalling 46 protons, correspond to Palladium, the halfway point in the periodic table (Figure 2).



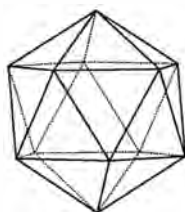
Tetrahedron



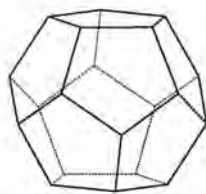
Cube



Octahedron



Icosahedron



Dodecahedron

Figure 1
THE FIVE PLATONIC SOLIDS

The five regular, or Platonic, solids are best conceptualized as the regular tilings of the surface of a sphere. They thus define a crucial boundary of what can be constructed in visual space. In nested arrangements, the solids and their implicit variations may represent a multiply connected manifold, which serves as a metaphor for the relationship of the individual to the whole universe in physical space. Construction of the solids, and exploration of their variations, has thus always been the foundation for creative work in science.

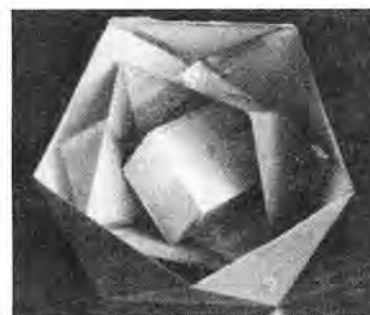
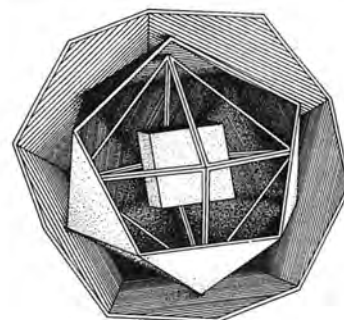


Figure 2
A WORKING MODEL OF THE NUCLEUS

In the Moon model of the nucleus, a nesting of four of the five Platonic solids similar to that conceived by Johannes Kepler to describe the Solar System, is employed. Also shown is a photograph of a working model of the nucleus, made for Moon by retired machinist George Hamann in 1986. The scale model was constructed out of used aluminum offset printing plates.

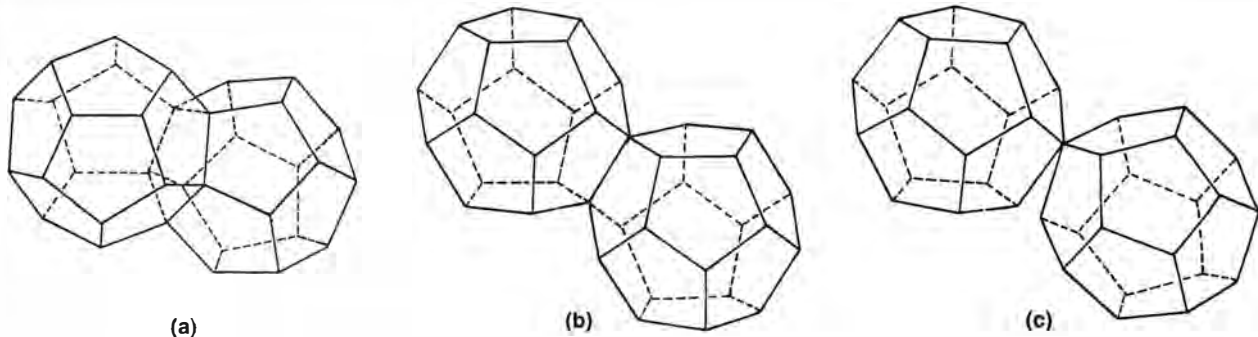


Figure 3
THE COMPLETED URANIUM NUCLEUS

(a) To go beyond palladium (atomic number 46), which is represented by the completed dodecahedron, an identical dodecahedron joins the first one at a face. When the second dodecahedron is completed, it is seen that six positions on the common dodecahedral face are already occupied. This represents the nucleus of radon (atomic number 86).

(b) To go beyond radon, the twin dodecahedra open up, using a common edge as if it were a hinge.

(c) To create 91-protactinium, the hinge is broken at one end. To create 92-uranium, the position where two protons join must be slightly displaced, creating the instability which permits fission.

Beyond Palladium, a second dodecahedral shell begins to form as a twin to the first. After 10 of its 20 vertices are filled at Lanthanum (atomic number 56), a cube and octahedron nesting fill inside

it, accounting for the 14 elements of the anomalous Lanthanide series.

Next, the icosahedron forms around the cube-octahedron structure, completing its 12 vertices at Lead (atomic

number 82), which is the stable, endpoint in the radioactive decay series. Finally the dodecahedron fills up, and the twinned structure “hinges” open, creating the instability which leads to the fissioning of uranium (Figure 3).

The completed “shells” of the Moon model, correspond to the elements whose stability is attested by their abundance in the Earth’s crust: Oxygen, Silicon, and Iron. These elements also occur at *minima* in the graphs of atomic volume (Figure 4), and of other physical properties (viz. compressibility, coefficient of expansion, and reciprocal melting point) as established by Lothar Meyer in the 1870s to 1880s. Palladium, which is an anomaly in the modern electron-configuration conception of the periodic table— because it has a closed electron shell, but occurs in the middle of a period— is not anomalous in the Moon model. Further, as I discovered since my 1988 article on the subject, all four closed-shell elements in the Moon model occur at maxima on the graph of paramagnetism (versus atomic number), as reported by William Draper Harkins.²

The Moon model is thus consistent with much of the same experimental data which underlies the periodic table of the elements, and explains additional features not explained by the modern, electron-configuration

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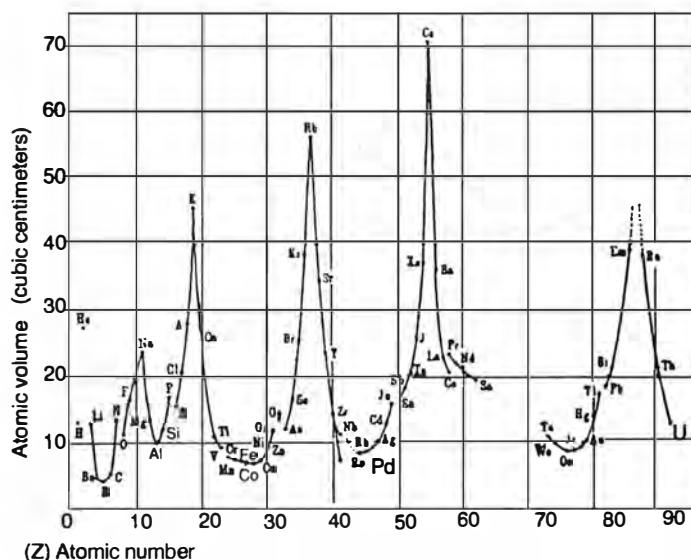


Figure 4
PERIODIC PROPERTIES OF THE ELEMENTS

The periodicity of the atomic volumes of the elements (the ratio of their atomic weight to density) guided Lothar Meyer in the 19th-century in developing the periodic table. The maxima in the graph at atomic numbers 3, 11, 19, 55, and 87 identify the Group 1A elements that begin each period. However, minima occur in the same graph at or near the atomic numbers 8, 14, 26, and 46, which mark the completed proton shells in the Moon nucleus.

Source: Arnold Sommerfeld, *Atomic Structure and Spectral Lines*, p. 144.

Who Was Robert J. Moon?

Robert James Moon (1911-1989): Arriving at the University of Chicago at the age of 16 in 1928, Moon expressed his intention to solve the problem of controlled thermonuclear fusion. Arthur Compton, then chair of the Physics Department, told him his department was not working on that problem, and sent him to the chairman of the Department of Physical Chemistry, William Draper Harkins.

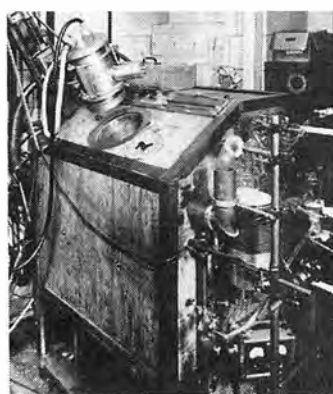
Moon earned a Ph.D. degree in Physical Chemistry under Harkins, and then a doctorate in Physics. He taught in both departments at the University of Chicago, starting in the 1930s. During World War II, he played a key role in the Manhattan Project; he later conducted biophysical research in connection with Argonne National Laboratory.

In the 1930s, Moon built the second cyclotron in the world, with many improvements over the first device constructed by E.O. Lawrence. During the Manhattan Project, he solved the problem of the carbon moderator, making the first atomic pile possible. After the war, he constructed the first scanning X-ray microscope, and pioneered in optical biophysics studies on the action potential in nerves.

His study of the electrodynamic theories of André-Marie Ampère and Wilhelm Weber, led him to reconsider the usual interpretation of the Rutherford scattering data, which ignores the variation in force between charged particles as a result of relative velocities and accelerations. Calculations based on the Weber electrodynamics forced Moon to re-conceptualize most of what is, still today, taken for granted in atomic and nuclear physics.

From 1974 onward, he was a key collaborator of Lyndon H. LaRouche, Jr. A founding member of the Fusion Energy Foundation, from 1984-1986 he edited its *International*

Journal of Fusion Energy. He was a member of the advisory board of *21st Century Science & Technology*, until his death in 1989.

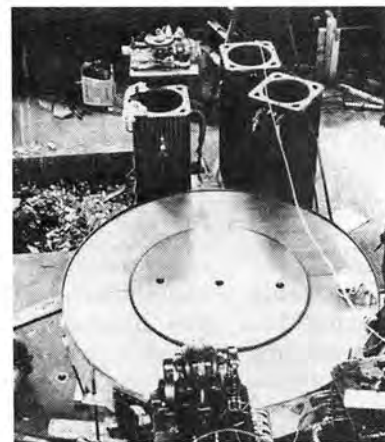


Below: The scanning X-ray assembly. Outer box contains one-half-inch thick shield of lead. Vacuum pumps are exterior to box on right. Calcium fluoride single crystal housing and photo multiplier tube are at upper left.

As an outgrowth of seminars conducted with LaRouche and other scientific collaborators in the 1984-1986 period, Moon came up with his proposal for a geometric ordering of the atomic nucleus, inspired by Johannes Kepler's conception of the solar system, as described in his work *Mysterium Cosmographicum*.

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The world's second cyclotron, designed and built by Dr. Moon at the University of Chicago (about 1936), had many improvements over the first one, built by E.O. Lawrence in California. Here, the core of the cyclotron being assembled.



Philip Ulanowsky/EIRNS

Dr. Moon teaching a class on the principles of electro-dynamics (1986) at a summer camp in Virginia run by the Schiller Institute. Students were instructed in the use of basic machine tools, and encouraged to reproduce original experiments of André-Marie Ampère.

PROPOSED NEUTRON DISTRIBUTION CHART

Element	N=	Alpha particle	Edges of				
			Tetrahedron	Cube	Octahedron	Icosahedron	
2-He-4	2	2	Complete period				
3-Li-7	4	2	2				
4-Be-9	5	2	3				
5-B-10	5	2	3				
6-C-12	6	2	4				
7-N-14	7	2	5				
8-O-16	8	2	6	Complete proton shell			
9-F-19	10	4	6				
10-Ne-20	10	4	6	Complete period			
11-Na-23	12	4	6	2			
12-Mg-24	12	4	6	2			
13-Al-27	14	4	6	4			
14-Si-28	14	4	6	4	Complete proton shell		
15-P-31	16	4	6	6			
16-S-32	16	4	6	6			
17-Cl-35	18	4	6	8			
18-Ar-40	22	4	6	12	Complete period		
19-K-39	20	4	6	10	0		
20-Ca-40	20	4	6	10	0		
21-Sc-45	24	4	6	12	2		
22-Ti-48	26	4	6	12	4		
23-V-51	28	4	6	12	6		
24-Cr-52	28	4	6	12	6		
25-Mn-55	30	4	6	12	8		
26-Fe-56	30	—	6	12	12	Complete proton shell	
27-Co-59	32	—	6	12	12	2	
28-Ni-59	31	—	6	12	12	1	
29-Cu-64	35	—	6	12	12	5	
30-Zn-65	35	—	6	12	12	5	
31-Ga-70	40	—	6	12	12	10	
32-Ge-73	41	—	6	12	12	11	
33-As-75	42	—	6	12	12	12	
34-Se-79	45	—	6	12	12	15	
35-Br-80	45	—	6	12	12	15	
36-Kr-84	48	—	6	12	—	30	Complete period
37-Rb-85	48	—	6	12	12	18	
38-Sr-88	50	—	6	12	12	20	
39-Y-89	50	—	6	12	12	20	
40-Zr-92	52	—	6	12	12	22	
41-Nb-93	52	—	6	12	12	22	
42-Mo-96	54	—	6	12	12	24	
43-Tc-98	55	—	6	12	12	25	
44-Ru-101	57	—	6	12	12	27	
45-Rh-103	58	—	6	12	12	28	
46-Pd-106	60	—	6	12	12	30	Complete proton shell

Continued from page 6
 presentation of the periodic table. However, it seems to be inconsistent with the evidence from spectroscopy (upon which the electron-configuration conception rests) which suggests the periods of 2, 8, 18, and 32; it is also not consistent with the older "law

of octaves," which was developed to explain the phenomena of chemical bonding, and was subsumed in Mendeleyev's conception.

An Ordering of Neutrons

From the period of my first exposure to Moon's nuclear model, I was of the opinion that the two apparently contra-

dictory orderings (electron and proton) must be governed by some higher principle, which was in some way contained in the Moon conception. Moon encouraged such speculations, pointing out that the theory of electron orbits (the "extra-nuclear electrons," as he insisted on calling them), had always suffered

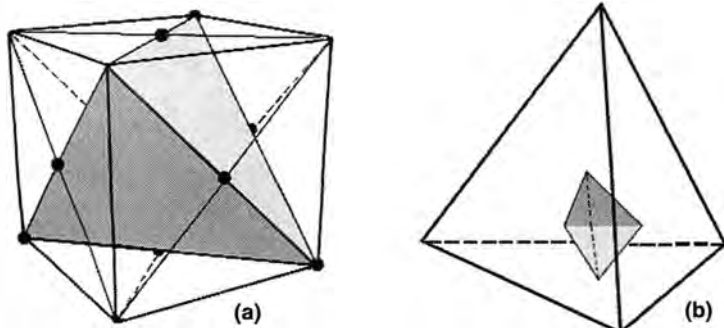


Figure 5

TETRAHEDRON INSCRIBED IN A CUBE

Every cube implies a tetrahedron. Four diagonally opposite vertices of the cube form the vertices of the tetrahedron (a). The alpha particle is conceived as a smaller tetrahedron (b), whose vertices fit at the centers of the faces of the larger tetrahedron pictured in (a).

from an aseptic separation of the electron from the nucleus.

During his lifetime, I worked out an ordering principle, using the unfilled

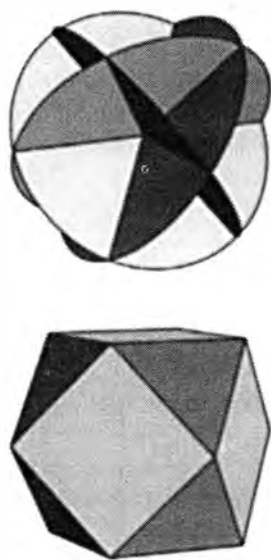


Figure 6

THE FOUR 'CURRENT RING' CONFIGURATION

Consider the four hoops pictured as four current-carrying loops. Their magnetic poles would point to the centers of the eight triangles formed by the intersection of the hoops. These correspond to the eight vertices of a cube.

faces and edge midpoints of his nested configuration, to determine the otherwise undetermined distribution of the neutrons in the nuclei.³ I assumed the addition of the fifth Platonic solid (tetrahedron) as the structure of an Alpha particle at the center of the nucleus (Figure 5), and distributed the neutrons at the unoccupied edge-midpoints of the set of solids. The neutron "shells" closed at the electron-shell singularities (2-helium-4, 10-neon-20, 18-argon-40, 36-krypton-84), specified in the modern periodic table (see table).

This suggested, for the first time, a relationship between the ordering of the nucleus and that of the electron shells. However, I could not see the cause for a relationship between the supposedly neutral neutrons, and the extranuclear electrons. The difficulty suggests some error of assumption, which must be contained in the oversimplification provided by the Rutherford-Bohr model.

Recently, I began to re-examine this problem. I was now aided by the intensive study of the Ampère-Gauss-Weber electrodynamics I had since carried out. The following are speculations I have examined in pursuit of this still unfinished task.

1.1 PROTONS CONSIDERED AS AMPERE MAGNETIC MOLECULES

In 1821, André-Marie Ampère adopted the hypothesis, suggested by his friend and colleague Augustin Fresnel, that there existed within matter, tiny

circular loops of electrical current, which, like the macroscopic ones he had studied, acted like magnets. If the current loop were thought of as the "equator" of an imaginary sphere, the north and south poles of the sphere would be the north and south poles of the magnet which the current loop produced. Ampère supposed that magnetization of a piece of iron consisted of alignment of these "magnetic molecules" in parallel columns, so as to magnify their effect.

I wondered what would result if we considered the Moon nucleus as constructed of magnetic molecules of positive charge, each one representing a proton. I supposed that each proton consisted of a tiny ring of electrical current. If one arranges four hoops into the configuration which produces the 12 vertices of a cuboctahedron at the intersection points of the hoops (Figure 6), it is seen that the poles of the four hoops (taken as "equators") point to the 8 spherical triangles produced by the configuration. The centers of these 8 triangles correspond to the 8 vertices of a cube. The "magnets" thus lie along the four axes which connect the 4 pairs of diagonally opposite vertices of a cube.

The cube is thus magnetically "polarized." Can the magnetic poles find a stable position in this configuration? By proper choice of polarities, it will be seen that they can. We will first examine this stability, and then turn to the question of what we mean by the magnetic poles. In the original Moon model, the protons are represented as singularities at the vertices of the various solids. In the variation under investigation here, the protons are rings of current, while the vertices of the solids are now magnetic poles produced by them. Let us turn, first, to the possibility of stable arrangements.

Consider a perspective cube drawn on a sheet of paper. On the top face, assign north poles to two diagonally opposite vertices (that is, along the diagonals of a face), and south poles to the other pair (Figure 7). The vertices which lie diagonally opposite these (that is, along the long diagonals which pass through the cube) must have the opposite magnetic polarity. Consider any vertex bearing a south polarity. It will be seen that its three nearest neigh-

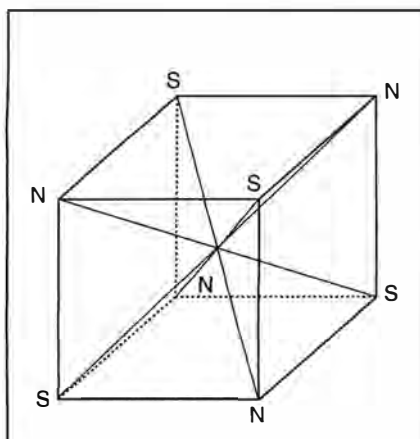


Figure 7
FORMATION OF DIPOLES

Dipoles formed by long diagonals on a cube create stability at each vertex.

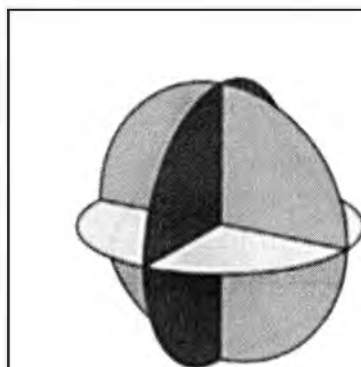
bors (distant by the length of an edge) all carry a north polarity, while its three more distant neighbors (distant by the length of a face diagonal) carry the south polarity.

Now, consider the diagonally opposite vertex (that is, the one along the long diagonal that passes through the cube). It is a north pole, while its nearest neighbors are south, and its more distant neighbors are north. The attractions and repulsions in opposing directions being equal and mutually opposite, it is seen that the magnetic dipole we have examined will have no moment of rotation. The same holds for the other three magnetic dipoles which connect the remaining vertices of the cube.

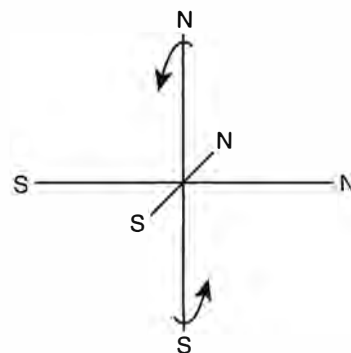
Thus, a set of four insulated, circular loops of copper wire, constrained so as to remain around a common center, and electrified, would find a steady state in the mooted configuration, or even be induced to take up such a configuration. I have thought of building such a model using slotted hoops as forms for the circular wire loops.

Stability of Octahedron

Now turn to the octahedron. The configuration is simpler. It can be constructed from three rings, placed in three mutually orthogonal directions (Figure 8a). In this case, the six vertices produced by the intersections, correspond to the six poles produced by the three magnetic molecules. The "magnets"



(a)



(b)

Figure 8
INSTABILITY OF OCTAHEDRAL MAGNETIC DIPOLES

Three circular loops (a) in which the poles point to the six vertices of the octahedron. The magnetic dipoles in this configuration (b) must be unstable; for example, the north pole at top experiences rotational moment.

may thus be represented by a drawing of three mutually orthogonal axes (Figure 8b). It is readily seen that no arrangement, in which north and south poles are opposite each other, will produce a stable configuration; rather a rotational moment will always be imparted to the magnets.

Such would be the end of any attempt at a linear modelling, one derived merely from properties of the solids taken one at a time. However, the nesting of the solids in Moon's nucleus, produces a multiple connectivity that now makes the octahedron possible. To see it, we must now superimpose upon the drawing of the perspective cube, the six poles of the octahedron, one standing above the center of each face of the cube (Figure 9). It is now seen that, in relationship to the nearest underlying face of the cube, the pole of the octahedron, whether north or south, is balanced, being mutually attracted in two opposite directions, and mutually repelled in another pair of opposite directions perpendicular to the first.

Thus, when we consider the poles of the octahedron, by themselves, they are unstable. However, when the octahedron is circumscribing the cube, we see that any given octahedral pole is considerably closer to the corners of the underlying cube than to the nearest adjacent pole of the octahedron. Since the force of a single magnetic pole upon

another, falls off as the square of the distance, it will be seen that the effect of the nearer cubic poles is three times as great as that of the adjacent octahedral ones.

(If the length of the edge of the cube is taken as 1, the edge of the circumscribing octahedron is $3/\sqrt{2}$. The distance of the octahedral pole to the nearest cubic one is $2/3$ the altitude of the face triangle of the octahedron, or $\sqrt{6}/2$.

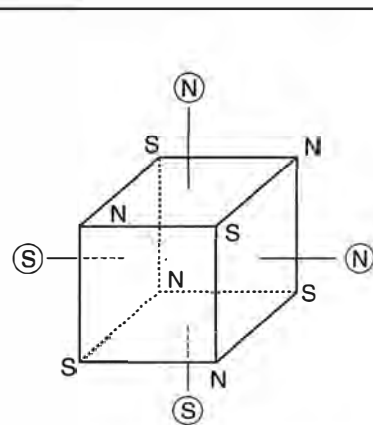


Figure 9
OCTAHEDRAL VERTICES INSIDE A CUBE

The octahedral vertices (circled) standing above the face centers of a cube, are stable with respect to the magnetic polarity of cube vertices

Hence, the ratio of the squares of the distance from the nearest cubic vertex to the nearest octahedral vertex stands as 1:3).

Thus, three Ampère magnetic molecules in octahedral formation would possess a considerable stability, when circumscribing the arrangement of four magnetic molecules in the configuration that produces poles at the eight vertices of a cube. They would not possess such stability when not in the nested ordering. This also would suggest why the cube must precede the octahedron in the Moon configuration.

Progression to 5-Fold Symmetries

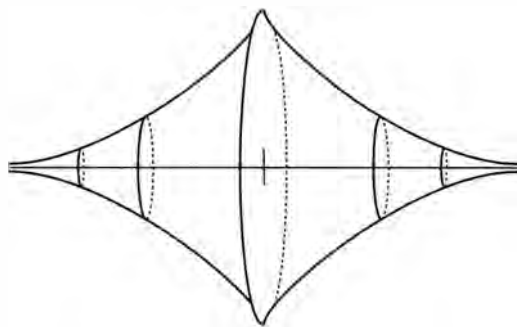
Let us next consider the circumscribing icosahedron and dodecahedron as a group. To move from the octahedron to icosahedron, the nested model must pass through a singularity, the same one examined in Johannes Kepler's famous "Six-Cornered Snowflake," that is the transition from the six-fold to five-fold symmetry. In Moon's configuration, the six vertices of the octahedron are placed along the altitude lines of 6 of the 20 triangular faces of the icosahedron, at a distance defined by the golden section.

In my recent consideration of protons as Ampère current loops, I chose to make a variation on this. My arrangement is built around the long-range relationship between the inner cube and the outer dodecahedron. The cube in my configuration, is oriented so as to align itself with one of the five possible cubes whose 12 edges can be inscribed within the 12 faces of the dodecahedron. In that case, the cube's vertices align with 8 of the 20 dodecahedral vertices, and the latter are designated a polarity such that the relationship to the nearest underlying cubic vertex is attractive.

This arrangement of the cube determines that the octahedron, unlike in Moon's arrangement, is fitted such that its 6 vertices sit at the midpoints of 6 of the 30 edges of the icosahedron. It will then be seen that the polarities can be assigned, such that each of the 6 octahedral vertices are held in place by 4 nearby vertices of opposing polarity, two of these are the nearest adjacent vertices of the icosahedron, and two are the nearest adjacent vertices of the dodecahedron, which lie on an axis per-

Figure 10
MAGNETIC STRENGTH
AROUND A WEBER
'MOLECULAR
AGGREGATE'

The circles represent the magnetic strength around Weber's "molecular aggregate" of two protons, and form a double, exponential, pseudosphere-like solid of rotation.



pendicular to the just-mentioned icosahedral pair. (A three-dimensional model makes this very clear).

In such a fashion, the completed structure of four nested solids achieves a stability, based on the multiple connectivity of magnetic pole relationships ranging from inner cube to outer dodecahedron, which each of the figures by themselves (the cube excepted), would not possess. The criterion of stability rests entirely upon two features: the hypothesis of the magnetic molecule first asserted by Ampère, and the geometric properties inherent in the structure. It will be seen however, that despite this pretty stability, more problems arise in considering such a structure as a model for the nucleus.

1.1a The Problem of Doubling

On the assumption that each of the above described rings corresponds to a single charged particle, the entire construction so far results in only half the necessary charges. As the relative abundancies and many other properties indicate, nature favors the even-numbered elements. The fact that the nuclear dipole and quadrupole moments measure zero for all even-numbered elements, has suggested that there is a pairing of charges in the nucleus.

It is easy to imagine each of the current rings we have constructed as pairing, with one rotating in the opposite sense to the other, thus eliminating the magnetic polarity of every other element. However, such a solution would eliminate the original basis for the construction, which was to provide a reason, in the laws of electrodynamics, for

the nested arrangement of the Moon model.

One might overcome this drawback simply by supposing that each ring is capable of carrying two charges rotating in the same direction, thus doubling its magnetic strength. However, in such a case the even-numbered elements would no longer be magnetically neutral. I have not given up this possibility, because the cause of the measured nuclear dipole magnetic moment may not correspond with the magnetism that results from this putative variation on the Moon model. However, in the course of contemplating the problem, another variation occurred to me, which I will now describe.

1.2 PROTONS CONSIDERED AS OSCILLATING WEBER PAIRS

Wilhelm Weber's "Sixth Memoir of 1871"⁴ is, in part, a response to an ideologically based criticism by Hermann Helmholtz, charging that Weber's Fundamental Law of Electrical Force violates the principle of conservation of energy. Weber's reply was so thorough and devastating that James Clerk Maxwell was forced to withdraw his earlier support for Helmholtz on this matter. But the piece is far more than a refutation of Helmholtz's insistent carping. It is one of the few truly revolutionary documents of theoretical physics. In the course of development of the "Memoir," Weber derives from his Fundamental Law of Electrical Force a *critical length*, below which the repulsion of like particles is reversed. The so-called "Coulomb barrier" is overcome, and the particles, rather than repelling each other, experience an attraction.

In exploring the possibilities of motion of electrical particles as a consequence of this law, Weber recognizes two cases in which *molecular states of aggregation* of particle pairs may lawfully occur. In one such state, two particles of unlike charge may rotate around one another. Supposing, as he does, that one of the charged particles is considerably heavier than the other, the representation corresponds to the view of the hydrogen atom, not generally accepted until half a century later (and based on far less firm foundation). Weber describes this state of aggregation of two dissimilarly charged particles as representing an *Ampèrian molecular current*.

This conception forms the basis for his attempt to construct the periodic table on the basis of the laws of electrodynamics as hinted at in the "Sixth Memoir," (Section 16. Applicability to Chemical Atomic Groups), and later developed in his last memoir *Determinations of Electrodynamical Measure: particularly in respect to the Connection of the Fundamental Laws of Elec-*

*tricity with the Law of Gravitation.*⁵

There also exists a second molecular state of aggregation, according to Weber. In this case, two *like* particles will form an oscillating pair, containing themselves within the bounds of the critical minimal length. According to Weber's derivation, the two particles, starting from a distance of separation just below the critical length, accelerate towards each other on a straight line, pass one another at a maximal velocity, then decelerate to zero velocity as they reach the boundary point of the critical minimal length, at which point the process repeats itself. (It seems necessary that the two material particles literally pass through one another, a difficulty which is overcome by use of Louis deBroglie's conception of particle-wave.)

1.3 APPLICATION TO THE MOON MODEL

I have imagined this latter derivation of Weber's to be the state of aggregation of proton pairs, whose straight-line trajectories are aligned along the diagonal axes of the nested Platonic solids of the Moon nuclear model. Thus, the oscillating pairs orient in the same direction as the magnetic dipoles of the previously examined hypothesis. In this case, the orientation of the pairs would not appear to be guided by the least-action configurations of magnetic poles which we constructed in the first case. One would rather have to assume that the arrangement expresses an underlying spatial geometry, or results from some other cause not yet adduced.

We may also briefly consider the trajectory of an extra-nuclear electron guided by a Weber pair of oscillating protons. A moving charge produces a magnetic effect in the shape of a circle in a plane perpendicular to the direction of its motion. The strength of the magnetic effect is proportional to the velocity of the charge. Let us picture the magnetic effect by allowing the radius of a surrounding circle to designate its strength at that point in the charge's trajectory.

In the Weber molecular aggregate, the two charges are accelerating towards the centerpoint where they meet. Thus, an axial cross-section of the surrounding circles would show an exponential curve increasing from

both ends towards the center (Figure 10). It would look much like an axial slice of a pseudosphere. An extranuclear electron moving in this field would tend to circle the axis of the proton pair, and at the same time be carried along the axis by the motion of the proton, the resultant being a spiral path. One would expect that an electron pair would follow opposing spiral trajectories around this pseudosphere-like object, guided by the frequency of oscillation of the paired protons.

The motion of the electron, itself a charged particle, along this trajectory would now produce a magnetic dipole aligned with the axis of the proton pair. That weaker dipole, created as an effect of the motion of the extra-nuclear electron, would have precisely the same alignment as that produced under the first conception (of the Ampère magnetic molecule) and might thus be thought of as providing the structure to the nucleus.

Yet, the continued stability of the nucleus under condition of being stripped of the extra-nuclear charge (ionization) casts doubt on such a construction. It were possible, however, to imagine the just-described trajectories as being those of the nuclear electrons. While these are now usually conceived as bound with a positive charge into a small sphere (the neutron), it were possible to explore other, more probable configurations. The strict, but as yet unexplained, determination of the isotope variations by addition of neutrons, suggests that the neutron must be a *necessary* part of the nuclear structure, not an arbitrary addition. Such explorations remain to be carried out.

Notes

1. Laurence Hecht, "The Geometric Basis for the Periodicity of the Elements," *21st Century*, May-June 1988, p. 18.
Interview with Dr. Robert J. Moon (in two parts), *Executive Intelligence Review*, Oct. 30, 1987, p.31 and Nov. 6, 1987, p. 18.
2. William D. Harkins and R.E. Hall, "The Periodic System and the Properties of the Elements," *J. Amer. Chem. Soc.*, Vol. 38, No. 2 (Feb. 1916), p. 169.
3. Hecht, *op. cit.*, pp. 25ff.
4. In English as, "Electrodynamical Measurements—Sixth Memoir, relating specially to the Principle of Conservation of Energy," *Philosophical Magazine*, S.4. Vol. 43 No. 283, Jan. 1872.
5. Unpublished English translation by George Gregory in *21st Century* archive.

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The Geometry of the Nucleus (May-June 1988)

'Mysterium Microscopicum':
The Geometric Basis for the
Periodicity of the Elements
Laurence Hecht

Space Must Be Quantized
Dr. Robert J. Moon

The Atomic Science Textbooks Don't Teach (Fall 1996)

An Introduction to 'The Significance
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Fight Starts to Reverse Electricity Deregulation

During Fall 2000, citizens in the city of San Diego got their first taste of the consequences of deregulating the electric utility industry. When temperatures soared, so did demand—and so did the price for electricity that the local utility had to pay to wholesalers to keep the lights (and air conditioners) on.

By the end of July, customers were receiving bills that were double those they had paid the year before. At press conferences and town meetings, local elected officials and consumer advocates advised customers not to pay their exorbitant bills. State legislators pushed for reversing the 1996 law that had started the state down the road of restructuring the California power industry.

By September, it had been decided that San Diego Gas & Electric would reimburse consumers for the inflated bills. But the utility had been forced to lay out the extra millions months before, to pay megacompanies, such as Duke, Southern, Dynegy, and AES—none of which is headquartered in California—prices that were nearly *two orders of magnitude* higher than those of two months earlier.

It did not cost any more to generate electricity this year than last, but on the hottest days, prices soared from a normal \$30 to \$60 per megawatt-hour to more than \$1,500 per megawatt-hour. The price charged by the producers was extortion: the local utilities had the choice to buy it—or to turn the lights off.

There were accusations that the supply companies were “gaming” the market, withholding power resources until the price went up higher and higher. There have been questions raised about collusion and price fixing among the various energy conglomerates. Investigations are now under way by the state of California, the FBI, and the Federal Energy Regulatory Commission.

All this could have been avoided if the people making such important



by Marsha Freeman

policy decisions had studied history.

Contrary to the propaganda from the large energy conglomerates, and their spokesmen in Congress, there was never any truth to the promise that removing government regulation from the electric utility industry would lower prices to consumers.

There has been a shortage of generating and transmission capacity in the industry for the past half decade. It was not visible until this summer, because summer and winter weather has been mild, in most parts of the nation. As soon as demand increased, overnight, it became a seller's market in the deregulated San Diego region, and the suppliers took maximum advantage.

Why Electricity Was Regulated

A similar situation existed at the dawn of the industry. Before the regulation instituted in the 1930s, Wall Street financiers and get-rich-quick speculators controlled the electric utilities, and used this economic resource base for pyramiding and other financial scams. Utilities went bankrupt, leaving consumers with no power.

The companies wanted only to provide power where it could be sold for a premium, at the lowest cost to them, to make the highest profit. Providing service to farmers, rural residents, and the disadvantaged was out of the question; it was unprofitable.

It became clear to President Franklin Roosevelt that electricity was becoming not a luxury, but a neces-

sity, and that as a segment of critical economic infrastructure, electricity could not be left to the financial manipulations of the private sector.

Unlike many other countries, the United States did not make the electric utilities part of a government-owned system. The utilities remained investor owned, but were tightly regulated on both a federal and state level. The utilities had a responsibility to provide reliable, affordable service, for which they were guaranteed a sensible return on their investment in new capacity by the state.

And where private industry would not provide service, the government did, through the Rural Electrification Administration, and the Tennessee Valley Authority. These policies led to the development of a continent-wide electric grid system available to virtually every citizen.

Throw Out the Snake Oil Salesman

If the system worked well, and the consequences of an unregulated industry were known, why have 25 states passed legislation to deregulate?

Middle-man marketers, such as the George Bush-allied Enron Corporation, based in Houston, promised states that if there were “competition,” and many suppliers available, instead of the monopoly utility sanctioned by the regulators, prices would automatically come down.

This summer, other states considering the deregulation of their electric utility, began to fear what became known as the “California effect.” Many have slowed down their efforts, and in some states, such as Nevada, legislative initiatives to reverse the deregulation law are under way.

The lesson for other states, if they want to keep the lights on: Follow the example of California, and fight to reverse electricity deregulation.

Marsha Freeman is an Associate Editor of 21st Century, and has covered the electricity industry since the 1970s. Her full report on the situation appeared in Executive Intelligence Review Aug. 18, 2000, pp. 18-28.



Randy Montoya/Sandia

Sandia researcher Bill Wampler places a graphite sample that has been exposed to divertor plasma in a chamber for ion-beam analysis to measure the erosion.

FUSION TEAM FINDS WAY TO KEEP PLASMA FROM ERODING TOKAMAK WALL

A team of researchers has discovered a way to keep the 100-million-degree plasma inside a tokamak fusion energy device from eroding the divertor walls, where the material surfaces are in direct contact with the hot plasma. Controlled thermonuclear fusion produces energy of very high heat, using the energy-releasing nuclear reaction by which isotopes of hydrogen or other light elements join together, or fuse, into a heavier element. In the tokamak, the extremely hot, ionized plasma is contained within a torus shape by high-strength magnetic fields. Once mastered, fusion will be a source of almost unlimited energy for mankind, drawing on the boundless sources of heavy hydrogen in seawater, and other abundant sources.

Researchers from Sandia National Laboratories, General Atomics, and the University of California at San Diego, used the DIII-D tokamak machine at General Atomics in San Diego, and the Divertor Materials Evaluation System (DiMes) to conduct the experiments. By injecting deuterium gas into the plasma near the divertor walls, they were able to cool the nearby plasma without significantly cooling the core plasma in the main chamber. The cooled plasma detaches from the divertor walls, reducing the energy of particles impinging on the divertor surface. Graphite cylinders and various metal films exposed to the divertor plasmas showed no erosion when the new technique was used.

PLACEBOS RULED UNETHICAL—BUT U.S. MAY KEEP USING THEM

Meeting in Scotland, representatives of 45 countries amended the Helsinki Declaration on medical ethics, Oct. 7, to state that the use of placebos in medical studies, is unethical in nearly all experiments involving diseases for which good treatments already exist. But the United States may not go along. The decision means that the control group in the "double-blind" studies used to determine efficacy of new treatments, must be treated for their ailment, using the best already-established treatment, rather than being left untreated, as they are at present here. According to a report by David Brown in the *Washington Post*, Oct. 8, the United States may not go along with this change, although the American Medical Association subscribes to the Helsinki Declaration, and it is the common-law doctrine of U.S. physicians.

The possibility of a U.S. refusal, demonstrates that here, more than in any other country, a belief in statistical mumbo-jumbo has replaced a scientific understanding of causality. It is obvious to any sane person, that no experiment gives a physician the right to deny effective treatment to a patient ("All this, I do for the benefit of the patient," says the Hippocratic Oath.) But, PC statistical routines, which are used in place of science to evaluate new drugs, are all set up to use placebos. Since many of the so-called medical scientists who use these programs have no idea how they work, they don't know how to change their experiments, to conform to the new Helsinki Declaration. Will a large ratio of the participants in U.S. medical studies, be denied available treatments for their ailments, simply because "it's not in the computer"?

WELFARE FOR LAB RATS MAY BE DELAYED BY AG APPROPRIATIONS BILL

Although a Federal District Court judge ruled Oct. 6 that rats, mice, and birds, will have to be covered by the 1966 Federal Animal Welfare Act, a rider inserted into the agricultural appropriations bill would postpone implementation for a year. Animal rights groups and antivivisectionists sued the Department of Agriculture last year to force it to apply the existing Act to smaller lab animals. The Act mandates minimum standards for housing and care of animals, such as cage size. The care of rats, mice, and birds used in research is already covered by U.S. Public Health Service and other rules that govern federally funded research.

"This rulemaking would only result in a major regulatory burden for the research community, slowing or even halting promising research at a time when so many cures are within our reach," said Frankie Trull, President of the National Association for Biomedical Research. "To suddenly cripple the biomedical community with redundant rules at this time is tantamount to dashing the hopes of millions of patients and their families suffering from devastating diseases and injuries."



"Life sure is better here than on the outside."

BEST MEASURED GLACIER IN NORTH AMERICA EXPANDING SINCE 1931

The Nisqually Glacier on Mount Rainier, near Tacoma, Washington, has been thickening and advancing since 1931, following a 1-kilometer retreat that took place from the end of the last Little Ice Age in the mid-1800s, to the 1920s. Continued recent thickening causes specialists from the U.S. Geological Survey (USGS) to expect further glacier advance in the first decade of the 21st century. The 14,410-foot Mt. Rainier has 26 glaciers, and is the greatest single-peak system in the United States.

In 1931, fearful that the receding glacier would provide insufficient runoff for their newly completed hydroelectric facility, Tacoma City Light began careful measurements of the glacier. Annual to semi-annual measurements, which were continued by the USGS and other agencies provide the longest continuous series of glacier measurements in North America.

"The greatest thickening during the period of measurement occurred between 1931 and 1945, when the glacier thickened by about 50 percent near 2,800 m of altitude. This and subsequent thickenings during the mid-1970s to mid-1980s produced waves that advanced its terminus. Glacier thinning occurred during intervening periods. Between 1994 and 1997, the glacier thickened by 17 meters at 2,800 m altitude, indicating probable glacier advance during the first decade of the 21st century," according to a report by government geologists, which appeared in *Washington Geology* (Sept. 2000).

The report of glacial advance on Mt. Rainier is consistent with observations of cooling trends made by field geologist Jack Sauers in other parts of the Cascade Mountain range, and with data collated from across the Northern Hemisphere (see *21st Century*, Winter 1997-1998), suggesting a new Ice Age.

FRANCE INTENDS TO STAY NUCLEAR, AND PURSUE FUSION

A major study compiled for French Prime Minister Lionel Jospin has concluded that existing nuclear power stations will retain their cost advantage over gas-fired plants, and that nuclear energy is likely to retain its economic edge when new power plants are built. Today about three quarters of France's electricity is produced in nuclear power plants.

The report is available in French on the Internet at www.plan.gov.fr.

At the July 11 meeting of the Consultative European Committee on Fusion in Brussels, the French delegate announced that France is offering a site for the location of the proposed International Thermonuclear Experimental Reactor (ITER). This project involves the participation of Russia and Japan in addition to Europe. The United States pulled out a couple of years ago, after drastic cuts in the fusion energy research budget. Sites have also been offered by Japan and Canada.

STEVE DEAN PRESENTED WITH DEPARTMENT OF ENERGY AWARD (FINALLY)

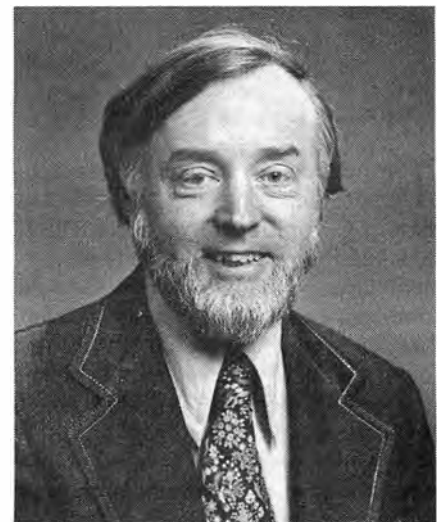
Dr. Stephen Dean, founder and president of Fusion Power Associates, has received the Distinguished Associates Award, one of the highest awards given by the U.S. Department of Energy. The award, dated July 2000, was presented "for your contributions to the fusion program over the past 20 years in your role as co-founder and President of Fusion Power Associates . . . tireless work in bringing diverse components of the fusion community together for topical meetings, and your efforts to increase public awareness and understanding of the potential benefits of fusion. . . ."

The award might also have recognized Dr. Dean for his 20 years of work in nuclear and fusion research, before founding Fusion Power Associates, and his tireless, nonpartisan efforts to bring squabbling groups within the fusion community together. *21st Century* also recognizes Dr. Dean for his past 25 years of work with the Fusion Energy Foundation (FEF) and this magazine, his presentations at conferences and meetings, and his testimony to federal court after the Foundation was illegally put into involuntary bankruptcy in 1987 (a case the the FEF subsequently won).



Patrick Pringle/Wash. Dept. of Natural Resources, Div. of Geology

The advancing glacier: A view to the north of the Nisqually glacier.



Steve Dean: A tireless worker for fusion.

PROGRAMMED TO KILL

Video Games, Drugs, and The 'New Violence'

by Michele Steinberg



Cloret Richardson/EIRNS

The murders of 13 students and teachers at Columbine High School in Littleton, Colorado on April 20, 1999, shocked the world. These acts of murder by two young men from well-to-do families, who cold-bloodedly shot fellow students and teachers, and then killed themselves, caused a wave of fear and soul-searching, to ripple throughout America.

Yet Littleton was only the most notorious of at least eight similar such incidents carried out by child killers, "Manchurian Children," who learned

their deadly skills from video games, and their scenarios from Hollywood. The brutal acts of these children exemplify a new phenomena in the world. It is the "New Violence," as Democratic Presidential pre-candidate Lyndon LaRouche was the first to precisely characterize it at the time (see box, p. 18). It is the use of Nintendo-style games, and related means, to transform young children and adolescents, as well as law-enforcement personnel into "Samurai"-style programmed killers.

The child-killers we have seen so far

Video games and video violence: an unregulated industry that deliberately addicts children, turns some of them into killers, and piously defends its First Amendment rights. Here, a Pokémon tournament in Massachusetts.

are only the first of what will be many more Nintendo killers—if we fail to recognize and stop the phenomenon. There is a pattern, certain features which are common to all of these cases in the United States:

- Moses Lake, Washington, February, 1996;
- Pearl, Mississippi, October, 1997;
- Paducah, Kentucky, December, 1997;
- Jonesboro, Arkansas, March, 1998;
- Springfield, Oregon, May 21, 1998;
- Littleton, Colorado, April, 1999

In each of these cases, satanism, nihilism, and a fascination with violence and destruction figure prominently. In several of the more notorious cases, addiction to video games, and to nihilistic and graphically violent movies (such as Oliver Stone's "Natural Born Killers") were major components of the lives of these children. There is also the disturbing fact that three of the school shooters—Eric Harris of Littleton, Kip Kinkel, and Thomas J. Solomon—were among the more than 6 million children in the United States who are taking mind-altering drugs prescribed as a treatment. It may well be that the children on Ritalin, on Prozac, Luvox, and other psychiatric drugs, are walking human time bombs.

Nintendo Killers

The very same video games which were originally designed to train soldiers to kill, are those being mass marketed today—to children! This is the shocking fact documented by Lt. Colonel David Grossman, an Army psychologist who has specialized in the training of troops for combat. Grossman, who wrote the authoritative book on deadly force, *On Killing: The Psychological Cost of Learning to Kill in War and Society*, has identified the essential part played by video-games in desensitizing human beings to hurting, injuring, and even killing others. *On*

Killing was published in 1996, long before Littleton, but Grossman updated his study in the 1999 book called, *Stop Teaching Our Kids to Kill*, co-authored with Gloria DeGaetano.

In a particularly powerful chapter, "Feel Something When You Kill," the authors reveal that the very "operant-conditioning techniques" used by the military and police agencies in training their troops to kill without compunction, are the basis for the increasingly lucrative point-and-shoot video-game "industry."

"There are three things you need in order to shoot and kill effectively and efficiently," Grossman and DeGaetano write. "From a soldier in Vietnam to an eleven-year-old in Jonesboro, anyone who does not have all three will essentially fail in any endeavor to kill. First, you need a gun. Next you need the skill to hit a target with that gun. And finally you need the will to use that gun. . . . [T]he military knows that the killing simulator takes care of two out of three by nurturing both the skill and the will to kill a fellow human being. . . ."

The authors continue, "Today soldiers learn to fire at realistic, man-shaped silhouettes that pop up in their field of vision. This 'simulated' human being is the conditioning stimulus. The trainee has only a split second to engage the target. The conditioned response is to shoot the target, and then it drops. Stimulus-response, stimulus-response, stimulus-response—soldiers and police officers experience hundreds of repetitions of this. Later, when they're out on the battlefield or walking a beat and someone pops up with a gun, reflexively they will shoot, and shoot to kill."

The authors' punch line is this:

"Now these simulators are in our homes and arcades—in the form of violent video games! If you don't believe us, you should know that one of the most effective and widely used simulators developed by the United States Army in recent years, MACS (Multipurpose Arcade Combat Simulator), is nothing more than a modified Super Nintendo game (in fact, it closely resembles the popular game *Duck Hunt*. . . .) The Fire Arms Training Simulator (FATS), a training program used by most law enforcement agencies in this country, is more or less identical to the ultra-violent video arcade game *Time Crisis*.

No Isolated Case

In February 2000, two incidents came to the fore that made clear that Grossman was right, and that Littleton was no isolated case.

The first incident was the acquittal of four New York City policemen who had killed an unarmed African man, Amadou Diallo. About a year earlier, on Feb. 4, 1999, West African immigrant Diallo—a devout Muslim, 22-years old, with no criminal record—was gunned down without provocation by four policemen in New York City.

The four officers from the "Street Crimes Unit," shot Diallo in the vestibule of his building about 12:40 a.m., as he was arriving home. He was unarmed, and offered no resistance. The police officers, who had been driving by in their car, noticed Diallo as he was entering his home. They stated that they believed that he was acting suspiciously. They were not wearing uniforms. One officer pulled out his badge, and said, "We'd like to have a word with you." Diallo continued to enter the vestibule of his building. At some point, he pulled out his wallet, apparently in an attempt to identify himself. According to testimony from the four policemen-defendants, one officer yelled, "Gun!" Forty-one bullets were fired in five seconds, nineteen of them hitting their target. Within minutes, Amadou Diallo was dead.

The officers were later acquitted of murder, setting off a wave of national

protests. They had not violated departmental rules concerning the use of deadly force. They had reacted as they were trained to react when they perceived a threat—even if the threat did not exist. They had become Nintendo Killers.

The second incident was the killing of a six-year-old girl in Flint, Michigan by her six-year-old classmate, a African-American boy, who was living at a crack house—without even a bed to sleep on—because his uncle who lived there, was the only available adult to "watch over" him. The boy killed his classmate with one deadly shot from the gun he had stolen from the uncle. He had never fired a gun before. But he had played point-and-shoot video games.

A Strategy to Defeat the 'New Violence'

The only national leader to identify the nature of the crisis and to pose a solution, was economist and then-candidate for the Democratic Presidential nomination, Lyndon H. LaRouche.

On March 3, in a dialogue with Hispanic-American leaders, LaRouche said: "We're getting killings which are caused by the use of Nintendo-style games, such as the game Pokémon, with children, and also with police and others. In the case of the Diallo shooting, the problem was that the Mayor of New York, like many other officials, has been training the police force in Nintendo-style killing techniques. . . . So we have Nintendo-killers.



Stuart Lewis/EIRNS

The National Commission Against the New Violence, initiated by Lyndon LaRouche, held a series of fact-finding meetings around the country this year. Here, the Commission meets in Washington, D.C., June 2, 2000. At the podium is U.S. Marshal Mathew Fogg. The author is second from right.

What Is the 'New Violence'?

This policy memorandum was written on April 26, 2000, by Lyndon H. LaRouche, Jr., then a candidate for the Democratic presidential nomination, for the use of LaRouche's Committee for a New Bretton Woods (LBW). It was adopted by the Commission Against the New Violence As Its founding principles.

* * *

1. The term "New Violence," as employed by LBW, signifies, chiefly, the introduction of new methods, those of Nintendo games and related means, to transform young children and adolescents, as well as law-enforcement personnel, into "Samurai"-style programmed killers. The term "New Violence" will be used in LBW proceedings solely to identify forms of violence which feature this distinctly new element. Old forms of violence will be included in this classification only when the role of Nintendo-style games and related means is a characteristic feature of the problem being considered in the study and report.

E.g., the classification of "New Violence," as distinct from new revivals of old forms of violence, will be included, only in such cases as the revival of old-style lynching conducted by law-enforcement agents, that only insofar as it is congruent with the pattern typified by the activities of Mayor Rudolph Giuliani's special teams of "Nintendo Cops" in New York City.

By "New Violence," we emphasize the Littleton-Columbine model, in which Nintendo-style games and related methods and means was a crucial, distinguishing feature. We include the use of related methods and objectives in the training and deployment of law-enforcement agents, or analogous instances. We must do this to avoid ruining the results of the investigation by fallacy of composition.

2. The standpoint of comparison used to aid in conceptualizing the common characteristics of this "New

Violence," is the utopian programs, such as H.G. Wells's *The Open Conspiracy*,

Wells-Russell protégé Aldous Huxley's utopian "New Age" models, the 1931 and 1951 models set forth by Bertrand Russell, and *Clockwork Orange*, as points of intellectual reference. What is specifically new, is the adaptation of the mythos of the Samurai warrior, and related "martial arts" mythology, combined with lunatic legacies such as *Dungeons and Dragons* and Tolkien's *Lord of the Rings*, to the childish mad-killer pornography of cinematic cartoons and Nintendo-style games. The use of this method and its derivatives, for the purpose of programmed conditioning of military, law enforcement teams, and for indoctrinating children in a programmed impulse for terrorist forms of violence, is adequately understood only when such Nintendo-game-style conditioning is situated within the utopian doctrine of Russell's relevant 1931 and 1951 writings on the required methods of population control to realize his own and H.G. Wells' oligarchical utopian ends.

3. A crucial feature of a clean inquiry, is to recognize the fraud implicit (or actually intended) in the use of any hysterical "gun-law reform" diversionary effort, to cover up for the crucial role of the popular mass-media, and firms such as Hasbro, in mass brainwashing of children to become, even as young children, programmed agents of blind-terrorist modes of mass-murder by means which do not depend in any characteristic fashion on firearms.

4. A most important feature of the inquiry, is to recognize the lessons to be learned from the role of "bread and circuses" in manipulating the population of ancient Rome into the pathological state of mind aimed at by the design of Nintendo-style games and related "New Age" tactics today.

". . . We are producing zombies from our students, by this means, and by the use of Ritalin and other dangerous drugs in classrooms, to try to control student populations.

". . . I'm determined to do everything I can, with my campaign and in other ways, to deal with this problem. . . [W]e are faced with a kind of violence this nation can not survive. . . it has almost the highest priority, among all world issues. . . ."

LaRouche called for the creation of a commission—a standing body of citizen leaders—against what he described as the "New Violence." After a highly successful, and animated town meeting, which was broadcast via the Internet over LaRouche's Democratic Party Presidential campaign website last April, LaRouche issued a document defining the New Violence. On May 8, 2000, the National Commission Against the New Violence was founded, and LaRouche's document was adopted as its founding principles.

In three town meetings, and several private workshops, participants in the discussions of the National Commission Against the New Violence have determined that there is nothing accidental about the new violence sweeping America, in which children are killing each other, killing their parents, and killing themselves. Killer kids are *created* using Nintendo techniques. Animated violence is a multibillion-dollar business, and its promotion is *deliberate*.

In a presentation to a national conference of the Schiller Institute, Feb. 20, 2000, Helga Zepp LaRouche, LaRouche's wife and founder of the Institute, addressed the issue in detail. Her speech, titled "The Mark of the Beast: America's Children Are in Mortal Danger," zeroed in on Pokémon, to which children as young as two or three become addicted. She documented how Pokémon has been underestimated as a trigger for violence, and an instrument for desensitizing children to violence.

Video Industry Sued

A month later, the U.S. Senate Committee on Commerce, Science, and Transportation held hearings on the crisis, and Sabrina Steger, a pediatric nurse, testified on video games and violence. Steger is not just any witness. She's the mother of Kayce Steger, one of three students killed at Heath High School in Paducah, Ky., on Dec. 1, 1997, by 14-year-

old Michael Carneal. As Steger said, "I am the person you do not want to be. I live a parent's worst nightmare. . . ."

Steger is also suing the top names of the violence "industry." She is a plaintiff in the suit against the makers, designers, and distributors of the killer video games that Carneal used.

Steger explained to the Senate: "Eight shots fired—eight children hit in the upper chest, neck, or head. Kayce, Jessica, and Nicole died that day. . . . We believe the Heath shooter was influenced by the movies he watched, the video games he played, and the Internet sites he used.

"One of the first indicators of media influence is that none of his shots missed. . . . [We] know of only one time prior that the killer practiced with the gun he used to commit murder. A recent case in the news involved a man shot at close range by police officers [the New York case of Amadou Diallo]. Of the 41 shots they fired, 19 hit the victim. Less than *half* of the shots fired by trained policemen hit their target, but 100 percent of those fired by a teenager hit students in the 'kill zone.' The fact that the shooter used the most effective methods of shooting, one shot per victim . . . is also a learned skill."

A day later, on March 22, ABC-TV's news magazine "20/20" aired a 15-minute segment featuring Jack Thompson, the attorney for Steger and other Paducah parents in their suit. Also featured is Lt. Col. David Grossman, Army Psychologist, who proves the role of the video games in training killers, and desensitizing the users to violence.

The "20/20" segment also showed that the video games industry is counterattacking—using the FBI as their defense! Interviewed on the show, the current (unnamed) Chief Executive Officer of id Software, makers of *Doom* and *Quake*, had a ready-made line: FBI statistics allegedly show that violent crime has "fallen" for the past nine years, while the video game industry has grown to a \$7-billion-a-year enterprise, even bigger than the movies. "20/20" and id Software's CEO insist that it's a right of "free speech" to make products as violent as the user "wants." Their "free speech" argument is the same one used by advocates of drug legalization.

Ban 'Point-Shoot' Games

In an April 2000 interview with *Executive Intelligence Review* magazine, attorney Thompson asserted that the violence associated with the "point-shoot" video games is *not* a free speech issue, and that it *can be stopped*. Instead of more conferences to "discuss" the violence, he said, the President could simply direct the Product Safety Commission to ban them *because they are dangerous*.

In May 1999, within weeks of the Littleton massacre, *Executive Intelligence Review* (EIR) magazine published a grisly report on the violent video games that are turning children into programmed killers. Drawing on the expertise of individuals such as Lt. Col. David Grossman, the report exposed that the fact that video games are specifically used by the "utopian" faction in the U.S. military to desensitize individuals to violence and killing, and that they serve as murder simulators in training programs.

EIR's lead in exposing the video industry—just one branch of the Holly-



Courtesy of Craig Shirley & Associates

Lt. Col. David Grossman (ret.): People who say you can't prove that the media violence is connected to violent crime are "like people who deny that the Holocaust happened."



These macabre images of video games are from advertisements in Computer Gaming World. "They are using intense manipulation of screen imagery, colors, rapid-fire imagery changes, in order to make this a powerfully addictive substance for children. At the heart of the addictive substances, is the violence," says Col. Grossman.

wood violence empire—was followed a year later by several significant initiatives by the Federal Trade Commission, and by leading public health professional associations, to make public the video violence and its causal connection to aggressive behavior. These initiatives may be the basis, finally, for outlawing the video game murder simulators.

On July 26, 2000, leaders of the American Psychological Association, the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, and the American Medical Association issued a "Joint Statement on the Impact of Entertainment Violence on Children" which said:

"At this time, well over 1,000 studies—including reports from the Surgeon General's office, the National Institute of Mental Health, and numerous studies conducted by leading figures within our medical and public health organizations—our own members—point overwhelmingly to a causal connection between media violence and aggressive behavior in some children." The statement noted that this is the conclusion of the public health community, based on more than 30 years of research.

One of the studies referenced, appears in the April 2000 issue of the *Journal of Personality and Social Behavior*. It is titled "Video Games and Aggressive Thoughts, Feelings, and Behavior in the Laboratory and in Life," by Dr. Craig A. Anderson from the Iowa State University of Science and Technology, and Dr. Karen E. Dill from Lenoir-Rhyne College.

The two studies described in the article say that playing violent video games such as *Doom*, *Wolfenstein 3D*, or *Mortal Kombat*, can increase aggressive thoughts, feelings, and behavior both in laboratory setting and in actual life.

The violent video games present a "unique danger," the authors note, for three reasons: first, because the player identifies with the aggressor; and, in fact, in "first person" video games, assumes the identity of the "hero." Second, because of the "active participation" of the player in choosing, often again and again, to act in an aggressive and violent manner. And third, because the games are "addictive," providing a "perfect paradigm for the induction of 'addictive' behavior."



A typical fun scene from a Pokémon comic book. The text reads, "Dream Eater. The gas Pokémon's most effective attack, it sucks out the opponent's soul."

The cumulative effect of early years of TV, pounding away at the child's brain, make impossible for these children to adjust to the slower pace of the teacher in school. And, Grossman says: "when they're whacked-out, we drug'em. And the

result is horror."

Drugging Babies

It is well known that many of the student killers were being prescribed mind-altering psychiatric drugs. T.J. Solomon, the 15-year-old from Conyers, Ga., who shot six classmates in May 1999, was on Ritalin; Eric Harris, 18, one of the two Columbine killers, was being prescribed the anti-depressant Luvox; and Kip Kinkel, the 15-year-old from Springfield, Ore., who killed both his parents and two schoolmates, and wounded 20 other students in May 1998, was taking Prozac, one of the most widely prescribed drugs.

Of more than 6 million children under 18 in America who have been prescribed Ritalin, Luvox, Prozac, Paxil, and other anti-depressants and psychiatric drugs, many have committed violent acts, even killings. Many others are walking time-bombs. *U.S. News & World Report*, March 6, 2000, documented some lesser known cases:

- In California, 16-year-old Jared Viktor was convicted of murder for stabbing his grandmother 61 times. Ten days earlier, Jared had been prescribed the anti-depressant Paxil, for pre-existing problems.

- In Kansas, 13-year-old Matt Miller committed suicide (he was found hanging in his closet) after taking the anti-depressant Zoloft for a week. The Miller family has sued Pfizer, the manufacturer of Zoloft.

Even more horrible, increasing numbers of infants, toddlers, and pre-school children are being zombified with psychiatric drugs produced for adults, before they can even learn to talk, let

On Sept. 11, 2000, the Federal Trade Commission (FTC) issued a report called "Marketing Violent Entertainment to Children," which reviewed the motion picture, music recording and electronic games industry. The FTC concluded that these industries *deliberately* and *intentionally* market extremely violent material to children as young as six-years old, violating their own "self-regulatory" codes.

Video-Induced Epilepsy

Another study, published in the March issue of *Nature Neuroscience*, reports that Pokémon (a widely popular children's video game, also called "Pocket Monster") is being investigated for links to visually induced epileptic seizures, associated with rapidly-shifting imagery.

The article states, "During a recent showing of the 'Pocket Monster' cartoon in Japan, 685 children experienced epileptic seizures." It says "photosensitive epilepsy" is the most common form of stimulus-induced epilepsy, and its prevalence in children ages 4-14, which is already "substantial . . . is increasing as a result of the proliferation of television display units and video games which may act as triggers."

More than 200 children who suffered epileptic convulsions during the particular Pokémon showing described, in 1997, remained hospitalized for some period of time.

Col. Grossman, the Army psychologist, has suggested that the rapid-fire images of television programs, such as MTV and even "Sesame Street" are, in fact, responsible for the syndrome known as Attention Deficit Disorder.

alone read.

According to an article in the *Journal of the American Medical Association* (JAMA), Feb. 23, 2000 ("Trends in the Prescribing of Psychotropic Medications to Pre-Schoolers"), poor children, especially black children, are prescribed Ritalin (methylphenidate) at younger and younger ages, with the number of prescriptions in two study groups having increased more than 300 percent during 1991-1995.

The anti-depressant Prozac is just as abused; the article says that a psychiatric newsletter, citing marketing data compiled by the Food and Drug Administration in 1994, reported some 3,000 pre-

scriptions for fluoxetine hydrochloride (the generic name for Prozac) written for children younger than one year-old!

The findings, written by a group of doctors from the University of Maryland, Johns Hopkins University, and the Center for Health Research at Kaiser Permanente, in Portland, Ore., were presented in May 1999, at a meeting of the American Psychiatric Association in Washington, D.C. But the dangerous practices haven't stopped.

The team studied ambulatory care prescription records from 1991 to 1995 from two Medicaid programs (a Mid-west state and a Mid-Atlantic state), and

from one HMO in the Northwest. Records were checked for enrollees between two and four years old during those years.

The results should shock the nation: In all three programs, psychotropic medications prescribed for pre-schoolers increased dramatically. The use of methylphenidate increased in all three sites: 3-fold for the Midwest database, 1.7-fold for the Mid-Atlantic group, and 3.1-fold at the HMO. These records involved hundreds of thousands of patients—more than 158,000 enrolled in the Midwestern state, 54,237 in the Mid-Atlantic state, and 19,322 at the HMO.

What Children Are Watching

"Death Can Strike Anyone. For the Right Price.

"You never know when death will come—unless you make a few special arrangements. Because once the Hitman takes your assignment, someone takes a bullet. It's not a righteous way of life, but we all have to make a living. Even if it means making a killing."

This is from the advertisement for the role-playing video game *HITMAN: Codename 47*, in the May 2000 issue of *Computer Gaming World*.

The advertiser for this product, the British firm Eidos, promises the child customer who buys its game, realistic training as a mercenary assassin.

Selling this violent filth is a very lucrative business for its perpetrators, who seldom appear before the public. Yet, the revenue from this sordid enterprise, between \$9 and \$11 billion per year, is now surpassing movie theater ticket sales.

The identity and background of those responsible for this mayhem, if widely known, might cause them considerable trouble. A case in point is Midway Home Entertainment, peddlers of some of the bloodiest violence to children.

In December 1999—seven months after Littleton—the Chicago City Council voted to grant \$2 million to Midway, to keep its corporate headquarters in the city. Although it was reported that Midway publishes *Mortal Kombat*, a game in which a char-

acter may tear out the vital organs of his opponent, the full nature of the company's deadly activity was not known: Midway is one of the biggest retailers of *Doom* and *Quake*, the advanced point-and-shoot "death match" games which have trained the Columbine and other young shooters to kill mindlessly.

Midway's website carries this ad for *Quake*:

"Gun 'em down. . . . Blow 'em to pieces. . . . or DIE!

"• Incorporates the ferocity of the single player game with the supreme bloodlust of the two player Deathmatch. . . ."

"• Realistic explosions echo and reverberate, transporting the player to a hellish, dungeon-like environment. . . ."

The corporate entity known as Midway Games is a legal fiction. It is actually a 1998 "spinoff," and was still housed in April 2000 with its former parent company, WMS Industries. WMS is one of the largest manufacturers of slot machines—the oldest and best-known of the 'addictive' electronic games.

The Top Ten Killers

In a press release Feb. 1, 2000, Midway Games reported the "top ten in killer games," that is, the leading U.S. video-game software companies, as ranked in order of their unit sales:

1. **Nintendo of America, Inc.:** Manufactures *Pokémon*, game-boys, and equipment for satanic video games.

2. **Electronic Arts, Inc.:** Produces

Road Rash, which features a hit and run, criminal assault on police.

3. **Sony Computer Entertainment:** Equipment for satanic video games. Was a defendant in the lawsuit on behalf of the three girls killed by video game addict Michael Carneal, the 14-year-old shooter in Paducah, Kentucky.

4. **Midway Home Entertainment:** *Mortal Kombat*, *Doom*, *Quake*.

5. **THQ, Inc.:** *Summoners*, which deals with evil sorcerers, satanic monsters.

6. **Acclaim Entertainment:** *Hard Core Wrestling* (such as nails in head, strangulation), *Hard Core Revolution*, and *Real F'n Wrestling*.

7. **989 Studios (Sony):** Produces *Everquest*. (In this, followers of the god Cazic-Thule inflict "pain, misery, violence, torture, living sacrifice.")

8. **Activision, Inc.:** *Soldier of Fortune* (assassination, race war).

9. **Namco Ltd.:** *Soul Calibur*. In this, "The Evil Seed is loose, threatens to swallow souls in its chilling wake."

10. **Hasbro Interactive:** Official U.S. distributor of *Pokémon* (abbreviation for "Pocket Monsters"), the killing game designed for toddlers beginning at 2 and 3 years old; *Dungeons and Dragons*, the medieval satanic and magic fantasy game; *Risk II*, a "ruthless quest for world domination. One of the Hasbro Board members is Paul Wolfowitz, the co-head of George W. Bush's team of foreign policy advisors. —Michele Steinberg and Anton Chaitkin

One noticeable pattern is the prevalence of poor children. The Medicaid youth were almost entirely eligible under Aid to Families with Dependent Children (AFDC, the former federal welfare program), and, within the Medicaid groups, "non-whites were over-represented," i.e., a greater number than in the general population.

There is no question that the poorest children are being abused. The article says that in 1998, "Pediatric researchers noted that 57 percent of 223 Michigan Medicaid enrollees aged younger than 4 years with a diagnosis of ADHD [Attention Deficit Hyperactivity Disorder] received at least one psychotropic medication to treat this condition." Methylphenidate was one of the two most prescribed.

These results show a pattern of premeditated medical abuse. At a March 3 press conference, Sen. Chris Dodd, a Connecticut Democrat, addressed the concerns posed by the JAMA article. He showed the warnings printed with every bottle of Ritalin. In large type, one says: "Warning: Ritalin should not be used in children under 6 years, since safety and efficacy in this age group have not been established." A second warning says: "Precautions: long-term effects of Ritalin in children have not been well-established." Yet, because these drugs have been approved for general use, there is no prohibition against giving them to children.

The Challenge

The "New Violence" is a question of national security: Can a nation survive, when the cultural view becomes predominant that man is "just another beast"? In the Roman Empire, gladiators ripped human beings to shreds, while tens of thousands of spectators cheered; today, in the Information Age, this beastliness takes other forms—which there is still time to stop.

Michele Steinberg is on the research staff of Executive Intelligence Review, and is a member of the Commission Against the New Violence.

For Further Reading

- Lt. Col. David Grossman (ret.) and Gloria DeGastano, *Stop Teaching Our Kids to Kill: A Call to Action Against TV, Movie, & Video Game Violence*, 1999. (New York: Random House).
- Helga Zepp LaRouche, "The Mark of the Beast: America's Children Are in Mortal Danger," *Executive Intelligence Review*, March 17, 2000.
- Lyndon H. LaRouche, Jr., "Star Wars and Littleton," *Executive Intelligence Review*, July 2, 1999.

Science Magazine Promotes Nazi Eugenics and The 'Biology' of Violence

by Jeffrey Steinberg

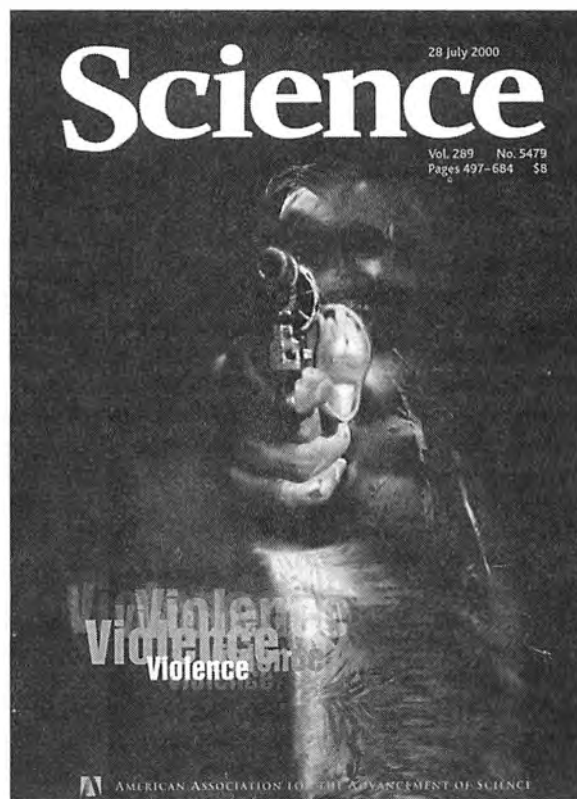
Under the guise of a "scientific" discussion about the roots of the new violence, *Science* magazine devoted a special issue, July 28, 2000, to a revival of racist eugenics, based on the fraudulent argument that human beings are mere animals whose behavior can be genetically determined and, therefore, genetically modified. Not since the heyday of H.G. Wells and Bertrand Russell has such a brazen call for bio-social engineering been put forward in a purported "scientific" publication.

The first sentence in the introduction to the special report, "Violence: No Silver Bullet," gives the "man is beast" argument:

"From the neighborhood bully berating a meek classmate to the rhesus macaque screaming at a rival, displays of aggression are the weapon of choice throughout the animal kingdom for asserting dominance, challenging a higher ranking individual, or laying claim to food, water, and other resources."

The introduction to the series of *Science* news articles complains that "ill formulated comparisons of inner city violence and the 'jungle'—which some saw as equating black youths with monkeys" had "ignited a firestorm of protests" and scared many researchers away from studying the "biology of violence."

Furthermore, one news section



The cover of the special issue of *Science* magazine on violence sported this grisly graphic, although the violence of video games, television, and movies received no mention in the 26-page report.

notes the recent emergence of a militant animal rights movement has scared some bio-scientists away from animal testing of techniques, and "dried up funding." (Ironically, and not mentioned, of course, is that scientists have had no qualms about using such techniques—like electroshock and other forms of torture—on human beings who are diagnosed as violence-prone.)

In addition, *Science* Senior Correspondent Eliot Marshall notes in his news coverage, researchers like Peter Breggin, an independent psychiatrist, have added to the furor by charging that

the widespread dissemination of Prozac and Ritalin to children is part of a "scheme to pacify inner city children with drugs."

The good news, however, according to *Science's* Marshall, is that the horror of the Columbine High School massacre has created a sense of desperation about the "symptoms of a diseased society," and convinced many skeptics that "Deeper knowledge of the biology of violence will help social scientists match violence-prone individuals with intervention programs. . . ."

After reviewing a string of new research protocols into the 'biology of violence,' *Science* News Writer Martin Enserink provides a glimpse into future "treatments" of violence-prone people. He cites the work of Adrian Raine, a British neuropsychologist now at the University of Southern California, who published a recent article in the *Archives of General Psychiatry*, arguing that one biological cause of violence is insufficient glucose metabolism in the prefrontal cortex. *Science* reports:

"[I]f the prefrontal cortex is at fault, says Raine, one future way to intervene may be to implant chips that somehow make up for its reduced function. Already, he notes, some biomedical engineers have predicted that the first electronic brain implants will become a reality within the next decade."

Raine commented to *Science* about the happy prospects of a more advanced kind of "lobotomy": "Forty years ago, we were chopping off the frontal cortex in violent people. In fifty years' time, we'll be doing the opposite. We'll be doing reparative surgery."

Some of the scientists cited by the magazine were not willing to go wholehog down the eugenics path, arguing, instead, that an interplay of factors—genetic and environmental—produced the violence-prone individual. *Science* News Writer Constance Holden notes, in a section titled "The Violence of the Lambs":

"[U]ntil a decade or so ago, most social scientists thought violent individuals were almost invariably the products of an abusive environment. Recent findings, however, reveal that violent

tendencies often show up in infancy, suggesting prenatal roots. Researchers are increasingly coming to view violence as the end result of multiple risk factors that may include a biological vulnerability—either genetic or created in the prenatal environment—that can be brought out or reinforced by the social environment."

Either way, however, the solutions being peddled are the same: drugs, chip implants, behavior modification "therapy," and incarceration.

The Money Angle

While promoting the "new eugenics," *Science* clearly did not wish to cross swords with the Federal Bureau of Investigation and the U.S. Department of Justice, which disburse millions of dollars a year in grant money to bio-researchers plumbing the depths of violence. So, the *Science* special report applauds the successful decline in rates of violent crime in America since the 1991 peak, but seeks, at the same time, to make sure eugenics and similar forms of Nazi-like quack science stay in line for the research funding largesse. (The editorial for this issue of *Science*, in fact, is titled "Violence: A New Frontier for Scientific Research," written by Alfred Blumstein, a director of the National Consortium on Violence Research, which funnels research money to scientists.)

In a section titled "Has America's Tide of Violence Receded for Good," *Science* News Writer Laura Helmuth, comes up with a two-fold explanation for the post-1991 fall in the crime rate, even at the same time that a new breed of "superpredators" were finding their way onto the streets and school yards of America, bringing us such horrors as Littleton.

The first crime-reducing factor she applauds is the skyrocketing rate of incarceration, which quadrupled from 1970 to 1995. But Helmuth notes:

VIOLENCE
NEWS

Searching for the Mark of Cain

Hampered by political, ethical, and methodological problems, a small group of researchers is trying to understand the biological roots of violence—with the ultimate hope of finding a treatment

MIDWINTER MASSACRE—There's a small village in this Boston suburb where the customers are encouraged to overindulge. It's a place where mice get tipsy. A thirsty mouse pokes its nose through a hole, when a scientist takes its order, then it scurries over to a spout a few centimeters away, which immediately dispenses a few drops of an alcohol solution roughly the strength of beer. Mice don't know when to stop. Invariably they scurry back to nip the spout for another round, and so on, until a computer program decides the bar is closed—by which time the rodent has ingested the equivalent of one or two human drinks.

Klaus Miczek, a psychopharmacologist at Tufts University here, wants to know why this binge drinking turns about one in four mice extreme or nasty. Miczek has just put a sober male mouse into a cage with one such inebriated male. The drinker starts chasing the newcomer and attacks it within seconds. The sober mouse retreats its front paws to ward off the teeth of its attacker and signals its submission. But the defensive postures and peace overtures are snuffed: By the time the two are separated 5 minutes later, the drunk has inflicted

studies on the biology of violence (see p. 570). "It used to be a thriving area of research," says Miczek. "But the whole field has been dismissed as irrelevant because of those remarks."

when there are much easier areas of research," adds Adrian Raine, a neuropsychologist at the University of Southern California (USC) in Los Angeles.

Despite these handicaps, the field has generated some interesting findings and hypotheses about how hormones, genes, and the brain control aggressive behavior. Researchers refer to these sets of observations as "genes": There's the serotonin story, the Y chromosome story, the hypothalamus story, and many others. But it's still hard to see how these single, and sometimes controversial, pieces of the puzzle fit together, says behavioral geneticist Stephen Mattson of the University of Connecticut. Stress, and progress is slow. And some are wary that if the field narrows and starts producing new, specific anti-aggression drugs, they could be abused by governments or doctors as a "quick fix" for violence in society, rather than addressing the social and economic problems



Baring its teeth, A rhesus macaque vents its rage.

Further undermining their efforts are addressing the social and economic problems

This raging rhesus macaque appears twice in Science's special report, which emphasizes the magazine's "animal" view of the nature of man.

"Imprisonment alone can't explain the recent drop in violent crime, [University of Chicago economist] Steve Levitt says, because the boom in incarceration started

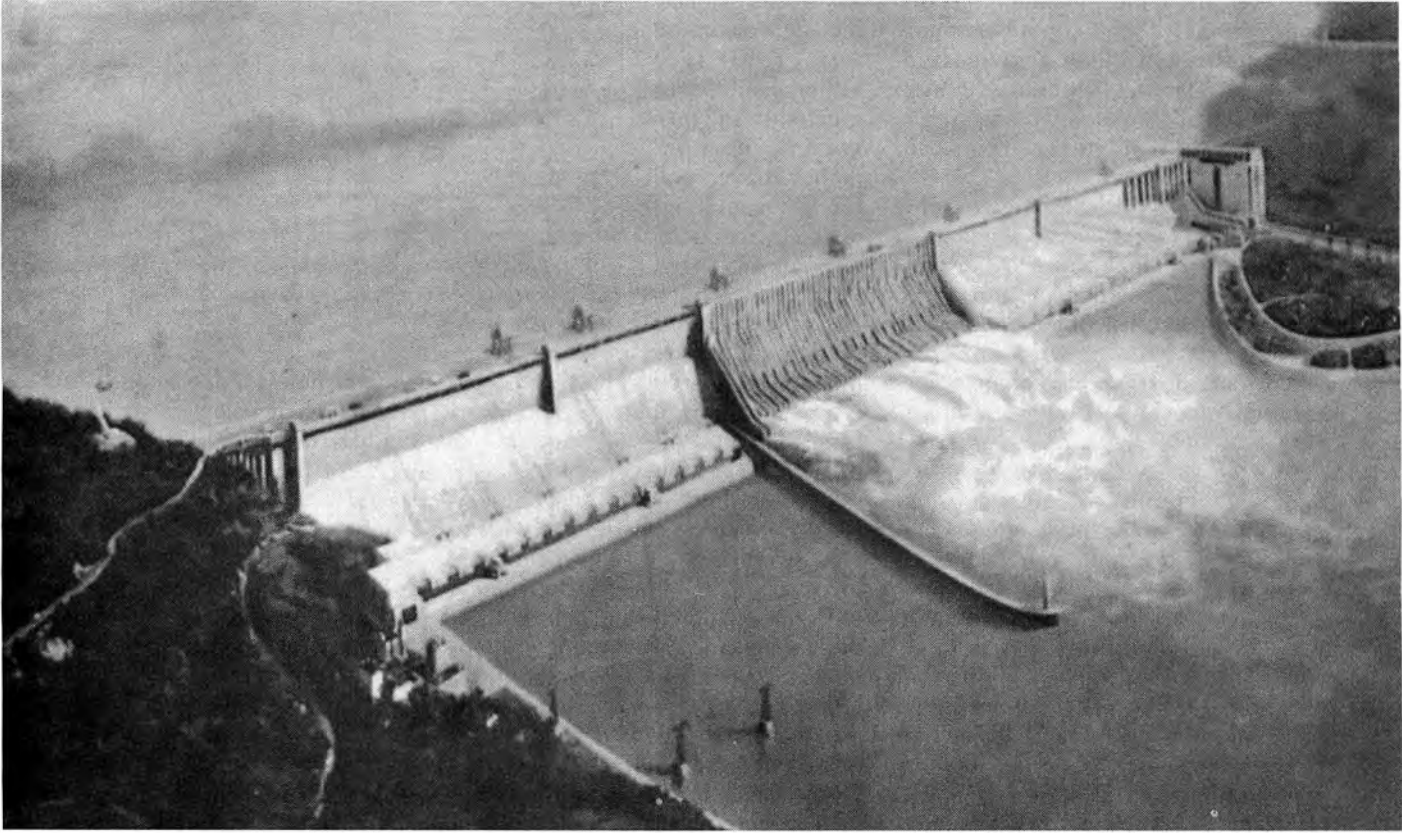
in the 1970s and crime rates started falling almost 20 years later."

The article continues: "He [Levitt] and John Donohue III of Stanford Law School point to a surprising factor: the legalization of abortion. The psychological literature shows that unwanted children are more likely to commit crimes, they contend, and demographic data suggest that women who have abortions are disproportionately young and poor—sub-populations whose children are at relatively high risk for committing crimes. Without 1973's *Roe v. Wade* decision, the researchers reason, more potentially violent children would have reached their peak crime years beginning in about 1991—when crime rates started dropping. They estimate that legalized abortion accounts for 50% of the recent drop in crime."

Not to worry, the report notes: In the past year, there are signs that crime rates are going back up again, suggesting that a few more Littleton-style school massacres, and a new wave of urban "superpredator" crime, could crank up those research dollars, and, perhaps, accelerate the day when the brain chips start rolling off the assembly lines, into a hospital operating room near you.

Jeffrey Steinberg is Counterintelligence Director for the Executive Intelligence Review.

Three Gorges Dam




Yangtze Three Gorges Project Development Corporation

The TVA on The Yangtze River

by William C. Jones and Marsha Freeman

China's Three Gorges Dam, modelled on the Tennessee Valley Authority, will greatly reduce the threat of flooding, and lead to a new era of economic development.



The one American achievement which has most appealed to Chinese observers as an American model for China to follow is the regional development program of the Tennessee Valley Authority. TVA makes sense in China. The use of public funds for big public works and water control, the government and the individual citizen cooperating in the application of modern technology to the ancient problems of the soil, the state helping the small man to help himself—this is the most clear-cut democratic ideal in Asia. In our relations with economically backward peoples, TVA is a primary asset. The fact that in our own more fully developed economy we have less urgent need, or think that we have less urgent need, for such programs of regional development, should not prevent our using the TVA idea in our foreign policy.

—John Fairbanks,
The United States and China, 1948

From its origins in the glacial marshlands of the 20,000-foot high Tibetan plateau, the mighty Yangtze River, or the Changjiang (Long River, as the Chinese call it), winds its way like a giant dragon nearly 6,300 km (3,900 miles) on its way to deposit its annual 960 billion cubic meters of water into the East China Sea. It is the third longest in the world after the Amazon and the Nile, and the third largest in terms of annual runoff after the Amazon and the Congo Rivers. On its journey eastward, the Yangtze passes through an area inhabited by more than 400 million people, approximately one third of the country's population.

Known since ancient times as the "Golden Waterway," the Yangtze has served as a main transmission belt for products and people, with 3,600 rivers open for navigation in its main-stream and its branches for 44,000 miles. In the late 1980s, the volume of goods transported on the Yangtze represented 80 percent of all goods transported in China. The fertile Yangtze basin, including the great delta region formed by the sediment from the Yangtze River, produces 40 percent of China's grain, 33 percent of its cotton, 48 percent of its fresh-water fish, and 40 percent of the total industrial output of the country.

In this drawing of the completed Three Gorges Dam, the spillway to release water and control flooding is in the center, with electric generating plants on either side. On the right is a shiplift for comparatively small vessels, and on far right is the five-step shiplock, which will allow ocean-going vessels to travel up the Yangtze to the western reaches of Chongqing.

Along the banks of the Yangtze are situated some of China's major industrial cities, Chongqing, Wuhan, Nanjing, and Shanghai. Cascading down from the high mountains southwest of Chongqing, the waters of the glacial snowmelt flow swiftly through the 200-kilometer long stretch of majestic gorges, beginning at Fengjie, east of Chongqing, and gathering strength from the hundreds of tributaries that rush down from the mountains to meet the Yangtze as it makes its way through the narrow limestone canyons to the fertile Jingjiang plain below, and on to the broad Yangtze delta, the famed "Land of Fish and Rice." The river has a drainage area of 1.8 million square kilometers (km), accounting for 18.8 percent of China's territory.

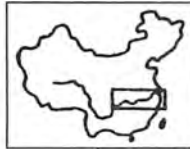
But the mighty river has also been the cause of great destruction and loss of life, that devastate the valley. From time immemorial, flooding has been a problem. During the spring and summer, flood waters rush down from the mountains in the west, through the gorges, overrunning the fields and plains and towns on the middle and lower reaches, and wreaking havoc in the lives of the millions of people inhabiting the region. Chinese scientists have determined that the bulk of the floodwaters accumulates in the upper reaches of the Yangtze. Historical data show that upstream flood flow usually accounts for 60 to 80 percent of the total volume of the river upstream of Yichang, and between 55 to 76 percent from Chenglingji and Wuhan. So, controlling the flow of the Yangtze in the gorges would significantly reduce the danger of flooding in the lower plains region.

During the 2,200 years, from the beginning of the Han Dynasty to the end of the Qing Dynasty in 1911, there have been 214 floods, an average of one every 10 years. In this century, there have been five severe floods. Combined flooding on the Yangtze and the Han rivers in 1911, is said to have claimed hundreds of thousands of lives. The great flood in 1931, took the lives of 145,000 people, inundated an area the size of New York State, submerged more than 3 million hectares of farmland, and destroyed 108 million houses. In the flood of 1935, 142,000 people were killed.

The 1954 flood inundated 48 million hectares of farmland, affected 18 million people, and claimed 30,000 lives. An additional 18.88 million people suffered from flood damage, and the operation of the vital Beijing-Guangzhou railway was suspended for more than 100 days.

THE YANGTZE RIVER AND THE THREE GORGES PROJECT

As the Yangtze River flows from west to east, it passes through the beautiful 200-km Three Gorges, and empties into the East China Sea, near Shanghai. The reservoir that will be created behind the Three Gorges Dam will stretch from Chongqing to the dam, near Sandouping, in Xiling Gorge, a distance about the length of the Grand Canyon. The inset shows the location of this section of the Yangtze in China.



Yangtze Three Gorges Project Development Corporation



Although other sites, farther east, had been considered for the Three Gorges Dam in the past, the current site near the city of Sandouping was considered to have the most stable foundation. The Gezhouba Dam, 40 kilometers downstream from the dam site, was completed in 1981.

Most recently, a major flood in 1996 was followed by an even greater one in 1998, which led to 3,656 fatalities, and affected the lives of 290 million people. In that flood, there were more than 5 million houses destroyed and 21.8 million hectares of farmland submerged. The total economic cost of the 1998 flood for China was \$30 billion. Ironically, the continual development of the Yangtze Basin is increasing the economic cost of such flooding.

The 1954 flood, which occurred at a time when the area was still considerably underdeveloped, would today, with the present agricultural and industrial capabilities, cause 10 times the amount of damage.

Taming The Dragon River

The flooding problem has generally been dealt with by constructing levees in the Jingjiang plain area. Since the 1950s, more than 30,000 km of dikes and levees have been reinforced or raised. As sedimentation lifts the river bottom, however, the dikes are continually in danger of being overrun, for the water level during flood season rises 6 to 17 meters higher than that of the plain region along both banks.

In the middle reaches of the Yangtze, the Jingjiang Flood Diversion Project and the Dujiatai Flood Diversion Project were completed in the 1950s. But since that time, most of the flood diversion areas have been economically developed and are now densely populated, so that diverting a flood, even temporarily, would displace people, and result in heavy economic losses. It is estimated that if there were a 1954-level flood today, inundating the flood-diversion areas, it would affect 933,000 hectares of farmland, and millions of people

would have to be relocated for several months. After completion of the Three Gorges Dam, the need for flood diversion will be greatly reduced, and some of the diversion areas may no longer be needed.

Dongting Lake, lying just to the south of the Yangtze as it makes its way up from the southwest towards Wuhan, and connecting to it by the Jingjiang River, has also been used as a reservoir to "capture" the rising waters of the Yangtze during flood season. Because of silting, however, the level of Dongting Lake has been rising, while the total area of the lake has shrunk from 6,000 km² in 1825, to 2,700 km² in 1983. This has greatly reduced the flood-diversion capability of the Jingjiang River. If it keeps diminishing at the present rate, Dongting Lake would vanish in the near future. The Three Gorges Dam will control both the water and sediment reaching Dongting Lake and help retard the process of siltation.

Sun Yat-sen's Vision

The idea of building a dam in the gorges has a long history. In 1919, in an article titled "Industrial Plan," Sun Yat-sen, the founding father of modern China, saw the tremendous economic benefits of building a dam on the Yangtze as a part of his economic development plan for China. Dr. Sun was particularly interested in using the vast hydropower resources of the river to produce the electricity needed to build factories for making artificial fertilizer, the only means he could envision for China to make the leap in agricultural productivity needed to feed its growing population.

He also saw the area of the gorges as the most suitable spot for building a dam to generate that electricity. Dr. Sun further elaborated on this idea in 1924, in a lecture he gave on his "Third Principle of the People, Peoples' Livelihood":

Consider the tremendous water power in the Kui Gorges of the upper Yangtze. Some who have studied the stretch of river between Ichang [Yichang] and Wanshien [Wanxian] estimate that the water power there could generate over thirty million electrical horsepower. Such an immense power is much greater than that produced at present in any country. It would not only supply all the railways, electric lines, and factories in the country with power, but it could be used to manufacture staple fertilizers.

Consider again the Yellow River which at Lungmen Waterfalls could also generate many million electrical horse power. You see how great are China's natural resources! If the water power in the Yangtze and Yellow rivers could be utilized by the newest methods to generate electric power, about one hundred million horse power might be obtained. Since one horse power is equivalent to the power of eight strong men, one hundred million horse power would be equivalent to eight hundred million man power. A man works eight hours a day, according to the law in most countries; a longer working-day is injurious to the worker's health and lessens production. . . . Man power can be used only eight hours a day, but mechanical horse power can be used all twenty-four hours. This means that one horsepower for a day and night accomplishes as much work as twenty-four men. If we could make use of the Yangtze and the Yellow river water power to generate a hundred million horse power, or twenty-four hundred million man power, and let this great electrical energy work for us, China would produce a great deal, and would certainly turn her poverty into riches.

In 1932, seven years after Dr. Sun's death, the Construction Committee of the Kuomintang, a party founded by Dr. Sun, which took power in 1927, organized a prospecting team to survey the hydroelectric power generation of the upper reaches of the Yangtze River. The team examined several alternative plans and recommended dams at one of two possible sites, at Huangling-miao and at Gezhouba. The project was to include a 12.8-meter-high water-head dam with an installed generating capacity of 300 megawatts (MW), and equipped with shiplocks. The Hydroelectric Generating Plan the Committee published the next year was, however, simply filed away for reference.

Why a Chinese TVA?

In 1933, when President Franklin Roosevelt signed the legislation that created the Ten-

nessee Valley Authority, fewer than 3 percent of the households in the Tennessee Valley had electricity. Malaria afflicted up to 30 percent of the population in some areas, and the average expenditure per child for education was about one third of that of the United States as a whole. The average farmer's income in the valley was \$639, compared to the national average of \$1,835. Conditions were little different than those in Third World nations around the globe.

The seven-state Tennessee Valley was at the mercy of the ravages of nature. The periodic flooding of the Tennessee River prevented the development of cities along the river's banks, leaving small and isolated towns. Unchecked fires burned 10 percent of the woodlands every year, and because of soil depletion, 4.5 million acres were on the decline, and 300,000 acres were nearly destroyed.

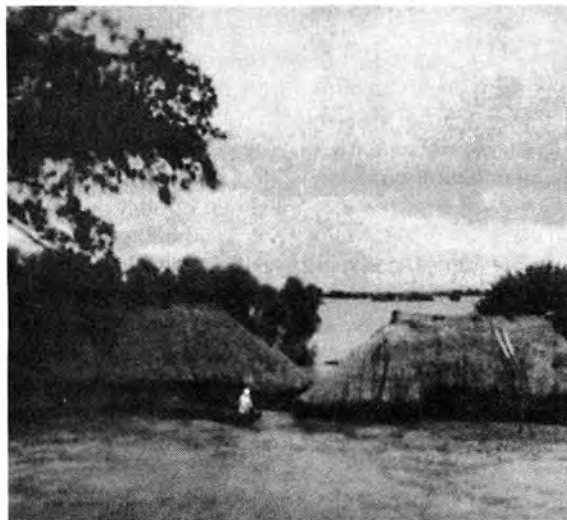
The TVA changed the valley dramatically. In the eight years after the establishment of the TVA, the number of households with electricity went from 6,000 to almost half a million. In its first 20 years, the TVA built 20 dams, requiring the use of 113 million cubic yards of concrete, rock, and earth—more construction materials than were used to build the seven great pyramids of Egypt. Nearly 200,000 men and women were employed by the TVA during its two-decade period of dam construction. At that time, the TVA was the largest construction project in the world.

In order to build the intricate systems of dams and reservoirs to tame the Tennessee River, 15,000 families had to be moved from the areas that were to be flooded. More than 19,000 graves were moved, along with 170 schoolhouses, and 180 churches. Entire towns and villages were relocated, or physically reorganized, to make way for the lakes that were created behind the dams.

Unique to the TVA system, was the concept of *multipurpose* dams. Previous dams had been constructed primarily for flood control, but the planners of the TVA designed a system for flood control, power generation, improved navigation, irrigation, and recreation. Writing about these early years, Gordon Clapp, a general manager of the TVA, said that this was

a policy deprecated by many prominent engineers of that day. In recruiting engineers to bring to life this idea—multipurpose dams—those who believed in the feasibility of this approach were sought and found.

The managers of the TVA knew that the introduction of electricity would be the single most important factor in improving the standard of living of the people in the valley. With electricity came the possibility of



China Pictorial Publications and Beijing National Library, *A Glimpse of Old China* (Beijing: Beijing Dongfang Mingzhu Cultural Co., Ltd., 1995)

The Yangtze River valley has been plagued with periodic floods since the beginning of recorded history of the region. Hundreds of thousands of people have died, millions of homes have been lost, and millions of hectares of farmland have been submerged. Shown here are homes wiped out in the middle reaches of the Yangtze, in the great flood of 1935.



Dr. Sun yat-Sen (1867-1925), the father of modern China, was one of the first to recommend the construction of a dam on the Yangtze River for electric power generation. Here, Dr. Sun at the Tientsin railway station in 1924.

eliminating much of the back-breaking work in farming, which, before the TVA, was conducted essentially at the same level of technology as in the 19th century. Once electricity and fertilizer factories were available, agricultural productivity in the valley tripled.

As increased productivity created an excess of manpower on the farms, cheap electricity made it possible for new and modern factories to spring up, and between 1933 and 1950, nearly half a million jobs in industry were created in the Tennessee Valley. For those free marketeers who would complain that this was all developed "at the taxpayers expense," it is worth noting that the annual income taxes now paid into the Federal treasury from the TVA are almost six times the government's yearly investment in the TVA.

The TVA established its own Health and Safety Department, to rid the valley of its endemic diseases. Libraries were established at every dam construction site, which connected otherwise isolated communities to the rest of the world. Model farms were established, where farmers were taught modern farming methods, and, in return for free fertilizer from the TVA, they then welcomed in their neighbors to teach others what they had learned.

It was this approach, not only to build dams, but to transform a population, that made the TVA the model for develop-

ment in nations around the world. This was the system that Chinese government officials and engineers saw when they, along with thousands of other foreign visitors, came to the Tennessee Valley before the end of World War II.

In 1944, the TVA's first director, David Lilienthal wrote his book *TVA: Democracy on the March*. In the preface, Lilienthal stated:

There is almost nothing, however fantastic, that (given competent organization) a team of engineers, scientists, and administrators cannot do today. Impossible things can be done, are being done, in this mid-twentieth century.

Although the resources of the TVA, particularly abundant electric power, were crucial for the war mobilization that was still under way when he wrote the book, Lilienthal said:

History may well record, however, that it is the TVA as an idea that represents its greatest significance; that it is in its high symbolic value "in a thousand valleys" beyond the seas that TVA has rendered its greatest service in safeguarding and nurturing freedom in the world.

By 1953, more than 39 million people had visited the TVA, from nearly every nation in the world, and David Lilienthal's book had been translated into 14 languages.

Before World War II, Lilienthal had developed a close relationship with China's ambassador to the United States, Hu Shih. Engineers from the National Resources Commission of China visited the TVA, and during the war, an electrical engineer from the TVA was an advisor to the Chinese War Production Board. In July 1944, the Chinese Resources Commission met in Knoxville, Tennessee, the home of the TVA.

Lilienthal reported in his diary that in 1939, Ambassador Hu suggested that the TVA should help rebuild China after the war. During the war, the two met, often in Lilienthal's home, to plan the multi-purpose dam development of the Yangtze River.

On Feb. 6, 1945, Lilienthal met with Donald Nelson, whom he describes as President Roosevelt's personal representative to China. Nelson said he was having Lilienthal's recently published book translated into Chinese. (In fact, in less than a year, 50,000 copies were circulating there). At their meeting, Nelson and Lilienthal discussed the Yangtze Three Gorges Project, which was being referred to as the "Chinese TVA," and Nelson said that the President wanted Lilienthal to be one of seven industrial leaders to go to China, to help work out the nation's postwar industrialization plan.

Lilienthal begged off the trip, but two months later, Nelson sent his assistant, Edwin Locke, to confer with Lilienthal about the next steps on the Yangtze project. After the death of President Roosevelt in 1945, the comprehensive plans of the President to use "American methods" to rebuild the postwar world, were shelved. Nonetheless, the idea of the "TVA on the Yangtze River" had been firmly planted.

After decades of study and investigation, in 1992, the Chinese government decided to start construction of its TVA on the Yangtze River. Although since that decision, U.S. government policy has virtually prohibited U.S. organizations and companies from participating in the project, in September 1996, the leadership of the TVA, and of the state of Tennessee,

organized a joint conference in Beijing on “Economic Opportunities Through Water and Energy,” to provide American input into China’s great projects. The conference was organized by people who understand the history and purpose of the TVA: Tennessee Governor Don Sundquist, the chairman of the TVA, and then-U.S. Ambassador to China, James Sasser, who is a former Senator from Tennessee.

Representatives from dozens of U.S. companies were invited by TVA to attend, including water and energy experts, and a representative of a U.S. nuclear company. China’s plans for water and power development were presented, and in side meetings, TVA engineers discussed the plans with China’s engineers. During the conference, TVA Chairman Craven Crowell announced that the TVA and the Minister of Water Resources of China had signed a Memorandum of Understanding (MOU) for the TVA to review the master plan for the development of the Han River, and an MOU was also signed with the Chinese Hydro and Power Corporation for assistance in developing the Li River Basin.

In an interview with one of the authors (Freeman) in 1998, during that summer’s devastating floods in China, David Hall, the head of the TVA’s work in China, explained that to control flooding in China, projects have to be planned on the tributary rivers, like the Han and the Li, not just on the Yangtze.

Asked what the “TVA model” is that the Chinese expect to learn from the U.S., Mr. Hall described it as

an integrated regional resource development approach. It entails developing a river system by looking at all the possible uses of the water, and making sure that you optimize the competing uses of water, such as navigation, flood

control, in their case, water supply for irrigation and flood protection. . . . [Y]ou optimize the way the water is utilized, which effects where dams are placed, how many dams, the size of the dams, navigation locks, and all of the facilities that will be built.

Overall, he said, “that model can be applied in China.” The joint work, Mr. Hall reported, also benefits the TVA itself. It

helps us from the standpoint that we’re not developing any new rivers. It’s important for us to maintain our skills in that area, because things happen on our river all the time. We look at modifying the way we operate reservoirs and continue to optimize that. It can always be better. So this type of work helps our water management people to keep their skills sharp.

Conveying the philosophy of the Roosevelt era, and the purpose of the TVA, Mr. Hall concluded:

It is very gratifying to be in China, and meet so many people who know TVA quite well, and see that they hold TVA in high regard, especially in the area of river basin development and hydroelectric power. We appreciate the fact that we’re held in high regard, so where we have the resources to help them, we’re happy to do that.

Roosevelt’s Postwar Reconstruction Program

After World War II, President Franklin Roosevelt envisioned using the economic power of the United States, exhibited so mightily during the course of the war mobilization, to create a new international system in the postwar world. Roosevelt was particularly determined to end the reign of the British Empire—indeed, of all empires—and to create a rebirth of the nation-state, especially in those areas of the underdeveloped world, in Asia and Africa, where the fight to overthrow the Nazi and Japanese yoke had been so intimately linked to the fight for independence and national sovereignty.

This was the one major factor that separated the postwar conceptions of the two wartime allies, the United States and Great Britain, for Winston Churchill was still intent on rebuilding a British Empire that lay in shambles. Nation-state building was also the postwar policy that Roosevelt intended towards our other wartime ally, China. Roosevelt was intent on preserving the territorial integrity of China, primarily by preventing a bloody civil war between the Nationalists and the Communists, and



Tennessee Valley Authority

President Franklin Delano Roosevelt’s plan for the reconstruction of China after World War II centered on the building of Great Projects, modelled on those he had initiated in the United States. Here, the President signs the legislation creating the Tennessee Valley Authority, on May 18, 1933.



Bureau of Reclamation, Department of the Interior

John Lucien Savage, one of the great dam builders of the Bureau of Reclamation in the United States, led an extensive study of the Three Gorges Dam in the 1940s, as part of President Franklin Roosevelt's postwar reconstruction program for China.

secondly, by instituting a major reconstruction program for war-torn China.

One aspect of that reconstruction program, which harkened back to the earlier development program of Sun Yat-sen, was a major program of dam construction on China's key rivers, the Yellow River and the Yangtze, which would help alleviate the serious flooding problems and allow the use of hydroelectric power to raise the standard of living of the impoverished Chinese peasantry.

In 1944, Nationalist leader Chiang Kai-shek, anxious to consolidate his sagging support and, under pressure from the United States to institute a program of political and economic reform, began to revive Sun Yat-sen's development program. Talks were initiated with the United States regarding the construction of a hydroelectric dam on the Yangtze. Earlier that year, American economist G.R. Paschal, an adviser to the China Wartime Production bureau, had suggested building a hydropower plant in the Three Gorges area with an installed capacity of 10,500 MW. He also resurrected Dr. Sun Yat-sen's idea of using the power generated to produce electricity in order to build a fertilizer plant with U.S. investment, machinery, and equipment, to be repaid to the United States with fertilizer, over a 15-year period. During the war, American farms were not getting enough fertilizer and were therefore decreasing in fertility from year to year.

In May 1944, John Lucien Savage, a leading dam-builder, who worked on most of the TVA dams as well as the great Boulder (Hoover) Dam in Nevada and Arizona, was invited to China by the Nanjing Government Resources Commission, to investigate possible sites for the construction of a dam on the Yangtze River.

Savage recommended a number of possible sites farther downstream from the present Three Gorges damsite, at various locations between Shipai and Nanjingyuan Pass, which is the entrance-way to Xiling Gorge, the longest of the three gorges. Savage presented a detailed engineering study to the Nationalist government. In the introduction to the report, Savage wrote:

It gives me one of the greatest pleasures in my forty years of engineering experience to submit this preliminary report on the Yangtze Gorge project. The study of this project has been extremely interesting because of the unprecedented magnitude of the works to be constructed and also because of China's great need for the benefits that will accrue from the project.

The Yangtze Gorge Project is a "CLASSIC." It will be of utmost importance to China. It will bring great industrial developments in Central and Western China. It will bring widespread employment. It will bring high standards of living. It will change China from a weak to a strong nation. The Yangtze Gorge Project should be constructed for the benefit of China and the world at large.

Savage proposed a dam which was 200 meters wide and 225 meters high, with an installed generating capacity of 10,560 MW. He recommended that hundreds of Chinese engineers and technicians be brought to the United States, to be trained by the only organization at the time which could accomplish such a massive task: the Tennessee Valley Authority (see box, p. 31). A contract was signed with the U.S. Bureau of Reclamation and the Resources Commission, and, in June 1944, the Bureau officially began work on the design of the Three Gorges Dam.

Enthusiasm for the project ran high in China, as well as in the United States. A 1946 China edition of *Stars and Stripes*, a U.S. military newspaper said, in part:

Drawing on the idealism and practical experience of the TVA and the Reclamation Bureau projects . . . the Chinese are projecting a public works improvement surpassing anything ever built.

An article in the *Engineering News-Record*, Feb. 28, 1946, reported, "China plans an unprecedented dam for power, irrigation, and navigation on the Yangtze river." Under a contract negotiated between the Bureau of Reclamation and the Natural Resources Commission, planning was being done for the great dam. John Savage was a consulting engineer on the project, for both the U.S. and Chinese governments. The *Engineering News-Record* reported that the estimated cost of the project, which would create a 250-mile long reservoir, and enough water to irrigate 10 million acres of land, would be \$1 billion. The generators would produce more than 10 GW of electricity, the article stated, which is three times the combined capacity of Grand Coulee, Shasta, and Boulder Dams, in the United States.

And yet, the initial implementation of the project fell far short of what Savage had envisioned. Some 54 Chinese technical personnel were sent to the United States to participate in the project, but after only a small amount of exploration, survey, economic study, and design work had been carried out, the Nationalist government, in the midst of a raging civil war in China, decided to terminate work on the project, in May 1947.

Optimism, however, remained. An August 1950 publication by the TVA, which was a digest of information concerning issues of interest to the Authority, has an entry titled, "China's TVA—The Proposed YVA on the Yangtze." The report

stated that although China was then in a "period of major transition," the program to tame and develop the Yangtze, remains a much publicized possibility for the future." The Yangtze, it reported, has been called, "transportation lifeline, bottomless irrigation well, and pitiless master of life and property." Referring to statements by David Lilienthal, the TVA publication continued:

The terms "gigantic" or "colossal" are not inappropriate to apply to the ambitious plans for the proposed Yangtze development. TVA is dwarfed in comparison. Within a 300-mile radius of the main dam site, more people than live in the entire United States would be affected. The river would be held in rein the year around, permitting ocean-

going ships to sail to Chungking, 650 miles from the coast. Hundreds of miles of canals would be excavated. Ten million acres could reap irrigation benefits.

Regarding the influence of the TVA on the project, the report stated that a large number of engineers with the National Resources Commission of China, as well as the leaders of that, and other organizations in China, had visited the Tennessee Valley and conferred with TVA officials and engineers.

The death of Roosevelt and the defeat of the Nationalist Kuomintang by the Communists put an end to these projects, for the time being. But the project itself was soon to be revived, under the new Communist regime which took power in 1949. The new Chinese leader, Mao Tse-tung, himself

Training Chinese Dam Specialists in America

John Lucien Savage, a world-famous dam-builder, who worked on most of the TVA dams as well as on the great Boulder Dam, was invited to China to investigate possible sites for the Yangtze project. In his preliminary report, he wrote:¹

The program of employment and training of Chinese engineers, scientists, and artisans, proposed by the [Chinese] National Resources Commission and cooperating Ministries, is believed to be essential and of utmost importance. The basic purpose of such a program should be to give practical experience on actual necessary work and to train specialists in the many important classifications of technical, scientific, and skilled work. . . .

What arrangements should be made for specialized training of Chinese personnel in China, India, America, and other countries, for the investigation, design, and construction of large multipurpose water projects?

An arrangement should be made with the Irrigation Branch of the Public Works Department of Punjab, India, through A.N. Khosla, Chief Engineer and Secretary, for training of Chinese technical personnel . . . providing a large construction program is to be started before conclusion of the war in China.

Similar arrangements should be made with the Bureau of Reclamation and Tennessee Valley Authority in America. These latter arrangements should include cooperative assistance by these two organizations on the investigations, designs, and construction of specific projects that are to be authorized for construction, following the conclusion of the war

The tentative estimate includes the training in America of professional personnel, such as engineers, geologists, chemists, and physicists; also of artisans such as construction superintendents, foremen in all classifications, electricians, machinists, mechanics, welders, etc. It is assumed that such training programs will be started at an early date and that they may

continue for perhaps two years in America. They will, of course, be continued simultaneously in China, so far as possible, and will be carried out principally in China after actual development work starts.

For preparing the final detail designs and specifications for the project, Savage states that 500 Chinese specialists will work in America, along with 500 specialists from the Bureau and the TVA. He outlined the following technical personnel requirements after the conclusion of the war in China:

TECHNICAL REQUIREMENTS FOR THE THREE GORGES PROJECT

Classification	Chinese	Foreign
Consulting engineers	2	3
Consulting geologists	2	3
Civil engineers	800	40
Electrical engineers	160	8
Mechanical engineers	140	7
Geologists	25	2
Chemists	20	2
Physicists	6	1
Construction superintendents	20	9
Construction foremen	200	25
Electricians	425	25
Machinists	425	25
Mechanics	750	50
Welders	425	25
Carpenters	3,000	175
Machine operators	1,000	50
Miscellaneous	2,000	100
TOTALS	9,400	550

Notes

1. J.L. Savage, Consulting Engineer, "Preliminary Report, Yangtze Gorge Project," October 1944.



Robert Kollac, Harper & Row

"There is almost nothing, however fantastic, that (given competent organization) a team of engineers, scientists, and administrators cannot do today. Impossible things can be done, are being done. . . ." This was the spirit of the TVA's first director, David Lilienthal whose book, TVA: Democracy on the March, was translated into 14 languages, including Chinese. Here, Lilienthal (center) in 1980 at a nuclear plant.

became a major proponent for building a great dam on the Yangtze River.

A New Era of Development

When the People's Republic of China was formed in 1949, flooding was one of the first problems the ruling Communist party had to confront. Earlier that year, another serious flood on the Yangtze had occurred, and many of the dikes on the middle and lower reaches of the river had burst, causing untold disaster. In February 1950, the Yangtze River Water Conservancy Commission was established in Wuhan. This organization, renamed the Yangtze Valley Planning Office in 1956, worked directly under the Ministry of Water Resources, and began to sort out the hydrological data which had been collected by the previous government, regarding the comprehensive utilization plan of the valley, including the plans for the Three Gorges Project.

In early 1952, the Government Administration Council issued the decision to build a flood diversion project in the

Jingjiang area. In the latter half of the year, the Yangtze River Water Conservancy Commission began to study plans to strengthen the embankments, to create retention basins on the plains and in the lake regions, and to construct dams in upstream mountain valleys for flood regulation. The commission concluded that even with these control measures, there would still be a serious threat to the middle and lower reaches of the Yangtze River, if there were serious rainstorms in the Three Gorges area, like those that occurred in Hubei province in July 1935. After hearing these reports, Chairman Mao Zedong said:

If after so much effort has been put into the construction of reservoirs on tributaries, flooding still cannot be controlled, then why not put a check to it at the Three Gorges?

From May to August 1954, a series of heavy rainstorms again struck the Yangtze Valley, culminating in the largest flood of this century in the middle and lower reaches of the Yangtze. Although the strengthening of the embankments, and the completion of the flood diversion project along the Jingjiang, saved the embankments, the cities of Wuhan and Nanjing, and other areas downstream, were subjected to severe destruction. It became clear that much more had to be done to control the flood danger, including the construction of one or more dams upstream. Planning for such a project was begun immediately, and Premier Zhou Enlai, who was to spearhead the effort, wrote to Soviet Premier Bulganin requesting that experts be sent from the Soviet Union to provide assistance. The Soviet experts began arriving in June 1955, and began a program of systematic surveying, design, and study of the Three Gorges.

In 1955, the Yangtze River Water Conservancy Commission began drawing up a comprehensive utilization plan for the valley, and conducting a large-scale work of surveys, planning, design, scientific research and economic investigations. The Soviet experts favored a location farther up the Yangtze, which, combined with a project on the Jialing River and several other sites, could effectively solve the flooding problem downstream. The Chinese, however, thought that a dam at the site favored by the Soviet advisors would create an excessively large reservoir, and they were still looking more favorably to the Three Gorges area as the damsite. At the end of 1955, after listening to the various viewpoints on the subject, Premier Zhou took the first step to define the Three Gorges Dam as the principal part of the project for the whole Yangtze River basin.

A year later, based on the preliminary results of the planning activities, Lin Yishan of the Yangtze Valley Planning Office published a paper on the subject, in which he expounded the principles of "multiple-use" in the Three Gorges Project. In January 1958, during a Communist Party Central Committee meeting in Nanning, Chairman Mao, Premier Zhou, and other leading party officials, listened to the various views on the subject, including the arguments of Lin Yishan for a dam at a Three Gorges site. Chairman Mao then

appointed Premier Zhou to take personal charge of the planning of the Yangtze River Basin and the Three Gorges Project.

In March 1958, at a Central Committee meeting in Chengdu, the capital of Sichuan province, the decision was taken to begin preliminary design work on the Three Gorges project. In June of that year, the first Three Gorges Scientific Conference was convened in Wuhan, to formulate the major research plans. The enormous size of the project meant that some of its technical aspects would place it on the very frontiers of dam-building technology, and would establish world precedents. These aspects included deep-water weir construction; damming under high-flow conditions; super high voltage electrical transmission and transformation; large turbo-generator and ancillary equipment manufacturing; giant machinery for high-speed building and for elevating ships; automation in electrical systems and installations; new building materials; reservoir regulation; and prevention of reservoir sedimentation.

More than 200 working groups and almost 10,000 scientific personnel took part in this nationwide effort. During the first year alone, more than 700 research reports and papers were published, which partially resolved a number of the major technical issues of the project, and provided scientific evidence for the preliminary technical design. Two areas along the Gorges were chosen for a closer examination of the bedrock. One was the stretch of the river, indicated by the U.S. Bureau of Reclamation's John L. Savage, from the entrance of the Xiling Gorge at Nanjingyuan Pass to Shipai.

The bedrock there was limestone. The other area examined was in the Meirentuo section, along the upper portion of Xiling Gorge, from Meirentuo to Nantuo, a stretch of the river about 25 km long. The bedrock there is crystalline igneous rock. In both areas, a total of nearly 200,000 meters of small-diameter rock cores were drilled. More than 150,000 meters of this total was obtained from the igneous rock area, and about 76,000 meters was from Sandouping in the Meirentuo section. After comparisons were made, the Meirentuo area was chosen as more suitable.

On the basis of the reports from the expert committees, the Yangtze Valley Planning Office issued the draft "Report on the Main Points of the Preliminary Design." In May 1958, the Planning Office invited 188 people, from 66 working groups involved in the design work, to discuss the report, in order to decide on the height and location of a dam. After 10 days of discussion, it was unanimously decided that the location at Sandouping possessed "unequivocal superiority."

During the following years, more investigations were carried out, although with the increased international tensions stemming from the escalating Vietnam War, and the onset of the disastrous Cultural Revolution in 1966, a decision on dam construction awaited better times. At the end of 1969, provincial leaders in Hubei Province, where the dam was to be located, again called for beginning construction on the Three Gorges Dam. The Chinese leadership struck a compromise, by deciding on first building the auxiliary dam further down-



Yangtze Three Gorges Project Development Corporation

A full view of Gezhouba Dam, which is 40 km downstream from the Three Gorges site. The decision to build this auxiliary dam first, was taken in 1970 by the Central Committee, and the dam began producing electricity in 1981.

stream at Gezhouba.

The Gezhouba Dam, about 40 kilometers downstream from the proposed Three Gorges site, was originally conceived as an auxiliary to the major dam at Sandouping, and was to be constructed only after the main dam was built. The auxiliary dam was needed, because the construction of the major dam at Sandouping would have the immediate effect of lowering the water level through the portion of the canyon downstream from it, thus seriously impeding navigation there, especially during the dry season. The building of a second dam downstream would help maintain the water level in this difficult canyon area. Although there were still those in the Chinese leadership who opposed the construction of the Gezhouba (and even of the Three Gorges Dam itself), Central Committee decided on December 25, 1970, to build the Gezhouba Dam.

Located about 3 kilometers downstream from the Nanjingyuan Pass, at the entrance to the Three Gorges, the Gezhouba construction provided valuable experience in dam-building to Chinese engineers and workers, preparing them for the major undertaking at Three Gorges. Gezhouba Dam began producing electricity in 1981, and was completed in 1988. It is 70 meters high and 2,606.5 meters long, and now produces an annual output of electricity of 15.7 billion kwh.

In 1992, the Seventh National People's Congress made the final decision to construct the larger Three Gorges Dam at Zhongbao Islet near the village of Sandouping. This is the area which divides the eastern and western parts of the Xiling Gorge, the first of the Three Gorges, heading upstream; the dam is situated some 5,000 km from its source and 1,300 km from its mouth near Shanghai. The Chinese assumed that experts in America, with whom they had worked for decades, would continue to provide advice for this great project. But while the Chinese were embarking on the construction of dams on the Yangtze, their colleagues in the United States were being told that the days of big water projects were over.

Environmentalists Target Big Dams

By the end of the 1960s, a paradigm shift was taking place in the United States and the industrialized nations, exemplified by the creation of the anti-growth Club of Rome in 1969, which proposed that man-altered nature was a crime against Mother Earth, and that great projects, such as dams and water development, were "bad for the environment." As the largest nation in the world, in terms of population, China came under attack for having "too many people," and whose continued growth would only further threaten the "environment." The Three Gorges Dam, as the largest economic development project in China, became a prime target for attack.

The Chinese had been aware since the 1950s, that such a dramatic change in the Yangtze River would alter the environment. Forty years ago, the Yangtze Valley Planning Office (which later became the Yangtze Water Resources Commission, under the Ministry of Water Resources), carried out a series of surveys concerning the natural and social impacts of the project, and issued *The Report on the Key Points of the Yangtze Valley Comprehensive Utilization Planning*, and also *The Report on the Key Points of the Preliminary Design of the Three Gorges Project*.

In 1976, the Yangtze Valley Water Resources Protection

Bureau was established by the Ministry of Water Resources, in order to carry out environmental impact studies of the Three Gorges Project. Working with more than 40 universities and research institutes in China, a special team was created in 1979. This group submitted an impact statement for a design of the dam which, at that time, was for a 200-meter Normal Pool Level.

By 1979, with the re-establishment of U.S. relations with the People's Republic of China, the Chinese government again expressed interest in re-establishing a working relationship with American dam builders. In the United States, however, the pro-growth outlook of the Roosevelt era had been replaced by the zero-growth insanity of the Carter Administration. The support for "great projects," which had been the hallmark of FDR's postwar reconstruction program, had been replaced by the call for "appropriate technologies." The commitment to progress had been gradually eroded by the new philosophy of "small is beautiful," put forward by E.F. Schumacher. In place of the commitment of the nation to economic and population growth, the world suddenly became "overpopulated," and disaster scenarios were spun out in the publications of Worldwatch Institute, the World Resources Institute, and other zero-growth organizations. In that atmosphere, any agreement on U.S.-China cooperation was ultimately doomed to failure.

In March 1980, the United States and China signed a "Protocol on Cooperation in Hydroelectric Power and Related Water Resource Management," which brought the Bureau of Reclamation, the Army Corps of Engineers, and the TVA again into work on the Three Gorges Project. However, the radical environmentalist bent of the Carter Administration prevented any major U.S. involvement in Three Gorges Project.

Under the Protocol, a one-year period of training was provided to 11 Chinese engineers, and a 30-day program was provided for a group of 10 engineers—a far cry from what dam-builder John Savage had proposed in the 1940s. The Carter team that was sent to China in April 1980, to investigate the Three Gorges, included the new Carter-appointed chairman of the TVA, S. David Freeman, a radical environmentalist and "conservation" proponent, whose claim to fame was his attempt to restore the use of wood-burning stoves, which had gone out of vogue in the Tennessee Valley with the introduction of electricity in the 1930s. Needless to say, the Freeman crew came back from China, recommending against the Three Gorges Project. In an article in *Engineering News-Record*, April 3, 1980, Freeman boasted, "I think our delegation succeeded in killing a 700-ft. high dam on the Yangzi River that a bunch of engineers there had been in love with for the past 20 years." Freeman neglected to note that among that "bunch" were some of the U.S. Bureau of Reclamation's and TVA's finest engineers.

The defeat of Jimmy Carter in the Presidential elections of 1980 helped to blunt the edge of the environmentalist attacks, but the sabotage of U.S. participation in the project did not cease. In the spring of 1981, a 10-man delegation from the Bureau of Reclamation, now under new management, was again in China studying the Three Gorges Project.

On his visit to China in 1984, President Reagan was asked by the Chinese leadership to increase U.S. involvement in this important project. Reagan, whose outlook, although conser-



AP Photo/Scott Stewart

On his visit to China in 1984, President Reagan reopened U.S. involvement in the Three Gorges Dam project. Here, President Reagan and his wife with Chinese leader Deng Xiaoping.

vative, was more characteristic of the Roosevelt era, responded forthrightly. He sent his former National Security Advisor, William Clark, to Beijing, as head of a group of people from the Bureau of Reclamation and private industry, with a wide-ranging proposal for collaboration on the Three Gorges Project, proposing, in fact, a U.S.-China consortium to build the dam. The proposal would have made of the Three Gorges Project a giant joint venture. The Chinese were not so eager to pursue this "joint venture" route in such a strategically important undertaking. Interest in the project from the Reagan Administration quickly cooled, and the joint venture bid was quietly tabled.

Nevertheless, the Reagan visit resulted in the 1984 signing of a five-year agreement between the U.S. Bureau of Reclamation and the Chinese Ministry of Water Resources and Electric Power, to provide technical assistance in the final planning and design phases, and in the construction of the Three Gorges Project. A second agreement was signed in 1992, to provide technical assistance on data management, computer software, drill-hole survey technology, and dam safety monitoring. By that time, however, the environmentalist movement had geared up its campaign to sabotage all U.S. involvement in the Three Gorges Project.

In 1985, the Environmental Policy Institute, the Worldwatch Institute, and other environmentalist groups initiated a major campaign to stymie continued U.S. cooperation with the Three Gorges Project. Hearings were held on Capitol Hill in July 1985 by the Subcommittee on Water and Power

Resources of the House Committee on Interior and Insular Affairs, on the topic "Irrigation in Drought and Famine-affected Countries," chaired by Democrat George Miller from California, a darling of the environmentalist lobby. The purpose of the hearings was clearly aimed at discouraging major water control and other infrastructure projects, which were absolutely critical for "jump-starting" developing sector countries. The call was out for a "small is beautiful" format for development—that is, no development at all.

Much of the material for the hearings had been provided by the Worldwatch Institute, whose founder was zero-growth guru, Lester Brown. In recent years, Worldwatch has published multiple tracts touting the old Malthusian argument that raising the standard of living of China and other developing countries, would require a substantial increase in their food consumption, and could increase the risk of famines!

Some of the popularity of this discredited doctrine, which totally ignores the element of productivity rises resulting from technological advances in agriculture, was caused by the fact that such zero-growth programs do not require much investment. The World Bank, the prime funder in the postwar world for many infrastructural projects in the developing sector, had 100 experts participating in the Feasibility Study of the Three Gorges Project in the mid-1980s. But after the project finally got under way, the Bank invested no funds. Instead, it became a promoter of "appropriate [that is, labor-intensive] technologies" for developing sector countries. The World Bank's claim was that large projects were not "economical," according to its cost-benefit analysis.

(The Chinese have well understood the "cost-benefit" of projects such as the Three Gorges Dam. The obvious direct economic benefit of the dam will be the avoidance of billions of dollars in damage to farms and property during floods, not to mention the enormous loss of life, and other losses, caused by the bursting of dikes, the threat to the city of Wuhan, the suspension of operation of the railway, and so on. In writing about the project, the Chinese point out that the dam can also prevent flood damage to the ecology and environment, the occurrence of which may contribute to famine, the spread of infectious diseases, large numbers of refugees, and further environmental problems. But in the end, as the Chinese point out, "All of the significant benefits are uncountable, and can hardly be measured in economic indexes.")

The environmentalists—in reality, white-collar Nazis—



AP Photo/Xinhua, Liu Shaoshan

Sen. Frank Murkowski, who visited China in 1997, opposed the Clinton Administration's refusal to support the Three Gorges Dam project. The Senator stressed the environmental benefits of the dam; electricity from the Three Gorges project equals that produced by 36 coal-burning power plants, he said. Here, the Senator meets with Chinese President Jiang Zemin

cloaked their attacks on the dam in fictitious arguments about how "small projects" benefit people more than larger enterprises, and were more "appropriate" to develop countries than those bigger infrastructural projects. Because the entire history of the United States, especially the development of the Tennessee Valley Authority in the 1930s under Roosevelt, belied these arguments, these zero-growthers were also forced to alter the historical record. In 1985, William U. Chandler, another associate of the Worldwatch Institute, published a book titled *The Myth of the TVA*, in which he attempted to discredit the role the TVA played in raising the standard of living for millions of people.

Greenies Attack Great Projects

Although the prime focus of the 1985 hearings of the Subcommittee on Water and Power Resources of the House Committee on Interior and Insular Affairs, was on Africa, the environmentalists focussed on the Three Gorges Project. They demanded that the Bureau of Reclamation submit an environmental impact statement on all its foreign engagements, under the newly legislated domestic requirements of the National Environmental Policy Act (NEPA), which was an environmentalist straitjacket that had been placed on U.S. industry during the Carter Administration.

By 1986, Rep. George Miller and his environmentalist friends in Congress had introduced legislation that would mandate the Bureau of Reclamation to "give priority to solutions to water resources problems which emphasize small-scale, affordable,

resource-conserving, low-risk projects." One of the key figures who helped shepherd this particular item through committee was Miller's staff director, Dan Beard.

When the Clinton Administration was elected to office in 1992, the year the Chinese Government actually decided to proceed with the Three Gorges Project, President Clinton had, in a "pre-nuptial agreement" with Al Gore, relegated to his Vice President key areas of responsibility, first and foremost over the environmental agenda. Many Gore appointees were immediately placed in responsible positions in the Bureau of Reclamation, and the Department of Interior.

A year later, seven environmentalist groups filed a law suit against the U.S. Bureau of Reclamation and the

Army Corps of Engineers, charging that the assistance they were rendering the Three Gorges Project would flood the habitats of a dozen "endangered species." The Bureau, a branch of the Interior Department, whose head now was the notorious environmentalist Bruce Babbitt, withdrew from the project that same year. Serving as the commissioner of the Bureau of Reclamation at this time was none other than the same Dan Beard, who had helped author the new "small is beautiful" policy during his work for the Water Resources subcommittee in 1986. True to form, Beard issued the new—and now politically correct—response of the Bureau to the Three Gorges Project: "Reclamation's current priorities," Beard said, "are water-resource management and environmental restoration, not large dam projects."

According to a *Wall Street Journal* article, April 18, 1994, on cost-benefit analysis, Dan Beard, was planning a trip to China that May to explain to the Chinese the position of the Bureau. "Large dams are tremendously expensive," Beard would later tell his Chinese hosts. "They always cost more than you thought and tie up huge sums of capital for many years." The trend is toward smaller dams and environmentally friendly flood control, he said. "There's no more visible symbol in the world of what we are trying to move away from than the Three Gorges Dam," Beard told the *Journal*.

At the same time, the Clinton Administration, was intent upon establishing a good working relationship with China—but not at the cost of alienating Al Gore's environmentalists.

When U.S. companies expressed a keen interest in getting involved in the construction of the Three Gorges Dam, the Clinton Administration was still split on the issue. Should it allow the U.S. Export-Import Bank to give credit guarantees to companies interested in building the Three Gorges? Here, again, the Gore influence won out. "The Clinton Administration, with Al Gore at the head of their environmental parade, wasn't going to take on industry head-on," said Robert Oury, CEO of Rotec Industries, an engineering firm interested in participating in the Three Gorges Project. Instead, it created bureaucratic obstacles. "They put out enough rabbit trails that we just went around and around, and they wore us out."

In 1992, under pressure from the environmentalist lobby, Congress passed legislation which mandated an environmental review for all foreign projects in which the U.S. Export Import Bank was involved. The Three Gorges Project became a test case for this new policy. Because of the significance of the project for U.S.-China relations, Ex-Im asked the National Security Council to convene a panel to consider the merits of U.S. participation in the dam. In September 1995, the interagency National Security Council panel delivered its recommendation, signed by the then Deputy National Security Advisor Sandy Berger. The U.S. government, the panel advised, should not "align itself with a project that raises environmental and human rights concerns on the scale of the Three Gorges." But the memo, leaked to Congress, counselled the government to "refrain from publicly condemning the Three Gorges Project." Instead, it continued, "explanation of our policy should emphasize the U.S. government's commitment to strengthening commercial relations with China and to helping China meet its basic energy needs."

In May 1996, in reply to a request for credit guarantees and associated loans by Caterpillar and other major companies bidding for contracts at the dam, the Ex-Im Bank issued a ruling that it would not provide guarantees for the project. Ex-Im President Martin Kamarck, a close ally of Al Gore, told

reporters on the occasion of the Board's decorges,

The Board has concluded that Ex-Im Bank cannot issue a letter of interest for this project at this time. The information received, though voluminous, fails to establish the project's consistency with the bank's environmental guidelines.

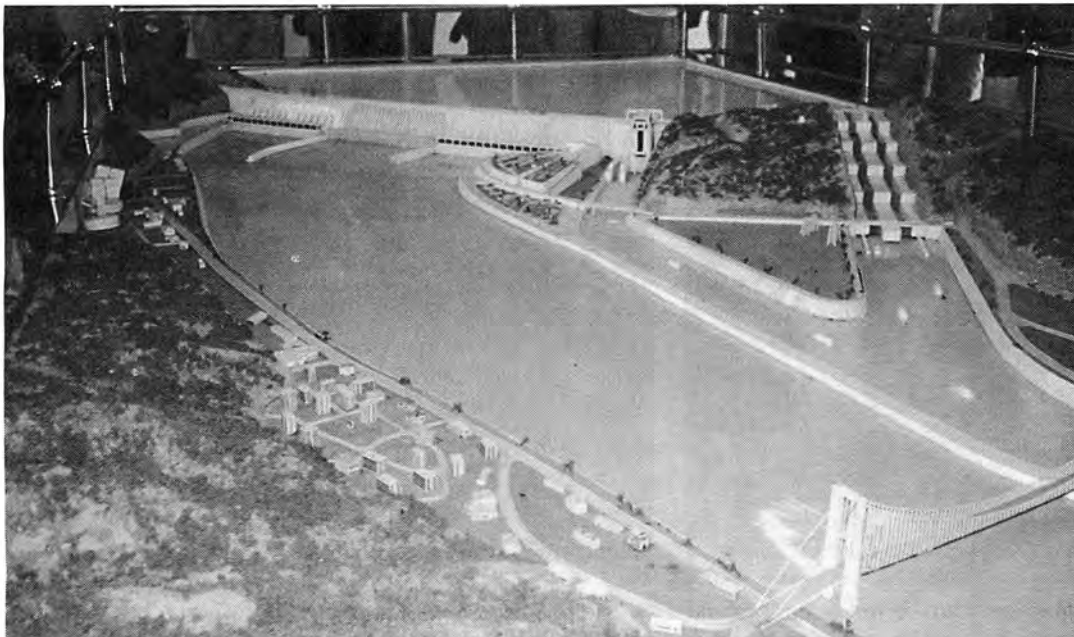
Kamarck then went on with his sop to the Chinese government:

If the China Yangtze Three Gorges Project Development Corporation, the sponsor of this project, provides Ex-Im Bank with additional information with respect to development and mitigation of the environmental issues involved in the project, the Board could reconsider support for the project.

As the project authorities had already provided "voluminous" environmental information, his final comments were really meant to allay any possible bitterness of the Chinese side regarding the decision. Kamarck was also quick to add that "no serious concerns were raised in this process about the creditworthiness of the project or the technical feasibility of the project."

There was a failed attempt by a handful of lawmakers, some representing districts of those companies interested in bidding on dam projects, to protest the Ex-Im Bank's decision. On May 30, the day the Ex-Im Bank made its ruling, Republican Rep. Don Manzullo, representing the 16th District in Illinois, issued a press release stating:

I am very disappointed that Ex-Im Bank has decided to postpone, in effect, deny, support for U.S. businesses and U.S. jobs. By denying support for U.S. exports to the Three Gorges Dam project, billions of dollars worth of



Marsha Freeman

A model of the current plan for the completed Three Gorges Dam, on display in the visitor's center at the construction site. The site has become one of the most important tourist attractions in China, for citizens and foreign visitors.



Marsha Freeman

Entrance to the Three Gorges, going upstream, at Xiling Gorge.

U.S.-made goods and services will be lost. That translates into revenues here. Every day that Ex-Im and the Administration drags its heels on this project, it means more lost sales and more lost wages.

The Three Gorges Dam is going to be built. We can't stop it. The strange twist on all of this is that it is a hydroelectric dam—one of the cleanest sources of energy on the planet. If the environmentalist lobby that opposes this project has a better idea of how China can solve its shortage of electricity, let them step forward with it.

Referring to the industrial companies in his district inter-

ested in supplying equipment for the Three Gorges Dam, Manzullo named Bergstrom Manufacturing in Rockford, Illinois, which makes heating, ventilating, and air conditioning components for Caterpillar. Based in Peoria, Illinois, Caterpillar is one of the handful of companies that is exporting equipment for the project, without guarantees from the Ex-Im Bank. Although we constantly hear about our trade deficit with China, Manzullo concluded, this policy will further block the export of goods to China.

During a trip to China in November 1997, Sen. Frank Murkowski, a Republican from Alaska, and chairman of the Senate Energy and Natural Resources Committee, scored the Administration's refusal to support the Three Gorges Dam project. Murkowski met with Chinese President Jiang Zemin and Vice Premier Zhu Rongji, and said he would pursue efforts to reverse the Ex-Im Bank's lending policies.

In an op-ed written a few months later, in August 1998, during severe flooding on the Yangtze River, Sen. Murkowski stated that while the environmentalists are worrying about the people who might be displaced by the dam, and the potential harm to endangered species, more than 3,000 people had already died in the ongoing flood. He pointed out that the Ex-Im Bank's policy actually hurts the environment, because if China did not build the dam, it would have to build an additional 36 coal-burning power plants. "Ex-Im's refusal to consider Three Gorges due to environmental concerns is ludicrous," Murkowski stated.

Although such protests did not alter the policy of the Gore faction in the Administration, the environmentalist obstruc-



Marsha Freeman

The steep hills that line the gorges are narrowly terraced and farmed, which has increased soil erosion and the amount of silt in the river.



Marsha Freeman

A bridge across a gorge. When the reservoir and dam are completed, the water level here will reach the bottom of the bridge.



Marsha Freeman



Marsha Freeman

An old town near the riverbank (right), now abandoned, as residents moved to new homes, higher up, in the resettlement program (left).

tions did not stop the project; the dam had become too important. The Three Gorges Project had already become a critical element in the overall development of China, elaborated under Premier Zhou Enlai and developed by Deng Xiaoping, as the "four modernizations," in 1978, embracing industry and trade, education, military organization, and agriculture.

In 1999, the new dam also served as a major element in the new initiative by the Zhu Rongji government to "develop the Western regions." For example, the dam will bring large, sea-going vessels to the interior port of Chongqing, a key gateway to the western regions of China.

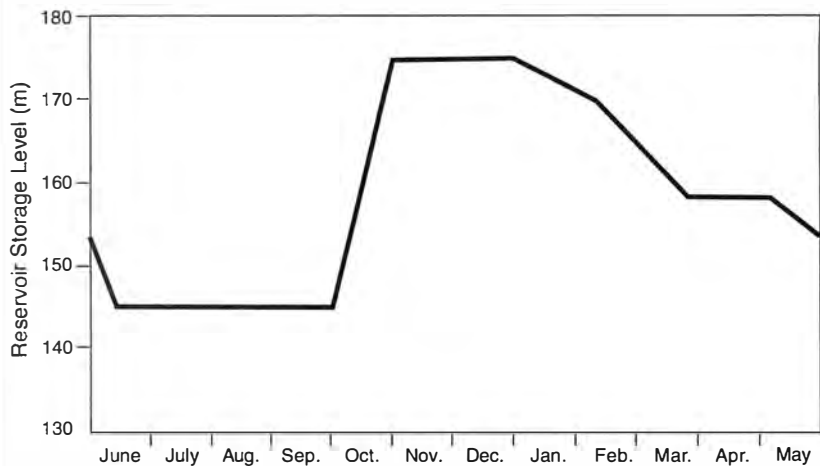
At the same time, the successful completion of the Three Gorges Project will also send an important signal to suffering nations in Africa, Asia, and Latin America that the era of "Great Projects" is not dead. The mealy-mouth double-talk about "appropriate technologies" and "sustainable development," will recede into the shadow of the great dam, built to tame the mighty Yangtze, and will appropriately become, along with the Great Wall of ancient times, one of the few man-made objects distinguishable by the naked eye from space.

Building The Mighty Dam

The construction of the dam, begun in September 1994, will take 17 years from its inception, proceeding in three stages. When the dam is completed, it will have a height, or crest, of 185 meters, placing it somewhat higher than

the Golden Gate Bridge. In the early phase of operation, during the third phase of construction, the water level in the reservoir region will be 135 meters, and the final Normal Pool Level, or highest level, will be 175 meters.

Once the dam is completed, the raising and lowering of the water level in the reservoir behind the dam will provide the ability to control flooding (see figure, below). As the flood sea-



SCHEMATIC OF ANNUAL VARIATION IN RESERVOIR WATER LEVEL

Unlike many other flood-control dams, the water level in the reservoir behind the Three Gorges dam will vary throughout the year, lessening the accumulation of silt in the reservoir. The level in the reservoir will be at its lowest during the potential flood months of June through August, in order to prevent flooding. The water level will be increased between September and November to allow for the maximum production of electricity. Water will be released through the dam during the dry winter months to enable navigation downstream of the dam, and it will remain at that lowered level to catch the flood waters the next spring and summer.

Source: Yangtze Three Gorges Project Development Corporation

son approaches, from the end of May to the beginning of June, the water level in the reservoir region will be lowered to the flood control level of 145 meters, with the expectation that storage capacity will be needed during the flood season. After the passing of the potential flood peak, the water that has been stored, to a maximum of 175 meters, will be safely discharged, and the reservoir will again be lowered to 145 meters.

By October, the reservoir level will be gradually raised to 175 meters to allow the power station to meet the demand for electricity; regulating the water storage will be used to guarantee power output. Between January and May, the reservoir storage level will be lowered to increase the flow downstream during the dry winter season. At the beginning of the spring, the level will then be appropriately low, in preparation for the possible summer floods.

The first stage of construction, from 1992 to 1997, involved the building of two phase-one cofferdams to shut off the flow of the river from the construction site, and the re-routing of the river through an artificial diversion channel. Barges and other ships pass through the diversion channel, or if the river floods, through a temporary shiplock built for that purpose. Additional infrastructure, such as a new major highway road, the Three Gorges Project Expressway, was built to reach the otherwise inaccessible mountainous region, in order to transport the tons of materials excavated from the construction site. Along the Expressway there are 34 bridges and 5 double-lane tunnels, including a 3,610-meter single-line tunnel, which is the longest in China. In addition, a major suspension bridge, the Xiling Yangtze Bridge, was built over the Yangtze River downstream from the dam site.

During the first stage, the site for the permanent shiplocks was excavated, and the foundation laid for generation unit number 1 of the left-bank powerhouse. Construction also began on a vertical shiplift, a one-stage vertical hoisting system, which will accommodate those lighter, 3,000-ton passenger ships which may require a quicker route through the dam than the five-step shiplock, which is designed to accommodate larger vessels.

Now during phase two, from 1997 to 2003, the construction of the left bank dam section is under way; the left-bank powerhouse will be completed with the installation of some units, and construction of the spillway and continued construction of the permanent shiplock are taking place. The spillway dam, placed in the mid-section of the structure, is 483 meters long with 23 bottom outlets and 22 surface sluice gates. With a maximum discharge capacity of 102,500 cubic meters per second, the project is able to discharge the maximum level of water possible during floods.

In December 2002, before the flood season in the spring of 2003, the phase-three cofferdams in the diversion channel will be finished, and the reservoir water level will be raised to 135 meters. At this time, the permanent shiplock will be ready for use, and the diversion channel will no longer be needed for navigation. According to the scheme for the second stage, 17 million cubic meters of concrete will be poured, 180,000 metal structures will be installed, and approximately \$10 billion will be invested. The water level will be raised to the 135-meter level, creating the reservoir behind it, stretching 600 km back to the city of Chongqing. Construction will continue on building the right bank dam and the second power plant.

By the end of phase three, the water level behind the dam will be raised to its final 175-meter level. The reservoir formed in the upper river will be longer than the Grand Canyon, with an average width of about 1 kilometer, approximately twice the width of the present river. It will have a total storage capacity of 39.3 billion cubic meters including a flood regulation and storage capacity of 22.15 billion cubic meters. This will effectively increase the flood control standard of the hard-hit Jingjiang section of the river, between the gorges and the city of Wuhan, from the present standard of sustained 10-year floods to the standard of 100-year floods. Even if there were a flood of the size that occurs only once every 1,000



Yangtze Three Gorges Project Development Corporation

During the first stage of construction of the Three Gorges Dam, temporary cofferdams were built to close off the flow of the river. A diversion channel was built to allow the passage of ships while the dam is under construction. The final closure of the coffer dam in 1997 (shown here) was a cause for national celebration, and carried out with great ceremony. With the flow of the river diverted around the dam site, the job of excavating the soil and building a foundation for the dam began.



Marsha Freeman

◀ During phase 2, the five-step shiplock is under construction. When completed, ocean-going vessels will be able to traverse the Yangtze River year round. A shiplift will be used for small passenger vessels.

The temporary shiplock, shown below under construction, is being used by ships during the flood season, when it is not safe to go through the diversion channel. When the dam is completed, it will be replaced by a five-step permanent shiplock.

years, the vast plains on both sides of the section of the river below the dam, with the appropriate flood diversion and retention capacity, would now significantly limit the damage.

The reservoir will considerably improve navigation upstream on the river by raising the river's level between Chongqing, and the city of Yichang, which is just downstream from the dam. That stretch of the Yangtze through the Gorges, so well loved and oft written about in Chinese song and poetry, consists of 139 major treacherous shoals and fast-moving rapids, and 46 control sections, where only one-way traffic is possible. Downstream, in the Jingjiang section of the river, navigation is difficult when the river level is low because of the ubiquitous sandbars. The river is well-nigh impassable during a large part of the year; during the dangerous flood season in the spring and summer, and during the dry season in the winter.

In the days before motorized boats, and indeed, until only a few decades ago, when the river was low, the upstream trip demanded the services of dozens of trackers, who would, sometimes at the risk of their lives, use ropes to pull boats up the river, walking along narrow paths carved into the cliffs, or along the shoreline. Motorized propulsion has made the trip easier, but it still requires a knowledgeable captain, who knows the nooks and crannies of this dragon river, to take the passengers safely to their destination.

Even then, occasional avalanches take place, which pour massive rocks into the river, thus changing the contours of the river bottom, making the going treacherous even for old river hands. The raising of the water level in the massive reservoir region will slow the flow of the water and submerge the dangerous shoals. This will allow barges in the 10,000-ton class to sail upstream to the harbors of Chongqing. It is estimated that there will be a five-fold increase in the amount of ship-



Yangtze Three Gorges Project Development Corporation

ping to Chongqing, and even ocean-going vessels will be able to reach it. This will increase the annual one-way passing capacity to Chongqing from the present 10 million tons, to 50 million tons, and transportation costs will be decreased by about 35 percent.

In addition, with the regulation of the reservoir, the minimum flow downstream of Yichang in the winter dry season will be increased from the present 3,000 cubic meters per second to more than 5,000 cubic meters/s, thus improving navigation also in the middle reaches of the Yangtze. Because it will be able, during low water conditions, to release water from the reservoir to the middle reaches of the Yangtze, the Three Gorges Project will also increase navigation along the



Wong How Man

For centuries, boats on the Yangtze River could safely negotiate the shoals in the gorges only with the help of trackers, who would pull the boat by ropes while passengers walked along the shore. Here, trackers at work in the early 20th century.



Marsha Freeman

The trackers used footpaths that they had carved in the steep sides of the mountains, during flood periods. Here, a view of the narrow footpaths used by trackers, carved into the mountain side.

mid-stream Jingjiang section of the river.

The creation of the reservoir upstream will also improve water conditions downstream, diluting sewage and improving water quality in that part of the river.

Vast Hydroelectric Power

The second major economic benefit from the dam will be the tremendous amount of hydroelectric power that will be drawn from the river. The Yangtze, with its elevation high in the west and low in the east—a total drop of 5,400 meters—contains the largest hydropower resources in China. For the cost-benefit analysts, who are convinced that China will never be able to pay for the Three Gorges Dam investment, and that the project will sap the capital available for growth, the Chinese point out that the project's power generation is what will allow all the capital investment in the project to be recovered.

The Three Gorges Hydropower Station is comprised of two power plants, situated on each side of the central spillway, with a total of 26 generating units. As a result of the U.S. decision in May 1996 to prevent the Export-Import Bank of the United States from guaranteeing loans for American companies interested in bidding on components for this vast hydropower project, eight of the turbines and alternators are being built by a consortium made up of GEC-Alsthom (Franco-British), and ABB Asea Brown Boveri of Switzerland. The contracts for another six, valued at \$320 million, went, in 1997, to Germany's Voith and Siemens AG, and to GE Canada. The only large U.S. industrial company involved in the Three Gorges Project is Caterpillar, Inc., which has supplied about \$30 million of earth-moving and other equipment. Rotec Industries Inc. has also sold about \$20 million of equipment to China.

Each generating unit has a capacity of 700 MW, the size of a baseload powerplant. The total capacity will be 18,200 million MW, with a planned annual power generation of 84.7 billion kilowatt-hours. It will be the single greatest power plant in the world, about 1.44 times bigger than the largest existing hydropower project built jointly by Brazil and Paraguay at Itaipu. The energy produced annually by the Three Gorges station would replace 40 to 50 million tons of coal, and relieve the corresponding stress on the nation's railway system, which transports the coal.

A Chinese poem about the Yangtze says that "the billowing Yangtze flows forward to the east entering the sea, while bringing away enormous coal and oil," because the water power has been wasted. Without tapping the vast hydroelectric resources of the river, the poem continues, "there are 50 million tons of coal, or 25 tons of raw oil, being poured into the sea in vain."



Marsha Freeman

Much of the industry that exists in the Three Gorges region today is old and labor intensive. Here, coal that is mined in the mountains is stored in these river-side bins for shipment. In the future, when this area is submerged and the dam's power plants are operating, China can reduce its reliance on coal burning, using the electricity produced by the dam. Note the new city at top.

The production of electricity from the Three Gorges Dam is particularly significant in light of China's recent drive to develop the western regions of the country. The city of Chongqing plays a very important role as one of the "gateways" to the Western regions. Much of the hydroelectric power from Three Gorges can help relieve some of the dependence on coal-burning plants, which has provided the bulk of China's energy production, but which leaves a perennial haze over Chongqing and other major Chinese cities. From the Three Gorges generators, there will be 15 transmission lines, with 500 kilovolt (kv) AC lines going west to Central China and Chongqing City, and 500 kv DC lines to East China.

At last, Sun Yat-sen's vision of plentiful electricity for the development of China's treasured valley will be a reality.

'Correcting' the Environment in China

In the aftermath of the refusal of U.S. government institutions to involve this nation in the Three Gorges Dam project, because it would supposedly "harm" the environment, Qin Zhongyi, vice president of the China Yangtze Three Gorges Development Project told *China Daily*, July 7, 1996, that unlike the American approach of "preserving" the environment, the Chinese approach is to "correct" the ecological problems in his country.

The Three Gorges Dam is necessary to save the lives of millions of people, as another "century flood," like that of 1870, is threatening the Yangtze, Qin said. "Erosion and silt buildup have swayed the natural balance of the river, and engineering is the only means available to restore the balance, aside from

resorting to God's mercy," he explained.

In fact, the 1998 flood—which killed more than 3,000 people, required the evacuation of 13.8 million people, destroyed millions of houses, and ruined 4.78 million hectares of crops—was less severe, in terms of the amount of river flow, than previous floods. But the build up of silt, largely the result of the erosion of land along the banks, had raised the height of the river and the flood diversion regions, leading to widespread flooding.

No one in any official capacity in China denies that the country has severe environmental problems. But in the south of China, the greatest threat to the environment is not "endangered species," but floods. And in the north, the greatest threat to the environment, and the economic growth of the people, is drought. The Three Gorges Dam project is the centerpiece of a vast plan designed to create a balance between areas of water abundance and water deficit, greatly improving the environment for hundreds of millions of people. The most important environmental benefit of the Yangtze dam project will be seen in the lives of the people.

A great deal has been made of the need to resettle as many as 1.2 million people from the lower slopes of the gorges, west of Sandouping, which will be inundated to create the great reservoir behind the dam. According to government figures, there are 846,200 people living there now who will have to be relocated. (The figure of 1.2 million, often quoted in the press, includes the natural population growth expected between the start of the project, and its completion in the year 2009.)

The opposition to resettlement, from "human rights" groups to environmentalist groups, has devoted thousands of pages of articles to the plight of the farmers in this region, and the failure of the government to adequately provide a new life for them. There have even been warnings that dissatisfied peasants may rise up in violent revolt against the authorities.

There is no question that the resettlement is an enormous job. The reservoir region behind the dam will inundate 17,160 hectares of farmland, and 3,867 hectares of riverside land will be flooded. It is estimated that 34.8 million square meters of rural and urban houses are below the inundation line. Also, land will be lost to the construction of roads, electricity transmission lines, communications lines, and other infrastructure.

According to one estimate, between 1949, when the People's Republic of China was founded, and the mid-1980s, more than 10 million residents have been affected by the building of reservoirs and other hydrological projects. The policy initially was to compensate them with a one-time payment to make up for the property they were to lose. But because there were not adequate opportunities for new work for those who were relocated, when that payment was

exhausted, the relocated individuals had to turn to the government for help.

The one-time compensation policy has been replaced with the policy of "population relocation for development," the goal of which is to raise the standard of living of the relocated population, by providing employment and better living conditions after the move. In a development-oriented policy, the resettlement should be integrated with the development of the economy, the exploitation of resources, and construction in the reservoir region to increase productive capability, improve the living standards of the relocated individuals, and raise the environmental quality.

Today, one sixth of the total population in the region from which people will be moved, roughly 3 million people, is below the poverty line. Because about one quarter of the land that is cultivated along the gorges exceeds a 25-degree slope (cultivation on which has now been forbidden), the soil is heavily eroded. According to a 1982 census, in Wan County, a district with 7.5 million people, there were only 13 secondary-school or university graduates per 10,000 population, whereas the national average is 44. The illiteracy rate of the population over the age of 12 was 31.9 percent.

Resettling—and Upgrading

Traversing the Yangtze River, it is plain what the government's plan for resettlement is. Above almost each settlement, or small town of old, and often dilapidated houses and small industries, entirely new cities are appearing, near the tops of the mountains. New roads, schools, health facilities, power lines, and housing are under construction. It is estimated that about 57 percent of the population in the inundation zone are urban dwellers, who could be resettled along with the relocation of the cities or towns.

Hillside slopes that are now farmed using the power of water buffalo and hand labor, and are fertilized with human and animal excrement, will be replaced with more modern farming methods and technology. But there will still be a gap between the amount of grain and basic foodstuffs that can be produced on the available land, and the number of farmers that will be displaced. The government planners expect now that 60 percent of the farmers will remain in farming, and the other 40 percent will be absorbed into secondary and tertiary industries. These industries will take advantage of the mineral resources, such as phosphorus, salt, and lime in the valley, which can serve as raw materials for chemicals, fertilizer, and building materials industries. This will require a dramatic upgrading of the education and skills of many of the valley's farmers.

In May 1999, the Chinese government made another important change in its relocation policy for the dam. China has decided to relocate 125,000 rural people living in Chongqing City, who will be affected by the rise in the level of the Yangtze River there after the reservoir is inundated, to 11 regions in the eastern coastal provinces over the next nine



Yangtze Three Gorges Project Development Corporation

◀ Before construction could begin on the Three Gorges Dam, preliminary infrastructure, such as roads and bridges, had to be built. The Three Gorges Project expressway is the pathway to bring materials to, and take excavated materials from, the dam site. A training center was also built, to train the 40,000 workers on the dam project in dozens of new skills.

Xiling Yangtze Bridge (below), opened in 1996, is located 4.5 km downstream from the dam site, and is a main road across the river.



Yangtze Three Gorges Project Development Corporation

years. Of the total, Shanghai, at the mouth of the Yangtze on the East China Sea, will take 5,500 people, all from one county in Chongqing, and the first group of 639 farmers and their families arrived there in mid-August. In total, *China Daily* reported on August 18, 2000, 227,000 people have been moved out of the Three Gorges Dam area so far. A given portion of the income from the hydroelectric production at the dam will be returned to the relocatees in other parts of the country, and the rest to the reservoir region for construction.

When the government announced this change in mid-1999, Prime Minister Zhu Rongji also voiced concern about the "misuse" of funds that have been given to local communities to build new housing and facilities for those who are relocated. Corruption by local officials has been given a public airing, with severe penalties imposed on those who are taking public money for personal gain.

Most of the Western press has stressed only the problems, and vastness of scale, of the resettlement program. But during an interview with Wan Jiazhu, Vice President of the China Three Gorges Project Corp., on August 11, 2000, reporter

Martia Sharp from *Star Weekly* in Germany remarked: "In Germany, moving even 100,000 people is impossible, whereas the TGP [Three Gorges Project] will move more than one million. May we say Chinese people have a sense of taking into account the interest of the whole?"

Wan Jiazhu replied, "That is right." When the dam was being planned, he said, "representatives of the upstream area [who will be moved] investigated the middle and downstream area. They understood that in the case of a large flood, people in the downstream plain area would have no way to escape [no hills to mount]. They thought it would be worth it to sacrifice some [of their] interests."

Asked whether the burden is "quite heavy" in being the Vice President of the Corporation, and a water resources expert, Wan Jiazhu replied,

We Chinese people have studied TGP for more than 70 years. Several generations of engineers expended the painstaking labor of their whole lifetime [on this project]. I have participated in the study of this project for more than 30 years; I am the third generation. I am inspired with enthusiasm, and feel my burden is very heavy, and I will do my best for the Three Gorges Project.

Real Environmental Concerns

In addition to making the most important environmental improvement—changing the lives of the people—the Three Gorges Dam is part of an overall policy to improve the environment of the Yangtze Valley, including the control of the approximately 500 million tons per year of silt that course down the river. Mountainside farming will be replaced with terraced fields to preserve the top soil. Reforesting the mountains to reduce the water runoff and erosion has been under way, and will accelerate.

The possibility of the collection of silt in the huge reservoir to be created by the dam has been a main objection by the dam's opponents. Problems of silt buildup at the Aswan Dam in Egypt, and others around the world, have added to this concern. According to the Chinese, extensive and detailed studies on sedimentation in the reservoir region began in the early 1950s, and concern has increased, as the existing reservoirs and water diversion areas have been filling with silt. The successful solution to the possibility of the silting of a dam's reservoir, achieved with the Yangtze Gezhouba Dam has provided 18 years of experience on how to solve such a problem.

Historical data suggest that the amount of silt content in the Yangtze River cannot be determined by examining only a few years' data, because the silt content can change dramatically, depending upon precipitation and its distribution in the region. The sediment load, for example, was 361 million tons in 1986, 320 million tons in 1992, and 210 million tons in 1994, with higher years in between. Based on more than 40 years of observations, sediment discharge averages about 526 million tons per year.

Unlike other dams, where the water storage for flood control is essentially static in non-flood years, and silt builds up year after year, the water in the Three Gorges Dam reservoir, which is not a lake but the widened river, will be raised and lowered throughout the year, to make room for flood waters

in the spring, and to increase the flow downstream during the dry winter period.

During flood periods, between June and September, when 84 percent of the sediment comes down from the upper reaches of the river, the dam will release water downstream so that the reservoir can remain able to store flood waters at a height of 145 meters. Sediments will be flushed out through the sluice gates with the water when the flow of the Yangtze is high. The remaining sediment will be kept in dead storage.

At the end of the flood period, when there is less sediment content in the water, the reservoir will be impounded for power generation, and for aiding navigation, at the 175 meter level. Toward spring, the water level in the reservoir will be lowered again to the flood control level, at which time the sediments deposited in storage will be flushed out with the increased water flow.

The operational mode is to "store clear water but release muddy water." In this mode, it is estimated that after about 100 years, when a balance is reached between deposition and flushing of sediment, 86 percent of the flood control capacity of the reservoir, and 92 percent of the active storage of silt, will be preserved.

David Hall, who directs the TVA's work in China, stated in an interview, that regarding silt,

there are ways to deal with it. We have silting in reservoirs across the United States in varying degrees. A lot of it depends upon the types of terrain that the river flows through. The more vegetation you have, the less erosion, and therefore the less silt coming into the reservoir. But at TVA we have a small reservoir that has silted up. It was not worth it to us to go to the expense of removing the silt and keeping the reservoir open.

In China, silting tends to be a larger problem; we're fortunate here, in that we have lush vegetation, and TVA has taken action to reforest lots of areas, and in the 1930s and '40s and '50s, we were helping to change farming techniques, and lots of things prevented soil erosion, which keep us from having our reservoirs silt up. In China, there is not a lot of vegetation, and there are still farming techniques that lead toward erosion. Silting is a problem any time you build a dam and slow the flow of the water. There are techniques for flushing the silt through the dam, and there are ways of designing the structure to minimize the silting. The Chinese say, "We understand silting and we have taken it into account using the best expertise from around the world."

Putting People First

Other "environmental" objections center on the impact this great water project will have on "endangered species," and other non-human forms of life. The Chinese have taken a clear stand on the issue, by putting people first. Until the 1960s, this was also the perspective of the builders of great projects in the United States, and around the world.

The Chinese describe the Yangtze River as "China's treasure house of freshwater aquatic resources." Although there are more than 1,000 aquatic species in the river, including 370 species of fish, what is important is that freshwater fish



Marsha Freeman

The White Emperor City, one of the cultural relics, will remain as an island when the surrounding area is flooded.

production in the river accounts for more than half of the nation's total, and is an important source of protein. These include, in particular, black carp, grass carp, silver carp, and bighead fish, described as the "Chinese Four Family Fish."

Changes in the flow of the river, the deposition of sediment, and other factors will influence the balance of fish species in the Yangtze. The experts expect that fish that move up to the higher reaches of the river to spawn and cannot navigate past the dam will decline, but that there will be an expansion of the habitats for the fish that favor living in still water, in the reservoir region. Also, some spawning fish will adapt, and not necessarily suffer a decline.

The construction of the great dam, and the reforming of the valley, on the model of the TVA, provides China with the opportunity, and the challenge, to move a large part of its population from the 19th century, into the 21st century.

Reporting on diversion of the Yangtze River, by completing the cofferdam, *The New York Times* wrote, on November 9, 1997:

Yet, like the Great Wall, the Three Gorges Dam may be as symbolic as it is practical. Although engineers on the site today described how the dam will control floods for centuries, these experts gushed even more about how the dam's tremendous scale—600 feet high and more than a mile wide—represents the nation's contemporary greatness. By insisting on an enormous size, rather than building several smaller and safer dams nearby as some engineers have proposed, the Communist Party leadership is building not just a dam but a political monument to itself. . . .

For years, opponents of the dam have thrown up "environmental" objections to the project, or questioned its "viability." But it is clear that much of the opposition, especially outside China, has been driven by opposition to the economic devel-

opment policies of the government, more than to the dam itself.

"It's because of politics, not technical problems, that they are against the dam," Three Gorges chief engineer, Gan Weiyi stated. He spent two years at Northwestern University researching the project before construction began. "I know it can be done," he said, "because I studied dams in America."

Preserving a Cultural Heritage

The Yangtze, together with the Yellow River, is one of the great sources of the origins of Chinese civilization. Some remains go back as far as 600,000 years ago, when so-

called Lantian man inhabited the area. Remains from 100,000 years ago, when a group of hunters inhabited Hubei province, have also been found. Early forms of agriculture date back to 6,000 B.C. Many new sites and cultural discoveries have been made in the archaeological work where the great dam is being built. As much of the area will soon be under water, it is of prime concern to save as many as possible of the cultural artifacts before the area is inundated.

There are an estimated 108 sites of important cultural and historical value in the area of the Three Gorges Project. Some of these sites are located above the 175-meter water mark of the new reservoir, and will not be touched. The famous White Emperor City (Baidicheng) that is now on dry ground, 180 meters above the river, will remain, and become an island, surrounded by rivers on three sides. But many are not above the water mark.

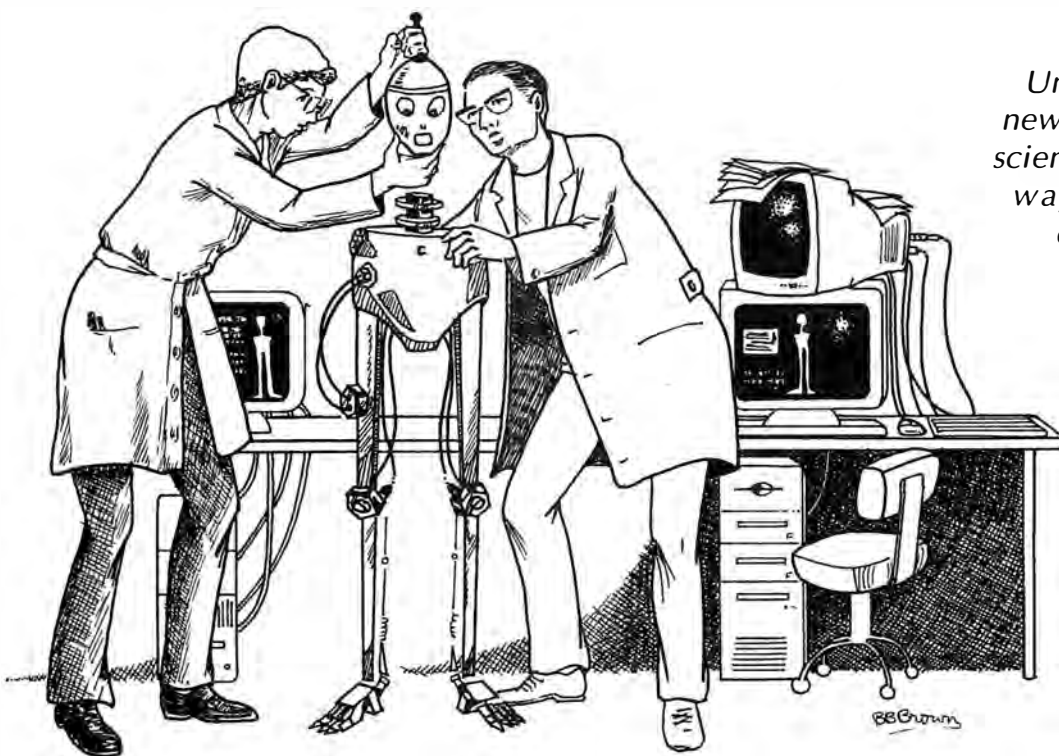
Some of the relics, including entire buildings, like the Zhangfei Temple at Yunyang, will be removed from their present site, to a higher location or to a museum. Some of the tablets found carved on stones in the river will have to be reproduced or protected. The key question at this point, is the amount of money that will be available for such preservation work from now until the area is inundated. Since this is such an important treasure, not only for China, but for the world, one would hope there would be more resources put into the preservation project from the international community. In a very real sense, it is a race against time to save those artifacts that can be saved.

The completion of the Three Gorges Dam, at the end of the first decade of this century, will open a new era in the economic development of China, and will provide an example to other developing countries of how Great Projects transform a nation. It will also stand as one of the greatest legacies of the TVA.

William C. Jones is the Washington Bureau Chief for Executive Intelligence Review, and Marsha Freeman, his wife, is an Associate Editor of 21st Century. They toured the Yangtze earlier this year.

Where Do We Attach The Head?

by Lyndon H. LaRouche, Jr.



Until a fundamentally new approach is taken to scientific work, there is no way the AIDS epidemic can be effectively countered.

claimed success was clearly not.

Perhaps the second big mistake, was the decision to make "Doctor Ike" look like a living human being: sort of. The compromises were perhaps inevitable, the tensions between the Committee and the Nerds being what they were. Take, for example, the decision to attach the head

"It," as the laboratory's night-janitor described that eerie contraption, was known as "Doctor Ike," a marvel of blended genome patent-work and silicon. Each sub-assembly had been duly benchmarked, and outsourced for cost-savings, with each step of the assembly carefully plotted by the World-Wide Committee. At the official unveiling, the Committee had presented it as the definitive breakthrough to the Arrival of the Age of Artificial Intellects (AAAI). The Committee named the final result "Isaac Galileo Newton," but the Nerds, who assembled the thing, referred to it as "Doctor Ike."

The initial claims were definitive, but, as time passed, the

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of "Doctor Ike" to his midriff, and the addition of a functionally unneeded rectum-port, as what one Committee member referred to wryly, as "a mere air of verisimilitude." There were other complications.

The net result was, at its least worst, that nothing was really in the right place, neither from the standpoint of aesthetics, nor function. Speaking plainly, "Doctor Ike" was both ugly, and, as a problem-solver, worse than useless. For that reason, the Nerds liked him all the more; as the seasoned Committee member, speaking *sotto voce*, made the point, the Nerds took him for one of their own.

The lesson which was finally, one might say belatedly, learned from the "Doctor Ike" project, was, that it was most fortunate, that neither that Committee, nor those Nerds, had had anything to do with the earlier designing, and building of the Solar System. You might say, the very name of the project doomed it from the start; no system designed in the spirit of either Galileo, or an Isaac Newton, would ever, actually work

as specified. It had been a snipe-hunt, from the start. That had been the first mistake. The folly of the "Doctor Ike" project was systemic.

'Doctor Ike' Is a Typical Case

The relevance of the example of this case, that of "Doctor Ike," is pointed up by the implications of a recent CIA report, the one underscored recently by the U.S. National Security Council.¹

For reasons which my associates and I have stressed, repeatedly, since my first policy-memorandum on that matter, issued back in early spring 1973, the world now faces a complex of threats from so-called AIDS and other epidemic disease, which constitutes, in effect, an active, major strategic security threat to the U.S.A., among all other nations. The CIA report repeats, essentially, the general arguments which my associates and I have issued repeatedly during the course of

"By definition, living processes do not conform to the reductionist's choice in statistical-thermodynamical mathematical methods."

the recent 27 years, including our mid-1980s assessment of the so-called AIDS pandemic.

In addition to the traditional measures, learned largely from the modern military medicine of total wars, measures which are needed for a global public health mobilization against this present strategic security threat, the world urgently requires the opening of new dimensions of scientific work, to supplement, and even largely supersede, the methods currently used for countering deadly combinations of pathogens of both old and new types and varieties.

The roster of relevant, much needed terminology, features such terms as "biophotons." The latter term, by itself, takes us into a new dimensionality of biological and related experimental systems, as the work of Bernhard Riemann gave more exact meaning to the proper scientific use and application of the term systemic. Thus, in the setting of this strategic security threat, for the United States and other nations, the urgency of the problem does not permit scientists and relevant others to continue their customary, actually, childish prattle about "generally accepted classroom methods of mathematical physics."

Specifically, in dealing with certain among the relevant aspects of living processes, we are operating in a systemic domain which does not permit reliance upon those varieties of mathematical physics, the which have been developed as subjects of Clausius-Kelvin-Grassmann-Helmholtz-Rayleigh-Boltzmann statistical thermodynamics. By definition, living processes do not conform to the reductionist's choice in statistical-thermodynamical mathematical methods. In approaching the kind of challenge which the CIA report implicitly specifies, the subject-matter is comparable to the case I make

for defining non-linear transformations in physical-economic processes.

Essentially, there is nothing in the CIA report which I have not personally stated, repeatedly, to be the global nature of the problem, over the course of the 1970s and 1980s. In my attacks on the IMF's and related policy-dictates imposed upon developing and other nations, I have warned explicitly of the epidemiological threat, and related increases of morbidity being produced by such presently continuing, policies of practice. The difference in the situation today, as marked by the CIA report, and the emphasis placed upon it by the U.S. National Security Council, is the outcome of what the IMF and others have done to Africa, for example, where the effects of the cruelty inflicted upon that continent, have now reached the level of being an undeniable, immediate, epidemiological, and related threat to the national security of the U.S.A. itself.

This now global and immediate threat, requires a reversal in all trends in U.S.A. health-care policy, since the initial introduction and adoption of the HMO law, during 1971-1973. We must restore the depth of defense of public health, which we had learned from the experiences of total wars over the period from the U.S. Civil War, through the experience of World War II and its aftermath, reversing every recent politically imposed trend in U.S. health-care policy, for example, since the mid-1970s. Anyone who opposes that, is an enemy of U.S. national security.

That summarizes what is merely the most obvious, first level of response required by the situation described in the CIA report. That will not be adequate for dealing with the new quality of threat which has emerged over the recent quarter-century. The fostering of new systemic thinking about the threat, and the methods which must be mustered to combat it, are now of the highest priority, for every nation on this planet.

It is time to attack the conventional academic evasiveness on the matter of defining the relevant classes of problems properly classed as systemic.

Systems: Plato to Riemann

The strict meaning of the term mathematical-physical system, is that defined in Professor Bernhard Riemann's famous 1854 habilitation dissertation, the work which completed Carl Gauss's development of orderable series of what are termed hyper-geometries, or multiply-connected manifolds. The relevant significance of that use of the term system, arises in the concluding portion of that Riemann dissertation. There, Riemann supplies mathematics (geometry) with a new, strictly experimental-physical basis.

Riemann's revolutionary discovery brought to an approximate completion, a long history in the development of mathematical physics. For our purposes here, the most relevant highlights of that development, feature the names of Plato; Nicholas of Cusa; Cusa followers Luca Pacioli and Leonardo da Vinci; follower of Cusa, Pacioli, and Leonardo, Kepler; Leibniz; Gauss; and Riemann. The rigorous use of the term system, emerges from tracing that historical process of development marked by that series of names.

The consequent, literate use of the term system, empha-

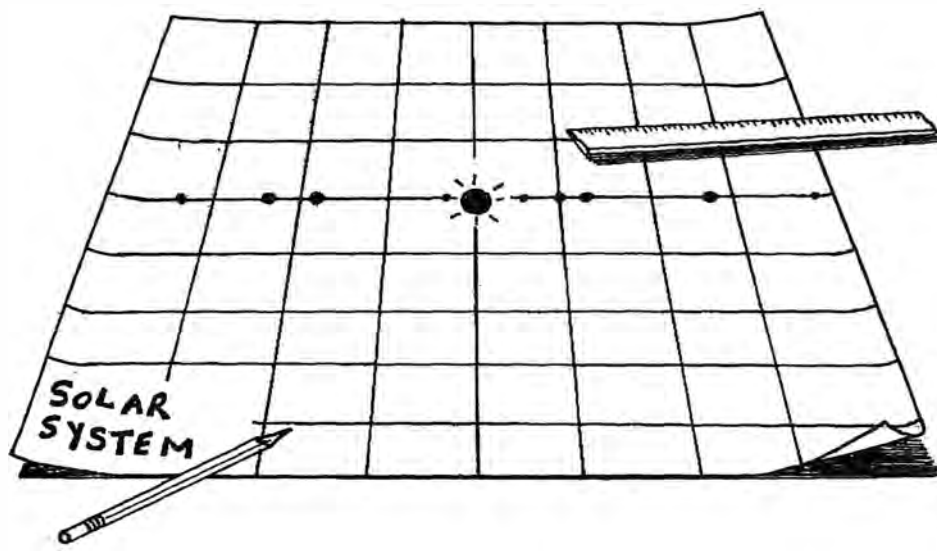
1. "The Global Infectious Disease Threat and Its Implications for the United States," NIE 99-17D, January 2000, unclassified CIA report.

See also "AIDS and Infectious Diseases Declared Threat to U.S. National Security," by Colin Lowry, *21st Century*, Fall 2000, p. 13.

sizes the axiomatic difference between so-called *a priori* geometries, such as those of commonplace secondary-school Euclidean geometry, and a geometry, that first defined by Riemann's habilitation dissertation, whose axiomatic dimensions of space, time, and matter, are based strictly upon evidence of what are best identified as unique physical experiments.

Keeping the CIA report in the corner of our mind's eye, let us begin by focussing on the most crucially relevant feature of the work of Riemann. Then, trace the development of that conception from, Plato's *Timaeus* dialogue, through the specifically relevant work of Cusa, Pacioli, and Leonardo, into the work of Kepler, and from there, through Leibniz, to Gauss and Riemann. Having thus reached the point of Riemann's work, proceed to what I have to add of relevance to the situation today.

Were we to assume, that the definitions of mathematics and geometry, began at approximately the level of today's



generally accepted secondary-school and university-undergraduate classroom mathematics, the term system would appear to be little more than a literary convention. The axiomatically significant use of that term begins, once we seriously doubt the arbitrary, childish presumption, that space and time are extended, self-evidently and infinitely, in simple, linear, straight-line directions. The beginning of the modern, functional notion of a system, is found in a topic featured in Plato's *Timaeus*, in which Plato emphasizes a discovery developed by his Academy at that time. The strictly functional notion of a system arises with the demonstration, as in that location, that physical space-time is, functionally, a characteristically curved space-time, not straight-line space and time.

The *Timaeus* is not the first location in which Plato takes up that matter; but, it is the most relevant from the standpoint of that later work of Cusa, Pacioli, and Leonardo, which leads directly into the chain of discoveries by Kepler, Leibniz, Gauss, and Riemann. The critical proof, that there exist physi-

cal space-times which are characteristically, which is to say axiomatically curved, rather than defined, elementarily, by pair-wise action at a distance along straight-line pathways, is the beginning of all serious discussion of axiomatically pervasive, systemic distinctions among differing qualities of real processes. It is Plato, for example, who emphasizes the systemic differences of this sort, between non-living and living processes.

Plato demonstrated two closely related, but distinct such points. First, that the astrophysical universe is curved, not four-square. (For example, try to map the distances as measured on a flat map of the Earth, in correspondence with the actual distances on the surface of the globe.) Second, however, he also demonstrated, that the difference between living and non-living processes, is that living processes are, systemically, subjects of the kind of curvature implied by the so-called Five Platonic Solids, as Plato followers Pacioli, Leonardo, and Kepler did later. Such differences in curvature, give us the most elementary mathematical definition of distinctions in the geometry of physical systems.

Kepler began where the known work of his predecessors, Plato, Eratosthenes, Cusa, Pacioli, and Leonardo apparently stopped. The modern scientific notion of systemic characteristics of entire systems, centers around Kepler's writing of his *New Astronomy*, the work which Isaac Newton attempted, rather unsuccessfully, to plagiarize. The turning-point is found, most simply and directly, by viewing all of Kepler's development of the foundations of modern astrophysics, as pivoting around

the implications of his approach to the measurement of the Mars orbit.

The significance of Kepler's contribution to our modern understanding of systems, is highlighted most efficiently, by considering the fact that Newton's so-called laws, which were simplified versions of what are commonly misnamed "Kepler's three laws," led poor Newton into the systemic paradox of the so-called "three-body problem." This poses the question: why does Newton's bowdlerized version of Kepler's discoveries, result in a "three-body" paradox which does not exist in the original astrophysics, Kepler's, from which bleary-eyed Newton poorly copied? That deserves to be regarded as typical of the systemic fallacy of Newton's system.

Now, we are on the track of discovering why the Nerds ended up attaching poor Doctor Ike's head to that dummy's midriff.

Kepler's astrophysics defines the lawful ordering of the entire Solar System as determined by a single, systemic

principle, rather than assuming that there is some simple abstract law, such as assuming, falsely, that Galileo's "pairwise action-at-a-distance" gimmick, which can be freely moved about in four-square space-time, could be adopted, to determine the interrelationship among the Solar bodies. Kepler defined the orbits as determined by harmonic principles consistent with, and pervasively subsumed by the characteristic curvature of a Solar System in which the Sun was located at one of the two centers of an ellipsoidal field.

One feature of Kepler's work would, nearly two centuries after *The New Astronomy*, totally vindicate Kepler's work, against the attempted revisions by Galileo, Newton, and their followers. That proof came in the form of Gauss's determination of the orbit of the asteroid Ceres, to conform to harmonic-orbital values projected for a missing, disintegrated planet, which Kepler proposed must have lain, in the past, between the orbits of Mars and Jupiter.

The importance of the latter connection, is not merely that Gauss's work verified Kepler's method experimentally. The point is, that Gauss's method was based on the successive work of Leibniz and others, in their continuing the related work which Kepler had bequeathed publicly to future mathematicians.

The crucially relevant point is, therefore, the following.

Kepler's method defined a principle of curvature for the internal "structure" of the Solar System as a unified whole. When this method is contrasted with that of Galileo and Newton, one recognizes the same issue posed successively by Plato's *Timaeus*, and Cusa, Pacioli, and Leonardo before Kepler. Newton's astronomy is Cartesian; Gauss's and Riemann's, like Kepler's and Leibniz's, what is to be strictly defined today, as that of an anti-Euclidean, multiply-connected manifold, a so-called physical hypergeometry.

The Principled Difference

As the most ancient known Zodiacs indicate, mankind's first systematic astronomy measured the angular changes, not assumed distances, in the positions of celestial bodies. There was no arbitrary assumption of straight-line distances, only angular measurements, implicitly reducible to approximations of a spherical universe. The significance of the related role played by the Five Platonic Solids in Plato's dialogues, is that the derivation of those solids as characteristic of spherical physical space-time, showed that we have means for determining, conclusively, as a matter of principle, whether the universe is organized as a four-square or (approximately) spherical universe. Indeed, as Eratosthenes' measurement of the Great Circle of Earth, and estimates of some intra-Solar distances, as by aid of eclipses, show: well-defined, principled notions of adducible distances, were developed as by-products of investigations of the systemically distinct curvatures of the relevant processes.

The same tactic presents life as consistent with the universe, and non-living processes as inferior to living ones. The same method defines Classical beauty, as Plato and the poet John Keats define it, as superior to non-Classical forms of art. These notions are already notions of systemic qualities of fun-

damental difference among different kinds of physical geometries.

With the continuation of this approach, through Gauss's work on asteroid orbits, or geodesy, and on general principles of curved surfaces, the root-conceptions met in Plato's work have become more richly comprehended. Riemann's revolution is the direct outcome of the state of the matter coinciding with the approaching moment of Gauss's death.

The evidence presently at hand, directs us to define the most general kinds of systems in the following way.

"We can never define the curvature of a specific physical-space-time, by ivory-tower methods of *a priori* geometry, or axiomatic algebra."

There are three primary distinctions among systems of physical behavior in the presently known universe: (1) Qualitative differences as scale is increased, or decreased, (a) from macrophysical toward astrophysical, or, (b) from macrophysical into microphysical directions; (2) the difference between living and non-living processes; and, (3) the systemic uniqueness of physical processes ordered by individual cognitive processes, relative to all other behavior of living systems.

Thus, we have, presently, four primary classes of systemic deviation from mechanical-like ordering of sense-perceived events on the scale of simple macrophysics. At specific levels of scale, there are systemic changes (for example, molecular, atomic, nuclear, and so on). Living processes are distinguished as classes, in a similar fashion, as are cognitive processes. At the base of each these four classes, so to speak, there are multiply-connected arrays of experimentally validated universal physical principles, known, or yet to be discovered.

Respecting each universal phase-space so defined, there is a measurement of curvature, which coincides with the validation of any multiply-connected array of the principles presumed to be effective in that phase-space. Experiments which test for the necessary inclusion of any one such proposed universal principle, within that phase-space, are unique experiments, which thus validate the existence of the principle. Those experiments are distinguished from, and superior to the frequently sophistry-ridden forms, those of mere classroom and related forms of demonstration-experiments.

As Riemann emphasizes, within the concluding portion of his habilitation dissertation, we can never define the curvature of a specific physical-space-time, by ivory-tower methods of *a priori* geometry, or axiomatic algebra. Those curvatures must be defined and validated by unique experimental methods which show the necessary existence of the relevant principle within the phase-space in which it is suspected to be efficiently situated.

The fact that what is otherwise the same apparent quality of material, may be encountered in two or more of the four

classes of axiomatic phase-spaces I have listed above, poses such questions as: how must we distinguish, in these terms, between living and non-living processes? It is precisely in such matters, that the difference between some material as functionally part of a living process, or not, should attract our attention. How must we distinguish, so, between the behavioral characteristics of living processes in general, and living processes expressing the cognitive characteristics unique to the human species?

The general answer to such types of questions, is that there must be some functional difference in the characteristic of a process operating under the regime of one class of phase-space, as compared with the characteristic of what is otherwise ostensibly the same material, operating under the regime characteristic of a different class of phase-space. Such, of course, are the measurable differences, by means of which validatable universal physical principles are to be incorporated into an axiomatic class of phase-space. Such are the implications of an acceptable standard for unique experimental proofs of principle.

These characteristic differences otherwise define a systemic characteristic, as Kepler defines the entire Solar system as subject to a single, pervasive, set of orbital-harmonic characteristics. There lies the awesome importance of Gauss's Keplerian solutions for the asteroid orbits.

Bring Back the Entrepreneurs!

Capitalism, as defined by the pro-satanic Mont Pelerin Society, the American Enterprise Institute, and Ayn Rand fanatic Alan Greenspan, is a giant, pro-feudalist fantasy and fraud. The timely imperative today, is to purge our agriculture, manufacturing, and government of the C.E.O.'s, and bring back the entrepreneur. Free civilization from the grip of the Invisible Hand of that Great Pickpocket which serves as the puppet-master for such poor wretches as Lady Margaret Thatcher, the modern New Babble-On's Magicians. What is urgent, is to free society from the neo-feudalist high priests of infinitely licentious Bernard Mandeville and François Quesnay's *laissez-faire*.

The object of a viable form of agro-industrial economy, is constant technological progress of the type which is dependent absolutely on an ongoing flow of validatable discoveries of new universal physical principles. Or, to state the same thing in other words, on an ongoing flow of progressive changes in the characteristic curvature of the rate at which mankind's potential relative population-density is increased, in the universe, per capita and per square kilometer of the Earth's surface-area.

It is solely from gains in curvature defined as increase of potential relative population-density, per capita and per square kilometer, that true gain, legitimate profit, is defined, and in no other way. This gain never occurs through mystical tricks of invisible hands; it occurs solely through willful innovations to the effect of increasing mankind's power, per capita and per square kilometer, in and over the universe.

In our American System of political-economy, as Hamilton, the Careys, and List defined it, and as I have raised that knowledge to a higher, more powerful level for practice, the

function of the state is the following.

1. To promote the general welfare of all the living and their posterity, as the sole basis for the legitimate functions and authority of government. This is the universal principle of natural law, to which all government, and all law-making is properly subordinate.

2. To create the preconditions for those forms of technological progress through private enterprise, which will increase the potential relative population-density of the human species, per capita and per square kilometer. This means developing the conditions of the entire land-area and of the population, in such ways as will foster both such general welfare and the potential for useful forms of private enterprise.

3. To give preferential consideration to those kinds of private enterprise which do, by their nature, foster the relatively higher rates of scientific and technological fecundity of the total economy's rate of increase of its potential relative population-density.

4. Any contrary standard for performance and for making public policy, is folly, and probably also an abomination to be abhorred. In other words, any contrary policy were a systemic folly.

In summary, therefore, the situation is this.

The U.S.A. requires no C.E.O.'s, as such curious creatures are customarily defined and much overpaid today. We require a return to power of the private entrepreneurs, as in the tradition of the Thomas Edison, who proved infinitely wiser, and a more electrifying contributor to our nation's cultural life than his envious, science-hating critic, that pseudo-literate, quasi-gentrified co-thinker of the Nashville Agrarians, *The New York Times*.

To that end, we require the development of the basic economic infrastructure of our land-area and of the cultural conditions of social life, the which are in accord with high rates of such increase of the physically defined productive powers of labor. This public responsibility for ensuring the suitable development of the potential for growth represented

"It is solely from increase of potential relative population-density, per capita and per square kilometer, that true gain, legitimate profit, is defined."

by the development of all of the land-area and all of the inhabitants, creates the indispensable preconditions for the proper role of leadership provided by the true entrepreneur as opposed to today's rentier style of C.E.O. in the private sector.

In the private sector, we require relatively high rates of net capital formation (after calculating for depletion and attrition), as capital formation is defined in physical, rather than financial terms. We favor credit, banking, and taxation policies which encourage high rates of such net capital formation, as to be measured per capita and per square kilometer; we encourage relatively high rates of capital formation, insofar as this reflects increase of potential relative

“We require a return to power of the private entrepreneurs, as in the tradition of Thomas Edison.”

population-density through the functions of such enterprises.

Restated summarily, these considerations are subsumed by a commitment to a systemically high rate of increase of the potential relative population-density of the society, and of humanity as a whole. This expresses an efficient commitment to the promotion of the general welfare for the living and their posterity.

The focal point of the system of statecraft so defined, is the intersection of fundamental scientific and technological progress, a point of intersection which coincides with the required systemic characteristic of the society as a whole. The functional characteristic of that point of intersection, is located in the interface between fundamental scientific progress (that is, the discovery of validatable new universal physical principles) and the quality of machine-tool design-work which overlaps the construction of the proof-of-principle experimental apparatus, upon which the experimental validation of newly discovered physical principles depends.

As the case of the circles associated with Philadelphia’s Henry C. Carey and Alexander Dallas Bache, situates the 1861-1876 U.S. economic miracle, and the resulting emergence of such results as the work of Thomas A. Edison, this interface of fundamental scientific discovery and immediately related machine-tool development, is the

essence of effective entrepreneurship. The form of private ownership associated with that quality of interface, is what our government should prefer to protect and foster, against all opposing, predator forms of private economic activity.

Precisely there, is where Doctor Ike failed as miserably as that project did. Once must never simply paste systems together according to bench-marking, outsourcing, and related foolishnesses. If this precaution is overlooked, one never knows where and when the body’s sundry organs will come out, or for what purpose.

Above all else, there is the human factor, which the World-Wide Committee, and its Nerds, alike, never considered. Indeed, they seem to have hated even the mention of that topic. The highest known systemic ordering in the universe, is that defined by the ordered self-development of those cognitive processes of the individual human mind, by means of which, man, and no other species, increases its species control within and over the universe at large. The propensity of the universe to obey such commands, when expressed as systemically validated discoveries of principle, is the highest known ordering of every other process in the universe yet known, or knowable, to man.

What the Nerds hated so viciously, was the proposition, that they could not succeed in building a mere machine which could out-think, and enslave mankind. The satanic lust to build an electromechanical God-machine, the goal of those satanists known as the fanatics of “information society,” was the new, doomed Tower of Babel, which the Committee proposed, and its Nerds set out to build. So, Doctor Ike’s head, like certain other parts, came out in inappropriate places. Such incidental incongruities were inevitable; but that was not the worst of the matter. “Information society,” the cult which prefers to worship Gaia’s dirt, rather than the Composer of this universe, is but another in the long list of ill-fated insolences of the satan-worshippers of Babble-On. Once, the satanists worshipped idols of gold; today, the idols are less vulnerable, and cheaper; they exist only in the realm of virtual unreality.

The Nerds have always hated God. Since they never knew God personally, they directed their hatred against a more accessible target, the human species and that species’ systemic characteristic, cognition.



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PROFILES IN PORRIDGE



The Artificial Reputation Of John von Neumann's Intelligence

by Ralf Schauerhammer

Von Neumann has been lauded as "the Man of the Century," and the "inventor of the computer," but his so-called accomplishments are computed out of thin air.

The *Financial Times* of London celebrated John von Neumann as "The Man of the Century" on Dec. 24, 1999. The headline hailed him as the "architect of the computer age," not only the "most striking" person of the 20th century, but its "pattern-card"—the pattern from which modern man, like the newest fashion collection, is cut.

The *Financial Times* and others characterize von Neumann's importance for the development of modern thinking by what are termed his three great accomplishments, namely:

(1) Von Neumann is the inventor of the computer. All computers in use today have the "architecture" von Neumann developed, which makes it possible to store the program, together with data, in working memory.

(2) By comparing human intelligence to computers, von Neumann laid the foundation for "Artificial Intelligence," which is taken to be one of the most important areas of research today.

(3) Von Neumann used his "game theory," to develop a dominant tool for economic analysis, which gained recognition in 1994 when the Nobel Prize for economic sciences was awarded to John C. Harsanyi, John F. Nash, and Richard Selten.

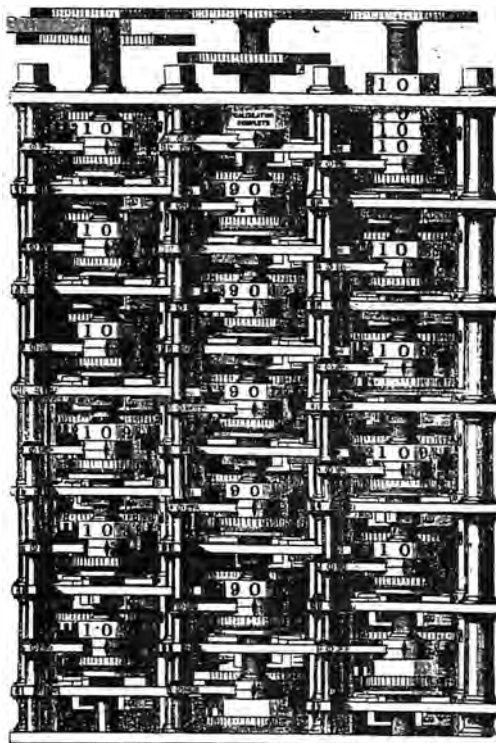
I shall examine these three millennial accomplishments in turn, the better to judge whether John von Neumann really is such a "Man of the Century," as the *Financial Times*, and others, claim.

Accomplishment No. 1: Invention of the Computer

"Computer" is one of the most common words in use today. But what is a "computer," really? The word obviously comes from the Anglo-American language group and denotes, or denoted, until the end of the World War II, a person who carries out calculations according to a given scheme (in bookkeeping, for example, or in a technical office). This person usually used a "calculator." Today, when we say "computer,"

we do not mean a person, but a calculating *machine*, which is not only able to perform calculations according to an arbitrarily given calculating scheme, but can manipulate the most diverse kinds of information and data in some desired way.

So, we see that the objects we designated with certain words, change with the development of technology. That is why it is not enough to consider only the function of a technology if we want to judge how certain inventions have unfolded; it is also necessary to investigate how the economic realization of this function was possible, in specific cycles of



British mathematician Charles Babbage, working in the first part of the 19th century, foresaw all the "organs" characteristic of a computer. Here, his "difference machine" (1822), which he followed in 1833 with an "analytical calculating automaton."

The Granger Collection

work, at a specific time. We have to consider an “evolutionary series” of this technology and pay attention to the emergence of its different “organs,” which make it what it is today, and which make it possible to develop in the direction it will take in the future.

In this context, I present a short overview of the history of the development of the calculating machine.

The idea for a calculating machine first arose in the year 1617, at a meeting of the founder of astrophysics, Johannes Kepler, and the theologian and machinist, Wilhelm Schickard. The machine was able to accomplish all four basic kinds of calculation (addition, subtraction, multiplication, and division). It had a mechanical adding function and a system of movable bars and windows, which allowed for the display of the preliminary results of multiplying two numbers, which then only had to be added together the proper number of times. The machine was lost in the turmoil of the Thirty Years’ War, and the description of it was only rediscovered in the papers of Kepler and Schickard in the 19th century.

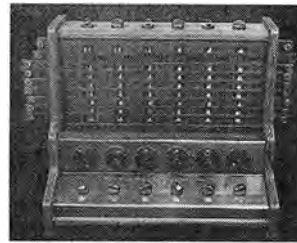
In 1642, the mathematician-philosopher Blaise Pascal exhibited in Paris a calculating machine, which was similar to that of Kepler-Schickard in certain ways. It was able only to add and subtract, and even then not with the decimal system, but in different units which corresponded to the system of monetary values at the time. The machine was developed to make it easier to count and calculate volumes of money.

Gottfried Wilhelm Leibniz took the next decisive step. He was familiar with Pascal’s work, but he already had a finished design of his own calculating machine when he went to Paris in 1672. Leibniz had invented a very crucial new “organ”—he used a stepped cylinder for entering the numbers. It was a broad gear which could be moved along the axis of rotation, on which the teeth of the gears are shifted slightly. At first, only one tooth grabs upon rotation, and if the cylinder is moved a step forward, two teeth grab, and then three, until all ten grab when the cylinder is shifted the full length of the axis. With a set of several cylinders, it is possible to generate decimal numbers of several places (by shifting the cylinder until the number of teeth corresponding to the number, grabs for each decimal place), and these can be repeatedly fed into the adding mechanism.

If the entire cylinder system is shifted one or two positions forward, the machine adds the sum 10 times, or 100 times, and so multiplication can be accomplished by means of repeated addition. Division, through a similar process, is equivalent to repeated subtraction. From that time forward, all calculating machines used this basic principle of Leibniz’s machine.

We should also mention, with respect to Leibniz, that he investigated various systems of number-notation, and recognized that the binary system, where only the numbers 0 and 1 are needed, is in fact the simplest means of representing numbers—but that advantage has a price: The representation of numbers requires a very long series of numerals, so that the number of calculating steps becomes very large. For a manual calculating machine, where a person is required to turn the crank, a higher system of numeration is more practical; for example, the decimal system.

This brings us up almost to today’s “computer,” and the development by British mathematician and inventor Charles

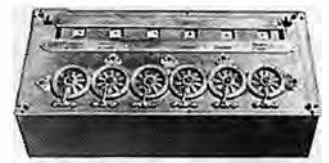


(a) Kepler model

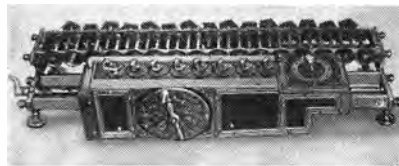
The idea for a calculating machine first arose in the year 1617, at a meeting of Johannes Kepler and the theologian and machinist Wilhelm Schickard. The machine could perform addition, subtraction, multiplication, and division. Although the description of the machine as lost in the turmoil of the

Thirty Years’ War, it was rediscovered in the papers of Kepler and Schickard in the 19th century. Here, a model of the machine.

A model of Blaise Pascal’s calculating machine, which was similar to that of Kepler and Schickard, but was able only to add and subtract.



(b) Pascal model



(c) Leibniz model

The decisive next step in computers was taken by Gottfried Wilhelm Leibniz, who developed a crucial new “organ”: Leibniz used a stepped cylinder

for entering the numbers, a broad gear that could be moved along the axis of rotation, on which the teeth of the gears are shifted slightly. Division was accomplished by repeated subtraction; multiplication by repeated addition. Later calculating machines all used this basic principle. Here, a model of Leibniz’s 1672 machine.

Why the ‘New Economy’ Is Doomed, EIR Special Report, June 2000

Babbage of the first mechanical, program-controlled calculating machine. In 1822, Babbage began to construct what he called his “difference machine,” and in 1833, he began construction of the “analytical calculating automaton.” Neither machine was fully functional, because Babbage came up against the limits of what could be done at the time in precision machining. However, Babbage foresaw all of the “organs” which are characteristic of a “computer”:

(1) an automatic calculating mechanism for all the calculating functions;

(2) a large memory storage;

(3) a control-system which used punch-cards;

(4) a unit to enter data; and

(5) a printer unit to display results.

Some 100 years after Babbage, in 1932, Konrad Zuse, an engineer, had the idea of producing a calculating machine which was conceptually similar to that of Babbage, in that it was programmable. He presented his idea in two patented designs on April 11, 1936, and July 3, 1937, and between 1938 and 1945, he built a number of machines which he named Z1, Z2, Z3, and Z4.

Zuse’s decisive step was to recognize the enormous advantage which lay in the use of binary switching elements, while

also using a dual system of numeration. This went hand in hand with the use of the logical basic functions AND, OR, and Negation, to carry out the steps of calculation as well as to display the floating decimal point. The program, for which Zuse used the appropriate expression "calculating plan," was stored on a strip with holes punched in it (or, more economically, on old rolls of film). In his patent applications, Zuse mentions the possibility of storing the calculating plan in a working memory, but this was impossible to achieve practically at that time.

We should keep in mind that Zuse built his Z1 and Z2 during the war, without any government support, and he did it in his "free time" from work. In 1940, he obtained a contract from the Aviation Testing Facility (*Versuchsanstalt fuer Luftfahrt*) to build the Z3. It was completed in 1941, and had a dual calculating mechanism consisting of 600 relays, and a memory of 1,400 relays for 62 numbers at 22 dual positions each. A multiplication or division, or the calculation of a square root, took three seconds. The Z3 was about the size of a large walk-in closet.

Three years later, in August 1944, in the United States, the MARK I of Howard H. Aiken was put into operation. This program-controlled calculator weighed 35 tons. It still worked with the decimal system and fixed points for decimals. A multiplication of two 10-position numbers took about 6 seconds, their division 11 seconds.

A little more than a year later, the ENIAC of J.P. Eckert and J.W. Mauchly was built in Pennsylvania. It took another two years for the machine to work properly. The ENIAC was the first calculator that used electrical tubes for switching elements, which added considerably to its speed of operation. Even this calculator—which took up a surface area of 140 square meters, consumed 150 kilowatts, and was equipped with more than 18,000 electronic vacuum tubes—did not realize the Zuse concept of a modern binary computer; the flip-flops, consisting of two tubes each, were used only to represent the 10 positions of a mechanical counting gear (as described in Leibniz's calculating machine). Moreover, the ENIAC was not freely programmable, and the control was accomplished by arrays of hundreds of turn-switches and cable connections.

When he set to work preparing the successor machine, EDVAC, J.W. Mauchly, one of the developers of ENIAC, mentioned the possibility, for the first time, of storing a program in a working memory, in a way comparable to that reported by Zuse in his patent writings of 1936-1937. Mauchly also mentioned the possibility of changing these calculation commands in the working memory while the program was running. If someone wanted to sketch this development in greater detail, he might look at Mauchly's report, written in June 1945, on the design of the EDVAC, in which he also described the five basic component units of a computer, as had been earlier developed by Charles Babbage.



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Courtesy of the Archives, Institute for Advanced Study, Princeton

Charles Babbage (left), shown here in an 1860 photograph, surely has a more legitimate claim to computer fatherhood than John von Neumann (right).

Now, in this short overview, we have become acquainted with all of the components—"organs" and principles—which make up a modern computer. Yet, such a modern computer, it is said, has a "von Neumann architecture." Amazing! Over the course of sketching this entire process of development, von Neumann has not appeared at all.¹

Accomplishment No. 2: John von Neumann and The Foundations of 'Artificial Intelligence'

That John von Neumann is the inventor of the modern computer, is a myth. The conditions of World War II might explain why an erroneous picture has arisen about the development of the computer. But they do not explain how this mistake endured through the 1950s and 1960s, and blossomed into the myth which prevails today. Perhaps the history of the invention of the computer just fits all too nicely with the idea that von Neumann created the foundations for "Artificial Intelligence," and that he did that with his book *The Computer and the Brain*, published in 1958 by Yale University Press.

Von Neumann claims in the Introduction to the book, "What is at stake is an attempt to find a way of understanding the nervous system from the standpoint of the mathematician." This sounds quite impressive, but the assertion is then modified in the very next line. First of all, von Neumann asserts, what is at stake is not really "a way to understand," but only a "systematic speculation about how such a way," in his opinion, "should be travelled." Second, he says, "the standpoint of the mathematician" is quite limited, because merely "logical and statistical aspects are in the foreground."

So, von Neumann says, in fact: "I am interested in a speculation about a way which one might take, to contribute to understanding the nervous system with notions of logic and statistics." Fine: But why didn't he say that from the start? This sort of introduction leads the reader to suspect that this book is about something quite different from what is claimed. And

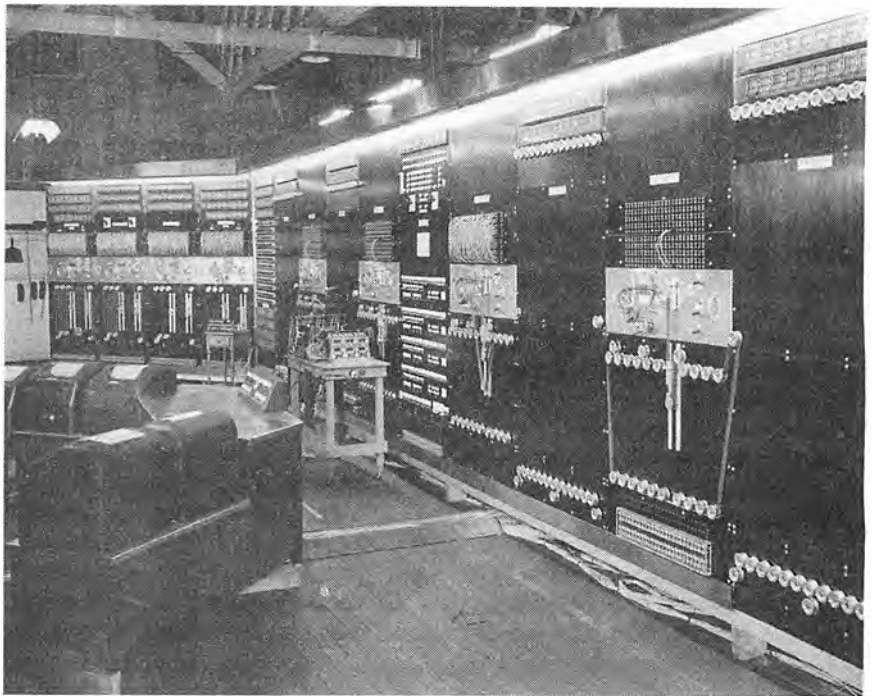
that is indeed the case.

The essential content of the book can be summarized briefly, as follows: Von Neumann describes the knowledge available at that time about computers. He explains the difference between analog computers and the digital computers that today are used almost exclusively. In analog computers, numbers are described and linked by measurable physical states (for example, electrical charge), while in digital computers, a system of numeration (today, exclusively the binary system of 0,1) is described by ordered markings.

Then von Neumann explains that the task set for a computer has to be resolved into a series of successive steps of "basic operations" (of which a computer can carry out only a very limited number). These steps may be passed through in part, but only in part, in parallel. On the basis of this procedure of resolving general problems into a few basic operations, there results the "arithmetic depth" of the process of calculation, that is, it consists of a multiplicity of steps consisting of basic operations which are minimally different from each other. That, in turn, makes it necessary to have a very precise representation of numbers, because the errors increase greatly with the number of steps in the calculation, a principle which any child knows from the game of "telephone." The greater the number of players who whisper a given message down the line, the less the final message resembles the original message.

Next, von Neumann describes the human nervous system. He says that he wants to "discuss the points in which the two 'machines' are similar, as well as the points in which they differ." He first says that data operated on in the nervous system, just as in a computer, are transported by electrical current. And he also finds a memory capacity in the brain (which should not be too surprising, given the ability of living creatures to remember things). Von Neumann compares the size, number, and packing-density of the just-developed electronic elements in computers, with human nerve cells, and he finds in the nervous system a numerical representation which is a digital-analog mixture, in which the magnitudes are represented "analog" by the frequency of particular "digital" impulses. Finally, he observes that the precision of this numerical representation, compared with the simplest computers, is very small. However, because the nervous system demonstrably functions quite precisely, von Neumann concludes: "Accordingly, the nervous system appears to use a system of representation which differs completely from the systems known from the usual arithmetic and mathematics."

Is that really the difference between the computer and the brain, the two "machines"? Hardly. The results of von Neumann's musings seem rather meager. But von Neumann was not interested in concrete results. Let us return to the Introduction of his book, where he states, "This is an attempt to



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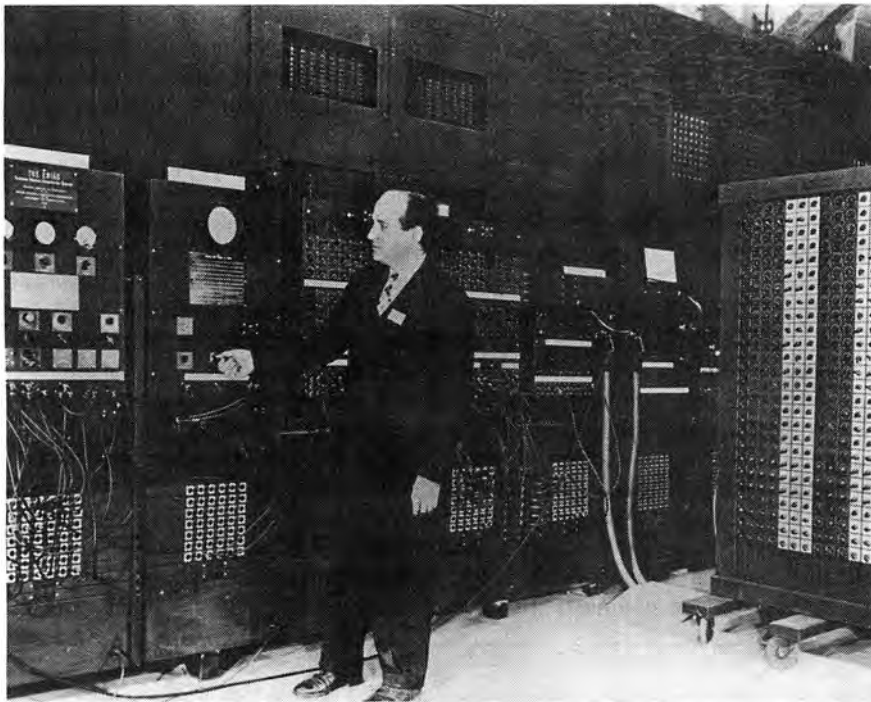
Howard H. Aiken's MARK II computer, under construction in the United States in 1947. The Mark I was put into operation in 1944.

find a way to understand the nervous system." Yes—and precisely the path which von Neumann took, cannot lead to meaningful results. It is just the wrong path, upon which people have repeatedly gone astray with new technologies in history, when they attempt to explain human beings by means of the processes of these new technologies. Such people reduce human beings to processes which human beings, as creative beings, themselves created, and they forget that, as their creators, human beings are infinitely superior to these newly created processes.

Today, we smile compassionately at the attempt which the radical "enlightened" atheist, physician Julien Offroy de La Mettrie, made to reduce human beings to a clockwork mechanism in his "L'homme machine" of 1747. But when von Neumann attempts in 1958 to compare the functions of the human brain, with the concepts and processes of the "electronic brain" of modern computers, many are paralyzed in wondrous adulation. Worse, many adopt this mechanical way of thinking about the human brain, and extend this approach, all unnoticed, to the way in which they try to explain human thinking itself—and that means, ultimately, creative thinking. It does not occur to them, when they babble about "Artificial Intelligence" and "thinking computers," that they reduce the human being, in a simplistic and decorticating way, to a machine—which could not exist at all, but for the inventive mind of the human being.

**Accomplishment No. 3:
John von Neumann's Game-Theory
Foundation of Economic Theory**

The basic document that is the basis for this vaunted accomplishment is the book *Theory of Games and Eco-*



IBM

The ENIAC, built by J.P. Eckert and J.W. Mauchly at the University of Pennsylvania in 1946.

conomic Behavior, which von Neumann authored with Oskar Morgenstern, and which was published by the Princeton University Press in 1944. The basic foundations of game-theory discussed in the book had been put forward by von Neumann in a 1928 essay, "Zur Theorie der Gesellschaftsspiele" (On the Theory of Social Games), published in the Berlin mathematics journal, *Mathematischen Annalen*. His argument elicited little interest at the time, but now, enriched by Oskar Morgenstern and the application of extreme neo-liberal economic dogmas, the old arguments fitted perfectly into the period of the onset of the Cold War.

In this connection, it is worth noting that even the *Financial Times* in its *laudatio* to "The Man of the Century" could not avoid reporting von Neumann's famous saying in 1950, "If you ask why should we not bomb the Russians tomorrow, I say, why don't we bomb them today?" The *Financial Times* explains von Neumann's anti-communism with reference to his experience as a youth at the end of World War I, when von Neumann's family left Hungary, temporarily, when the Soviet republic came to power.

Von Neumann's co-author, Oskar Morgenstern, belonged to the same liberal school of economics from which Friedrich von Hayek came, and he had spent the days after World War I in Vienna, where a socialist government had come to power. Morgenstern knew the government's economic expert, Otto Bauer, from their joint visit to the Boehme-Bawerk political seminar, and he succeeded, in nightlong meetings, in turning Bauer away from Marxism.

In the 1928 essay, in contrast to the objective-theoretical tone of the 1944 book, Von Neumann explained more directly, and with less euphemism, why game-theory is the ideal tool to serve as the foundation of liberal economic

dogma. In the earlier work, he says, "And ultimately any event whatsoever, under given external circumstances and given acting persons, . . . can be seen as a social game." Along the same lines, he also says, "The main problem of classical national economics is: What will the absolutely egoistic 'homo oeconomicus' do under given external circumstances?"

Obviously, Von Neumann reduces the notion of "classical national economics" to the liberal dogma of a Thomas Hobbes, an Adam Smith, or a Bernard de Mandeville. Mandeville, for example, represented human egoism as the decisive motive force for moral action in his 1723 *Fable of the Bees*, satirically elaborating how it is that private vices, and not public virtue, promote general well-being.

According to this economic dogma, an effective higher principle (such as the "pursuit of happiness" set forth in the American Constitution as a bedrock human right which government must protect, or Christian brotherly love), which seeks to maximize

the general welfare, is not permitted. Mathematically this means, as von Neumann correctly observes, that the mathematical methods developed for physical problems, are of no use in determining an optimum in economic theory. On the other hand, even the available methods of mathematics for calculating probabilities are insufficient for solving this "main problem of classical national economy." Chance events do happen, but the crucial point is that the persons acting develop strategies, so they do not in general act according to principles of statistical probability; they decide "freely" and "rationally," as "absolute egoists," and consider only their personal advantage. The most suitable tool for investigating this situation theoretically, is game-theory, von Neumann claims.

An oft-cited example for the application of game-theory is the "prisoners' dilemma," which shows, in fact, quite well how the method of game-theory functions and where it fails. The following situation is assumed: Sitting in a prison cell are two people (let's call them Max and Melvin), against whom the prosecuting attorney cannot prove his accusation of crime. He speaks to each of them individually, and says "So, listen up. If you both plead guilty, you won't be sentenced to five years as usual, but only four years because of your plea. But don't believe that you'll get out of here if you say nothing: I have enough circumstantial and other evidence to put you both behind bars for two years without a guilty plea. But if you cooperate and testify against your buddy, he gets five years and I'll apply the state's evidence clause in your case—you go free."

Once Max and Melvin are both back in the cell, they scratch their heads, and both of them think "rationally" as game-theory defines it, so they both think the same thing.

Let us consider the situation from Melvin's standpoint:
If I don't testify, and Max doesn't testify, I get two years.
If I testify and Max does not testify, I get zero years.
If I don't testify and Max doesn't testify, I get five years.
If I testify and Max testifies, I get four years.

Regardless of whether Max and Melvin committed the crime or not,² and regardless of whether Max testifies or not, it pays off for Melvin to testify in any case. If Max does not testify, then Melvin gets zero years instead of the two years he would get if he did not testify himself, and in case Max also testifies, Melvin gets only four years, instead of the five he would get if he remained silent.

The same calculation works for Max too, so both of them will behave "rationally" in the sense of game-theory, "absolutely egoistically," and both of them will confess to the deed of which the prosecuting attorney accuses them. So each of them will get a sentence of four years. Max is happy, Melvin is happy, and John von Neumann and the prosecuting attorney are happy, too.

This simple standard example for the application of game-theory ought to convince anyone, that the state's evidence

rules are nonsense, and likewise for the common practice of plea-bargaining. Second, it shows quite convincingly how drastically the game-theory approach collapses as soon as the participants diverge ever so slightly from the behavioral norm of the "absolute egoist." If Melvin and Max, for example, did indeed commit the crime, but do not testify against each other out of "honor among thieves," and instead remain silent, they get only two years. (For those who want to save the belief in game-theory, let it be remarked that this "honor among thieves"—self-determined but not egoistical—represents a real paradox and does not correspond to the behavior described in game-theory with the notion of a "coalition.") And in more complicated cases, for example, that of the magnificently filmed Agatha Christie classic crime story, *Witness for the Prosecution*, with Marlene Dietrich and Charles Laughton, or real life, or real economics, the game-theory method fails also.

The point is not the claim that reality is too complicated for game-theory to encompass it. That problem might be solved by working out the mathematics and developing the theory. Game-theory fails systematically because the economic

The First Programmer Was a Woman

The first computer program ever written was for Charles Babbage's "Analytical Engine" in the 1830s. It was developed by the poet Lord Byron's daughter, Augusta Ada Byron, Countess Lovelace, who collaborated with Babbage for several years. In her published description of Babbage's computer, she wrote: "It is quite fitting to say that the Analytical Engine weaves algebraic patterns just as Jacquart's loom weaves leaves and blossoms." That is accurate, because Babbage recognized that the way Joseph Marie Jacquart used punched cards to control the operations of the loom, could be generally used for a "programmed" control of any machine, especially a computer.

Babbage's computer used punch-cards for three different purposes: First, the "operation cards" stipulated which operations the "mill" (the central processing unit, CPU) was supposed to carry out. These operation cards gave commands, such as whether numbers were to be added, divided, and so on.

Second, there was the "variable card," from which the values for the operations were to be retrieved from the "store" (the "random access memory," or RAM), and the destination for the storage of the results. These variable address cards stipulate, for example, that the operation contained on the operation card should be carried out with the values at storage-position 1 and storage-position 2, and that the result should be deposited in storage-position 3.

Let us assume we have the value 1903 at storage-position 1, and the value 1834 at storage-position 2. If the operation card says subtraction is to be carried out, Babbage's analytical machine can retrieve the value 69 from the storage-position 3 and print it out. Babbage's computer can thus calculate that the invention of the modern computer occurred

precisely 69 years before John von Neumann was born.

A third kind of card, the "number card," was designed by Babbage to have an external storage for the Analytical Engine's calculated values, for example, for logarithms or approximations for the number π . These values were punched into the number cards, in order to read them into a computation later. This external storage made it possible to generate tables and calculations in almost unlimited ways.

Ada's Achievements

Countess Lovelace developed concrete examples for how the machine could be used for calculations, in the context of her description of the Analytical Machine—for example, for the calculation of Bernoulli numbers. These example/calculations with the Analytical Engine were the first "computer programs." A century before our own computers, Lovelace completely understood the principles of the programmable computer. Her programs included sub-routines, program loops, and the conditional jumps. She even recognized that "the mechanism [of the Analytical Engine] could operate with things other than numbers, if their natural relations can be expressed by the abstract science of operations."

The concept of Boolean algebra—that is, the basis for logical calculations—was published in 1854, two years after Lovelace's death.² It was almost 100 years before Konrad Zuse took the last step toward building the modern computer, by using the CPU of his computer for the processing of numbers and logical variables together.

Augusta Ada Byron also reflected on the principled possibilities of future computers, and, even at that time, she rejected the idea of "artificial intelligence." She emphasized

dogma to which it is chained, for better or worse, has a principled fault. *It cannot explain how real wealth is created.* The market cannot generate real wealth, but only, at best, distribute it. The Mandevillean basic assumption that “private vices” promote the “public good,” in a way which remains a mystery to the participants in the great “social game,” is wrong. Without a horizon of the future which provides a perspective for economic activity, no national economy can last for long. General egoism cannot replace creative innovations, which always also contain changes in the economic and social “rules of the game.”

Wherever this overriding principle makes itself felt in concrete activity, game-theory must systematically fail, as surely as do the prisoners Max and Melvin. Or, inversely expressed, to the degree that game-theory yields correct results, the economy has lost the horizon opening onto the future, without which it cannot exist.

For irresponsible and immoral speculators and frauds, on the other hand, the game-theoretical approach is ideal. The game-theoretical approach to economics functions so well that it even wins Nobel Prizes. And then it is high

time to ring the alarm bells!

‘A Thought Problem’

The following quote from a current representation of “applications of game-theory” characterizes how the “thought problem” in considering “Artificial Intelligence” is connected to game-theory.³ It is said that:

Wherever the competition of ‘individuals’ for resources is to be investigated, game-theory investigations can be applied. . . . In Artificial Intelligence and in the research for “artificial life,” artificial agents are to be so programmed that they “survive,” or are successful, in the (real or simulated) environment. Here, too, competition situations often arise, in which the agents quarrel with other agents or real objects for resources. After all, in modern computer games the artificial adversary is equipped with strategies which give the impression of a real adversary. The adversary should not be invincible, operating in real time, and he should manifest a pattern of action which is not easily seen through. A good example are the real-time strategy games which have become popular in recent years (“Dune II,” “Command & Conquer,” “War Craft”), where two competing “tribes” or “races” establish settlements and bases of operation with limited resources, and pursue the goal of conquering the territory of the adversary.

The educational effect of these “popular” games is foreseeable: a “rational” behavior, in the sense of game-theory, is practiced—“absolute egoism.” Individuals shaped in this way in their development by Artificial Intelligence are then most suited for game-theory investigations of their economic behavior, because they will in all probability behave “rationally.”

So, one thing fits the other. But isn’t something missing? Yes, human freedom. That is what was missing all along, from the von Neumann “pattern card.”

Ralf Schauerhammer is an editor of the German-language science magazine Fusion, a computer specialist, and an organizer with the LaRouche political movement in Germany. He is the co-author of The Holes in the Ozone Scare, The Scientific Evidence That the Sky Isn’t Falling, published by 21st Century. This article was translated from German by George Gregory, and has been adapted here from an Executive Intelligence Review Special Report, “Why the ‘New Economy’ Is Doomed,” June 2000.

Notes

1. I want to comment here on Alan Turing’s work, “On Calculable Numbers” written in 1936, which has also been cited in the context of the development of the computer as the design of a “universal machine.” This was a *theoretical* writing. If I have proven that the three operations, “go one step westwards,” “go one step northwards,” and “go one step southwards,” allow one to reach any point on the surface of the Earth from any other given point, that does not mean that I am the inventor of a universal system of transportation. Similarly, Alan Turing was not the inventor of the computer. Typically, the machines used for deciphering Germany’s Enigma-code at the wartime cryptography laboratory at Bletchley Park, were not universal calculators and not even freely programmable.
2. The fact that the truth makes no difference for the game-theory result of this juridical example, corresponds to the assumption (and a wrong one) in economic issues, that economic activity has nothing to do with physical reality. Today’s markets, dominated by financial wheeling and dealing and speculation, operate as if this were so.
3. Tobias Thelen, 1998. *Game Theory* (Universität Osnabrueck).



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An engraving of Augusta Ada Byron (1815-1852) as a child.

that machines can never have free will: “The Analytical Engine has no desire to produce anything. It can do everything we know how to order it to do.”

This remarkable woman died in 1852, at the early age of 36, and when she died, her achievements were forgotten. The programming language of ADA should recall her memory.

—Ralf Schauerhammer

Notes

1. So called after George Boole, the English mathematician and logician whose book, *An Investigation of the Laws of Thought*, was published in 1854.

PROFILES IN PORRIDGE



How Norbert Wiener Found Cybernetics, And Lost Human Creativity

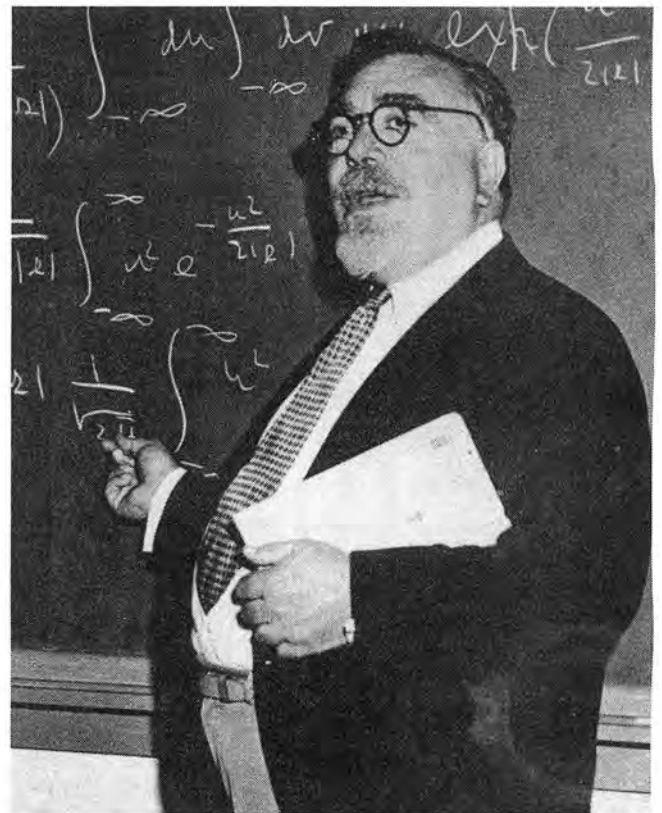
by Ralf Schauerhammer

Cyberspace and information technology are infected with a deadly "bug," which incapacitates individuals and society, by denying the existence of cognition.

Today, we are at the beginning of a development which many think is unique, a radical change in society and economics, which will put even the accomplishments of the Industrial Revolution in the shade. In the context of globalization, it is said, this process is already unfolding necessarily and irreversibly. All of the crucial processes of human life are undergoing a shift into "cyberspace." Whoever doesn't jump on the bandwagon with a shout of hurrah, runs the risk of being thrust aside as "obsolete," "retro," or even "anti-technological." Information-technology experts predict that by way of global networking, computers will soon achieve an intelligence which will surpass that of any individual human being!

For all the cyberspace euphoria, it needs to be said that the application of cybernetic methods to human beings and human society, is based on a serious mistake in thinking. Whoever looks carefully at the cyberspace program for the future, will observe that a bug has wormed its way into the biological-neural net of the brains of its proponents. This article will examine what sort of bug this is, and the reason such an obvious mistake could proliferate as it has. Let us begin with the following discussion between Professors Klaus Haefner of Bremen University, and Joseph Weizenbaum of the Massachusetts Institute of Technology (MIT), as presented in the book *Are Computers Better Than Human Beings?*¹

Haefner: The following episode will shock you somewhat. Some years ago, a moderator from Radio



Norbert Wiener (1894-1964): Leave the "thinking" to computers.

Bremen and I played a guessing game with the listeners. We read poems composed, alternately, by human beings and by computers. Then we asked the listeners who the author was. No one was able to distinguish computer poems from the humanly composed poems.

Weizenbaum: I know of similar experiments. They only show that the listeners could not hear a difference. But

there is, nevertheless, a difference between computer works and those created by an intellect.

Haefner: And what is the difference in the case of a real object, for example, a computer graphic, a computer-generated piece of music, a computer-produced piece of prose?

Weizenbaum: I deserve that question. What is a poem, actually? Why do human beings compose poems? Each poem is, first of all, the expression, formed in speech, of an idea, a perception, or an experience, which cannot be expressed in any other way than with the language-imagination of the poet. The poem is the attempt of the poet (or poetess) to surpass the limits of normal language. The computer has no ideas, no perceptions, no experience, which it wants to clothe in speech. . . . This indicates a completely different process of creation than the computation of syllables and word-sequences by means of formal procedures.

Haefner: You are thinking of the poet. But the situation looks quite different when you consider the poem from the standpoint of the listener or the reader. . . . What do I care what Wolfgang Amadeus Mozart might have thought and felt over 200 years ago, on some particular afternoon? How am I supposed to know that? Perhaps Mozart was thinking about the coal bill he didn't pay, or about the cleavage of a woman at the court, when he wrote down the enchanting melody in the second movement.

And what does Prof. Weizenbaum say to that? He remains polite. My proposed answer is less polite, but more appropriate: "Dear Professor Haefner: It makes no sense to talk to fish about flying. But I am sorry for your wife. Just imagine, perhaps she really loves you and then she expresses that to you, and each time, she hears, 'Considered from the standpoint of the recipient, there is no difference between love and sex.' "

This conversation—or, better, this case of the experts talking past each other—shows how deeply entrenched is the bug in the thinking system of the proponents of cyberspace. They can't even detect it any more. Just as any good programmer in such a situation grabs the source code and works through it systematically, we want to study the source code for the social program "cyberspace."

The Basic Operations of Cybernetics

The notion of "cybernetics" was first defined and explained in Norbert Wiener's book *Cybernetics or Control and Communication in the Animal and the Machine*, published in 1948 by MIT. Wiener, was involved during World War II in the development of calculators for anti-aircraft artillery, and he describes the problem of controlling such artillery—the problem being that the target flies at a velocity which is scarcely slower than the projectile which is supposed to hit it. So, one has to aim ahead of the target, that is, at a point where one believes the aircraft will fly. One can control the artillery better, the faster one can receive a report back ("feedback") about whether the aircraft is actually flying in the direction of the presumed target-point, or whether its flight path diverges from that point.

Toward the end of the war, Wiener applied his war experience to the control of processes of living beings and to human thought processes. This was the birth of what he called "cybernetics," described in his 1948 book.

The basic mistake in Norbert Wiener's program of cybernetics is recognizable in Chapter 5 of that book, titled "Computers and the Nervous System." There Wiener writes:

In the English empirical philosophical school of Locke to Hume, it was assumed that the content of the mind is constituted by certain entities which Locke knew as Ideas, and the later authors as Ideas and Impressions. It was assumed of these simple Ideas and Impressions, that they exist in a completely passive mind.

So, the mind, according to Wiener, is a *tabula rasa*—a blank slate. He continues:

It was assumed of these Ideas that, by reason of some sort of inner activity, according to the principles of similarity, contact and cause and effect combine in bundles. Contact was perhaps the most important of these principles: of Ideas and Impressions, which often occur temporally or spatially together, it was assumed that they had obtained the capacity to generate each other, so that the presence of any one of them would bring forth the entire bundle.

Norbert Wiener built his entire theory, with which he wants to describe and imitate the activity of human thinking, on John Locke's 1690 *Essay Concerning Human Understanding*. He ought to have known that he was on a path to nowhere, because Gottfried Wilhelm Leibniz had already provided a direct response to Locke 200 years before in his *New Essay on Human Understanding*, wherein Leibniz had disposed of British empiricism and its faults. We quote briefly from this 1690 writing by Leibniz, for the following passage from the introduction to the *New Essay* is so amusing and so relevant for the issue of "cyberspace":

The knowledge of human beings is distinguished from that of animals in this: Animals rely solely on experience and orient only to examples; for, as far as can be judged, they never get so far as to formulate necessary principles, while human beings are capable of forming demonstrative sciences. The capacity of animals to draw conclusions is therefore something which is not the equivalent of human reason. The conclusions which animals draw are at the same level as those of pure empiricists, who claim that what has occurred a number of times, will also occur in other situations which appear similar, without being able to judge whether the same causes are in effect. That is why it is so easy for human beings to catch animals, and why simple empiricists make mistakes so easily.

Then Leibniz goes on to give the decisive reason that this should be so:

One does not thus sufficiently consider that the world

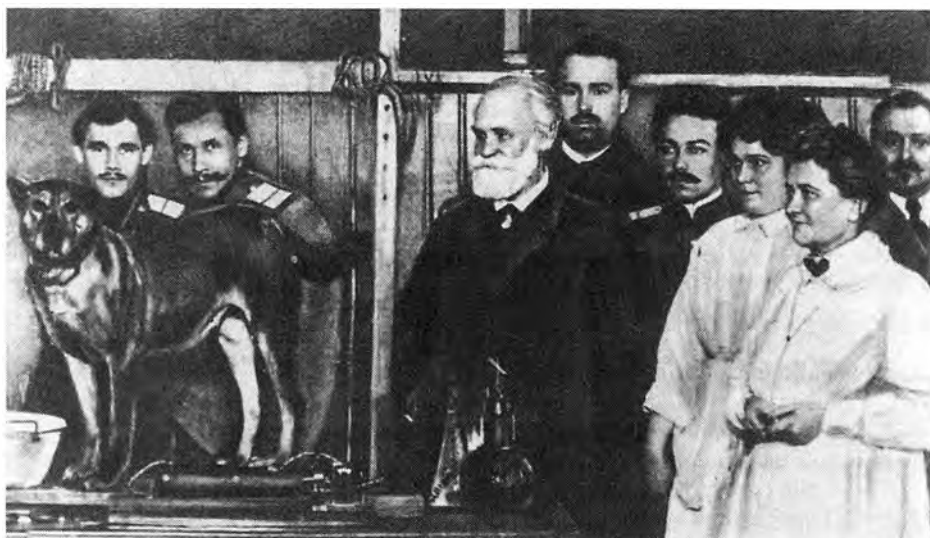
changes and human beings become more skilled, in that they invent thousands of new devices, while the deer and the rabbits of our time are no more clever than they were in the past. The conclusions of animals are only the shadows of the conclusions of reason, namely, only a combination in the imagination and the transition from one image to another, whereby they expect once more in a new situation which seems similar to one which preceded just what they previously found to be combined therewith; as if things in reality had to be combined with each other because the images of their imagination are so combined in memory. . . . Thus, that which justifies the inner principles of necessary truths, also serves to distinguish human beings from animals.

Let us recall the conversation cited at the beginning. The poet has to attempt to “surpass the limits of normal speech,” to express something new, since “the world changes and human beings become more skilled.” Computers and animals can combine “images of the imagination in memory,” such as coal bills, cleavages, or the notes in a melodic musical score.

The changes in the world and in human beings by means of creative inventions distinguish human beings *fundamentally* from any animal and every machine. This creative potential constitutes the individuality of the person—even, if there were such a thing, from his own clone, as an independent, completely unique being. This creative development also answers the question of how the human being, despite permanent changes, remains unmistakably the same individual. Leibniz notes explicitly in the *New Essay* that Locke, with his empiricist approach, comes to contradictory conclusions on the issue of “can material think?” These are the same reasons that those proponents of cyberspace today who build on Locke’s theory, become entangled in the most absurd contradictions when the question is whether a computer “can think.”

The Program of Cybernetics

The basic axioms of the empiricists are not capable of comprehending the essential nature of human thinking. Norbert Wiener nevertheless constructed his cybernetic program on the foundation of this false theory. What John Locke did only in theory, Wiener wants to realize in practice. He says: “Locke’s theory bears to reality only the relationship of a picture of a locomotive to a working locomotive . . . like a diagram without the working parts.”² With his “Cybernetics,” Norbert Wiener attempts to generate all these “working parts.” In other words, “Cybernetics” is actually nothing but a “Locke-motive.”



The Granger Collection

According to Wiener, Ivan Pavlov’s work on conditioned reflexes is the key to intelligence, including artificial intelligence. Here, Pavlov (center, with white beard) with his associates and dogs, performing a demonstration before students of the Russian Military Academy.

In Chapter 6, Wiener takes on the task of constructing the “assignment of a neural mechanism to the Lockean theory of thought association.” His aim is a mechanism which works in a way which is similar in computers, animals, and the human brain. He considers again, and more closely, the three principles of the “Lockean theory of thought association.” These are (1) the “principle of contact,” (2) the “principle of similarity,” and (3) the “principle of cause and effect.” But this is still too complicated for Wiener’s vision of a thought machine, so he simplifies the whole thing by reducing the three principles to the first principle, “contact.” With respect to the third principle, “cause and effect,” he observes: “The third of these [principles] was reduced by Locke, and even more definitely by Hume, to nothing more than constant coexistence, and is thus included under the first, that of contact.”

We have heard from Leibniz what this reduction leads to. But the second principle, “similarity, deserves a more detailed discussion,” he says.

The reduction of the second principle, in fact, causes Wiener more difficulty, because similarity of forms indicates the existence of universal concepts, which cannot exist on the *tabula rasa*. So Norbert Wiener gets to work. By means of the “process of scanning, which is known to the television technician,” one can transpose multi-dimensional images “in space into a one-dimensional succession” of points. Then, he claims, by means of the “appropriate transformation” of this series of points, one can get a grip on the principle of similarity. As a technical example, Wiener mentions the work begun in 1947 on the apparatus of Dr. McCulloch and Mr. Pits, to transform letters of different forms in print, but therefore of similar form, into certain acoustical tones, in order to make it possible for blind people to read by hearing the tones.

We have now arrived at the point in Norbert Wiener’s program of cybernetics where human “thinking” can be reduced to Locke’s *tabula rasa* with one single “thought association”—

the principle of contact. Wiener not only constructs his cybernetic program on the basis of Locke, which is completely inadequate to explain human thinking, but he cripples even that theory still more with his crass reductionism to a single "principle of thought association." Once he has "accomplished" this reduction, Wiener looks around for an empirically demonstrable mechanism which he can equate with his theoretical "principle," so that he can finally get some "dynamic" into the "Locke-motive."

Wiener finds this mechanism with Pavlov:

In the last quarter of the last century and in the first of the current century, another great scholar, Pavlov, worked on the problem which Locke had dealt with in his own way. He worked out the area of conditioned reflexes experimentally, in contrast to Locke, who worked on it reflectively. Pavlov observed that, if a dog is systematically given a certain sign or a certain sound at eating time, it will be sufficient at a later time to give the sign or the tone in order to start the flow of saliva, i.e., the flow of saliva was conditioned by the association created earlier. Here we have in the animal and in the area of reflexes something quite analogous to the association of ideas. That is so in particular of reflexive answers, where the total behavior of the dog leads us to suspect something which we could call a strongly emotional content among human beings.³

Because, as Wiener explains to us, certain "temporally separate impressions . . . bring forth . . . [a] total bundle" of reflexes, an answer arises which allows us to conclude that a "strongly emotional content" exists. Eureka! the think-and-feel-mechanism of dog, and man, is discovered! In order to complete his cybernetic program, Wiener needs only to find this capacity to learn, evidenced by Pavlov's dogs, in a computer. And he is immediately successful, of course:

There is nothing in the nature of the computer which prevents it from showing conditioned reflexes. Let us recall that a working computer is more than the network of relays and storage mechanisms, which the builder built into it. It also contains the content of its storage [memory] and its content will never be completely erased over the course of particular operations. . . . It is, for example, quite possible to induce each message which goes into storage to change, permanently or semipermanently, the current of one or a number of electron tubes, and thus to change the numerical value of the combination of impulses, which switch the tubes or induce the tubes to switch.⁴

The computer will have learned something, thinks Wiener, and Professor Haefner (of computer poetry fame) nods in agreement. Gottfried Wilhelm Leibniz glances down from above and grins about the blunders which the empiricists, animals, and "thinking" computers make so easily. Yes, they are all mistaken in common, if they think that the "transposition of an image" or a datum in the memory of a computer from one condition to another is anything but "shadows of the conclusions of reason," and if they overlook the fact that

these images are not connected with each other in the same way, as "things in reality are connected with one another."

The Cybernetic Control of Society

If cybernetics has such an obvious program fault, why is it so widespread and so popular, that everyone believes they have to pack their bags to move into cyberspace? One suspects that at least some of the people who propagate the application of cybernetics to human society, make this mistake gladly. And, in fact, one arrives at a completely different image of man, and at diametrically opposed forms of society, apart from the issue of whether the human thinking process works as Locke claims, or as Leibniz represents it. Ultimately, in the world of the empiricists, everything is determined, unfree, or left up to blind chance—which also permits no freedom, or, at most, anarchy. Man and society change only accidentally, if at all.

Leibniz's approach, on the other hand, explains how the



Jack Manning/*The New York Times*, courtesy of the Museum of Natural History

Anthropologist Margaret Mead, had a profound hatred of industrial civilization and its accompanying progress, so it is no surprise that she and her husband, Dr. Gregory Bateson, should be cited by Wiener as encouraging him to apply cybernetics to the "healing" of America's "illness"—its focus on science and technology. Here, Mead poses on her 75th birthday, in front of a reproduction of an Easter Island stone figure.

freedom of creative human beings is possible in a lawful and knowable universe. Man becomes more "skilled," changes his social behavior, and can affect "the world, which changes itself," with "thousands of new devices" and technologies. The consequences these respective images of man hold for the notion of the right form of society are unmistakable, and it becomes clear why oligarchs of all stripes so readily lean on Locke and the British empiricists, from Hobbes to Locke, and then to Hume.

This explains the interest in applications of cybernetic methods to "social control," and so it is no accident that cybernetics was actually brought to life by "social scientists": Gregory Bateson and his wife, Margaret Mead, were the midwives. In his book *Cybernetics*, Wiener reports how the term was coined during a series of meetings of the Macy Foundation in 1947. The core team consisted of the same people he had brought together with John von Neumann at Princeton University in 1944.

Norbert Wiener also says that a "working direction, which grew out of the circle of ideas at meetings of the Macy Foundation," was generated to research "the importance of the concept, and the technique of transferring it to social systems." In his opinion, it is easy to explain how this is possible:

It is certainly the case that the social system is similar to the organization of a single being, that it is connected by a system of information transfer, and that it has a dynamic in which circular processes of playback play an important role.

This is so in "anthropology and sociology," and also in "economics," Wiener says, in which connection he then mentions with high praise the "very significant work of von Neumann and Morgenstern on the theory of games."

Then Wiener reveals that, "On this basis, Dr. Gregory Bateson and Dr. Margaret Mead have encouraged me to devote a considerable part of my energy to the investigation of this aspect of cybernetics, in view of the urgency of the sociological and economic problems of the present age of confusion," because they hoped for "a therapeutic effect" from cybernetics. So, in the view of its parents and midwives, cybernetics is a tool with which society can be "healed."

And against what "illness" of society is this "therapy" to be applied? It is the ineradicable belief in progress and human creativity, which always moves beyond new limits, and which was apparently a most obnoxious phenomenon in the United States, especially, as far as Wiener was concerned. Wiener did not state the point so nakedly; instead, he pretended to be modest and skeptical with respect to the "therapeutic effect" of cybernetics upon the "present sickness of society."

The reason for his skepticism leads us back, however, to the real point. Wiener claims that "it would be useless to compare the economy of the steel industry before and after the introduction of the Bessemer process, or the statistics of the rubber industry before and after the emergence of the automobile industry. . . ." In reality, what Wiener describes as a problem of statistical collections of data, is the "bug" of the cybernetic method identified above: It fails just where qualitatively new "playback structures" are created by new inventions.

This failure is irrelevant from the standpoint of social con-

trol. There one thinks in the other direction. If, on the model of the thinking of British empiricism, one wants to remove the absolutist face of the Hobbesian Leviathan, which controls the social battle of the wolves, of "all against all," and if one wants to control the "wolf" in a "democratic" way by controlling his "social reflexes and playback," then the basic failure of cybernetics only takes on the form of a political task which has to be concretely solved.

In his book *The Human Use of Human Beings*, Wiener describes this approach. He compares the hierarchical systems of fascism and communism with mechanical music boxes, where everything is centrally controlled and fixed, while modern democratic systems are "capable of learning," just like the control mechanisms for anti-aircraft artillery, by playback. Whether we are talking about the direct and obvious control of a music box or the control by means of a fixed system for anti-aircraft artillery, there is no freedom in either of the systems. Real freedom would break up the existing "playback mechanisms" by means of new inventions, which bring about development in social behavior. Cybernetic control, to the contrary, must set out to thwart such fundamental inventions, together with the resulting changes in social behavior, simply because these would destroy the existing playback structures.

The more successfully one can persuade the population that the human mind is not infinite, but that it functions, instead, according to the empiricist model of John Locke, so that it is better to leave the thinking up to horses and computers, the better the functioning of the "democratic" social controls according to cybernetic methods. The zero-growth ideology, in the form in which it has been systematically proliferated since the late 1960s, serves exactly this purpose.

It is astonishing to read what Norbert Wiener wrote as early as 1950, in his *The Human Use of Human Beings* in this connection. In the chapter on "Progress and Entropy," Wiener first observes that the entropy theorem inevitably leads to a pessimistic worldview. This is utter nonsense. How should a theorem, which Carnot derived from the way a steam engine functions, and which such committed empiricists as Helmholtz and Boltzmann applied without any justification to the entire universe, make anyone pessimistic? Nevertheless, the reason it leads to pessimism, says Wiener, is the subjective judgment of human beings, who take themselves too seriously. Wiener proposes that we look at the matter with a "certain optimism." We only have to tell ourselves: "We will perish, but let us do it as befits our human dignity."

Oh? Then let us shape society by promoting universal education and research, so that a growing number of ever more creative people can make inventions! That is what Leibniz would say, if he read these lines. But not the empiricist cyberneticist, because his system of thought knows of no freedom, and human creativity, as far as he is concerned, can happen only by chance, if at all. Wiener explains that, from his

point of view, inventions have to be seen in a certain way as blind and accidental. They are rare events in a system about which we understand too little.

We should not, according to Wiener, rely on this "gamble." What Wiener decries as a "gamble," is the creative freedom

of human beings, upon which their long-term existence depends.

Today, a half-century after Wiener developed cybernetics, his view has become so widespread that those in positions of political responsibility, and even most scientists, no longer sense how great is the discrepancy between the number and quality of socially necessary inventions, and the inventions which have actually been realized. Yet, there is the supposedly breathtaking progress in the development of computers: new software every day, new networks, new graphic user interfaces, new computer games, and so on. And the social control really isn't all that bad, most would say. Most people are quite satisfied with it!

Who, on the other hand, takes real joy in the creative mind and love of man which Mozart's music expresses? For most people, it is quite enough when they shove in the CD and let their fantasies run wild as they listen to the "enchanted melodies" about coal bills and cleavages, or who knows what.

So, off into cyberspace! Or so one might think, were it not for this problem, this dumb "bug." The universe as it actually exists, does not fantasize. It interprets this "bug" for what it is, and it doesn't worry about whether someone wants to give society "therapy" with cybernetic methods. It makes us pay the bill for this system error, mercilessly. Mankind cannot exist in this sort of cyberspace, and that is why, in the final analysis, mankind will not live there.

Ralf Schauerhammer is an editor of the German-language magazine Fusion, a computer specialist, and a political organizer with the LaRouche political movement in Europe. He is the

co-author of The Holes in the Ozone Scare, The Scientific Evidence That the Sky Isn't Falling, published by 21st Century. This article was translated from the German by George Gregory, and appeared in a Special Report by Executive Intelligence Review, June 2000, Why the 'New Economy' Is Doomed.

Notes

1. This is a slightly abridged version of a discussion between Professor Klaus Haefner, a Bremen University information theorist and geneticist, who is convinced that the cloning of human beings will soon belong to "the normal standard supply," and Professor Joseph Weizenbaum of MIT, a pioneer in the area of Artificial Intelligence and today one of its critics. It is quoted from the 1990 book *Are Computers Better Human Beings?*
2. Norbert Wiener, 1950. *The Human Use of Human Beings: Cybernetics and Society.*
3. If one considers the history of mathematics, it becomes clear that Wiener (who calls himself a student of Bertrand Russell, to whom he owes so much) has to have made this mistake deliberately. When Georg Cantor in 1883 developed the Theory of Manifolds (which is standardly translated as, or perhaps reduced to, "set theory," although Cantor's notion has nothing to do with the modern notion of sets), he defined something "which is related to the Platonic 'Idea.'" Cantor's transfinite succession of infinities describes the process which Leibniz described as "*Schlauewerden*," or, which is the same thing, the creative "transgression of limits" of that which is expressible by the language created by existing knowledge. This process is the equivalent of achieving a new infinity. In that sense, Cantor says the human spirit is infinite. The empiricists, especially Bertrand Russell, waged a bitter campaign against Cantor, which ultimately led to the reinterpretation into their opposites, as it were, of Gödel's proof of 1931 and of the Turing machine. These prove that Cantor was right, by showing with mathematical thoroughness, that each fixed and formal axiomatic system is incomplete, that is, is finite, relative to the infinity which is created by the human mind. Turned into their opposites, these are cited today as supposed demonstrations of the limits of human thinking, because—and this is what Wiener wrongly assumes—they confine human thinking to formal conclusions. Yet it is precisely *against* formal conclusions that human creativity and thought take place.
4. Norbert Wiener, *The Human Use of Human Beings.*

All man-made catastrophes occur solely as the outcome of prolonged adberence to a mind-set which is alien to the principles upon which the universe is constituted. Thus, a great crisis can be mastered only by methods and policies which must appear to the existing generations of society as revolutionary.

—LYNDON H. LAROCHE, JR., May 26, 2000

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Animal bones and charred trees at Yellowstone National Park in 1988, when "Mother Nature" was allowed to take her natural course.

Extremists Are Destroying Our National Forests

by Richard S. Bennett

The year 2000 will be remembered in forestry circles as the year of the Big Burn. At no time in our previous record keeping has the total acreage burned in our National Forests approached the levels of this year. There have been an

Richard S. Bennett has taught forestry courses at the University of Wisconsin and Virginia Tech, and was a forestry advisor to the Libyan government. He was executive director of the Society for Environmental Truth (SET) for eight years, and is now president of that organization. The Society is a nonprofit group that believes in using sound science to address environmental concerns and bring into balance the needs of people, while improving our natural resources and environmental conditions. He is located at 4338 Murphey Drive, Corpus Christi, TX 78413 and can be reached at (361)814-6052 or by e-mail at settorch@aol.com.

amazing number of fires in our National Forests in the 39-year period from 1960 to 1998—420,553 to be exact. Of these, 54 percent were caused by lightning, and 46 percent by human beings. The number of lightning-caused fires has remained fairly consistent through the years, and there is no evidence that "global warming" has upset the weather patterns that might be a factor in their generation.

Lightning-caused forest fires occur more frequently in the West, mostly because forests occupy a larger percentage of the land area than they do in the eastern part of the country. Consequently, people in the East think that most fires are started by human activity; the Smokey Bear campaign has lent credibility to this misconception.

The most common cause of human-started fires is arson. Next on the list are accidental fires set by campers and hik-

ers, followed by hunters, fishermen, railroads, and equipment.

The Sierra Club, which originally had been fairly understanding of the benefits of forest management practices, underwent a dramatic change in the 1960s, when it began to advocate the cessation of "logging" in our National Forests. One of the results of this campaign was the passage of the National Forest Management Act (NFMA) in 1976. This was a defining moment in the management of the National Forests, because NFMA stood professional forest management on its head.

Now, Congress defined what management practices could be used, and it was required that local people be consulted, and approve, any specific National Forest Management Plan. Most outrageous, was the statement that economics should not be considered in the management of our National Forests.

In the ensuing period, the Sierra Club Legal Defense Fund filed at least 55 suits in federal courts against many National Forests for not having a "correct" plan. The Forest Service was overwhelmed, and soon became disheartened.

From that point on, management practices began to deteriorate. Timber sales already in the pipeline were completed, but new timber sales soon began a steady decline. Meanwhile, environmentalists began more actively to apply the Endangered Species Act, and it became a favorite tool to stop timber harvesting; the spotted owl in the Northwest, the red cockaded woodpecker in the Southeast and the Mexican spotted owl in the Southwest became surrogates for stopping timber harvesting. So, the removal of mature trees decreased, timber stand improvement sales slowed, and the fuel load on the forest floor began to increase.

1980: Turning Point for Forests

The year 1980 was a turning point for our National Forests. Prior to 1976, timber sales had been conducted in a rational, professional manner. Any sales that had been under way when the

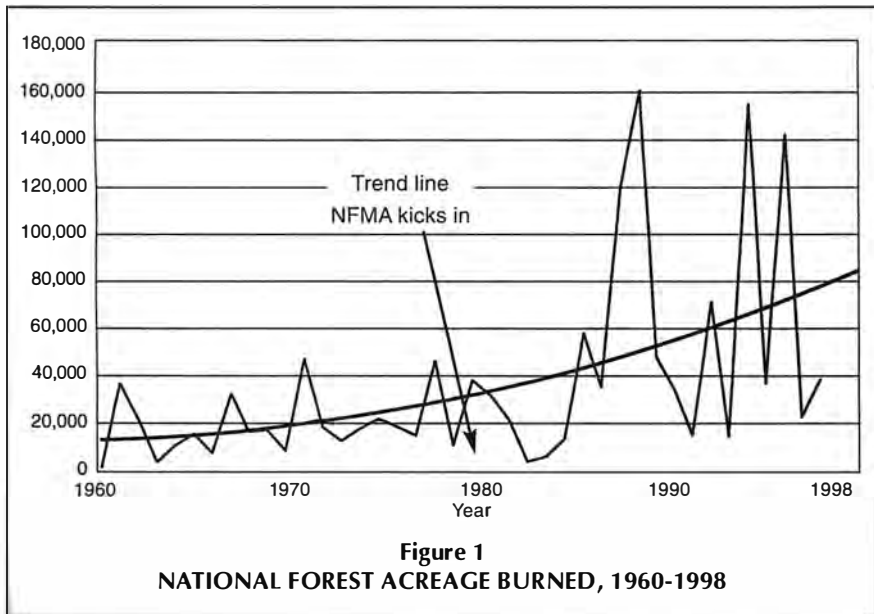


Figure 1
NATIONAL FOREST ACREAGE BURNED, 1960-1998

NFMA was enacted, were allowed to continue, which took about four years. It took an additional four years before the resulting fuel buildup had an impact.

The results of that fuel buildup in our National Forests are shown in Figure 1. It is both informative and distressing. The conclusion that can be drawn is that after 1985, the acreage burned from wild fires increased dramatically. In the period 1960-1984, the yearly area burned, the average, was 162,276 acres; but from 1985 to 1998, the average exploded to 670,018 acres per year.

But the year 2000 will go down in the record books as the worst fire season in history for our National Forests. When the final figures are tabulated, more than 2 million acres of our National Forests will have been destroyed.

The Fire Suppression Argument

There are those in the environmental community who will claim that this is a result of the U.S. Forest Service's past policy of aggressive fire suppression. Such environmentalists further claim that fire plays a "natural" role in forest management. If the latter statement were true, then we should have no fire suppression activity at all: Just let the forests burn.

This position is patently absurd. From 1920 to 1980, the Forest Service's policy of suppressing fires resulted in holding the amount of acreage lost to burning each year, almost constant. During most of this time frame, timber harvest-

ing was carried out increasingly throughout the System, and the forests were becoming healthier and more productive. If the suppression policy were faulty, there would have been a substantial increase in acreage burned, long before the end of that period.

After 1984, the only factor in the equation that changed was the decline in timber harvesting and timber stand improvement (usually thinning) projects. As timber harvesting declined, the acreage burned increased. That conclusion is inescapable.

Critics of the fire suppression policy also argue that, with increasing use of the National Forests for recreation by more people, there are more fires, resulting in more burned acres. An

examination of the data does not substantiate this position. Figure 2 is a plot of the total number of fires occurring in National Forests from 1960 to 1998, with a linear regression trend line superimposed. The trend line does have an upward slope, indicating that more fires are occurring through time, but the slope is quite modest—10,100 fires in 1960 to 11,500 in 1998. This indicates a 0.3 percent per year increase over the 39-year period, which closely corresponds to the increase in the area protected by the Forest Service.

The big increase is in the size of the fires, not their number. The average fire is getting larger, indicating that the fires are more difficult to extinguish because of the higher fuel load. During the period 1960-1984, the average fire in our National Forests was 16.4 acres. From 1985 to 1998 the average size rose to 60.4 acres—almost a fourfold increase.

No Good Side to Wildfires

Wildfires are not pretty. They often are disastrous, not only to the forest, but to human life and property. Large fires generate their own wind storms, as the heat from the burning trees rises and creates wind drafts that can be deadly. The earth is often scorched so badly that nothing will grow for many years. Valuable topsoil is washed away, and mudslides often silt up streams, destroying fish life and recreational opportunities.

Wildlife suffer as they either perish in the fires, or die from lack of food and sustenance. The dead trees standing in a

Continued on page 70

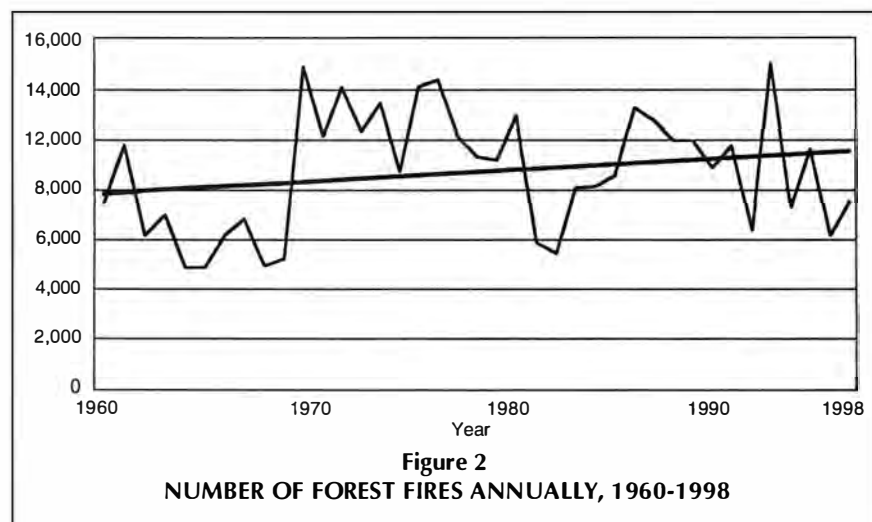


Figure 2
NUMBER OF FOREST FIRES ANNUALLY, 1960-1998

THE LESSON OF LOS ALAMOS

Our Forests Need 'Active Management'

by Thomas M. Bonnicksen, Ph.D.

The devastating fire that swept over Los Alamos, N.M. last summer is only the symptom of a far more serious problem. We are letting America's native forests deteriorate and burn.

The Los Alamos fire, also known as the Cerro Grande fire, is just one among thousands of fires that ravage Western forests each year, and they are growing worse. So far this year, 81,697 fires burned 6.9 million acres. By comparison, the 10-year average is 64,908 fires burning 2.9 million acres. The average fire size this year is 85 acres, more than double the 10-year average of 44 acres. Suppression costs are about \$15 million per day and may reach \$1 billion by year-end, and property losses and forest restoration costs could easily cause that total to double.

The reason for this problem is simple. Today's forests are a tattered and unhealthy remnant of the original forests. More than a century ago, we began to protect forests from fires, and we set some forests aside in parks and reserves to protect them from humans. We did not consider that our forests had evolved with lightning fires and more than 12,000 years of burning, cutting, and other uses by native peoples. Now, we have succeeded in putting out most of the little fires that kept forests open and clear of debris, and we have nearly shut down timber management on the national forests. Therefore, our forests are growing older, thicker, and more hazardous, and fires can rarely be stopped during hot dry periods.

In the Southwest, ponderosa pine forests (like those that burned at Los Alamos) are 31 times denser than the original forests. So it is not surprising that fires are larger and more destructive, that plant and animal species are disappearing, that streams are drying as thickets of trees use up the water, and that insects and disease are reaching epidemic proportions.

The original forests were open and patchy, but now they are so thick that any fire has the potential for turning a



Thick growth in a Montana forest—a prime condition for aiding the spread of fire.

forest into a colossal furnace. That is what happened in Montana's Bitterroot Mountains this year, where fires destroyed 300,000 acres of forest. Much of it was ponderosa pine, which is a forest that normally burns with small and light fires that do little damage to the larger trees.

Drastic cuts in trained personnel within federal agencies make the fire problem worse. On Jan. 3, 2000, Lester Rosenkrance, Bureau of Land Management (BLM) Director for Fire and Aviation, sent a memo to Director Tom Fry stating, "There is no doubt in my mind that we are placing the public and property at greater risk as our ability to respond quickly and aggressively to wildland fires decreases." He added that, "Should calamity strike, the agencies will be held accountable." The BLM Director ignored Rosenkrance's warning and transferred him to another job.

The Problem with Present Methods

The National Park Service and other federal agencies argue that prescribed

fires and thinning will reduce the fire hazard. Thinning, from their point-of-view, means removing "the trees causing the problem." Specifically, it means little trees that grow under big trees. However, it is not just little trees that cause the problem. Historically, our forests were fragmented. They formed a mosaic of patches containing different sizes of trees. This confined the hotter fires to mostly older patches, because patches of younger trees do not burn well.

In some forests, such as ponderosa pine, even the older patches burned light because fires were so frequent. Now that small fires and cutting are no longer creating new openings for young trees, this patchiness is disappearing. Thus, forests have become more uniform, and fires spread over vast areas. Thinning little trees may make an older forest less flammable, but it does nothing to restore the natural mosaic that regenerated young trees and kept fires small. Thinning

also does nothing to restore and sustain the diverse array of wildlife and plants that depend on the patchiness of a forest.

Equally important, thinning is expensive. Forest Service managers design timber sales to ease the fire danger, but nobody's buying. The Forest Service is trying to sell just the little trees, and then they want timber companies to use helicopter logging. But who can afford to harvest the least valuable trees with the most expensive logging methods? No wonder nobody is buying.

The Forest Service refuses to use logging as a tool to restore the natural patchiness and diversity of a forest, because that would require allowing the timber companies to remove some big trees. At the same time, the Forest Service is willing to forego the expertise and money these companies would contribute to restoring our forests. Instead, it would rather ask taxpayers to pay hundreds of millions of dollars a year to use non-commercial thinning.

The Forest Service then accepts the unnatural forests that this method creates. U.S. Representative Helen Chenoweth-Hage (R.-Id.), Chairman of the Subcommittee on Forests and Forest Health, summed it up when she said, "The USDA Forest Service has gone from being a model of federal organizational effectiveness to 'the gang that can't shoot straight.'"

Why Prescribed Fires Don't Work

Prescribed fire creates many of the same problems as thinning, and it is equally expensive. It is also extremely dangerous. Even the best-planned fire can go out of control. The fire set by Bandelier National Monument officials, under conditions that anyone would call extreme, is indefensible.

At Bandelier, they intended to "restore fire as a keystone natural process and to reduce hazard fuels." Instead, they created the Los Alamos fire. They set the fire knowing it was the second year of drought caused by La Niña. They even failed to heed a U.S. Weather Service warning that the potential for fire growth was extreme. It was becoming too dry and windy for a prescribed fire but they lit it anyway. Bandelier superintendent Roy Weaver even told the *Albuquerque Tribune*, "we knew this one was going to be pushing the limits a little bit."

Park staff did the same thing in Yel-

lowstone National Park in 1988, when they let a fire burn until it became impossible to control. When it was over, the fire had charred nearly one-half of our oldest national park. An internal memo documented that the park staff "were determined" to let the fires burn although they knew it "was a very dry year."

Just like park staff at Bandelier, Yellowstone personnel remain unrepentant to this day. They continue to blame "Mother Nature" for high winds and drought. The Los Alamos fire, the let-it-burn Yellowstone fire, and the fires of 2000 are ominous signs of what lies



ahead. The forest fire menace is growing more serious each year, and we are not using what we know to prevent it.

Solutions

Our forests are in serious trouble. No one knows this better than federal officials who set prescribed fires. They also know that the problem is so severe, that we can no longer rely on prescribed fire to repair the damage caused by more than a century of neglect. Prescribed fire is an essential tool, but high costs, safety concerns, and air pollution restrictions prevent widespread and frequent burning. We have other tools available, but we cannot use them on most of the public lands where the need is greatest.

The only viable alternatives to prescribed fire and non-commercial thinning are commercial thinning and timber harvesting. Prescribed fire should also play a limited role, where it is cost-effective and safe. These are the most effective ways to manage forests. They

can be used with near surgical precision, and they have the added advantage of creating jobs in rural communities, producing wood, and generating revenue instead of using taxes to pay for management.

However, the Park Service resists these approaches, and environmentalists block every attempt to use them to restore our national forests. They do so for philosophical reasons. They believe in "letting nature take-its-course." They have convinced themselves that setting prescribed fires, designed to change forests in predetermined ways, is "natural" while using a chainsaw or mechanical harvester to do the same thing is not.

A Turning Point

We have reached a turning point in the history of our forests. Unless we begin a large-scale restoration forestry program now, many of America's native forests will further deteriorate, and some may cease to exist within a few decades. The best way to reverse the decline is to use the original forests as models for future forests. The native forests that European explorers found, provide excellent models for management because of their beauty, diversity, and abundance of wildlife. They also were inherently sustainable.

However, this goal cannot be achieved by "letting nature take-its-course" or with prescribed fire alone. It requires *active management*. We must use the safest and most cost-effective tools available to restore health and diversity to America's forests.

Dr. Bonnicksen, an expert on the history of America's forests, is Professor of Forest Science at Texas A&M University. His new book, America's Ancient Forests: From the Ice Age to the Age of Discovery, was published this year by John Wiley & Sons, Inc.. He earned B.S., M.S., and Ph.D. degrees in forestry at the University of California-Berkeley, and has worked to document, restore, and sustain North America's native forests for more than 30 years. He is also co-founder of the International Society for Ecological Restoration and a former member of its board of directors.

An earlier version of this paper was distributed to members of Congress by the New Mexico delegation.

National Forests

Continued from page 67

burned-over area provide a feast for bark beetles, which soon migrate to the weakened trees that survived the infernos.

Since 1970, 249 people (including 8 so far this year) have died fighting forest fires. The value of personal property—homes, cabins, furniture, and priceless personal possessions—has never been calculated. There is no good side to wildfire.

The Fallacies of Prescribed Burns

“Prescribed” or “controlled” burns are now the buzzword in some circles. All that is required, this theory goes, is to lightly and periodically burn the fallen debris that accumulates on the forest floor, and remove the fuel on which forest fires feed. This will also keep seeds from germinating and reduce the dense “dog-hair” thickets which result from too many small trees growing too close together.

The proponents of this view also claim that this is more “natural,” as this is what the Indians did to promote grass growth for the grazing ungulates which were so important to their food supplies. (Why Indians burning the forests is “natural” is never explained.) Unfortunately, there are many fallacies in that approach.

First, is the sheer area involved. The National Forests cover more than 192 million acres, so if a once-every-ten-year-prescribed burn program were initiated, it would involve burning an area more than the size of South Carolina (30,000 square miles) each year.

Second, the impact upon reproduction in the forest to replace the trees that die each year would be disastrous.

Third, vegetative material on the forest floor is destroyed. Instead of forming humus and acting as fertilizer, it is turned into ashes, which causes alkalinity in the soil.

Fourth, the burning of 19,000,000 acres per year presents serious air pollution problems. There is absolutely no way that an area this size could be burned each year without disasters occurring. (Remember the fire at Los Alamos this spring started out as a “controlled burn” which ended up as a wildfire that destroyed almost 50,000 acres of forest and 400 homes).

But the really important problem is

that conditions have to be “just right” for controlled burns. Humidity should be high, and expected wind velocities very low. Controlled burns also require fire breaks to be constructed, and roads are extremely effective in that regard. But wilderness areas cannot have roads, and the new Forest Service road-less program is an added deterrent to any effective implementation of a controlled burning program.

There are other technical reasons that controlled burns are ineffective. Not all forest types can be managed in this manner. Ponderosa pine, which typically grows in fairly open stands, has been used as an example of a forest species that may lend itself to periodic controlled burns. But there are questions about this approach, because it destroys reproduction, and we do not know what the optimum stocking of this forest type really is. Fires may be good for ungrazed grasslands, but they are not good for small tree seedlings.

The hardwood stands found in the East and the Midwest have often been burned by farmers and adjacent landowners to promote grass growth for grazing, and the stands show the result: They are devoid of young trees to replace the older trees as they mature and die. In the West, the mountainous terrain is also a formidable barrier to controlled burning.

Reinstitute Forest Management

So what are the solutions, if any? In broad terms, it is the reinstatement of forest management practices. Before the well-meaning but unknowledgeable extremists intruded on the process, our National Forests were being managed in a manner that boded well for their future. The amount of timber grown on them was increasing each year, the acreage of tree-covered land was growing larger, more barren acres were being planted to trees, grazing by cattlemen was improving the range, recreational opportunities were increasing, more people were using the forests for camping and hiking, and forest fires were controlled. The multiple use concept was including everyone.

Passage of NFMA in 1976 changed all that, and our National Forests became battlegrounds between the environmentalists and Forest Service professional personnel. As the extrem-

ists gained the upper hand through court decisions, the Forest Service lost out. As a result, our National Forests are being run like National Parks, with recreation and visitors being the focus of attention. Campers and hikers may be fine people, but they don't provide the materials to build homes for millions of people.

National Forests are being run by Supervisors who are geologists, archaeologists, and “wildlife biologists”—whatever that may mean. Until this situation is rectified, and our National Forests are managed in accordance with the original concept of multiple use, we will continue to see them destroyed by fire. The Endangered Species Act needs to be revised, so that the Fish and Wildlife Service does not make the decisions as to which species are endangered or threatened. That scientific decision should be put in the hands of an independent group, such as the National Academy of Sciences.

There should also be a full appreciation that wildlife are flexible in their requirements for nesting or range. If no dead snags (so attractive to lightning strikes) are available, birds will nest in tall trees. (Peregrine falcons, for example, nest on the ledges of tall buildings in some of our major cities.)

The Wilderness Area program needs to be completely revised, and in some cases reversed. It is easy for a legislator to show his recognition of the “importance of the environment” by backing legislation to set aside one or two million acres in his state as wilderness, but such areas should only be declared as true wilderness when they present no feasible alternatives. Cleared fire-breaks should be established at reasonable locations for fire control and suppression activities.

Finally, the extremists must recognize that the management of our National Forest is not entirely up to them, and that during the last 15 years when they have been in charge, the results have been disastrous. The decisions made that affect the careers of many people, and the future of an important segment of our economy, should be the province of the professionals who have the training, the background, and the experience to accommodate all reasonable needs for the future good of those who come after us, while improving our precious forest resources.

Nuclear Transmutation Considered As Cause in Geologic Transformation

by Jack Sauers

In the previous issue of *21st Century* (Research Communication, Summer 2000, p. 4), I described the Pliocene erosion surface shown on the topological map at around the 6,000-foot elevation on Table Mountain, in the Liberty area northeast of Cle Elum in the Cascade Mountain range of western Washington state.

Across the Cascades, there are rounded concordant summits at around the 6,000-foot elevation, below which, the terrace development at similar elevations takes place, similar to that at Liberty. The Cascade Mountain peneplain had Mt. Stuart as a monadnock in the pre-Tertiary granitics described by Bailey Willis in 1903.¹ Willis correctly deduced a fault zone along the west side of the Cascades. The ridge, from the back of Wallace Lake thrust area to the east, is called Stickney Ridge. It descends from the Mt. Stickney nunatak (surrounded by a glacier) monadnock, in a slowly declining long ridge towards the northwest, down across Olney Pass to Blue Mountain, and thence west of the Sultan River Canyon to a plateau.

That plateau area is truncated by a fault at its west end, between it and the Puget Lowland, with a 50 milligal gravity gradient across the fault zone. It is underlain possibly by granitics at the west, and mostly by the Upper Jurassic-Lower Cretaceous Sultan Series slaty rocks, from which I have collected Aucella and Buchia fossils that I placed in the Burke Museum in Seattle many years ago.

It is neotectonic uplift, across areas underlain by granitics, that has raised the Cascade Mountain peneplain to its current elevation, since 800,000 years before present (YBP).

After the Tertiary thrusting, a process of intrusion, assimilation, and possibly both chemical fusion, and chemically assisted nuclear fusion has been responsible for the emplacement of the Miocene Snoqualmie Batholith and



A small section of the U.S. Geological Survey map showing major glacial terraces in the Liberty area of the Cascade Mountains.

Oligocene Index Batholith along the zone of discontinuity of their eastward dipping sole thrust zones which penetrated deep into the Cenozoic, Mesozoic, and Paleozoic crust.

Neomagnetic Reconstitution

My working hypothesis is that a neomagnetic reconstitution process is at work, in which silicon atoms are partly changed to aluminum atoms, releasing hydrogen atoms. This would reduce density, and shift more basic basaltic volcanics towards andesitic ones, producing quartz-diorite plutonic massifs. These later become isostatically unstable, and rise neotectonically after around the time of the Brunhes magnetic reversal (ca. 800,000 YBP), uplifting the range as a part of the sialic formation and accretion process, as the continent moved to the west and developed microplates.

Released water from the nuclear fusion process, as indicated by work on metamorphic minerals by P.A. Korol'kov in the former Soviet Union, would be a product of such a process. With later fracturing of the solidified granitics, this would go to make up the extensive base and precious metal ores, deposited on suitable loci here in the Cascades, which often today lie along the radiating fracture zones of our Pleistocene volcanoes. I have mapped these on SLAR photography from Canada to the south of Mt.

Hood, and from the Olympics to the Columbia River, on a megatectonic 1993 aerial radar photomosaic compilation.

These are being saved for the Ice Age. Jack Sauers (6240 5th N.W., Seattle, WA 98107-2121) is a retired field geologist with 50 years experience exploring in the Cascade range.

Notes

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Stuart Lewis

Jacob Welsh is 10 years old and in the fifth grade.

this rather annoying, because it is not a miracle at all, once you understand it.

There is more than one way to think about how to solve the puzzle. My father, when he was a child, learned a rule: If an odd number of pieces is to be moved, move the first one (the smallest) to the post to which the entire set is to be moved. But if an even number of pieces is to be moved, move the first to the *other* post—not the target post.³

That method works, but it's only a rule, and it requires a lot of other rules to explain it to somebody, as the footnote shows.

Another method pairs the size of the wooden blocks to the markings on an inch ruler⁴ (Figure 2). Each of the fraction divisions on the ruler is numbered, starting with 1 for the smallest, and the blocks are also numbered, with 1 for the smallest. By following along the scale of the ruler, you can tell which block to move next.

This is a better method, because, by numbering the blocks according to their size, you can begin to see the repeating number patterns: which blocks are to be moved when. But it doesn't show you *where* to move each block.

I played with the puzzle long enough that I memorized the number pattern. Then, one day, when I generated the Sierpinski Triangle fractal pattern by computer, I noticed that, if you number the triangles on the fractal from 1 to 7, from smallest to largest, and then read the numbers along the *edge* of the largest triangle, you find the very same number pattern that solves the Hanoi Tower puzzle!

Because the size of the triangles corresponds to the size of the wooden blocks, it is easy to tell which block to move next. But it still doesn't tell you *where* to move the blocks.

I knew how to do it, because I had done it so often. Then, I figured out a good way to explain it to others.

Imagine that the three posts are placed beneath trap doors at the bottom of a vertical circular track—like a ferris wheel. You always move the blocks in the same direction around the circle,

New Key Unlocks Puzzle Of The Hanoi Tower

by Jacob Welsh¹

In ancient times, somebody invented a puzzle called the Hanoi Tower at the great Temple of Benares. Three diamond needles were fixed on a brass plate, and 60 gold discs of diminishing size were placed on one needle. The challenge was to transfer the discs from one needle to another, according to two rules: You may move only one disc at a time, and you may not place a larger disc on top of a smaller disc. When you are finished, the discs will be in the same order of diminishing size that they were originally.

My father had a version of this puzzle as a child, with seven square, flat, wooden blocks and three posts—instead of golden discs and diamond needles.

He kept the puzzle, and we've had it around the house. But I never paid much attention to it, until recently.

After I had spent quite a bit of time working with it, and was very familiar with the pattern of repeating numbers required to solve it, I discovered something very surprising: The solution to the puzzle is contained in a fractal pattern of large and small triangles (Figure 1), which is one of the "sample scripts" that comes with The Geometer's Sketchpad® computer software,² which my parents bought for me to work with during summer vacation.

When I pointed this out to my mother, she said, "It's a miracle!" and screamed for my father to come and look. I found

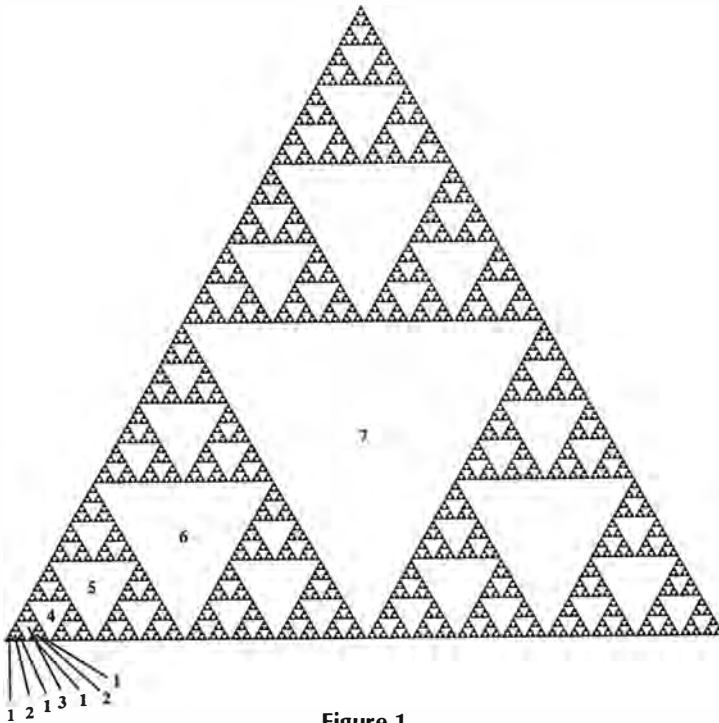


Figure 1
THE SIERPINSKI TRIANGLE FRACTAL

The fractal pattern is generated in this way: Begin with a large, solid black triangle. Find the midpoint of each of its sides. Construct a triangle that connects those midpoints, and remove the black color from the central triangle. This leaves three black triangles and one white triangle. Do the same thing with each of the remaining, smaller black triangles, and keep repeating this process as long as you want. (For the purpose of solving the Hanoi Tower puzzle, repeat it until you have seven sizes of white triangles.)

Then, number the white triangles, with 1 for the smallest. Reading along one of the edges of the large triangle, the resulting number pattern gives the sequence of blocks to be moved to solve the puzzle.

following the number pattern along the edge of the fractal to see which block to move next. If you come to an empty post, your block can fall through the trap door, onto the post. If there is a larger block already on the post, the new block can still fall through the trap door. But if a smaller block is already on the post, the trap door is blocked, so you have to keep moving around the circle, until you come to a post that is not blocked.

What the inch-ruler and fractal triangle methods have in common, is that you start with a number pattern, and then go on to the next, larger number in sequence, repeating everything that came before; then, you go on to an even bigger number in sequence, and repeat everything that came before that. It's a bit like the old song, "There Was an Old

Woman Who Swallowed a Fly."

If you continue in this way long enough, you will solve the puzzle.

Notes

1. As told to Susan Welsh, his mother.
2. Manufactured by Key Curriculum Press, 1-800-995-MATH.
3. The idea is to move increasingly larger stacks of pieces, to expose each next-larger (lower) piece, so that piece can be moved, down to the bottom-most, largest piece. The position of the new, growing, stack shifts back and forth between the target post and the other unoccupied post. So, label the posts A, B, and C, and suppose an odd number of pieces (seven in the set we use). The stack starts out on Post A, and C is the target. Number the pieces one through seven, from smallest to largest.
First, move Piece #1 to Post C. This exposes #2, which can now be moved to Post B. Piece #1 must then be moved back onto #2, clearing Post C, for the next larger piece (#3). Then, the small stack of Pieces 1 and 2, must be moved onto #3, to clear Post B for Piece #4. Because this small stack is made up of an even number of pieces, make the first move to the post that is *not* your

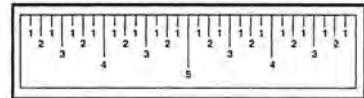


Figure 2
THE INCH-RULER METHOD
The numbers marked on the ruler correspond to the size of the squares on the Hanoi Tower, and the order of the numbers gives the sequence of blocks to be moved. This diagram works for five square blocks. If you have seven, you start the pattern again at the beginning for #6, and once again for #7.

Source: Used with permission of Sterling Publishing Co., Inc. from *Mental Math Workout*, by Michael L. Lobosco, © by Michael L. Lobosco, a Sterling/Tamos book

objective: in this case, Post A. This exposes Piece 2, so it can be moved on top of Piece 3 (still sitting on Post C); and then Piece 1 on top of that.

When it is time to move this new stack of three pieces onto Piece #4 (on Post B), make the first move onto that post, since the stack contains an odd number of pieces.

4. Michael L. Lobosco, *Mental Math Workout* (New York: Scholastic, Inc., 1998). The book gives instructions for how to make your own Hanoi Tower.

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'And Yet It Gets Hot'

by Thomas E. Phipps, Jr.

Excess Heat: Why Cold Fusion Research Prevailed

Charles G. Beaudette
 (Foreword by Arthur C. Clarke,
 Introduction by David J. Nagel)
 South Bristol, Maine: Oak Grove Press,
 2000
 Paperback, 365 pp., \$26.95

In the 5th century, at Alexandria in Egypt, an unruly mob of Christian monks tore to bits the pagan female Neoplatonist philosopher Hypatia, who had dared to challenge the spiritual hegemony of the Church. In the 20th century, at Baltimore in the United States, an unruly mob of physicists applauded to the rafters a pair of character assassins that tore to bits the reputations of electrochemists Pons and Fleischmann, who had dared to challenge the scientific hegemony of Physics.

Thus the world progresses, twirling down the ringing grooves of change.

Appalled—as any good man might be—by the record of that May 1, 1989, Baltimore meeting of the American Physical Society (APS), wherein scholars reverted to savages, Charles Beaudette (a retired electrical engineer) has made it his business to examine the questions of scientific ethics and method raised by such behavior. How could physicists at the top of the social and scientific pyramid degenerate overnight into instinctive power grabbers? Was it fear that drove them to instill fear in others?

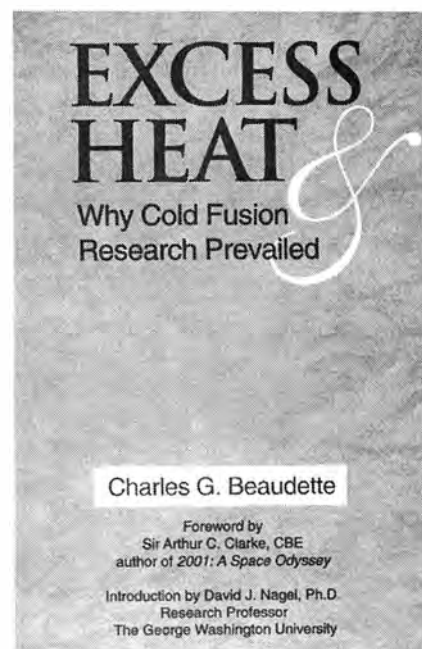
What caused the physicists to abandon at one stroke their hard-bought, ancient traditions of free inquiry, to feel themselves threatened by honest research endeavors of fellow scientists, to strike out with puerile charges of incompetence and fraud, rather than face the possibility of failure of the precious "nuclear theory" on which was built their house of cards?

To provide the reader with the background needed to form his own opin-

ions on such matters, the bulk of the Beaudette book furnishes a carefully documented history of the entire "cold fusion" episode, from its beginning to the present.

Alas, it is a sorry tale. There are few heroes. Suppose academic chemists had rallied in numbers to the defense of their fellow chemists. Suppose they had stood up to the physicists and said, "Hold on there, we are scientists too!" What would have been the result? Aside from grumblings among the media lapdogs, I suspect the physicists would have had morning-after thoughts (as perhaps those Christian monks did, when they got the blood washed off), and would have backed down.

In any case, the government money granters and the U.S. Patent Office would not have been cowed into craven surrender of all independent judgment. There would surely among the chemist, if not the physicist, bureaucrats of, say, the Office of Naval Research, have been



sufficient vestiges of courage to fund continuing investigations into excess heat production. What a difference that would have made!

But no, as I say, heroes in our time are few on the ground. That's what our affluent society has come to: Affluence for all, means cowardice for all. A few attack dogs rule the chicken-roost. The



Crushed by the attack dogs of modern physics: Martin Fleischmann (left) and Stanley Pons (center) at a 1989 meeting of the Electrochemical Society.

joke is that the dogs are cowards, too, the only difference being that their skill at managing retreat has not been tested. A society of this stamp gets what it earns—and ours certainly has done little to earn the singular boon of cold fusion energy.

Just the Observational Facts

To me, the most telling parts of the book are just the plain rehearsals of observational facts, mostly reported in the “underground” literature of what the author calls the cold fusion “ghetto.” Replications of the Pons-Fleischmann results, and elucidations of their calorimetry, which were demanded rhetorically by the physicists in their 1989 rush to judgment, have in fact been accomplished during the subsequent decade, and have been reported. But not reported where the self-centered physicists look, in their own exclusive publications.

Why not? Simply because the editors of those publications, when not themselves leaders of the anti-cold-fusion vendetta, have played the coward’s part in knuckling under to intimidation by the academic physicist know-it-alls of the attack-dog persuasion.

In short, cold fusion researchers (of which a few are still extant), both chemists and physicists, have been shunned and denied communications access to the generality of their professions, just as they have been denied patent rights. If voodoo science authorities such as the APS’s alpha attack dog (Dr. Robert Park) had their way, inhabitants of the cold fusion ghetto would be denied the right to breathe (without ridicule) the common air.

And what is their crime? It used to be called scientific curiosity. If you want to be charitable, call it insufficient respect for scientific “Authority.” Specifically, the inadequate respect is for nuclear physics theory, an intellectual fiefdom that I (long ago Harvard-trained as a “nuclear physicist”) think of as low-grade interim-concept carpentry, dolled-up in the specious finery of ultimate truth.

A Reduction to Absurdity

In the whole world, there are very few physicists who can claim even moderate hands-on competence at calorimetry—yet, fewer still hesitate to asperse the competence of chemists experienced in that art. In this peck order, the

pecked-on squawk not. It is not just strange, it is a reduction to absurdity of two sciences.

In general, the *Excess Heat* does a very good job. I do not see how an unbiased reader can emerge from it without a conviction that the physicists, particularly of the United States, have disgraced themselves, and continue to do so to this day. Not that the book argues in any such biased fashion as I have done here. On the contrary, it is for the most part dispassionate, willing to let history speak for itself. Therein lies its persuasiveness.

In fact, I should have been earlier persuaded if the author had cut more rapidly to the chase—that is, to the facts of validation of cold fusion phenomena—with less attention along the way to issues of ethics and method. I believe the author himself is most interested in the ethical-philosophical aspects of the case—and perhaps many readers will share this orientation. However, if you have children, and some of them get cold in near-term future winters, this might shift your central concern to central heating—that is, from ethics to engineering.

A Staggering Omission

In one matter, there is an incredible oversight. One of the rare heroes of the cold fusion story, Julian Schwinger, is not even mentioned. From the earliest days of 1989, this Noble (Nobel) Laureate stood up for the possibility that accepted nuclear theory might be wrong, and that Pons-Fleischmann might be right. It cost him dearly. He was shunned by brain-proud academics, he was accused of senility, he was denied publication of his alternative theories by those same fanatics—1,500-year time-travelled “Christian monks”—who were both demanding alternative theory and denying its possibility.

So outrageous was his treatment by editors and referees, that he resigned from the APS in protest—surely one of the few honorable actions recorded of the whole sordid saga. When he died soon after, his obituary in *Physics Today* barely touched upon his concern with cold fusion, and courage shown in this matter. Yet, I venture the judgment that nothing in his eminently distinguished professional career became him like his final days. If one name could redeem

American physics, it would be that of Schwinger. That that name should not even appear in the index of this book is a staggering omission.

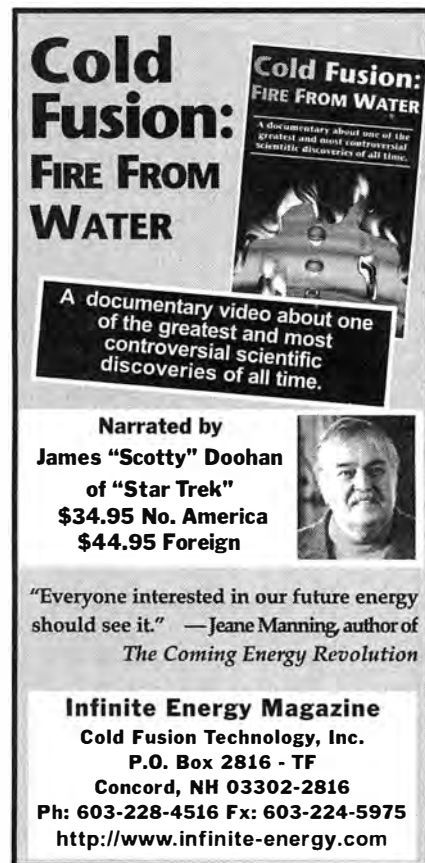
Among acknowledgments we read that theorist “Peter Hagelstein read my manuscript and made several important points of criticisms.” Shame on you, Peter, for letting that one get by.

Peripheral Interactions Reviewed

In addition to evidence of Pons-Fleischmann-type cold fusion, which with literally scores of replications by McKubre and other respected workers can be considered by now quite solid, the book treats many of the peripheral data that have emerged in the past 10 years indicating other types of interactions of chemistry with nuclear physics, such as element and isotope transmutations. Transmutation proofs by T. Mizuno in Japan and by George Miley in the United States appear to be just as solid as those for cold fusion.

Admittedly, the “new energy” field is exactly such as to attract the people

Continued on page 80



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Renaissance Instruments That Made Accurate Astronomical Measurements Possible

by Rick Sanders

The Sun in the Church: Cathedrals as Solar Observatories

J.L. Heilbron

Cambridge: Harvard University Press, 1999

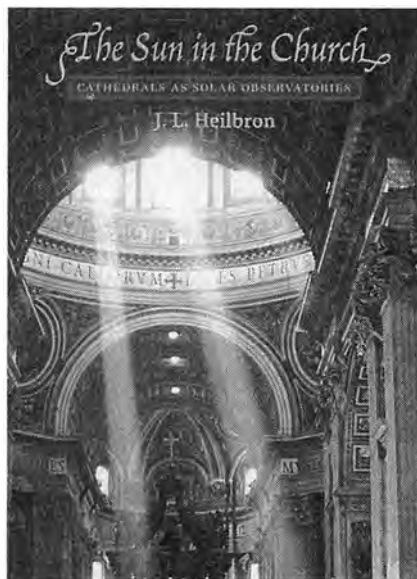
Hardcover, 366 pp., \$35.00

The instruments brought to public attention by this book are both beautiful and of major importance in the history of astronomy. The first major *meridiana* (as they are called, because they are neither sundials, nor clocks in the narrow sense, but built like a camera obscura, to catch the Sun's image on the north-south, or meridian line, at noon) was built in 1475 in Florence by the astronomer, Paolo dal Pozzo Toscanelli, who provided Columbus with his map to find the new world; the last one in Palermo (1795), by astronomer Giuseppe Piazzi, whose sightings of the asteroid Ceres, allowed the great Carl Gauss to throw Newtonian physics into the garbage can forever.

But *caveat emptor*, buyer beware! The author, Heilbron, continuously strikes a chord of cynicism, and retails Black Legend insignnia remarks about the Church, while mindlessly puffing up Galileo. All this would spoil the book if it were not that, perhaps in spite of himself, Heilbron has done careful work on this hitherto undeservedly obscure topic. What a shame that Heilbron seems to be driven to propitiate some Aristotelian gods, with his constant attacks on the Church; while paradoxically for him, the Renaissance of Platonic, anti-Aristotelian thought could not have occurred, nor could these instruments have been built, outside the protecting confines of the Church.

The Meridiana

The meridiana is not a sundial, though similar. It consists of a hole in the ceiling of a tall building, and a line along the floor marking the places on which the Sun falls at noon over the course of a year. It looks simple enough, but is actually an amazing instrument. Ask yourself some questions. Do you know how to find your latitude, or lon-



gitude, the angle that the Earth's axis makes with the ecliptic? Do you know where north is, or south? Do you know precisely when noon occurs?

Well, if you are navigating long distances, or aiming ICBMs halfway around the world, or if you're trying to land on another planet millions of miles away, or trying to time an eclipse so that you might know your longitude, or using lunar distances for the same—you had better be more accurate than what has become "good enough for the government." Look what happened to the Hubble Space Telescope when somebody thought washers from a hardware store were good enough when they could not find the precision-machined ones—the pictures were fuzzy for months, and a special trip had to be made to fix it.

Beauty Is Truth, Truth Beauty

Only a love of truth can drive this work. Take, for example, Giovanni Domenico Cassini who used the meridiana in the church of San Petronio, in Bologna, to find the angle of the ecliptic to within a few arc-seconds! That put him in the position of being able to cure the headache given astronomers by the changing and elusive index of refrac-

tion; and in fact, Cassini's tables were used for almost a century in France, as well as in Italy. It also gave him the means for finding his latitude, longitude, and the circumference of the Earth with great precision. It took telescopic lenses and 150 years before these results were surpassed!

Using the instrument in San Petronio, between 1655 and 1736, Cassini, Grimaldi, Riccioli, and others, left us a wealth of data: 4,500 observations.

The restoration of Toscanelli's old (1475) meridiana at Santa Maria del Fiore, to become what another astronomer called "the most beautiful monument to astronomy in the world," was carried out in 1755 by the Jesuit Leonardo Ximenes. He levelled his line against a water basin and a special apparatus, through which a plumb bob was lowered until a little droplet, visible in the light, sprang up to it. In this way Ximenes thought he could determine the level to within half a millimeter.

Heilbron elaborates: "The large water surface suffered appreciable evaporation. After finishing his levelling, Ximenes used his apparatus for a 'precise experiment in physics,' that is, the determination of the rate of evaporation of water as a function of temperature."

To measure the height of the hole in the cupola, Ximenes dropped down a chain, but then had to build a special apparatus to compensate for the stretching of the chain caused by its own weight, and by temperature variations. Like Cassini before him, Ximenes damped the vibration of the chain by attaching specially shaped plumb bobs, immersed in water. His measurement for the height was the equivalent of 91.05 meters or 298 feet $8\frac{1}{64}$ inches.

Ximenes found Toscanelli's north-south line to be off by 56' 41" of an arc. Heilbron does not say—and it seems to be unknown—how Toscanelli actually determined this line. Some churches (but it seems not Santa Maria del Fiore), had a hole pierced in the wall facing north, through which it was possible to

see the north star even in the day time, determine the radius of its diurnal circle, and aim for the center of that circle as both determining the direction of north-south, and the true latitude of the church in question. (Gottfried W. Leibniz's friend, Francesco Bianchini, had one of these built in Santa Maria degli Angeli in Rome.)

The close approximation of astronomical north, measured in this way, could then be compared with daytime solar observations, taking an image of the Sun (which of course is not clear and crisp, but flickering, with indistinct boundaries, more or less, depending on the weather) a few hours before it hits the north-south line, and the same amount of time after: If the angle of the chord joining these two images were perpendicular to the hypothesized north-south line, then this line was placed correctly, to the degree of precision allowed by the other measurements.

This concern with accuracy is not some kind of perfection sickness: Often one measurement, such as latitude, or longitude, or the exact time of local noon, is taken as the base for a series of other measurements, where small errors can soon become significant. Moreover, we know that it was Kepler's tireless pursuit of a difference of 8" of an arc, that enabled him to revolutionize all of astronomy hitherto, and bring it back into line with Plato's *Timaeus*, after its having been poisoned by Aristotelianism for almost two millennia.

Measuring the Angle of the Earth's Axis, and Its Rate of Change

One of the most important things to be measured, from the time of Toscanelli, to the end of the reign of the meridiana, was the nature of the angle of inclination of the Earth's axis. Here again, you were dealing with an "invariant" which was itself changing, but in which way? Was it cyclical? Over how long a period?

Heilbron gives the figures for the angle going back to Pytheas (360 B.C.) and Eratosthenes (200 B.C.), Ptolemy 23° 51' 20"; Albategno (969 A.D.), 23° 35';

Regiomontanus 23° 28' . . . up through Cassini, in 1660, at 23° 28' 42". Were the measurements bad, or is the angle decreasing? Buildings of course also settle, some more than others, again throwing measurements into doubt.

By the time of Ximenes, there was an agreement among the leading astronomers, that there was a decrease in the angle—but the amount could not be agreed upon. Ximenes had 34" per century, while Abbé Nicolas-Louis de Lacaille, who compared his own observations made between 1749 and 1757, with corrected Chinese observations of the 13th century, had 47" per century. When making these measurements, astronomers also had to correct for a small nutation, or nodding, of the Earth's axis, which Ximenes took as 15" every 18.6 years, relating to the Moon's cycle with that same period.

Measuring the Ellipticity Of the Earth's Orbit

Thanks to the quality of the meridiana in San Petronio, and thanks to Cassini's commitment to accuracy, he was able

to measure the (very slight) ellipticity of the Earth's orbit, by measuring the Sun's image cast on the floor at the two solstices, when the Sun was approximately at apogee and perigee: He measured the apparent diameters of the Sun at apogee as 31'8", and for perigee 32'10". Now, the speeding up and slowing down of the Sun during the year could no longer be attributed to an "optical illusion," à la Ptolemy, but a real event; Aristotle's "eternal sameness" of the heavens, was now eternally demolished.

What finally replaced the meridiana for accuracy, were mural quadrants, with telescopic sights, and a diameter of 6 to 8 feet. To match the meridiana's accuracy, the instrument makers might have to take months, literally, just to divide a quarter of a circle into one second of an arc intervals. Heilbron tells us about:

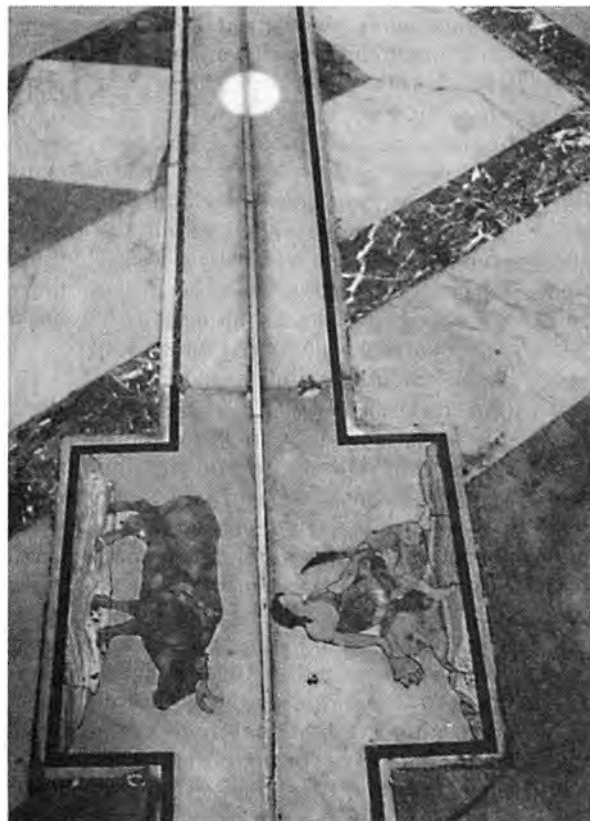
"[T]he meticulous John Bird, who . . . engraved the most delicate lines on his creations only in the morning, in the spring or in the fall, with a compass he had set the night before and allowed to come into full thermal equilibrium with the piece under construction. He would allow but one assistant to work with him, lest the combined body heats of several should expand the limb during division" (p. 259).

Let us get our schools back to where they might inspire such students!

We have to thank Heilbron for bringing these instruments to public attention. But, once again, we must warn readers to "mine" this book, throwing out the dross. Judge the mind of Heilbron by what he says about the great and lovable Johannes Kepler (p. 10):

"The son of a 'vicious, inflexible, quarrelsome' mercenary and a woman later tried as a witch, Kepler would have led the life of the snarling little dog he took himself to be were it not for a system of state education in the Duchy of Wuerttemberg. . .!"

This book leaves many leads to be explored, so buy it and have fun! A project on Cassini, for one, would no doubt be rich in consequence.



Publifoto, Palermo, from *The Sun in the Church*,

The meridiana at the Duomo of Palermo, showing the Sun. At noon in the spring, it is in Taurus, and in the summer, it is in Virgo.

An Imaginative Look at 'What Is Life?'

by Ron Castonguay

The Rainbow and the Worm: The Physics of Organisms

Mae-Wan Ho

River Edge, N.J.: World Scientific, 1993

(reissued 1998)

Paperback, 202 pp., \$21.00

This is a far more important book than the title and official affiliation of the author (Director, Bioelectrodynamics Laboratory, Open University, England) would suggest. It starts by re-posing the question of Erwin Schrödinger's 1944 book *What is Life?*: "How can the events in space and time which take place within the spatial boundary of a living organism be accounted for by the laws of physics and chemistry?"

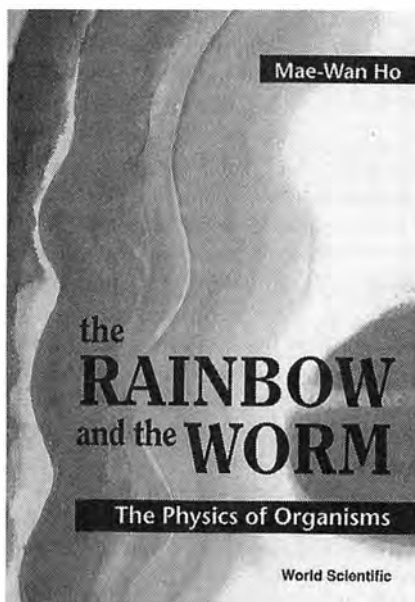
However, Dr. Ho immediately judos Schrödinger's reductionist formulation. From the start, she includes "knowing consciousness" as necessary to a definition of life, stating that "[she is] far from implying that consciousness must be 'reduced' to physics and chemistry," but rather the obverse. Then she notes that the scientific ground for this issue are, specifically, thermodynamics and quantum physics, in distinction to simple chemistry and physics.

Thus, having reformulated the issue as "life, including consciousness, being accounted for by thermodynamics and quantum theory" (my formulation), she answers, in the course of the book, "Yes, but. . ."

Yes, but what a "BUT"! The entire field of thermodynamics is completely reformulated as "a thermodynamics of organized complexity," removing completely the infamous Second Law. Although she retains the term "thermodynamics," her reformulation reduces thermal energy, heat, to the lowest and most unimportant, uninteresting type of energy, the trivial case. Her approach to quantum mechanics is less drastic, but still accomplishes a much needed cleansing of the (Solvay, et al.) stables.

Some Enticing Bits

This is a spare, tight book, very compact and dense in its arguments (there are only 183 pages of text, and these include diagrams and notes), and it can-



not be usefully summarized. It must be read, and, to be properly appreciated, studied. Thus, rather than attempting a summation or a review, I will extract bits here and there as your *hors d'oeuvre*:

- the extreme sensitivity and efficiency of energy transductions, as exemplified by the sensitivity of visual apparatus to a single photon;
- "the coordinated splitting of 10^{20} individual molecules of ATP" in a muscle contraction, and its near 100 percent energy efficiency;
- a reprise of the Second Law, with a dig at Leo Szilard's solution of the Maxwell's Demon problem;
- self-organizing systems, especially coordinated systems of interlocking, cascading spatial and temporal dimensions;
- catenation of living processes in time with characteristic times, ranging from 10^{-14} to 10^7 seconds (photon absorption to circannual rhythms); a simple muscle contraction contains cycles of 10^{-3} to 10^6 seconds;
- thermal versus organized energy flows; free energy versus "stored" energy in organisms and the biosphere; energy storage in organisms of multiple levels and types (however,

Dr. Ho assumes that only outer valence electrons are involved in living processes);

- "Seventy-three Octaves of Nature's Music" (matter-energy frequency ranges in organisms);
- "Coherent Excitation"; "Non-equilibrium Transitions to Dynamic Order"; comparisons with laser, tuning;
- "The standard procedure is to grind up the organism . . . to a pulp . . . separate out the different 'factions'. . . extract . . . and to purify . . . dissolve in . . . double distilled deionized water," and *voilà*, no structure is found!;
- "If we let this [reductionist] language dominate our thoughts . . . it will surely reduce us all to idiots";
- "RNA and especially DNA are also enormous dielectric molecules that can sustain coherent excited modes which may . . . determin[e] which genes are transcribed or translated."

• "nerve cells growing in culture will respond to electrical fields as weak as 0.1v/cm—six orders of magnitude below the potential difference . . . across membranes."

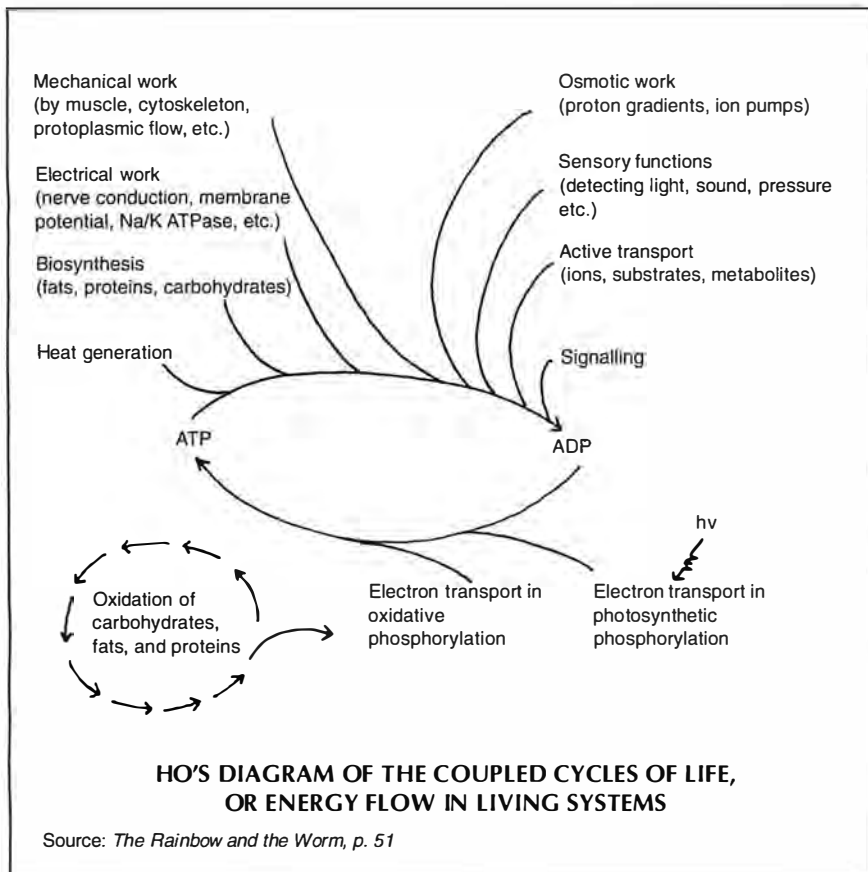
- "organisms are in general much more sensitive to weak magnetic fields than to weak electric fields"; "static magnetic fields . . . have very different effects from oscillating. . .";

Gratitude to Fritz Popp

Dr. Mae-Wan Ho is Director of the Bioelectrodynamics Laboratory, and a member of the Biology Department at the Open University, Walton Hall, U.K. An eminent and respected British scientist, she gained her Ph.D. in biochemistry at Hong Kong University and held a post-doctoral fellowship at the University of California. She was Senior Research Fellow at the University of London before joining the Open University in 1976.

She cites a 1985 lecture by German biophysicist Fritz Popp (whose work has been frequently noted in *21st Century*)¹ as pointing her in the direction where "everything begins to make sense."

Speaking of long-range cellular communication, by means of biophotons,



she describes movies of living embryos (larva) filmed under polarizing light, with certain apparatus and technique, which produce a multicolored display of function. "Muscle bands switch from brilliant turquoise to bright vermilion [as they contract] . . . the egg yolk shimmers a dull chartreuse. . . ." Hence, the title.

Showing an historical depth, Ho refers to the first studies of biophoton emission by Alexander Gurwitsch. On entropy, information theory and the Shannon thesis, she calls it irreconcilable from an "objective" standpoint. In her discussion of time, she approaches the concept of "simultaneity of eternity" from a quantum/philosophical perspective.

It is clear that Dr. Ho's thinking coheres with *21st Century's* integrated approach to biology and physics.

The profundity of Ho's ideas can be illustrated by some additional quotes:

" . . . [I]f thermodynamics were to apply to living systems, it must apply to individual molecules," thus, thrashing the very idea of "statistical" thermodynamics. She asks "how can individual

quantum molecular machines function in collective modes extending over macroscopic distances?" And answers, ". . . one of the *raison d'être* of development is to set up nested hierarchies of space-time domains where local equilibrium can be maintained in a macroscopically *non-equilibrium* system." And lastly, ". . . the continuity between the living and the non-living, which is my thesis."

High flying for a professor at a British university!

Ho isn't without her weaknesses. She does not come close to comprehending the intensely political nature of the history of science, and the distortions, fabrications, and pure lies that lard the standard version—for example, she takes the legend of James Clerk Maxwell at face value.

This may be why Dr. Ho is subject to some Aquarian leanings. This is more evident in her other, later work *Genetic Engineering, Dream or Nightmare, Brave New World of Science and Business*. There, she objects to genetic engineering on a naive "North/South" political basis, and also

on a scientific basis, saying that the science is dangerous in itself, because it directly breaches the natural, cross-species genetic barriers. But, like fire, what is dangerous can, properly utilized, be of immense benefit to mankind.

Thus, she has ties to the Greens, and has served as a spokesman for them on genetic engineering issues. This connection, I believe, has also led her to a foolish (one hopes merely nominal) anti-nuclear stance.

Ho has yet to fully understand that one cannot define the laws of the universe, and ignore the existence of the human beings doing the investigating. Her Green proclivities do not deny the human investigator directly, but *merely* that investigator's implicit value as creature created in the image of God.

Notes

1. See for example, the series of historical articles on Alexander Gurwitsch and his work, which appeared in the Summer 1998, Fall 1998, Winter 1998-1999, Summer 1999, and Fall 1999 issues of *21st Century*. See also a report on the Second International Alexander Gurwitsch Conference in the Spring 2000 issue.

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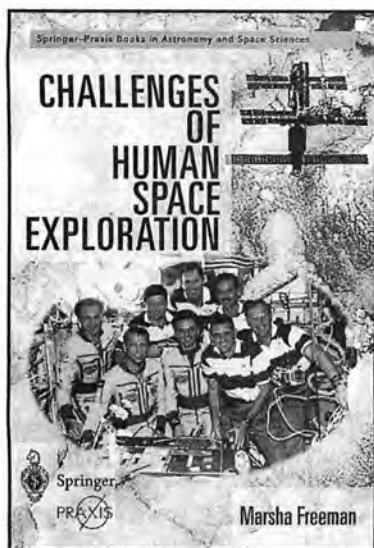
articles on the new,
non-reductionist biology?

- Vladimir Voeikov, Ph.D., "The Scientific Basis of the New Biological Paradigm"
—**Summer 1999**
- Michael Lipkind, "Alexander Gurwitsch and the Concept of the Biological Field" (appended "Remarks on Gurwitsch's Method," by Lyndon H. LaRouche, Jr.)
—**Part 1: Summer 1998;**
Part 2: Fall 1998
- Alexander and Lydia Gurwitsch, "Twenty Years of Mitogenetic Radiation: Emergence, Development, and Perspectives"
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Cold Fusion

Continued from page 75

who in an earlier generation sold patent medicine out of the back of a wagon—and one might say today's woods are full of the lineal heirs and assigns of such mountebanks. (I think I could name more than one, but am not sure enough to chance the laws of libel.) One cannot in all honesty take the easy way of the APS attack dogs by assigning to the lot of them the role of charlatans or the self-deluded. Life is not that simple. One has to be selective and exercise the little gray cells. If science and scientific communication were working as they should, the normal processes of error correction would be functioning in this field—but the attack dogs have prevented that.

Consequently, most of the errors of the Establishment are strongly on the side of negativism. Even the chemists, after 10 years, remain ignorant of the dawn of their new empowerment. From habit they continue passively to submit to the physicists' peckings. One feels little sympathy for them. It is the plain people of the world, victims of scientific cowardice and inanition, one feels sorry for.

And, while in this mood of regret, let us not omit to shed a tear for America, which opened the 20th century as the land of action, progress, hope, freedom, and Yankee ingenuity—land of Edison and Tesla, magnet to the world's finest intellects—and closed it as an affluent arthritic, from which its most original minds had fled abroad.

I am glad I read this book and can recommend it without reserve to anyone not subject to apoplexy. For, if you are like me, it will make you fighting mad. Legend has it that Galileo, crushed by papal authority and consigned to house arrest, was heard to mutter, "and yet it moves." In the same spirit, Pons and Fleischmann, crushed by modern physics authority and consigned to Coventry, may be heard to mumble, "and yet it gets hot."

Dr. Thomas Phipps, a retired physicist, describes himself as a certified heretic in the field of modern theoretical physics.

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The Case for Mars II, Ed., C. P. McKay, 1985, Second Printing 1988, 730p, Hard Cover \$30; Soft Cover \$20

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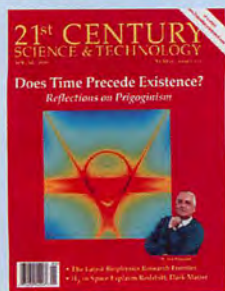
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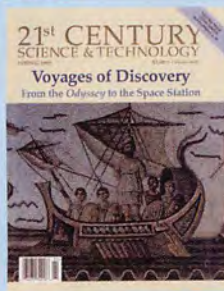
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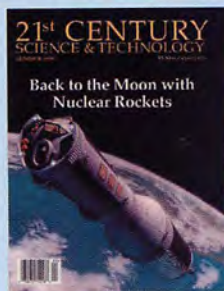
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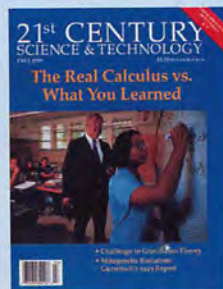


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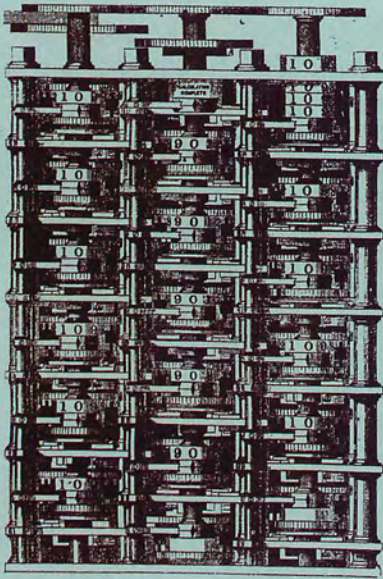
In This Issue:

WHY ARTIFICIAL INTELLIGENCE IS STUPID—AND DANGEROUS

The first calculating machine was developed by Johannes Kepler and Wilhelm Schickard in 1617. Every element of the modern programmable computer was known to Charles Babbage and Augusta Ada Byron by the 1830s. The much-celebrated work of John von Neumann and Norbert Wiener (*Cybernetics*) has set back the development and application of modern computing devices by centuries. Today's cult of artificial intelligence contributes mightily to the New Violence, the creation of programmed child killers by addiction to point-and-shoot video games, designed for training of military personnel but mass-marketed to youth.

In four major articles and an Editorial in this issue, Lyndon H. LaRouche, Ralf Schauerhammer, Michele Steinberg, and Laurence Hecht set the record straight, and go to the heart of the axiomatic flaws underlying artificial intelligence and the "New Economy."

The Granger Collection



Charles Babbage foresaw all the characteristics of today's computer in the 1800s. Here, his "difference machine" (1822), which was followed in 1833 by an "analytical calculating automaton."

Programming virtual killers: A boy plays *Virtual Fighter*, a video game at a Japanese amusement park owned by Sega.



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John McColgan

Fire rages through a National Forest in Montana, Aug. 6, 2000, in a view captured by fire behavior analyst John McColgan.

U.S. FOREST MANAGEMENT POLICY IS OUT OF CONTROL

Foolish assumptions of so-called ecologists are destroying our national forests. The National Forest Management Act of 1976 stood professional forest management on its head. The average yearly acreage lost to fires increased fourfold in the period 1985 to 1998, compared to 1960-1984—and the year 2000 will be much worse. Contributions in the Environment section by professional forest scientists Richard Bennett and Thomas Bonnicksen define and explore the problem, and the rational solutions.