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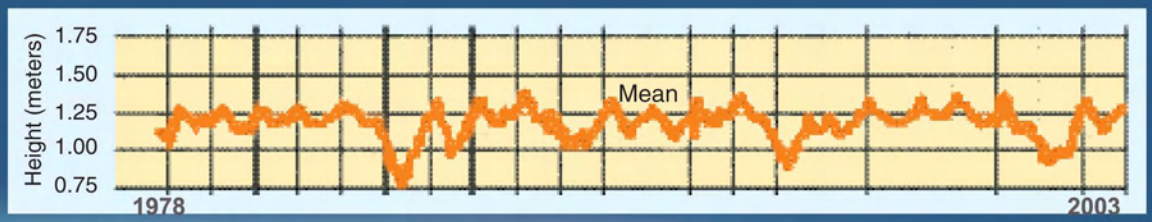
What Sea Level Rise?



21st CENTURY SCIENCE & TECHNOLOGY

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Features

Departments

News

On the cover: Part of a Pacific atoll showing two islets on a barrier reef, separated by a deep pass between the ocean and the lagoon, courtesy of NOAA. Inset is the mean tide-gauge record for Tuvalu, 1978-2003, showing sea-level stability, courtesy of Nils-Axel Mörner. Cover design by Alan Yue.

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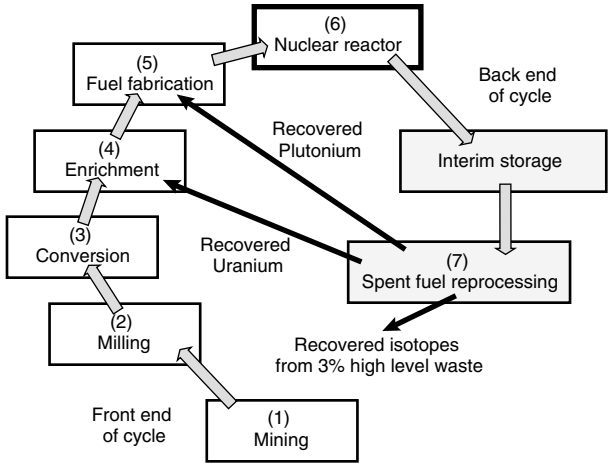
U.S. Nuclear Energy Program: Too Little Mission

A "Review of the Department of Energy's Nuclear Energy Research and Development Program," issued Oct. 29 by a committee of the National Academy of Sciences,[1] criticized the Department of Energy's Global Nuclear Energy Partnership (GNEP) program, but for all the wrong reasons. Instead of critically looking at GNEP's goal of preventing other countries from developing a complete nuclear fuel cycle on their own, the committee focussed on how there is no real need for the United States to develop the reprocessing of spent nuclear fuel, and how it's too expensive anyway.

"All committee members agree that the GNEP program [for fuel recycling] should not go forward and that it should be replaced by a less aggressive research program.... Domestic waste management, security, and fuel supply needs are not adequate to justify early deployment of commercial-scale reprocessing and fast reactor facilities," the report states. "There is no economic justification to go



COMPLETING THE NUCLEAR FUEL CYCLE

The full nuclear fuel cycle shows that nuclear is a renewable energy source: The spent fuel can be reprocessed to recover unburned uranium and plutonium that can be fabricated into new reactor fuel. Since 1976, the U.S. nuclear cycle has been "once through," going from spent fuel to interim storage and then longer-term storage.

The spent fuel produced by a single 1,000-megawatt nuclear plant, over its 40-year lifetime, is equal to the energy in 130 million barrels of oil, or 37 million tons of coal, plus strategic metals and other valuable isotopes that could be retrieved from the high-level fission products. Other nuclear nations reprocess this resource.

forward with this program at anything approaching commercial scale."

The head of this small-thinking NAS committee, Robert W. Fri, happens to be the same person who headed President Gerald Ford's nuclear group in 1975, which made the decision to stop the reprocessing of spent fuel. (This nuclear group worked with Ford's chief-of-staff, Dick Cheney.) Ford lost the election, but Jimmy Carter, as President, then implemented the same Ford nuclear program and stopped U.S. spent-fuel reprocessing. This decision led to the accumulation of spent fuel in storage at nuclear plants, and thus created a perpetual "cause" for the anti-nuclear movement: "But what about the waste?"

Spent fuel from nuclear plants, it should be emphasized, is not "waste." About 97 percent of it can be recycled into new fuel, and the remaining 3 percent of actinides—high level radioactive elements—could also be "mined" to retrieve valuable isotopes for medical and industrial use. Until the decision of the Carter Administration, the United States, like other nuclear nations, routinely reprocessed spent fuel in a large industrial facility (the Savannah River Site in South Carolina), which worked well and did not have a security problem.

The NAS committee's report recommends that the DOE Office of Nuclear Energy put more emphasis on the department's Nuclear Power 2010 program, which is geared to facilitating the siting, design, and licensing of new nuclear power plants. It also supports more funding for the Generation IV program, which aims to put a next-generation nuclear plant in operation by 2017.[2]

These recommendations are good, as far as they go. Both programs need more funding to achieve their limited goals (compared to the need), and both programs should be accelerated. But the littleness of the DOE's vision is exceeded, not challenged, by the committee's report.

The Real Issue:
American System Development

The real issue, not addressed by either the DOE or the NAS report, is the *mission* of the United States in the economic future of the world. The world needs 6,000 nuclear plants by the year 2050, in order to bring the entire world's population up to a decent standard of living, by ensuring an adequate supply of electricity.[3] To accomplish this requires American System thinking, like that successfully implemented by Alexander Hamilton and, more recently, by Franklin Roosevelt. This means low-interest credit for projects that will build needed infrastructure and benefit the economy.

Long-term nuclear development projects, 25-50 years, will *pay for themselves and more,* as the Apollo Program did, which returned $10-$14 to the economy for every dollar spent. The spinoffs, in terms of new technologies, an educated and employed workforce, and plentiful

electricity, will allow the entire world economy to grow.

Imagine what an industrial boom we would have in this country, if we put our mind and resources to mass-producing nuclear plants (and mass-producing the facilities that could mass-produce reactors) for the world, at the same time training a future workforce in the necessary skills.

But this NAS committee, like most of today's decision-makers in industry, is fatally stuck in the post-Bretton Woods economic mode, even as the world financial system is imploding in front of its eyes. It bows to the market's "bottom-line," with its invisible hand that commands what will turn a "profit" in the shortest possible amount of time. This is *not* how this country was built and became an industrial giant.

The recommended incremental approach, taking step by tiny baby step, like the Achilles in Zeno's Paradox, never arrives at the destination. This kind of thinking is what killed the U.S. fusion program, and a host of other promising technologies that could have moved civilization forward.

Both the head of the DOE nuclear program and most of the members of the NAS committee, are without doubt "pro-nuclear." But some members of the committee, might most charitably be described as "anti-pronuclear," that is, technically qualified nuclear experts who in fact want to curb civilian nuclear energy, especially in the developing sector, and who use their technical expertise to have a seat at the table of policy-making bodies.

Closing the Nuclear Fuel Cycle

The U.S. civilian nuclear program, like others around the world, was established with the intention of recycling spent nuclear fuel. After all, that is what makes nuclear a truly *renewable* energy: Uranium fuel can be used to produce heat and electricity, and when it is "spent," it can be recycled into new reactor fuel. No other energy source can do that.

But, when reprocessing was stopped under the Carter Administration, in 1975-1976, the United States adopted a "once-through" nuclear fuel cycle, with all the attached political baggage. This once-through cycle was touted as being both cheaper, and non-proliferation friendly. If we don't reprocess, the Carter reasoning went, other nations will be encouraged not to reprocess.

Plans were made for a permanent burial place for the U.S. spent fuel that would accumulate, a site that, *billions* of dollars later, is still today in contention.

The GNEP program was announced in February 2006. In addition to its aim of policing the fuel cycles of other nuclear countries, GNEP set out to research and develop the recycling of spent fuel as an alternative to the once-through fuel cycle, but to do this *without* the separation of plutonium.

When spent fuel is reprocessed, the highly radioactive fission products (3 percent) are removed, and the fissionable uranium-235 (96 percent) and plutonium (1 percent) are separated for reuse. This plutonium could be directly used as fuel in breeder reactors, or mixed with uranium to make MOX, mixed oxide fuel for conventional reactors. (MOX, made from surplus weapons plutonium, has been used in 35

European reactors, and MOX is beginning to be used in the United States, with the Savannah River Facility designated as the production site.)

GNEP: It's All About Nonproliferation

GNEP, however, has set as a goal the development of a recycling process that will prevent any plutonium from being used. A second goal is to develop a breeder reactor whose fast neutrons would be used, not to make electricity, while at the same time breeding more reactor fuel,[4] but instead to "burn up" the highly radioactive fission products (3 percent of the spent fuel). Both of these GNEP goals are geared to develop commercial-scale facilities not for advancing nuclear technology in order to produce power more efficiently, but simply for preventing proliferation.

The NAS report does not question the aims of GNEP. It criticizes the timetable, saying that GNEP should not rush into developing a commercial facility for nuclear fuel recycling or an advanced sodium-cooled burner reactor; that it should instead continue research, and not select a particular technology yet. In particular, the NAS report states that GNEP should not skip the step of building an engineering-scale facility by moving directly into the commercial facility stage.

The NAS report outlines all the technical and political problems that remain for GNEP to solve, and concludes that delay is inevitable, so why not delay: "If and when technical progress justifies construction of a major facility, it is the very strong view of this committee that an engineering-scale facility is by far the safest, most effective, and least risky course.... [The committee believes that DOE should] commit to the construction of a major demonstration or facility only when there is a clear economic, national security, or environmental policy reason for doing so.... The committee is concerned that the plan to move rapidly to recycling and fast reactors has no economic basis."

What's missing here is any sense of mission or reality: What role will the United States play, as the rest of the world, led by Russia, India, and China intends to move forward—fast—with nuclear? Will we bury our heads in the sands of bureaucracy and continue to "study" and talk about the issue, as the NAS committee recommends? Will we inch along, inventing a new recycling process, and building a new facility based solely on an unproven and misguided goal of preventing proliferation? Neither GNEP nor the NAS has a solution befitting the nation that pioneered civilian nuclear technologies and, under the Atoms for Peace program, trained hundreds of nuclear engineers and scientists from around the world.

In short, if the United States doesn't wake up and make nuclear power the centerpiece of a domestic reindustrialization program, with a renewed mission to help the world industrialize, someday soon we will have to import both nuclear electricity and nuclear engineers, scientists, and technicians from other countries.

—Marjorie Mazel Hecht

Notes

1. "Review of DOE's Nuclear Energy Research and Development Program," National Research Council of the National Academy of Sciences, Oct. 29, 2007, 144 pp. Available online at www.nap.edu.
2. For more on the fourth-generation nuclear plants, see: Marsha Freeman, "Time for Next-Generation Nuclear Plants in the USA," and Marjorie Mazel Hecht, "Fourth-Generation Reactors Are Key to World's Nuclear Future," in this issue's Nuclear Report.
3. Massachusetts State Nuclear Engineer Jim Muckerheide discusses "How To Build 6,000 Nuclear Plants by 2050," and why we need them, in the Summer 2005 *21st Century Science & Technology*, available at www.21stcenturysciencetech.com/Articles%202005/Nuclear2050.pdf.
4. Breeder reactors, also called fast reactors, produce electricity *and* new nuclear fuel, and were considered to be an essential part of the Atoms for Peace nuclear development plans. In a conventional reactor, a moderator such as water, slows down the fast neutrons of the fission reaction to the optimal rate for maintaining a chain reaction. In the breeder reactor, these neutrons are not slowed down, but are caught in a "blanket" of uranium or thorium surrounding the reactor core. There, the neutrons produce new fissile material, such as plutonium-239. At the same time, the heat from the fission reactions in the core is used to produce electricity.

   The Russians have operated sodium-cooled fast reactors since 1958, including the prototype BN-350, which produced electricity and desalinated water from 1972 to 1999. They have an ambitious program for developing larger commercial fast reactors.

Biodiesel Is No Answer

Editor's Note: The letter writer is responding to an Aug. 15, 2007 press release about the ethanol articles in the Spring-Summer 2007 issue, which read in part:

*"*21st Century Science & Technology *has just posted on its website an article by editor-in-chief Laurence Hecht, 'Smell of Gigantic Hoax in Government Ethanol Promotion,' which shows that the claims by government agencies about the efficiency of biofuels are based on sleight-of-hand manuevers, not real evidence."*

To the Editor:

I resent your use of the word "BioFuels" in this press release.

Biodiesel gets a bad rap from ethanol's crappy energy balances—sometimes worse than petrol oil. Biodiesel has a very different energy balance and has the possibility to have an even better one when produced and distributed regionally/locally. Energy balances will be/should be the benchmarks and guidestones of the energy decisions we make for our future.

I also do not believe that ethanol promotion began with the Bush family, nor that it is perpetrated by their machine. I think this press release ultimately undermines your organization's credibility.

Sara Hope Smith
hopecreations@gmail.com

The Editor Replies:

You are missing the point. The proposal to convert developing nations into cheap-labor suppliers of liquid fuel substitutes, whether sugar cane ethanol or palm oil, amounts to a new form of colonial slavery. Replacement of agricultural land to grow biofuels already threatens the world food supply. Continuation of this policy is genocide.

Synthetic hydrogen-based fuels can be produced locally with the new generation of high-temperature nuclear reactors, without the need for transporting liquid fuels over long distances. High-temperature reactors also permit the efficient desalination of sea water. Development of nuclear fission and fusion power, is the only means to assure power and fresh water for the world's future.

The CO_2 Fraud

Prof. Zbigniew Jaworowski has made an excellent contribution to the literature ["CO_2: The Greatest Scientific Scandal of the Century," Spring-Summer 2007]. Even if the theory of climate change were true, which it is not, the implication is that the basic conditions of life for 6 billion people have to be controlled rigidly. This has never happened, and never will happen.

Herbert Inhaber, Ph.D.
Risk Concepts
Las Vegas, Nevada

International Condensed Matter Nuclear Science Conference
Aug. 10-15, 2008.

Information and papers on LENR can be found at:

http://www.lenr.org
http://www.newenergytimes.com
http://world.std.com/~mica/cftsci.html
http://www.infinite-energy.com

For information on the ICCF series of conferences, search on ICCF-X, where X can be any integer from 1 through 13.

To obtain more information on the conference hotel, see **http://washingtonregency.hyatt.com/hyatt/hotels/services/maps/index.jsp**

The 14th International Conference on Condensed Matter Nuclear Science (ICCF-14) will be held from August 10-15, 2008 at the Hyatt Regency Hotel on Capitol Hill in Washington, D.C. The purpose of this scientific conference is to present and discuss new results on low energy nuclear reactions (LENR), which originally went by the name "cold fusion." The production of unexpectedly large amounts of excess heat in metals heavily loaded with hydrogen is also called the Fleischmann-Pons Effect.

LENR have been studied by hundreds of scientists globally since the field began in 1989. At this time, the experimental evidence for the existence of LENR is strong. Further, many of the characteristics of LENR are already known. Measurement techniques and results obtained with them have been published in more than 1,000 scientific papers.

The mechanisms for such reactions are not yet understood theoretically. Nevertheless, the empirical information shows that LENR produce energy with harmless helium as the primary by-product. In most experiments, there is neither significant immediate radiation nor residual radioactivity.

Several start-up companies and other organizations are working on the science of LENR. The emerging results might provide the basis for green energy sources with many applications, such as desalination.

The series of ICCF conferences, which began in 1990, has been held alternatively in North America, Europe, and Asia. It is the primary venue for the international community of involved and interested scientists to give and critique papers that describe what was done and found. The papers are then published in the proceedings of the conference.

The conference website will be hosted by the International Society for Condensed Matter Nuclear Science (www.iscmns.org). The site will have registration, program and other information, with the initial postings before the end of 2007.

David J. Nagel, Research Professor at George Washington University, is chairman and Michael E. Melich, Professor at the U.S. Naval Postgraduate School, is co-chairman of the conference.

Open Letter to the American Nuclear Society

Nuclear Energy and the CO_2 Fiction

by Zbigniew Jaworowski

Zbigniew Jaworowski, M.D., Ph.D., D.Sc., is a multidisciplinary scientist and former chairman of the United Nations Scientific Committee on the Effects of Atomic Radiation. He is now a senior advisor at the Central Laboratory for Radiological Protection in Warsaw. In the winter of 1957-1958, he measured the concentration of CO_2 in the atmospheric air at Spitsbergen. From 1972 to 1991, he investigated the history of the pollution of the global atmosphere, measuring the dust preserved in 17 glaciers: in the Tatra Mountains in Poland, in the Arctic, Antarctic, Alaska, Norway, the Alps, the Himalayas, the Ruwenzori Mountains in Uganda, and the Peruvian Andes. He has published many papers on climate, most of them concerning the CO_2 measurements in ice cores.

Three of Jaworowski's papers on climate appear on the website of 21st Century Science & Technology *magazine, www.21stcenturysciencetech.com .*

In 1989 I was invited by Dr Hans Blix, then the Director General of the International Atomic Energy Agency for a chat in his Vienna office. Staunch defender of the truth, it was more than a decade before he hit the headlines proving his honesty and integrity, as the head of the United Nations Commission for Weapons of Mass Destruction in Iraq. He had asked my opinion on future prospects for nuclear energy, in view of the societal effects of the Chernobyl disaster. I told him what I already said in an editorial to the Special Chernobyl Issue of the Environment International (Jaworowski 1988). Chernobyl was the greatest possible catastrophe of a nuclear power reactor—nothing worse could happen—and its worst effects were psychological. In terms of human losses, Chernobyl may be regarded as a minor one compared with other industrial catastrophes.

I stated that in future ages Chernobyl will be remembered as a proof that nuclear power is probably the safest means of energy production, as was also proved by the Three Mile Island accident in 1979. I said that in its public relations policy the Agency should concentrate on presenting this positive practical experience, and on comparing the health and economic effects, and geopolitical risks of nuclear power with other industries.

I doubt that my arguments convinced Dr Blix. He said that for gaining the public support for nuclear energy one should concentrate on its near-zero CO_2 emissions, which may redeem us from the climatic warming doom scenario. Already, at that time, I knew that this global warming scenario was a politicized science fiction, inflated with ideology and big money. I advised Blix that for the sake of honesty and scientific integrity, in promoting nuclear energy, the IAEA should refrain from using a fiction, the flaws of which sooner or later will be apparent.

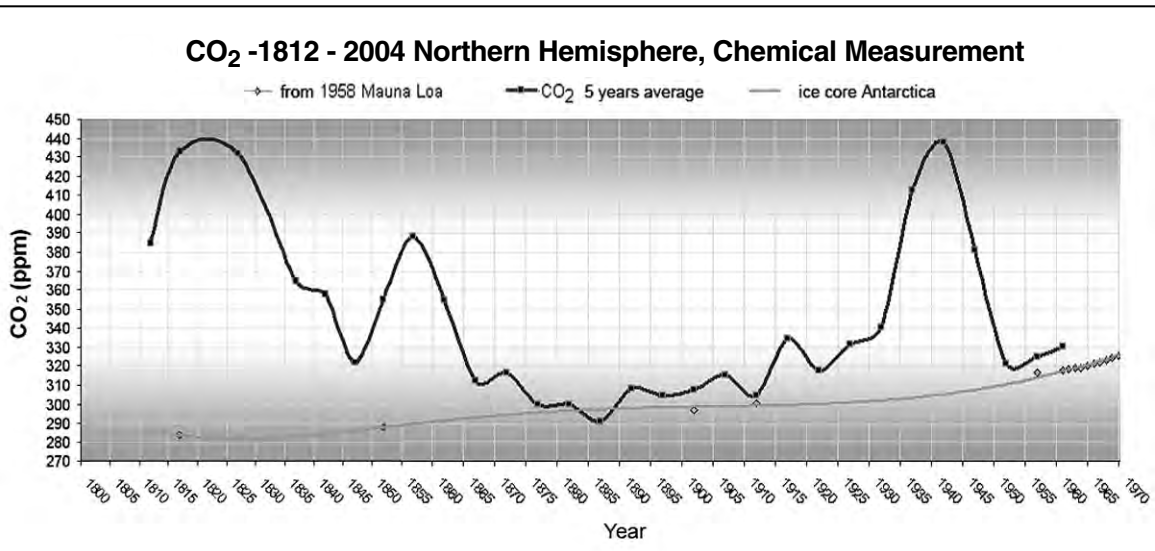
Today, 18 years, and only a meager worldwide increase of 14 nuclear power reactors later, the IAEA still promotes nuclear energy by reciting the CO_2 mantra, even though the Chernobyl specter with its 31 deaths among the plant employees and rescue workers, is much less frightening now than in 1989 (UNSCEAR 2000). Many people learned that Chernobyl is dwarfed by a host of other industrial catastrophes, among them the one in Bhopal chemical factory in 1984, with its more than 15,000 fatalities (Dhara and Dhara 2002), and the Banquiao Dam burst in 1975, with 230,000 fatalities (McCully 1998), the latter for a quarter of century airbrushed from history by Chinese authorities.

Climate Scare Not Helpful for IAEA

The climate scare was not very helpful for the IAEA. The European Union has suffered a decades-long stagnation in nuclear power development, even though, with its 152 nuclear reactors, atoms play a crucial role in the EU energy market, sharing 31 percent of electricity production. Yet, in a 2006 EU energy paper (COM 2006, 105, 8.3. 2006) only one sentence paid lip service to nuclear energy, and the discussion was centered on zero-emission fossil fuel power plants, biofuels, photovoltaics, wind energy, and solar thermal energy. All of these energy sources are expensive, not technically ripe, less environment friendly than nuclear power, and hopelessly unfit both to fulfill the long-term energy needs for the world, and to stop climatic warming. This 2006 EU document did not even mention nuclear energy in its conclusion and vision statements.

Unexpectedly, in 2007, the European Union started a new love affair with nuclear energy. In its resolution of October 24, 2007 on Conventional Energy Sources and Energy Technology (2007/2091, INI), the European Parliament defined nuclear energy as indispensable for the basic energy needs of Europe. A similar conclusion appears in the basic EU document Nuclear Illustrative Programme (COM, 2007, 884 final). From these documents one can deduce that the European Parliament realized that expensive renewable sources of energy are too small, too expensive, and too unreliable, and that without nuclear energy the European energy policy goals cannot be met in an economically acceptable way. The era of cheap energy (and thus of prosperity) is over, mainly due to insufficient and improper investments in energy production over the past few decades (COM, 2007, 884 final).

This neglect in energy investment, partly sparked by environmentalists, combined with increased energy demand, may first lead to skyrocketing energy prices, and then to a decline of the world economy, with its drastic negative political, societal, and environmental effects. The economically recoverable fossil fuel resources, at the world's annual 2000 consumption level, will run out in about 200 years for coal, 60 years for natural gas and 30 years for oil (Chow and al. 2003). So, there is still enough time for replacement of fossil fuels, this aging workhorse of modern civilization, with nuclear energy sources: fission reactions of uranium and thorium, and then synthesis of hydrogen or helium-3 atoms.



FIRST RECONSTRUCTION OF TRENDS IN CO_2 ATMOSPHERIC CONCENTRATION BASED ON ACTUAL MEASUREMENT

This first reconstruction of trends in CO_2 concentration in the Northern Hemisphere is based on more than 90,000 direct chemical measurements in the atmosphere at 43 stations, between 1812 and 2004. The lower line are the values from Antarctic ice core artifacts. The diamonds on the lower line (after 1958) are infrared CO_2 measurements in air from Mauna Loa, Hawaii.

Source: Adapted from Beck 2007

With fast breeder reactors, uranium and thorium resources will suffice for a few thousand years of global energy consumption, and the synthesis of light atoms will suffice practically for infinity (Cramer 2004, Ongena and Van Oost 1998). Because of the high energy content of nuclear fuels (75,000 times higher than that of coal), each country could easily make reserves sufficient to feed nuclear power stations for many decades, a task impossible for coal, oil, and gas power stations. Switching to nuclear power as a main energy source would eliminate dependence on fossil fuel supplies from unstable regions. This would have a beneficial stabilizing influence on global politics. With access to nuclear energy, we would stop the rapid exhaustion of coal, gas and oil by primitive burning in homes and in industry. We would do this not because of a man-made climate-warming illusion, but to keep these resources for their more sophisticated uses by the future generations peopling the long corridors of time ahead.

The recent enthusiasm of European Union bureaucrats for nuclear energy stems not from this perspective, however. The main argument for nuclear energy is the same as that of Dr. Hans Blix: fighting against climate change, against CO_2 emissions, which are erroneously regarded in the EU document COM, 2007, 884 final, as the principal greenhouse gas. Accordingly, the Commission of the European Communities proposed as its strategic energy policy objective for 2050, that greenhouse gas emissions in industrialized countries be reduced by 60 to 80 percent (COM, 2007: 2, 10.1.2007).

The problem is that the principal greenhouse gas is not CO_2, but water vapor, which is responsible for about 98 percent of the greenhouse effect (Lindzen 1991), to which man-made CO_2 contributes about 0.2 percent (Jaworowski 1999). The overwhelming emphasis of recent EU documents on nuclear energy is as a means to prevent and fight a nonexistent menace of climatic catastrophe. It is depressing to see how global warming hysteria dominates the thinking of the EU bureaucrats on the most important issue of energy supply for the world. In effect these documents are a mixture of nuclear and economic realism, garlanded with the ritual of green creed guiles—raising hopes that in time the garland will wither, leaving the realism free.

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Climate Mafia Uses Desperate Tactics At AAAS Seminar

The American Association for the Advancement of Science held what can only be described as a Soviet-era propaganda session on Oct. 30 in Washington, D.C., where it was stressed that the science on climate is settled, and that scientists are in consensus on this. (http://www.aaas.org/programs/centers/pe/abelson/)

The occasion was the session on "Documenting Change" at the "New Horizons in Polar Science" seminar, held in memory of long-time *Science* editor Philip Abelson.

In trying to maintain the illusion of settled science, two of the global warming mafia (James Anderson, Professor of Atmospheric Chemistry at Harvard University, and a global warming believer, and Mike McCracken, of Sir Crispin Tickel's Climate Initiative) kept one of the speakers on what seemed to be a leash, trying to control what he said in public as well as in private discussions.

Apparently, Dr. Richard Alley, Evan Pugh Professor of Geosciences at Pennsylvania State University, is too much on the fence about man-made climate change, and had to be managed by the climate mafia, to keep him in line.

For example, during Dr. Alley's talk at the AAAS meeting, when he said that the melting of Greenland would take "thousands of years," fellow speaker James Anderson would chime in like a Soviet-era political officer enforcing the party line. In this case, Anderson claimed that Alley's statement was not correct and did not take into account that man-made CO_2 would cause a faster melt.

In the informal discussions after the talks, either Anderson or McCracken were always with Alley to make sure their views were represented.

It was shocking to witness the tactics of this desperate mafia.

—Gregory Murphy

Editor's Note: More global warming news appears on the 21st Century *website, www.21stcenturysciencetech.com/Global_Warming.html*

The Climate Modeller

On average, his temperature is fine.

Weather Channel Founder: Global Warming Is 'Greatest Scam in History'

John Coleman, the founder of the Weather Channel, called global warming "the greatest scam in history" in an article posted on the International Climate and Environmental Change Assessment Project website (http://icecap.us/images/uploads/JC_comments.doc)

"I am amazed, appalled, and highly offended by it," Coleman wrote. "Global Warming; it is a scam. Some dastardly scientist with environmental and political motives manipulated long-term scientific data back in the late 1990s to create an illusion of rapid global warming."

Coleman continued: "However, Global Warming, i.e., Climate Change, is not environmentalism or politics. It is not a religion. It is not something you 'believe in.' It is Science; the science of meteorology. This my field of life-long expertise. And I am telling you Global Warming is a non-event, a manufactured crisis and a total scam."

Coleman concluded: "The impact of humans on climate is not catastrophic. Our planet is not in peril. The sky is not falling and natural cycles and drifts in climate are as much if not more responsible for any climate changes under way."

Are the British Stepping Back On Climate Policy?

http://fora.tv/2007/10/28/Science_and_Politics_of_Climate_Change

At a London forum titled "Science and Politics of Climate Change," Oct. 28, there were indications that British scientists are tempering their accusations of man-made global warming. The panel, part of "The Battle of Ideas" series, featured Mike Hulme of the Tyndall Center of the University of East Anglia (home of the most rabid climate mafia); Chris Rapley, former head of the British Antarctica Survey; and Hans von Storch of the German Marine survey.

Hulme's comments were telling. He said that a 2-degree rise in global temperature would not be a real danger for him, and never used the standard phrase "man-made global warming," but referenced a more general "climate change."

Hulme also attacked the media hyperbole on global warming, and he criticized the notion of solving the climate change question by passing more Kyoto-type agreements, which, he said, have little or no effect.

Rapley seconded Hulme's comments by saying that you can not solve the climate problem with monolithic treaties and policies. Furthermore, he said, the science is still under discussion and there is no need to hype the danger since there are still big "uncertainties" about the complex climate system.

These public pronouncements continue a trend toward more rational statements on the warming issue in Britain. During the summer, Alan Thrope, chairman of the British National Environment Research Council, which is a

Continued on page 75

FFTF COULD BE RESTARTED, AND IS UNDER CONSIDERATION FOR GNEP SITE

The Fast Flux Test Facility in Hanford, Washington, the nation's only sodium-cooled fast reactor, could be restarted, and is under consideration as a potential facility for the Global Nuclear Energy Partnership (GNEP) program of the U.S. Department of Energy. In an interview Nov. 13, DOE Assistant Secretary for Nuclear Energy, Dennis Spurgeon, told *21st Century* that "The Fast Flux Test Facility (FFTF) in the state of Washington continues to be a potential option. The ultimate decision to use FFTF or a different solution will depend upon many factors, including cost, acceptance by the state and local populations, FFTF's ranking against other technologies, operating and maintenance costs, amongst other considerations."

The DOE made the decision to shut down the FFTF in 2005 for budgetary reasons, although the 400-megawatt reactor had worked well as a prototype for testing fission fuels and materials, and for producing isotopes for medical and industrial use. Within months of its shutdown, the new GNEP program was announced, which called for the development of a sodium-cooled fast reactor!

A hole was drilled in a plate inside the FFTF reactor vessel to drain the sodium coolant, which was thought would permanently disable the reactor. However, after the hole was drilled, engineers inspected it, reassessed the situation, and determined that the reactor could be restarted. For more background on the FFTF, see www.21stcenturysciencetech.com/Articles%202005/Hanford.pdf .

DOE

Back from the grave?: The Fast Flux Test Reactor at Hanford.

INDIA TO BUILD FOUR NEW 500-MW FAST BREEDER REACTORS BY 2020

Four new fast breeder reactors, which will be used to convert India's abundant thorium supplies into fissionable uranium, were approved for construction by 2020, reported Baldev Raj, the director of Indira Gandhi Centre for Atomic Energy, on Nov. 14. The reactors will also generate excess power for the electricity grid. India's Planning Commission has cleared the 500-megawatt fast breeder reactors, each costing about $800 million. Two of the reactors will be set up at Kalpakkam in Tamil Nadu, alongside the existing Fast Breeder Test Reactor and the Prototype Fast Breeder reactor (PFBR), which is under construction.

India's fast breeder reactor program is primarily to develop fissile uranium-233 fuel from the country's abundant supply of thorium-232. The breeders are the second-stage of India's three-stage self-sustaining nuclear power program, designed by Dr. Homi Bhabha in the 1960s. The third and final stage will use the fissile uranium-233 generated in thorium breeder reactors.

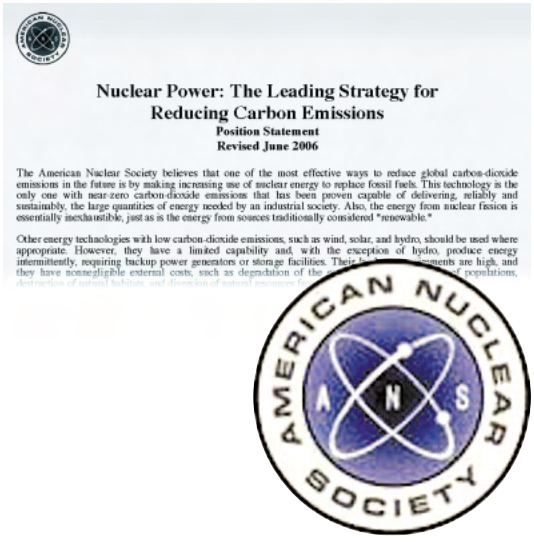
DDT REPELS MOSQUITOES, NOT JUST KILLS THEM

DDT's main effectiveness in reducing the spread of malaria is that it *repels* mosquitoes: When mosquitoes sense that DDT has been sprayed on the inside walls of a house, most (3 out of 5) will not enter the house. Further, DDT is a *contact irritant*, so that many of those mosquitoes who do enter the sprayed house, will quickly leave. DDT indoor spraying will repel and irritate even those mosquitoes that are resistant to DDT and will not be killed by it.

The most recent study establishing the effectiveness of DDT for insect control was carried out in Thailand by a team that included entomologist Donald Roberts. ("A New Classification System for the Actions of IRS Chemicals Traditionally Used for Malaria Control," Aug. 8, 2007, PLosOne.) What makes DDT superior, the authors say, is not so much that it is toxic for insects (actually it is a slow killer), but that it is a spatial repellent and contact irritant. They call for a reclassification of insecticides based on these three factors.

Although the World Health Organization reversed its ban on DDT use in September 2006, and now permits its use in Indoor Residual Spraying or IRS, the legacy of lies and environmentalist myths is still stopping its use in some African countries, while malaria deaths continue to soar.

Read more about DDT on the 21st Century website, including an interview with Dr. Roberts at www.21stcentury sciencetech.com/2006_articles/Donald_ Roberts.pdf.



Nuclear Power: The Leading Strategy for Reducing Carbon Emissions

Position Statement

Revised June 2006

The American Nuclear Society believes that one of the most effective ways to reduce global carbon-dioxide emissions in the future is by making increasing use of nuclear energy to replace fossil fuels. This technology is the only one with near-zero carbon-dioxide emissions that has been proven capable of delivering, reliably and sustainably, the large quantities of energy needed by an industrial society. Also, the energy from nuclear fission is essentially inexhaustible, just as is the energy from sources traditionally considered "renewable."

Other energy technologies with low carbon-dioxide emissions, such as wind, solar, and hydro, should be used where appropriate. However, they have a limited capability and, with the exception of hydro, produce energy intermittently, requiring backup power generators or storage facilities. Their [illegible] segments are high, and they have nonnegligible external costs, such as degradation of the [illegible] of populations,

We need nuclear power because its energy flux density can power an industrial economy and support a growing world population—not because of the global warming hoax.

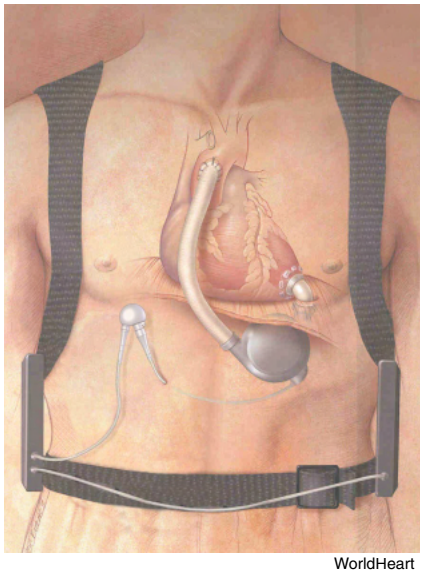
WILL PRAGMATISM AND COWARDICE KILL THE NUCLEAR INDUSTRY, AGAIN?

That the U.S. nuclear industry could kill the "nuclear renaissance" before it gets off the ground, was evidenced at the plenary session of the annual meeting of the American Nuclear Society, Nov. 11-15 in Washington, D.C.. There, nuclear engineers were put through a rant by environmentalist Eileen Claussen, president of the Pew Center on Global Climate Change, who claimed that carbon dioxide emissions had to be reduced by 80 percent by 2050. Claussen stated that putting a "price on carbon" is the "only way to make nuclear competitive." Instead of federal subsidies, the "best subsidy is a climate policy," she counseled. "Cap and trade."

It is not such environmental extremists who could kill nuclear—it is the "nuclear supporters," and the industry itself, which opportunistically jumped on the "global warming" bandwagon a few years ago, selling nuclear energy as a way of reducing carbon emissions. The second plenary session, for example, included former New Hampshire Gov. John Sununu, who two decades ago led a fight for years to get New Hampshire's Seabrook nuclear power plant online. After appropriately excoriating the industry for being "too afraid to be pro-nuclear," Sununu stated that although he is "a skeptic on global warming, you might as well exploit it, and use the stupidity of one group to accomplish what we want."

During the question period, *21st Century* Associate Editor Marsha Freeman questioned Sununu's global warming embrace, stating that global warming is not the reason that the United States needs nuclear power plants. Not telling the truth will backfire, she said. Although Sununu agreed that "too much of the private sector has caved in to the fad of global warming," he repeated that the nuclear industry has to be part of the discussion of what policy should be enacted to combat it!

A great many of the attendees—from the nuclear industry, universities, and national laboratories—agreed that global warming is a hoax, and not the way to promote nuclear energy, and were happy to receive copies (distributed by *21st Century)*of an open letter to the American Nuclear Society by scientist Zbigniew Jaworowski (this issue, p. 6).



WorldHeart

This tiny maglev pump device can keep a heart pumping while heart muscles are healing.

MINI-MAGLEV PUMPS TRANSPORT BLOOD FOR AILING HEARTS

The WorldHeart company announced in September that it had successfully concluded a multi-day study with lambs of its magnetically levitated heart pump, Pediaflow, which is small enough to be implanted in a newborn. In Spring 2006, its first adult-size mini-maglev heart pump successfully assisted the pumping of blood from a human patient's left ventricle to the aorta for 85 days, while the patient's heart healed. WorldHeart's prototype maglev heart pump, the Levacor VAD (ventricular assist device), was implanted in a heart patient at a hospital in Thessaloniki, Greece. Subsequently another Greek heart patient underwent similar successful therapy with the Levacor VAD.

Dr. Antonis Pitsis, principal investigator of the Levacor clinical feasibility trial, commented: "These patients' recovery of natural heart function while supported by the Levacor VAD has been remarkable. This device, with its wide range of operation, supported our protocols for recovery of the natural left ventricle extremely well. Most important is the high quality of life achieved by recovery."

Some of the technological know-how behind the maglev heart pumps comes from Launchpoint Technologies, a California company with several maglev projects under development, including designs for innovative freight and human maglev transport systems, and a space-launching system using maglev technology.

THE RUSSIAN SPACE PROGRAM IS STARTING TO SEE A 'RENAISSANCE'

After the 1990s near-collapse of the Soviet space program, when "free market' economic policies nearly destroyed a half-century of Russian scientific and technical patrimony, President Vladimir Putin's personal support has started a "renaissance" in the civilian space sector, Russian space experts reported at a Washington, D.C. conference Nov. 12, celebrating Sputnik's 50th anniversary.

Academician Lev Zeleny, director of the prestigious Russian Space Research Institute in Moscow, told the conference that Russia is now planning a series of new space science missions for the second 50 years of the space age, including exploring new

physics hypotheses from space, exploring the question of the origin of life, and life beyond the Earth. But, he said, "we are not going into space just to do science." There is a "heritage in Russian philosophy" that is not just "pragmatic," reflected in the space program, from Konstantin Tsiolkovsky, Vernadsky, and Soviet "chief designer" Sergei Korolev.

MEXICO FLOOD CATASTROPHE: THE CAUSE IS AN 'INFRASTRUCTURE DEFICIT'

The catastrophic floods in the southern Mexico states of Tabasco and Chiapas, affecting hundreds of thousands of people and putting 90 percent of Tabasco under water, could have been prevented had planned infrastructure projects been carried out. Water-management engineer Manual Frías told *Executive Intelligence Review* that at the time of the 1999 floods, he proposed specific infrastructure projects and warned that if they were not built, future flooding would be a catastrophe. It's the "infrastructure deficit" alone that is responsible for the current disaster, he said.

A mass leaflet distributed by the Mexican LaRouche Youth Movement maps out the water management programs long put forward since the 1980s by the LaRouche movement: the Hydraulic Plan of the Northwest Gulf (PLHINO) and of the Northeast Gulf (PLHIGÓN). These consist of a series of dams and canals, which would transport large quantities from southern Mexico's big rivers to the arid, but very fertile coastal regions of the northeast and northwest.

Southern Mexico town under water: the result of de-investment in water projects and other infrastructure. Photo taken by a member of a Pemex rescue crew.

WOUNDS TREATED WITH PULSED MAGNETIC FIELDS HEAL FASTER

Medical researchers from several New York hospitals gave dramatic evidence for the healing power of pulsed magnetic fields, writing in the journal *Plastic and Reconstructive Surgery* in August. Certain well-defined radiofrequency-pulsed magnetic fields accelerated wound healing (measured by increased tensile strength at the wound line) in sutured rat incisions by 48 percent at 21 days, the researchers found.

The team began with a configuration already in successful clinical use for chronic wound treatment (pressure sores and diabetic ulcers): a 27.12 MHz sinusoidal wave inducing a 1-gauss peak field of 65-microseconds' duration, repeated 600 times per second. This field gave them the successful results mentioned above. Earlier research had shown that smaller amplitude fields—in the .01- to .05-G range—using such short bursts were not effective on wounds, even at high repeat rates. The researchers predicted, based on known magnetic-field stimulation of Ca^{++} binding to calmodulin, a critical electrically mediated biochemical event in tissue repair, that such small amplitude fields could be successful if longer burst times were used. Indeed, a field of .05 G was found to accelerate wound healing if tuned to a burst duration of 1 msec repeated five times per second. For 2-msec bursts five times per second, healing was even faster.

The success of pulsed magnetic fields 20 times smaller than the initial setup is important, as the device generating the field can be much smaller and more portable, and the output from the smaller device has a minimal effect on nearby electronic apparatus.

WNA HEAD: WE CAN BUILD FIVE NUCLEAR REACTORS PER WEEK!

"If the OECD countries, plus China and India, were to build at France's 1980s start-up rate, the result would be five reactors per week, rather than one," stated John Ritch, director-general of the World Nuclear Association, July 4, cited by World Nuclear News online. France built an average of 3.4 reactors per year from 1977 to 1993, achieving a nuclear share of electricity near 80 percent, he said.

Ritch was responding to a new report issued by the Oxford Research Group in Britain, which concluded that "nuclear power should be taken out of the energy mix," because of concerns with proliferation and safety, and because it would be impossible to build even 48 new reactors per year, between now and 2075, the rate the report says would be required to combat global warming. "Whereas the authors dismiss as a pipedream the idea that the world's nations might somehow combine to build one reactor a week," Ritch said, "the future expansion of nuclear power will probably be even more rapid." Unfortunately, Ritch is a fervent believer in "global warming" as an effect of human population. See this issue's Conference Report, p. 63.

Korea Hydro and Nuclear Power Co., Ltd.

Ritch's estimate of the nuclear construction potential fits with that of Jim Muckerheide, the state nuclear engineer of Massachusetts, in "How to Build 6,000 Nuclear Plants by 2050," www.21stcenturysciencetech.com/Articles%202005/Nuclear2050.pdf. Here, a line-up of nuclear plants at South Korea's Yongwang nuclear complex.

IN MEMORIAM
James Frazer (1928-2007)

An Innovative Biophysicist Who Pioneered in the Use of Electromagnetic Radiation

by Ned Rosinsky, M.D.

James Frazer, an innovative scientist in the fields of biology and electromagnetic radiation, and a member of the Scientific Advisory Board of *21st Century Science & Technology,* died Aug. 3 in San Antonio.

Jim was an energetic and enthusiastic collaborator of Lyndon LaRouche, starting in the formative stages of the biological sciences work of the Fusion Energy Foundation (FEF). This collaboration began in the early 1980s, when he was recommended to the FEF as one of the best people to talk to about the then new science of Nuclear Magnetic Resonance or NMR (now called Magnetic Resonance Imaging or MRI). Frazer participated in several dozen informal seminars with LaRouche and the FEF, here and in Europe, and he served on the advisory board of *Fusion* magazine, and its successor, *21st Century.*

Frazer's scientific interests were broad. His educational background included training in electrical engineering, and he received his Ph.D. in basic medical sciences from New York Upstate Medical Center School of Medicine. He served in the U.S. Navy Medical Service Corps and subsequently devoted his life to scientific research, training students, and advocating for reform in national science policy.

He had a strong interest in investigating living processes by using spectroscopy, the measurement of absorbed and emitted electromagnetic radiation which characterizes the resonant properties of the process. He worked on the spectral properties of such biological entities as enzymes, DNA, cellular water, cell membranes, and glycoprotein molecules attached to the surface of cell membranes. From these spectroscopic investigations, he developed dynamic concepts of living processes based on the harmonic relations of their characteristic resonances.

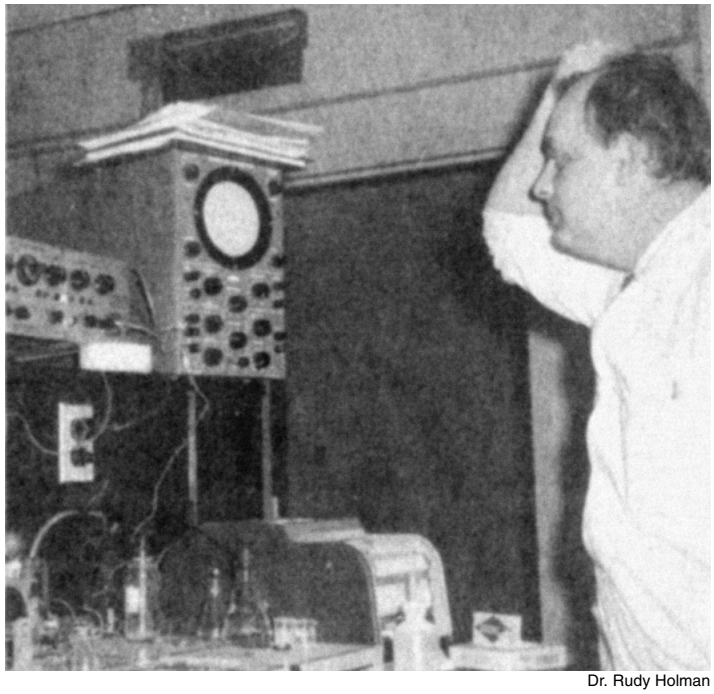
For example, Frazer was able to distinguish varying degrees of malignancy among several similar lines of cancer cells, based on the resonances of the cell membrane glycoprotein structure. These glycoproteins are known to be involved in immune reactions and in the control of cell growth, both of which are abnormal in malignancies.

Similarly, he had a strong interest in the use of nuclear magnetic resonance to characterize the structure of water molecule associations with other cell constituents, such as enzymes and cell membranes, and he did work in using NMR to identify changes in cellular water structure in malignant cells with important implications for diagnosing cancer early.

In the Tradition of Kepler

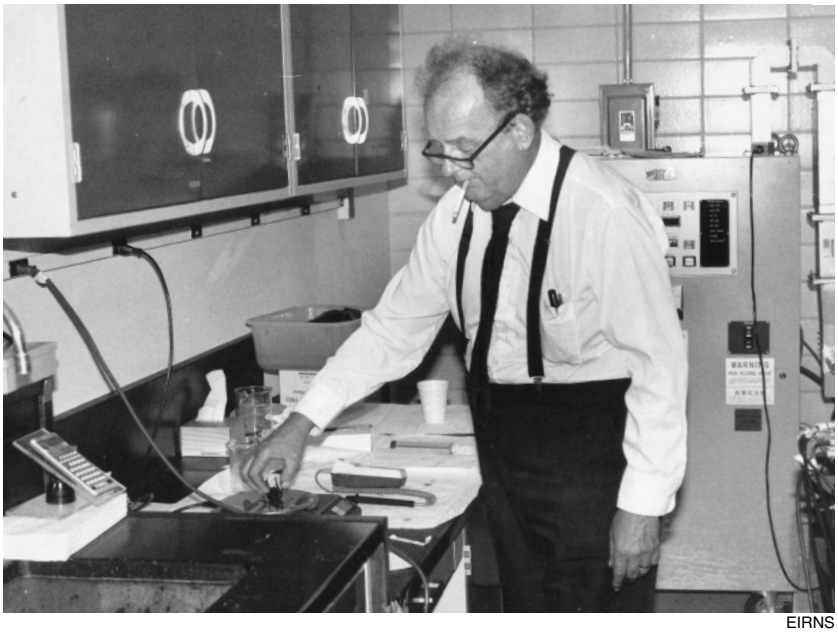
Frazer's interest in the resonant frequencies and harmonic characterization of living processes put him squarely in the tradition of the scientific genius Johannes Kepler. It was Kepler who discovered harmonic relations among the planetary orbits of the Solar System, in which the eccentricity of the orbits correspond to musical interval ratios, and the orbital radii correspond to a nested set of Platonic solids. It is likely that these harmonic relations among the planets represent the footprint of a prior self-organized plasma state of the early Solar System, in which harmonic resonances of the plasma state would form in these patterns, similar to the self-organized plasma processes seen in magnetic confinement high-energy fusion reactor experiments.

Frazer was not only interested in



Dr. Rudy Holman

Frazer as a predoctoral fellow around 1963 at the Upstate Medical Center in Syracuse. He wrote of this photo that he was "puzzled by the discrepancy between hydrogen ion production, measured with the home-built autotitrator (shown), and inorganic phosphorus production while ATP was being hydrolized by a crude renal ion-stimulated ATP-ASE enzyme preparation."



EIRNS

Jim Frazer in his lab, working on the proof-of-principle electromagnetic radiation experiment to kill grasshoppers.

understanding the living process; he carried his scientific endeavors to the next step, actively intervening into living processes on the basis of his understanding of the harmonic relations. He developed treatments for cancer using directed electromagnetic radiation in the microwave range to kill tumor cells. He invented a process for causing two living cells to fuse into one cell, using electromagnetic radiation, a technique of extreme importance in basic biological research.

During the 1970s and 1980s, Frazer collaborated with the military to assess the possibility that the Soviet Union was developing anti-personnel weapons, based on using electromagnetic radiation tuned to the frequencies that would be maximally absorbed by the entire human body, or by the human head, based on size and electrical impedance properties.

Working with the Fusion Energy Foundation and the LaRouche political movement to combat the deadly locust plague that raged in Africa in the 1980s, Frazer demonstrated in a laboratory the highly nonlinear absorption of electromagnetic radiation by grasshoppers. This was a proof-of-principle study to show the possibility of wiping out a swarm of locusts using a helicopter trailing an antenna which would provide the electromagnetic waves. (This successful work could be used today, as locusts once again threaten crops in Africa and elsewhere.)

Frazer's interest in nonlinear spectroscopy, including the inducing of shock wave propagation, also places him in the tradition of Bernhard Riemann, who wrote the first paper on shock wave production, and continued Kepler's work with his own work on harmonic functions. Frazer's interest in biophysics within this tradition enabled him to quickly recognize the relevance and importance of LaRouche's Riemannian model of the physical economy. He was committed to fighting to change the priorities of research funding to put more effort into these lines of investigation.

Those of us fortunate enough to know Jim personally, and to benefit from his wisdom, recognized that he had a mild demeanor, approached the world with a kind smile, and tolerated adversity without becoming ruffled. But his thought was revolutionary and steadfast, his bearing likened to an iron fist in a velvet glove. We will miss him sorely, and we extend our condolences to his family.

Sufficient Harmony: The Scientific Method of Kepler and Gauss

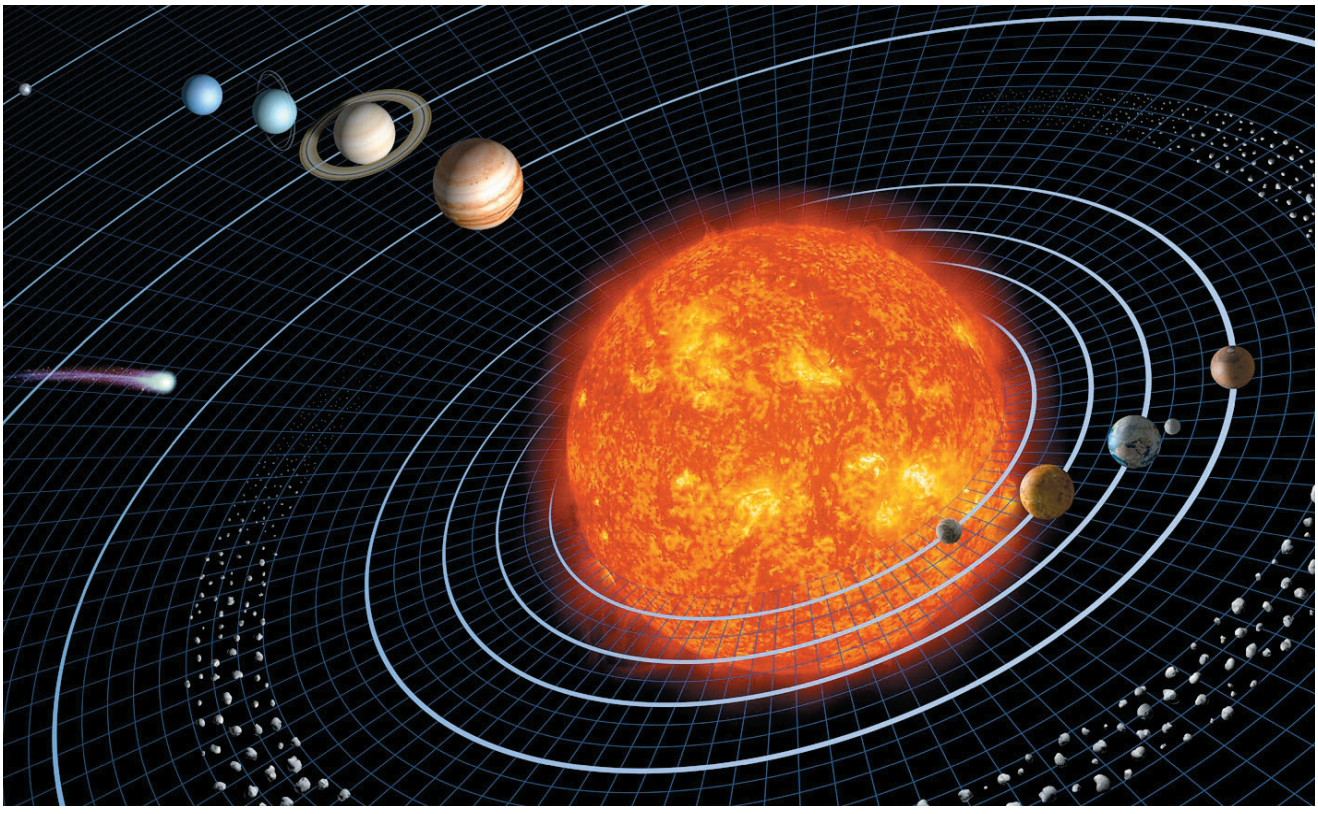
by Sky Shields

This introduction to the scientific method of Carl Friedrich Gauss, which looks at it as a continuation of that of Johannes Kepler, is part of an ongoing project of the LaRouche Youth Movement.

In Chapter 32 of the *New Astronomy,* Johannes Kepler begins his long stretch towards his discovery that the planets move in elliptical, not circular orbits around the Sun. And at first glance, his method for making this discovery might appear to be confusing, or even to lack rigor. At one point he swaps the arithmetic mean for the geometric mean, saying that they are almost equal, and again, later, he treats the physical and optical equations, two clearly different angles, as equal, and he continues in such a fashion until he ends up with a larger error than the one he set out to try to remove. He then declares a battle won, and in fact proceeds to win the war, discovering what is now called "Kepler's First Law."

Confusion about this method has led some to call it "sleepwalking," or to declare that Kepler made his discovery clumsily, or by accident! But a look at what Kepler's method actually was—and how it is in complete conformity with what Gottfried Wilhelm Leibniz called the principle of sufficient reason, where a formally "rigorous" mathematical/mechanical treatment would not have been successful—will shed an indispensable light on the method of discovery which underlies the true genius of Carl Friedrich Gauss.

The conditions in which Gauss was operating during the period straddling the end of the 18th and beginning of the 19th Century were those of a serious conflict over the nature of the future of the human species. A new nation had just been formed across the ocean, the United States of America, which was the first ever in human history to be based entirely on the principle of republican humanism. The intellectual environment in which Gauss was raised was shaped by vocal supporters and organizers of this revolution, fol-



NASA

Artist's depiction of the Solar System showing the Sun, the inner planets, the asteroid belt, the outer planets, and a comet.

lowers of the work of Gottfried Leibniz and Johannes Kepler.[1] But it was also the center of a nightmarish counterattack by the oligarchical feudal interests who were intent on destroying that conception of man and its political expression across the sea, by first destroying any possibility of its taking hold politically in the nations of Europe.[2]

As a result, almost the entirety of Gauss's scientific work was accomplished under conditions of occupation. Because of this, Gauss became an expert at appearing to replace the *a priori* methods of Kepler, based on the worthiness and eminence of truthfulness of physical principle, with what Kepler called "rather long induction." Because of this, any discussion of Gauss's work will have to draw largely from his private, unpublished documents, and a thorough understanding of the philosophical tradition in which he was raised, and with which he identified.

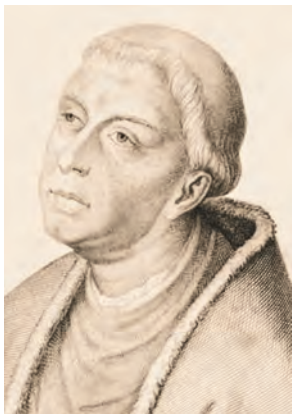
A preliminary application of that approach, in preparation for a more thorough treatment some months from now, will be given here. We will start with the epistemological framework set down by Gauss's great predecessor, Kepler, and systematized by Kepler's successor, Gottfried Wilhelm Leibniz.

Sufficient Reason

> The great foundation of mathematics is the principle of contradiction, or identity, that is, that a proposition cannot be true and false at the same time; and that therefore A is A, and cannot be not A. This single principle is sufficient to demonstrate every part of arithmetic and geometry, that is, all mathematical principles. But in order to proceed from mathematics to natural philosophy, another principle is requisite, as I have observed in my *Theodicy*: I mean, the principle of a sufficient reason, viz. that nothing happens without a reason why it should be so, rather than otherwise ... if there be a balance, in which everything is alike on both sides, and if equal weights are hung on the two ends of that balance, the whole will be at rest ... because no reason can be given, why one side should weigh down, rather than the other.[3]
>
> [T]hat God wills something, without any sufficient reason for his will ... [is] contrary to the wisdom of God, as if he could operate without acting by reason ... [however] I maintain that God has the power of choosing, since I ground that power upon the reason of a choice agreeable to his wisdom. And 'tis not this fatality, (which is only the wisest order of providence) but a blind fatality or necessity, void of all wisdom and choice, which we ought to avoid.[4]

That "nothing happens without a reason why it should be so, rather than otherwise," seems like a simple enough idea to anyone who gives it just a little thought: If something falls, we think, for instance, that we can be sure that we can attribute some

1. See Peter Martinson, "Neither Venetians Nor Empiricists Can Handle Discoveries," http://www.wlym.com/~animations/ceres/Interim/interim_peter.html.
2. See Tarranja Dorsey, "First Thoughts on the Determination of the Orbit of Gauss," http://www.wlym.com/~animations/ceres/Interim/interim_tarrajna.html.
3. Leibniz to Clarke, Second Letter, in H.G. Alexander, ed., *The Leibniz-Clarke Correspondence* (New York: Manchester University Press: 1956).
4. Leibniz to Clarke, Third Letter, *op. cit.*



Library of Congress

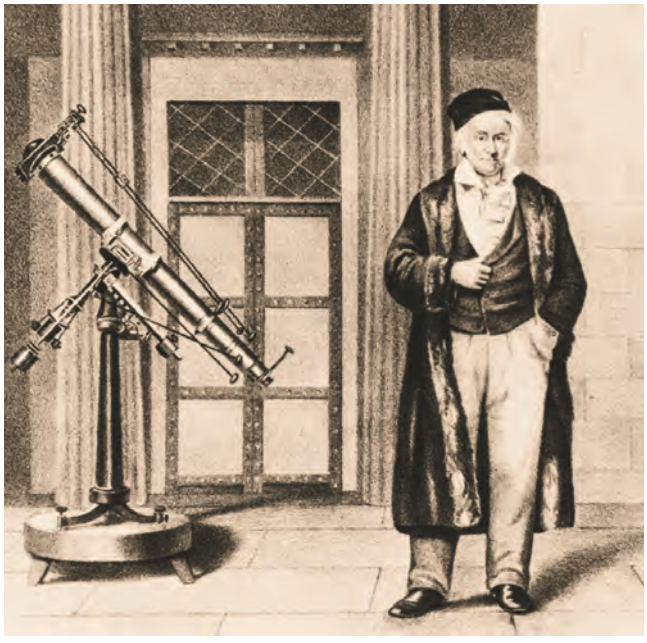
Nicholas of Cusa
(1400-1464)

Johannes Kepler
(1571-1630)

Gottfried Wilhelm Leibniz
(1646-1716)

AIP Niels Bohr Library

Abraham Kästner
(1719-1800)



The scientific tradition in which to locate Carl Gauss (depicted above) goes back to Nicholas of Cusa, Kepler, Leibniz, and Kästner.

cause to its falling. Maybe it slipped, maybe it was pushed, maybe a million particles of air moved around each other in just the right way and a breeze blew it over. Even if we don't know directly what the reason was, we can be assured there was a reason. This single fact accounts for the efficacy (and, not incidentally, as we will see below, the name) of human reason. If any one thing in all the world could occur absent a cause, there would be no surety in knowledge, because all knowledge that is, is a knowledge of causes.

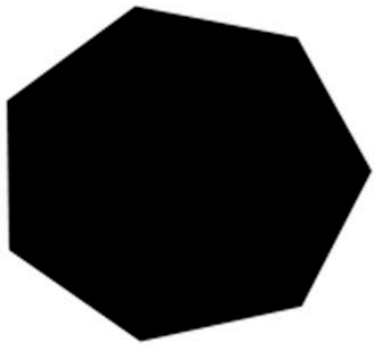
With this, there are few people who would argue. However, by accepting this we are presented with one most interesting question: Why did anything ever happen at all? Put perhaps less modestly, the same question might be, what's the reason for everything?

We won't pretend to answer that question directly here, but we will answer another question, by analogy, and in so doing touch upon the topic of this entire report: the scientific tradition initiated by Nicholas of Cusa, reified by the work of Johannes Kepler, defended and developed by the ideas of Gottfried Leibniz and Abraham Kästner, and culminating in the successive work of Carl F. Gauss and Bernard Riemann, only to decline sharply thereafter and limp along haltingly to the present day, awaiting its renaissance in the revolutionary activities of Lyndon LaRouche and the LaRouche Youth Movement today.

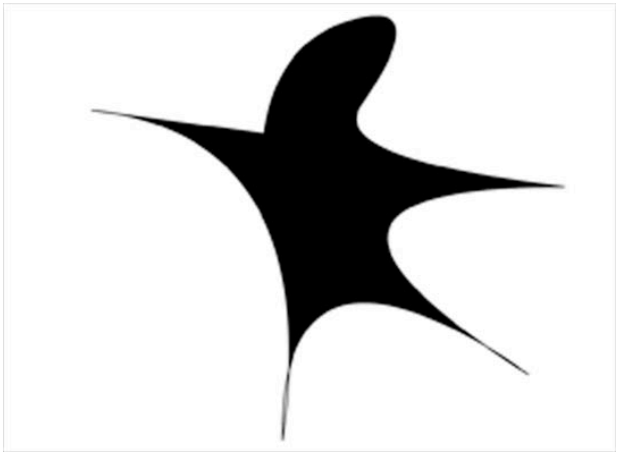
So, to that end, we'll start not with nothing, but rather with an empty page.

Euclid, in his *Elements,* begins all of geometry with what he calls a point: that which has no width, breadth, or depth. The astute reader quickly recognizes that this is nothing other than nothing at all and, as Gauss's teacher A.G. Kästner emphasized, there is no number of nothings which can be combined to obtain a something.

So if we start with Euclid, we don't start with anything at all, which is fine. So, say we start in geometry with nothing; presuming that we must have something (which is indeed a presumption), for what sort of something would there be sufficient reason for its existence? We have a million things to choose from: the square? The triangle? The pentagon? We can add sides to polygons forever without any limit ... in fact, the triangle, having the least amount of sides, seems to stand out the greatest of all of them. (Animation 1)

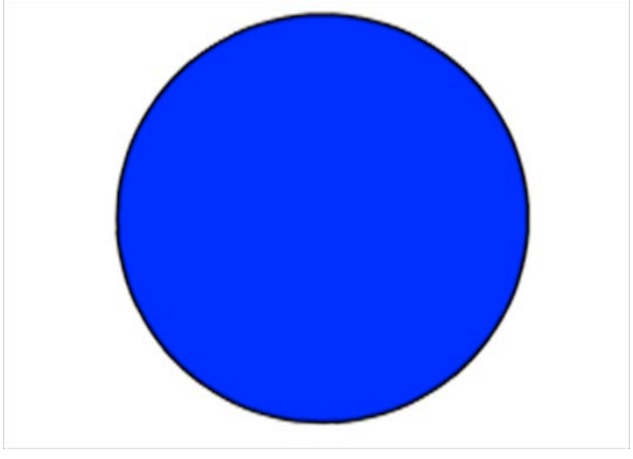


There is something significant about this state of being the least. It would seem that in order to have sufficient reason to be selected out from the vast sea of possibilities, a thing would have to be either the greatest or the least of the entire range of choices—the maximum or the minimum. And the triangle is indeed the least polygon. But, how did we come to speak of polygons (Animation 2)?

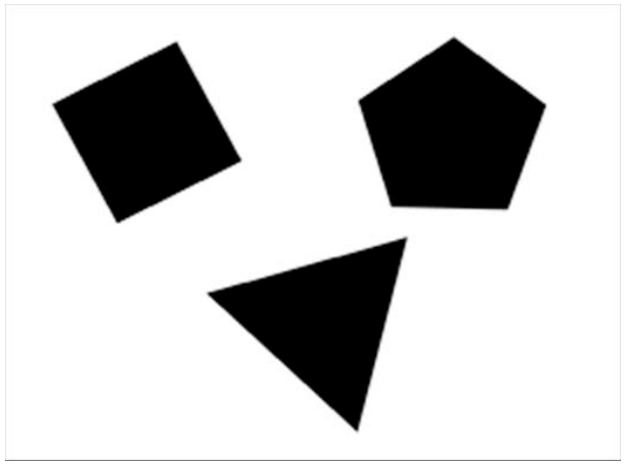


There are an infinite number of other possible figures to choose from; which of these could be called the least or the greatest of them? For which one, more than for any other, is there sufficient reason for its existence? Recall Leibniz's example of the scale: If none of these stands out more than any other, none of them will be chosen at all. The largest and the smallest shape are clearly absurdities—nothing can be imagined so small or so large that a thing could not be imagined smaller or larger. The single thing that all of these shapes have in common is that they have an inside, and a line or lines which contain it. Maybe the answer to our question is neither the least nor the greatest ... but both. For any given shape, a shape can be imagined which has more contents and less circumference.

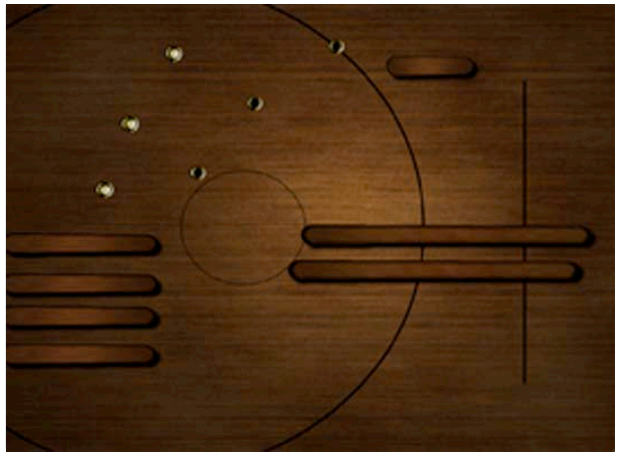
But there is a limit to this process: What figure has the greatest area for the least circumference? Look at the circle in Animation 3. Can you adjust the perimeter to make the area any greater?



What's more: Every figure has circular motion as its first, implicit action (Animation 4).



This action is a simple physical expression of the geometric property which distinguishes the circle: the ability to accomplish the most with the least. All translational action can then be derived from circular action acting on circular action (Animation 5).



It can be seen with little effort that the entirety of Euclidean geometry can now, in fact, begin to be constructed by the circle, or circular action: that is, by ruler and compass, once circular action acting on circular action has given you the line.[5]

But now, the introduction of multiple figures gives rise to another type of magnitude that must precede them: A proportion must exist between two similar figures in order for them to actually be different (if there is no proportion between them, they will be the same figure). In fact, for any triangle, a definite proportion must exist between the sides in order for them to be unequal.

5. There are physical curves which cannot be constructed with ruler and compass, but all of these curves are demonstrably produced by circular action acting infinitely on circular action. This is almost certainly the proper interpretation of the results of French physicist and mathematician Jean Baptiste Joseph Fourier (1768-1830), and the development of those results by Pierre Gustav Lejeune-Dirichlet (1805-1859), culminating in the work of Bernhard Riemann (1826-1866). They demonstrated, successively, through their work on physical potential fields, that all mathematical functions which occur in nature can be approximated by infinite series of trigonometric (circular) functions, and nothing else. That is, the exemplar of every physical process can be decomposed into circular action acting on circular action, accurate to whatever degree of precision is desired.

If we are to divide our line into a given proportion, which division would be favored by sufficient reason as the first? Are any of them more or less arbitrary than the others? Here, it is clear, there is again no maximum division. The minimum, then, would have to be two, since the next smallest number, one, would be no division at all. Also, it seems clear that, so long as our division is into two equal parts, nothing unnatural is being introduced, as a division into one and one is simply two of what we began with.

But from where did we get our two? Or, better: where did we get our 1:2? In order for us to divide a line in half, the idea of one half would have to precede our division.

But maybe that is unavoidable. After all, what kind of division of a line doesn't require that the size and number of pieces be known, arbitrarily, in advance? After all, a line can't simply be in some proportion with itself, can it? And if it were possible for that to occur, where would that cut be?

The cut would have to be simultaneously the maximum and the minimum: in this case, both the extremes and the mean of a single ratio. Let's assume that we have such a cut, similar to itself, where, if the entirety (the maximum) is one, the smallest piece (the minimum) is chosen so that the remainder is the mean between the two, forming a constant proportion with 1, or itself. Because of this property of maximality and minimality, it is called the "Mean and Extreme Ratio." More commonly, it is called the "Golden Ratio," and it encompasses all other proportion in the same way as circular action encompasses straight-line action.

In this way, we can begin to account for all things which partake in quantity and proportion, using geometry and number as symbols for their exemplars. As Nicholas of Cusa states in his "On Conjectures":[6]

> The natural, sprouting origin of the rational art is number; indeed, beings which possess no intellect, such as animals, do not count. Number is nothing other than unfolded rationality. So much, indeed, is number shown to be the beginning of those things which are attained by rationality, that with its sublation, nothing remains at all, as is proven by rationality. And if rationality unfolds number and employs it in constituting conjectures, that is nothing other than if rationality employs itself and forms everything in its highest natural similitude, just as God, as infinite mind, in His coeternal Word imparts being to things. There cannot be anything prior to number, for everything other affirms that it necessarily existed from it.

Now, you will recall our double meaning for the word reason: Reason is the word for both a cause, and that which looks into causes. The reason for this should be obvious from the geometry: If human reason is capable of measuring every cause, then every cause must share some similarity to human reason, although differing in proportion, because two things can measure each other only insofar as they are similar, and one is contained proportionally in the other.[7] This is often called Plato's doctrine of reminiscence, because it was validated in a rigorous demonstration which Socrates performed in the *Meno* dialogue. As Kepler states it:

> Now Plato's view on mathematical things was that the human mind is in itself thoroughly informed on species or figures, and axioms and conclusions about things. However, when it seems to learn, it is merely being reminded by sensible diagrams of those things which it knows on its own account. He conveys that with singular ingenuity in the Dialogues by introducing a slave who when questioned by his master makes all the replies as desired.[8]

And as Leibniz states it:

> [N]othing enters into our minds from without, and it is a bad habit we have of thinking as if our soul received certain species as messengers and as if it had doors and windows. We have all these forms in our own minds, and even from eternity, for at every moment the mind expresses all its future thought and already thinks confusedly of everything of which it will ever think distinctly.... This Plato excellently recognized in proposing his doctrine of reminiscence....[9]

Before we can elaborate further on that, however, we have to take note that we passed over something which was introduced earlier, at the moment we began to compound our circular motions. Just as proportion was required in order to have multiplicity of objects, position in space, whiteness, blackness, and difference more generally; something similar is required in order to have a world with more than a single motion.

Every set of motions is combined in some definite proportion. These proportions can be heard in a simple way in contrasted rhythms but more profoundly in the motion of a vibrating string (Animation 6).

And just as geometry and arithmetic deal in the exemplars which produce quantity and shape, music is the science which deals solely in the exemplar of harmony. Kepler writes: "Music has nothing but the harmonies to keep in view, and seeks for noth-

6. For Cusa's influence on the work of Kepler and Kästner, see "In Praise of Astronomy" (1747) and Kästner's review of Cusa's mathematical works, both original translations excerpted here: http://www.wlym.com/~animations/ceres/PDF/Tarrajna/KaestLobderSternk.pdf.For a more thorough treatment of the lineage from Kepler through Gauss see Peter Martinson's paper, Note 1.

7. This is clear from the fact that the word reason is also derived from the word *ratio,* hence rational. It is also for this reason that irrational magnitudes should be considered as misnamed, because even transcendental quantities are rational in the original, broader sense.

8. Johannes Kepler, *Harmonices Mundi*, Book IV. *The Harmony of the World,* Trans. E.J. Aiton, et. al. American Philosophical Society, 1997

9. Gottfried Leibniz, *Discourse on Metaphysics*, 1686, available at http://evans-experientialism.freewebspace.com/leibnitz03.htm.

ing beyond it: it is directed to the sole aim of giving delight."[10]

However, Kepler continues,

> [T]he philosophers commonly look for harmonies nowhere else but in melody, and ... for many people it is an unexpected treat when they are told that sounds are something different from the harmonies that are thought to be in sounds.
>
> For sensible harmony, or things which are analogous to it, is one thing, harmony which is apart from and purified of sensible things is another. The former are many, both in respect of their subjects, which are different in kind, and individually: but genuine harmony which is apart from sensible subjects is one and the same in whatever kind.

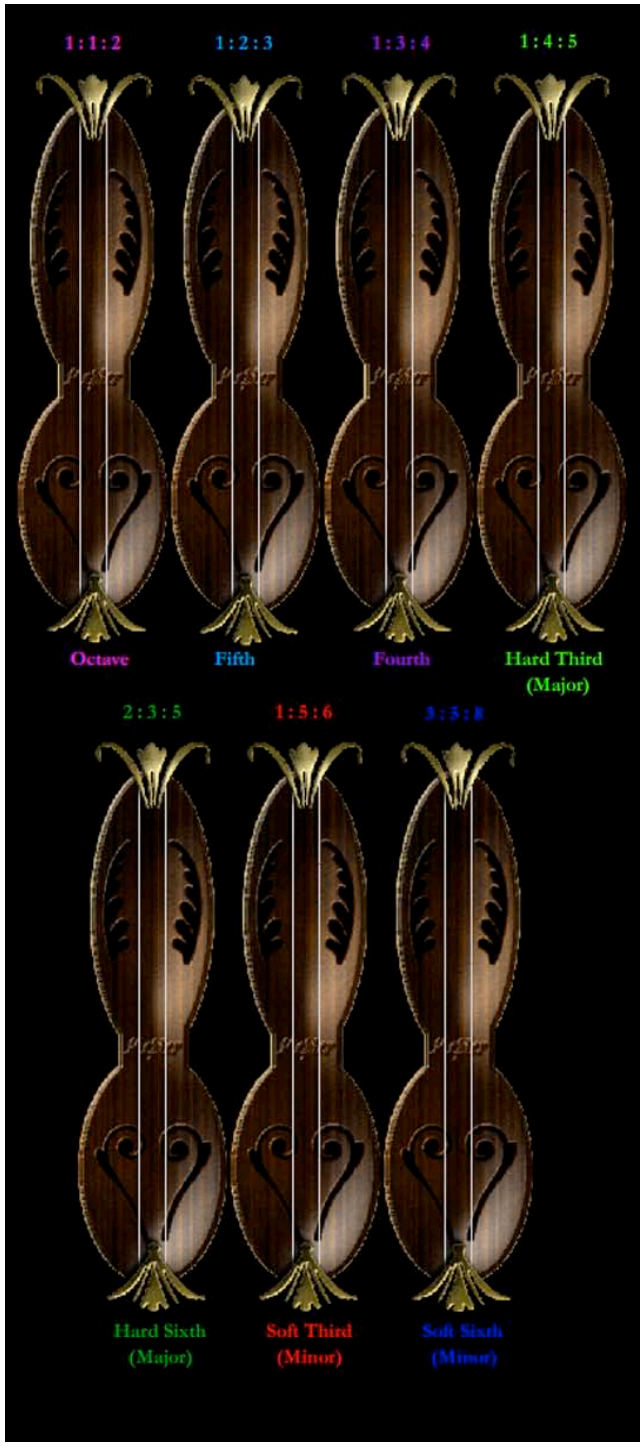
Now our earlier example from the *Meno* can be made even clearer: The rational soul responds to quantity, proportion, and sufficient reason in motion, in the form of musical harmonies generated from the motion of vibrating strings. Thus, Kepler can say that "... harmony ... is in no way outside the soul," as was made clear above in the example of number—following Socrates, who says in the *Timaeus* dialogue that "harmony, which has motions akin to the revolutions of our souls, is ... meant to correct any discord which may have arisen in the courses of the soul, and to be our ally in bringing her to harmony and agreement with herself...."

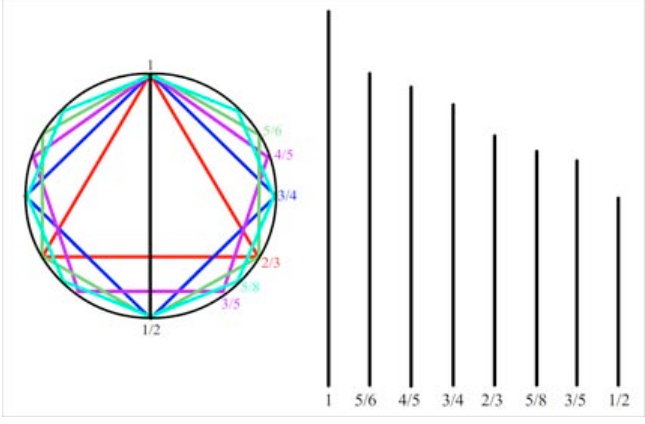
But now, different proportions of the string produce different consonances and dissonances with each other. Which of these is primary?

Kepler describes seven divisions of the string, and only seven, as having the same "harmonic" characteristic of self-similarity as our extreme and mean ratio from above. If, instead of a line, we take a vibrating string as our One, which divisions of the string will give us tonal consonances such that each part is in consonance with the other, and both are consonant with the whole? This is another expression of our mean and extreme ratio—sufficient reason, but with regard to harmonic states (Animation 7).

Aside from the properties of self-similarity and simultaneous maximality and minimality, which sufficient reason demands, these seven are limited by two important factors: constructibility by means of circular action acting on circular action (see figure), and the judgment of the soul which was composed in accordance with these harmonies.[11]

From these seven harmonic divisions, the entirety of the musical scale can be built up—or rather, built down, because, as can be seen here, the smaller divisions of whole and half steps are constructed by means of intersection of the larger, harmonic ratios. This is a necessary consequence of sufficient reason. Remember Euclid: Euclid's points, planes, and lines, the supposed building blocks of geometry, only exist in actuality as the intersection of solid bodies. In all cases, sufficient reason demands that the part be composed of the whole, rather than vice-versa. This becomes the basis of a refutation of the suppo-





10. Johannes Kepler, *Harmonices Mundi*, Book IV
11. Johannes Kepler, *Harmonices Mundi*, Book III.

EIRNS

The current LYM "basement team," at work on the Gauss project. The name comes from their "basement" location in rural Northern Virginia.

sition that matter is composed from the bottom up by the atoms and particles which are found in it, as we shall see below in the work of Kepler and Gauss.

A Rather Long Induction

Kepler's investigation in Chapter 32 of his *New Astronomy* finds him in the middle of demonstrating, ostensibly, that every planet has an equant, or a point about which it is said to move equal angles in equal times, serving to act as a sort of clock, measuring out the time or "mean motion" in proportion to the distance traveled along a planetary orbit.[12] As part of that argument, he presents the following proof that the amount of distance covered by a moving planet in one day varies in proportion to its distance from the Sun. That is, looking at the image, that ϵω is greater than γδ by the same proportion that αϵ is less than αδ. The colors in the text correspond to those in the image, where measurements made with respect to the equant, or point of uniform motion, γ, are in red; those made from the Sun, α, are in blue, and those made from the center of the physical orbit, β, are in green. The symbol ~ means almost equal to.

γυ:γδ he says, is ~ υζ:δψ and γφ:γϵ~φτ:γω. But γδ:γυ~βδ (which is equal to γυ):αδ because βδ is the arithmetic mean between γδ and αδ, which is almost equal to the geometric mean when two numbers are very close. And, in this case, the entire reason for this investigation is that, as Kepler showed earlier in chapter 31, it is impossible to tell from the observations where the equant of the Earth would be located relative to the center of its orbit, due to their being imperceptibly close. It is then easily concluded from those (almost) ratios, that υζ:δψ:~αδ:βδ.

He then states again that γφ:γϵ~φτ:γω but γϵ:γφ~ϵβ (which is equal to γφ):αϵ, again because ϵβ is the arithmetic (almost the geometric) mean between γϵ and αϵ. Therefore, in the same way as before, it is concluded that now φτ:ϵω~αϵ:ϵβ.

From those two conclusions above, he concludes further that αδ:δβ~δβ (or βϵ):ϵα. Remember, all of this is "almost!" But, it is less almost, he says, because really υζ:δψ>αδ:δβ and ϵω:φτ<ϵβ:αϵ, which errors compensate and make it even more the case that υζ:δψ~ϵω:φτ.

Therefore, if we want to find the change in speed as the distance from the Sun changes, we need to take the physical motions at aphelion and perihelion, or δψ and ϵω, as equal. Then we have φτ:ϵω~ϵω:ζυ or the same thing, φτ:δψ~δψ:ζυ. Thus the ratio of the times for those equal motions, or (watch the color change here!) $\phi\tau/\zeta\upsilon = \epsilon\omega^2/\zeta\upsilon^2 = \delta\psi^2/\zeta\upsilon^2 = \gamma\delta^2/\gamma\upsilon^2 = \alpha\epsilon^2/\beta\epsilon^2$ = (because $\beta\epsilon^2 = \beta\delta^2 = \alpha\delta\times\alpha\epsilon$) = $\alpha\epsilon/\alpha\delta$. What you can see here in the change in colors is what Kepler reveals in the next chapters, and what forms the basis of Gauss's return to a Keplerian/Leibnizian dynamics in opposition to a Newtonian mechanical universe. As Kepler says:

> But indeed, if this very thing which I have just demonstrated *a posteriori* (from the observations) by a rather long induction, if, I say, I had taken this as something to be demonstrated *a priori* (from the worthiness and eminence of the Sun), so that the source of the world's life (which is visible in the motion of the heavens) is the same as the source of the light which forms the adornment of the entire machine, and which is also the source of the heat by which everything grows, I think I would deserve an equal hearing.

That is, his investigation was guided by what he knew the truth had to be, in the same way as a developed harmonic faculty of the human soul (which has not been destroyed by modern music) knows what has to be proper relationship among harmonies. The rest of Kepler's investigation is covered in detail on the *New Astronomy* section of the LYM website, but I will report on it here briefly for the sake of comparison.

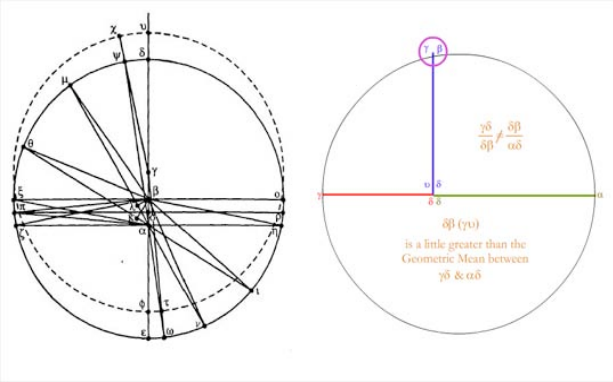
Kepler knows that there are two suppositions, involved in the physics of the vicarious hypothesis, which violate the principle of sufficient reason:

(1) The change in speed which a planet undergoes cannot take place with reference to a point in space because, as we saw earlier with Euclid, points do not exist, particularly not disembodied points. All change in position which is not simply rotational must take place with respect to something.

(2) If that something is not the center of a circle, then perfect circular action is not possible.

For the first reason given, the existence of an equant is a physical impossibility. So, Kepler sets about seeking a measure equivalent to the equant, but which is physical in nature. In this case, that means a cause measured from the Sun, and in accordance with the above-demonstrated principles of sufficient reason. He uses his conclusion from Chapter 32 to demonstrate that the area swept out by a planet, the measure of the sum of the distances, is roughly proportional to the time as measured by the equant (Animation 8).

12. For an animated work-through of Kepler's entire *New Astronomy*, see http://www.wlym.com/~animations/newastronomy.html



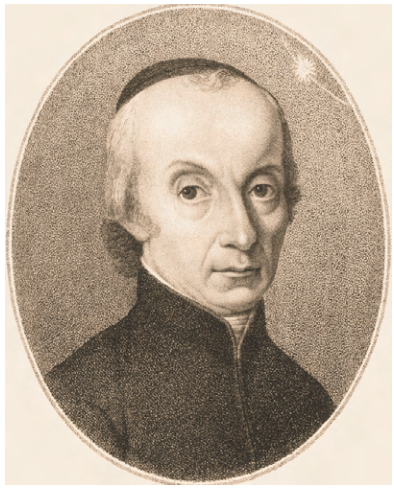
In the course of doing this, he shows that the area which would therefore have to measure the physical equation is roughly equal to the arc subtended by the optical equation. And *voila*! The physical equation becomes actually physical, and the equant is gone! The fact that his error has now increased does not sway Kepler, because he knows that there is still one more matter to be dealt with before he has set the Solar System firmly on a physical footing: that of the circular orbit. Readers who are not familiar with how that is accomplished will enjoy working through the entire process in the pedagogically animated work-through of Kepler's *New Astronomy*, but enough has been said here for us to move on to our main goal.

Harmony Beneath Discord

For Gauss, the target of his eraser was not the equant, but its equivalent: the arbitrary accountant's metrics of Newtonian mass and force.

Two facts would have been known to Gauss by the time Giuseppe Piazzi's observations of the new planet Ceres were made public in January 1801:

(1) Leibniz had already proven, decisively, on the basis of his principle of sufficient reason, that absolute space and time did not exist.[13] This was in explicit contradiction to the Newtonian view which was being peddled through turn-of-the-century Europe by the imperial forces associated with the French and British Newtonians and Napoleon Bonaparte.[14]



Giuseppe Piazzi (1746-1826), an Italian astronomer working in Palermo, discovered the asteroid Ceres on Jan. 1, 1801. He named it Ceres Ferdinandea, after the Italian king.

(2) Kepler, in demonstrating this fact earlier, had shown that all matter, space, and time, were not substantial, but accidental quantities derived from the harmonies. This was expressed most clearly in his *Harmonices Mundi*, where he demonstrated that the reason for the spacing and motion of the planets was derived entirely from intersecting harmonic considerations.

In Britain, and in parts of France, Newton's rewrite of Kepler and the political burial of Leibniz had taken hold, but within Germany, the tradition of Leibniz and Kepler had been defended by the work of Abraham Kästner.[15] In 1810, one year after Gauss published his astronomical tome *Theoria Motus Corporum Coelestium in Sectionibus Conicis Solem Ambientium*—whose release was timed to coincide with the exact 200th anniversary of Johannes Kepler's *Nova Astronomia*—Gauss was busy encouraging fellow astronomers to master Kepler's epistemolog-

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13. Leibniz proves this in several locations, but the proof as it appears in his correspondence with Samuel Clarke is the most significant to us here, because Leibniz grounds it solely on the principle of sufficient reason:

    "[Newtonians] maintain therefore, that space is a real absolute being. But this involves them in great difficulties ... I have said more than once, that I hold space to be something merely relative, as time is; that I hold it to be an order of coexistences, as time is an order of successions. For space denotes, in terms of possibility, an order of things which exist at the same time, considered as existing together; without enquiring into their manner of existing. And when many things are seen together, one perceives that order of things among themselves.

    "I have many demonstrations, to confute the fancy of those who take space to be a substance, or at least an absolute being. But I shall only use, at the present, one demonstration, which the author here gives me occasion to insist upon. I say then, that if space was an absolute being, something would happen for which it would be impossible there should be a sufficient reason. Which is against my axiom. And I prove it thus. Space is something absolutely uniform; and, without the things placed in it, one point of space does not absolutely differ in any respect whatsoever from another point of space. Now from hence it follows, (supposing space to be something in itself, besides the order of bodies among themselves,) that 'tis impossible there should be a reason why God, preserving the same situations of bodies among themselves, should have placed them in space after one certain particular manner, and not otherwise; why every thing was not placed the quite contrary way, for instance, by changing East into West. But if space is nothing else, but that order or relation; and is nothing at all without bodies, but the possibility of placing them; then those two states, the one such as it now is, the other supposed to be quite the contrary way, would not at all differ from one another. Their difference therefore is only to be found in our chimerical supposition of the reality of space in itself. But in truth the one exactly be the same thing as the other, they being absolutely indiscernible; and consequently there is no room to enquire after a reason of the preference of the one to the other.

    "The case is the same with respect to time. Supposing any one should ask, why God did not create everything a year sooner; and the same person should infer from thence, that God has done something, concerning which 'tis not possible there should be a reason, why he did it so, and not otherwise: the answer is, that his inference would be right, if time was any thing distinct from things existing in time. For it would be impossible there should be any reason, why things should be applied to such particular instants, rather than to others, their succession continuing the same. But then the same argument, that instants, considerd without the things, are nothing at all; and that they consist only in the successive order of things: which order remaining the same, one of the two states, viz. that of a supposed anticipation, would not at all differ, nor could be discerned from, the other which now is."

14. The conditions of war and oppression which formed the environment in which Gauss operated during much of his life are described in Tarranja Dorsey, "First Thoughts on the Determination of the Orbit of C.F. Gauss," Note 2.

15. See David Shavin, "The Courage of Gauss," at http://www.wlym.com/~animations/ceres/PDF/courageofgauss.pdf.

ical outlook. That year, Heinrich Olbers writes Gauss in reply:

> I recently obtained some somewhat rarer books from Leipzig. Also, Kepler's letters, to the reading of which you directed my attention. I actually read them with great pleasure, in particular those written by Kepler himself.

Although Gauss said explicitly that he would never publicly state his agreement with this view, and although only shadows of it are to be found in his published works, the method of execution utilized in his scientific work makes clear his epistemology. The thorough elaboration of these examples will have to wait until the final report from this team currently working out of "The Basement"; however, a sufficient summary can be presented as an overview.

In Gauss's work on discovering the orbit of Ceres, he doesn't once make use of the Newtonian mass or inverse square law. He briefly mentions that what Newton added to Kepler's laws requires the introduction of the mass of the planet, and the way that the gravitational force generated by that mass affects the Sun. This is because Newton's concepts of mass and force are necessary fictions with respect to each other. Mass can be determined only by observing its response to a force—weighing it on a scale, for example. However, a force can only be measured by its effect on mass. The basic quantities of Newtonian mechanics are nothing more than a self-consistent (up to a point) exercise in circular logic.

What's more, none of these quantities is actually applicable to matter, but rather is applicable only to material points (such as centers of gravity) which we dispensed with back at Euclid. Kepler, however, derived the properties of the planetary orbits without the aid of either of these fictions. Gauss states—with understandable diplomacy, given the circumstances—in his *Theoria Motus*:

> The laws above stated differ from those discovered by our own KEPLER in no other respect than this, that they are given in a form applicable to all kinds of conic sections, and that the action of the moving body on the sun, on which depends the factor, is taken into account. If we regard these laws as phenomena derived from innumerable and indubitable observations, geometry shows what action ought in consequence to be exerted upon bodies moving about the sun, in order that these phenomena may be continually produced. In this way it is found that the action of the sun upon the bodies moving about it is exerted just as if an attractive force, the intensity of which is reciprocally proportional to the square of the distance, should urge the bodies toward the center of the sun. If now, on the other hand, we set out with the assumption of such an attractive force, the phenomena are deduced from it as necessary consequences. It is sufficient here merely to have recited these laws, the connection of which with the principle of gravitation it will be the less necessary to dwell upon in this place, since several authors subsequently to the eminent NEWTON have treated this subject, and among them the illustrious LAPLACE [see note 16] in that most perfect work the *Mécanique Céleste*, in such a manner as to leave nothing further to be desired.[17]

Gauss repeats this sentiment multiple times throughout the course of the book. Again, with a careful sort of veiled diplomatic delivery, but always making the point for anyone who is willing to listen. This denial of the Newtonian equants of mass, force, energy, absolute space and absolute time originates here in his work on astronomy, the first science, but its implications shape the entire body of his work on curvature, potential, and, ultimately, the hypergeometries of his student Bernhard Riemann.

In a paper, ironically titled "General Propositions Relating to Attractive and Repulsive Forces Acting in the Inverse Ratio of the Square of the Distance," Gauss eliminates the need for both forces and Newton's inverse square law by redefining the concept of potential as Laplace had introduced it in his *Mécanique Céleste*:

> Nature presents to us many phenomena which we explain by the assumption of forces exerted by the ultimate particles of substances upon each other, acting in inverse proportion to the squares of their distances apart.[18]

Gauss's conceptual underpinnings are often buried underneath pages of rather long induction in order to conform to the mind-deadening logical deductive-inductive structure of Euclid's *Elements*, but their core is clear when viewed from the standpoint of Kepler. The only things which can be primary are those conceptions which can be derived immediately from sufficient reason and, as is clear in the above examples of geometry and harmony, that means a universe which is built from the top down, rather than from the bottom up. Matter, then, like the melodic intervals defined by the intersecting harmonies, must be the product of a universe which is unfolding from a single, harmonic, always self-similar whole.

This becomes most clear in Gauss's investigation of the secular perturbations of planetary orbits. In the terms of Newtonian astrophysics, the secular perturbations are said to be the effect of gravitating point masses on one another as they pass, deflecting each other from what would otherwise be near perfect elliptical orbits around the Sun (Animation 9).

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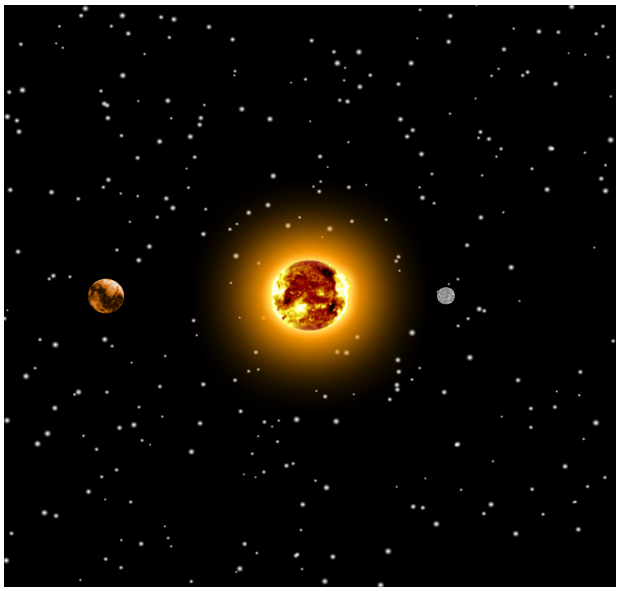
16. The French Newtonian Pierre Simon de Laplace was one of Napoleon Bonaparte's mathematics teachers at the Ecole Militaire. The first two books of his *Mécanique Céleste* (Celestial Mechanics), which Fourier called (with perhaps intentional accuracy) the *Almagest* of his age, were published in 1799, the same year Gauss launched his first (and last) explicit public attack on the French Newtonians. We present here an excerpt from the opening of this latter-day Ptolemy's work, in order to juxtapose his thought process to what we have just gone through:

    "A body appears to us to be in motion when it changes its situation relative to a system of bodies which we suppose to be at rest; but as all bodies, even those which seem to be in a state of absolute rest, may be in motion; we conceive a space, boundless, immoveable, and penetrable to matter: it is to the parts of this real or ideal space that we by imagination refer the situation of bodies; and we conceive them to be in motion when they answer successively to different parts of space.

    "The nature of that singular modification in consequence of which bodies are transported from one place to another, is, and always will be unknown: we have designated it by the name of force; and we are not able to determine any thing more than its effects, and the laws of its action. The effect of a force acting upon a material point is, if no obstacle opposes, to put it into motion; the direction of the force is the right line which it tends to make the point describe."

17. Carl Friedrich Gauss, *Theory of the Motion of the Heavenly Bodies Moving About the Sun in Conic Sections.* (Capitals are as in the original, but emphasis has been added.) A translation by Charles Henry Davis was published in 1857 by Little, Brown and Company and is available at http://books.google.com/books?id=I37LpyiNRIoC.

18. Emphasis added

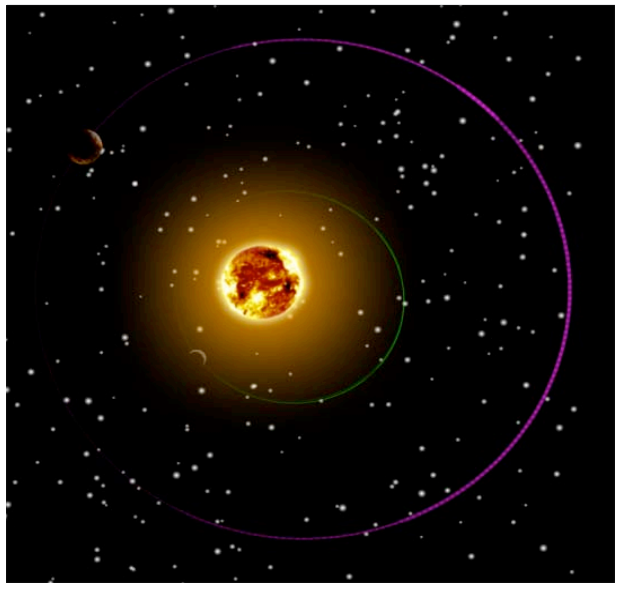


Could this perhaps be a demonstration that Kepler's laws were wrong, and that Newtonian mechanics are necessarily correct? After all, Kepler's laws include no attractive forces, and no masses. They deal only with the spacing, orbital velocities, and elliptical properties of the planetary orbits, as these are derived from the harmonies.

How could Kepler's harmonies account for the apparently mechanistic effect of perturbations experienced in planetary orbits? Let's read the introduction to Gauss's paper "Determination of the Attraction Which a Planet Would Exert Upon a Point at an Arbitrarily Given Location, If Its Mass Were Distributed Continuously Along the Entire Orbit, in Proportion to the Time It Takes to Traverse Its Individual Parts":[19]

> The secular changes which the elements of a planetary orbit experience owing to the perturbation of another planet, are independent of the position of the latter in its orbit, and their values are the same whether the perturbing planet follows the elliptical path according to the Keplerian laws or whether its mass is considered to be continuously distributed along its orbit such that the sections of the orbit which are traversed in equal times are also given equal amounts of mass, provided only that the periods of the perturbed and perturbing planets are not commensurable. This elegant theorem can be easily proven from the axioms [Grundsätzen] of celestial mechanics, even if it has not been expressly stated by anyone before now. Hence the following problem arises, which is worthy of interest as much on its own account as on account of the various artifices which its solution requires: to determine exactly the attraction of a planetary orbit or, better said, of an elliptical ring, on a point at an arbitrarily given location, where the thickness of the ring is infinitely small and variable according to the law just laid out.

Gauss goes on to demonstrate that the effect of perturbation depends entirely upon the parameters of the planet's orbit, where the mass only appears as an effect of the amount of time spent by the perturbing and the perturbed planets at a given point in their orbits—essentially, the length of the daily arcs dealt with by Kepler in the discussion above. (See Animation 10.)



But also, this is nothing other than the orbital velocities of the respective planets, all of which, as Kepler demonstrates in Book 5 of his *Harmonices Mundi*,[20] are defined by the minimum and maximum orbital velocities of a planet, which it experiences at aphelion and perihelion. These in turn are defined entirely by the harmonies!

Gauss has demonstrated clearly, in the domain of astronomy, what sufficient reason teaches must be true generally—and what Kepler and Leibniz already knew—that matter and its physical properties must be derivative effects drawn from the self-reflexive actions of a single principle of sufficient reason.

Again, as the name implies, the most characteristic property of this sufficient reason is that man's reason is its measure. Man's reason, though diverse in its individual expression in individual human beings, is necessarily made in the image of a single process of sufficient, creative reason. Therefore all of creation reflects a single, creative personality, a single Creator, whom it is the nature, responsibility, and sole pleasure of man to investigate amidst the harmonies which He has placed inside of us and in the universe which surrounds us. And because of this, as the very existence of Kepler, Leibniz, Gauss, and Riemann demonstrates, man's mind is the measure of all causes, though confusedly at first, until prompted. This is the core of the method applied by Cusa, Kepler, Kästner, Gauss, and Riemann, and it is the method which a modern renaissance, studying them, is obliged to revive.

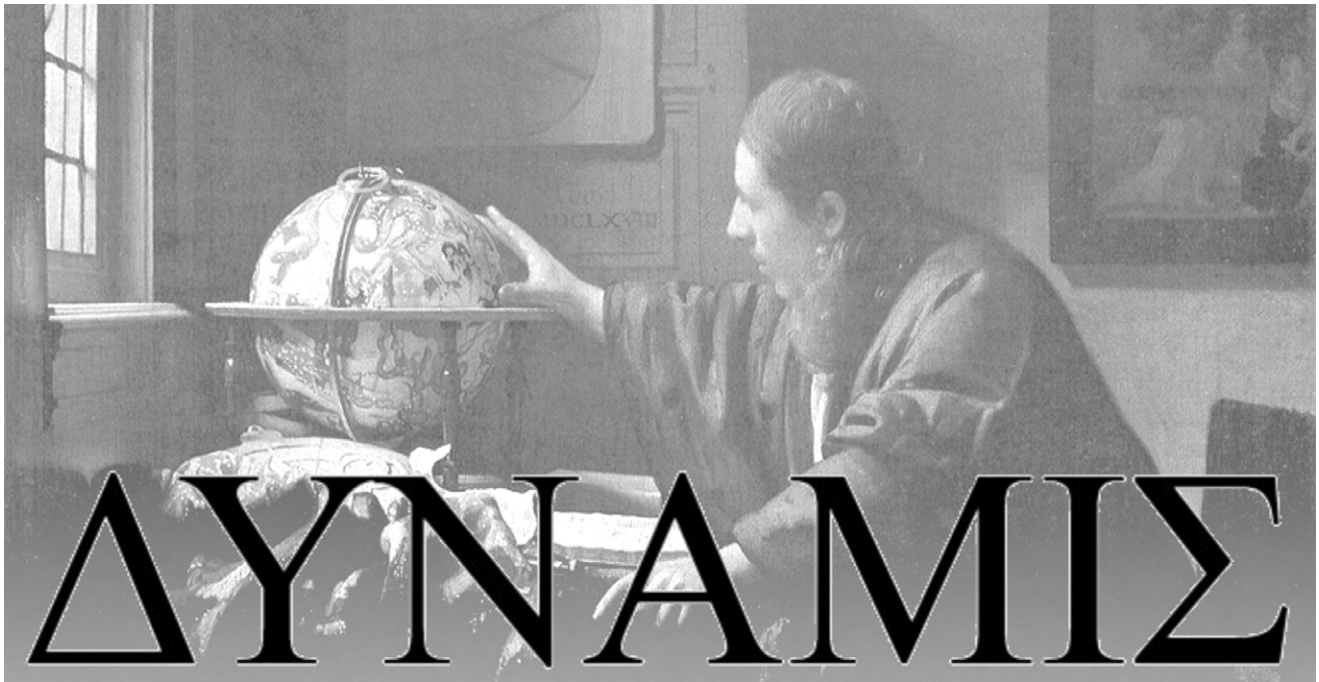
> For just as sensible things which we had known beforehand, similarly sensible mathematical things, if they are recognized, therefore, elicit intellectual things which are previously present within, so that the things now in actuality shine forth in the soul which were hidden in it before, as if under a veil of potentiality.[21]

Sky Shields is a member of the LaRouche Youth Movement in Los Angeles.

19. http://www.wlym.com/~animations/ceres/PDF/Sky/GaussPlanetMassDist.pdf

20. http://www.wlym.com/~animations/harmonies/

21. Kepler, *Harmonices Mundi*, Book IV



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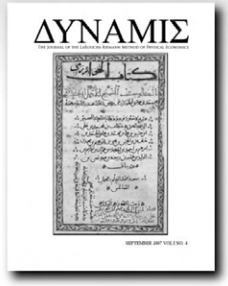

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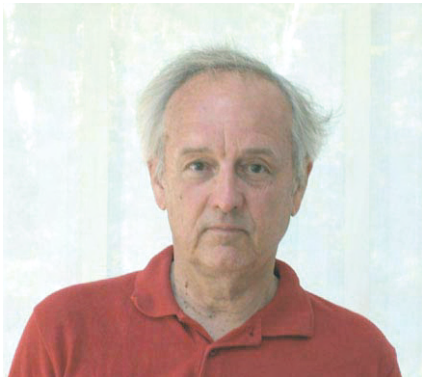
INTERVIEW: DR. NILS-AXEL MÖRNER



Sea-level Expert: It's Not Rising!

Why coastal dwellers should not live in fear of inundation.

www.actualmaldives.com

The North and South Malosmadulu Atolls in the Maldive Islands, as viewed from a seaplane.

Question: I would like to start with a little bit about your background.

I am a sea-level specialist. There are many good sea-level people in the world, but let's put it this way: There's no one who's beaten me. I took my thesis in 1969, devoted to a large extent to the sea-level problem. From then on I have launched most of the new theories, in the '70s, '80s, and '90s. I was the one who understood the problem of the gravitational potential surface, the theory that it changes with time. I'm the one who studied the rotation of the Earth, how it affected the redistribution of the oceans' masses. And so on.

I was president of INQUA, an international fraternal association, their Commission on Sea-Level Changes and Coastal

Dr. Nils-Axel Mörner has studied sea level and its effects on coastal areas for some 35 years. Recently retired as director of the Paleogeophysics and Geodynamics Department at Stockholm University, Mörner is past president (1999-2003) of the INQUA Commission on Sea Level Changes and Coastal Evolution, and leader of the Maldives Sea Level Project.

Mörner was interviewed by Associate Editor Gregory Murphy on June 6. The interview here is abridged; a full version appeared in Executive Intelligence Review, *June 22, 2007.*

Evolution, from 1999 to 2003. And in order to do something intelligent there, we launched a special international sea-level research project in the Maldives, because that's the hottest spot on Earth for [this topic]—there are so many variables interacting there, so it was interesting, and also people had claimed that the Maldives—about 1,200 small islands—were doomed to disappear in 50 years, or at most, 100 years. So that was a very important target.

I have had my own research institute at Stockholm University, which was devoted to something called paleogeophysics and geodynamics. It's primarily a research institute, but lots of students came, I have several Ph.D. theses at my institute, and lots of visiting professors and research scientists came to learn about sea level. Working in this field, I don't think there's a spot on the Earth I haven't been in! In the northmost, Greenland; and in Antarctica; and all around the Earth, and very much at the coasts.

So I have primary data from so many places, that when I'm speaking, I don't do it out of ignorance, but on the contrary, I know what I'm talking about. And I have interaction with other scientific branches, because it's very important to see the problems not just from one eye, but from many different aspects. Sometimes you dig up some very important thing in some geodesic paper which no other geologist would read. And you must have the time and the courage to go into the big questions, and I think I have done that.

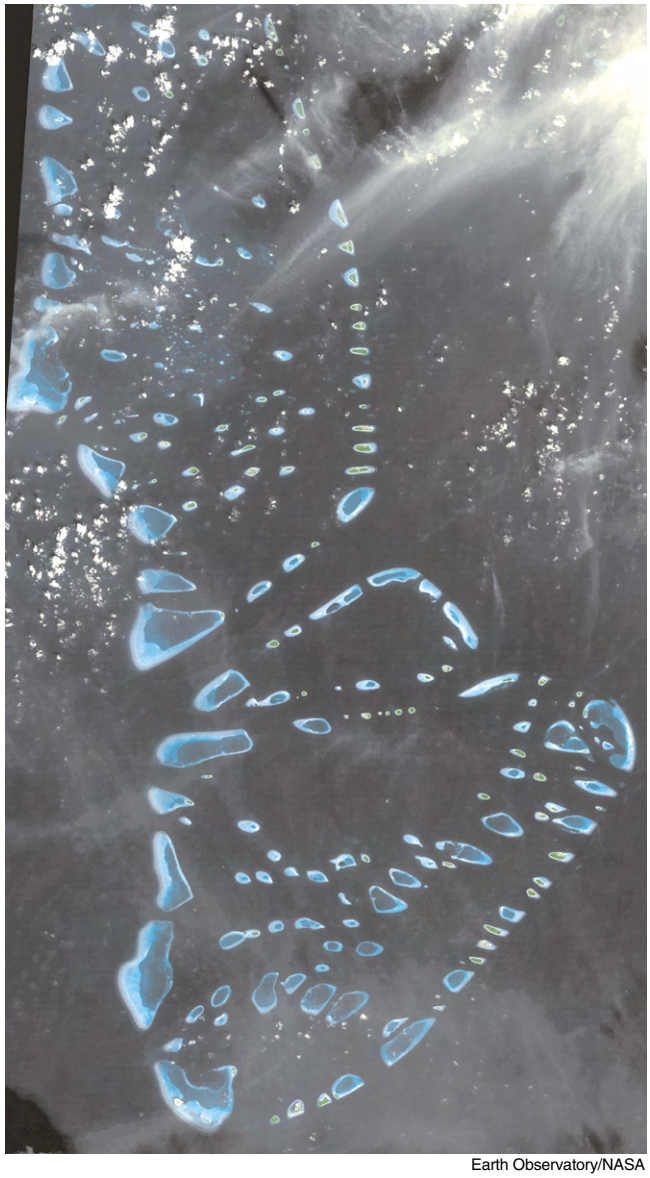
The last 10 years or so, of course, everything has been the discussion on sea level, which they say is drowning us. In the early '90s, I was in Washington giving a paper on how the sea level is *not* rising, as they said. That had some echoes around the world.

Question: What is the real state of the sea-level?

You have to look at that in a lot of different ways. That is what I have done in a lot of different papers, so we can confine ourselves to the short story here. One way is to look at the global picture, to try to find the essence of what is going on. And then we can see that the sea level was indeed rising, from, let us say, 1850 to 1930-1940. And that rise had a rate in the order of 1 millimeter per year; 1.1 is the exact figure. Not more. And we can check that, because Holland is a subsiding area; it has been subsiding for many millions of years; and Sweden, after the last Ice Age, was uplifted. So if you balance those, there is only one solution, and it will be this figure....

There's another way of checking it, because if the radius of the Earth increases as a result of sea level rise, then immediately the Earth's rate of rotation would slow down. That is a physical law, right? You have it in figure-skating: when skaters rotate very fast, the arms are close to the body; and then when they increase the radius, by putting out their arms, they stop by themselves. So you can look at the rotation and you see the same thing: Yes, it might be 1.1 mm per year, but absolutely not more. It could be less, because there could be other factors affecting the Earth, but it certainly could not be more. Absolutely not! Again, it's a matter of physics.

So, we have this 1 mm per year up to 1930, by observation, and we have it by rotation recording. So we go with those two. They go up and down, but there's no trend in it; it was up until 1930, and then down again. There's no trend, *absolutely no trend.*



Earth Observatory/NASA

A satellite view of the Maldives chain of small coral islands in the northern Indian Ocean.

Another way of looking at what is going on is the tide gauge. Tide gauging is very complicated, because it gives different answers for wherever you are in the world. We have to rely on geology when we interpret it. So, for example, those people in the IPCC [Intergovernmental Panel on Climate Change], choose Hong Kong, which has six tide gauges, and they choose the record of one, which gives a 2.3 mm per year rise of sea level. Every geologist knows that that is a subsiding area. It's the compaction of sediment; it is the only record which you *should not* use.

And if that [2.3 mm] figure is correct, then Holland would not be subsiding, it would be uplifting. And that is just ridiculous. Not even ignorance could be responsible for a thing like that. So tide gauges, you have to treat very, very carefully.

Now back to satellite altimetry, which shows the water, not just the coasts, but in the whole of the ocean, as measured by satellite. From 1992 to 2002, [the graph of the sea level] was a straight line, variability along a straight line, but absolutely no trend whatsoever. We could see spikes: a very rapid rise, but then in half a year, they fall back again. But absolutely no trend, and to have a sea-level rise, you need a trend.

Data Fudged

Then, in 2003, the same data set, which in their [IPCC's] publications, in their website, was a straight line—suddenly it changed, and showed a very strong line of uplift, 2.3 mm per year, the same as from the tide gauge. And that didn't look so nice. It looked as though they had recorded something, *but they hadn't recorded anything.* It was the original data which they suddenly twisted up, because they entered a "correction factor," which they took from the tide gauge.

So it was not a measured thing, but a figure introduced from outside. I accused them of this at the Academy of Sciences meeting in Moscow—I said you have introduced factors from outside; it's not a measurement. It looks like it is measured from the satellite, but you don't say what really happened. And they answered, that we had to do it, because otherwise we would not have gotten any trend!

That is terrible! As a matter of fact, it is a falsification of the data set. Why? Because they know the answer. And there you come to the point: They "know" the answer; the rest of us, we are *searching* for the answer. Because we are field geologists; they are computer scientists. So all this talk that sea level is rising, this stems from the computer modelling, not from observations. The observations don't find it!

I have been an expert reviewer for the IPCC, both in 2000 and last year. The first time I read it [the report], I was exceptionally surprised. First of all, it had 22 authors, but none of them—*none*—were sea-level specialists. They were given this mission, because they promised to answer the right thing. Again, it was a computer issue. This is the typical thing: The meteorological community works with computers, simple computers. Geologists don't do that! We go out in the field and observe, and then we can try to make a model with computerization; but it's not the first thing.

So there we are. Then we went to the Maldives. I traced a drop in sea level in the 1970s, and the fishermen told me, "Yes, you are correct, because we remember"—things in their sailing routes have changed, things in their harbor have changed. I worked in the lagoon, I drilled in the sea, I drilled in lakes, I looked at the shore morphology—so many different environments. Always the same thing: In about 1970, the sea fell about 20 cm, for reasons involving probably evaporation or something. Not a change in volume or something like that—it was a rapid thing. The new level, which has been stable, has not changed in the last 35 years. You can trace it so very, very carefully. No rise at all is the answer there.

The Case of Tuvalu

Another famous place is the Tuvalu Islands, which are supposed to soon disappear because they've put out too much carbon dioxide. There we have a tide gauge record, a variograph record, from 1978, so it's 30 years. And again, if you look there, *absolutely no trend*, no rise.

So, from where do they get this rise in the Tuvalu Islands?

We know in the Tuvalu Islands that there was a Japanese pineapple industry which extracted too much fresh water from the inland, and those islands have very little fresh water available from precipitation, rain. So, if you take out too much, you destroy the water magazine, and you bring seawater into the magazine, which is not nice. So they took out too much freshwater and in came salt water. And of course the local people were upset. But then it was much easier to say, "No, no! It's the global sea level rising! It has nothing to do with our extraction of freshwater." So there you have it. This is a local industry which doesn't pay.

You have Vanuatu, and also in the Pacific, north of New Zealand and Fiji—there is the island Tegua. They said they had to evacuate it, because the sea level was rising. But again, you look at the tide-gauge record: There is absolutely no signal that the sea level is rising. If anything, you could say that maybe the tide is lowering a little bit, but absolutely no rising.

And again, where do they [the IPCC] get it from? They get it from their inspiration, their hopes, their computer models, but not from observation, which is terrible.

Remote Sensing Tutorial/GSFC/NASA

A satellite view of Venice, Italy. If you look at the 300-year record, the sea level has gone up and down, around the subsidence rate.

We have Venice. Venice is well known, because that area is tectonically, because of the delta, slowly subsiding. The rate has been constant over time. A rising sea level would immediately accelerate the flooding. And it would be so simple to record it. And if you look at that 300-year record: In the 20th Century it was going up and down, around the subsidence rate. In 1970, you should have an acceleration, but instead, the rise almost finished. So it was the opposite.

If you go around the globe, you find no rise anywhere. But they need the rise, because if there is no rise, there is no death threat. They say there is nothing good to come from a sea-level rise, only problems, coastal problems. If you have a temperature rise, if it's a problem in one area, it's beneficial in another area. But sea level is the real "bad guy," and therefore they have talked very much about it. But the real thing is, that it doesn't exist in observational data, only in computer modelling....

Courtesy of Nils-Axel Mörner

This tree, near the coast in the Maldives, would have been swept away by high tides if sea levels were rising. An Australian sea-level team pulled the tree down, so it would not remain as proof that sea levels were not rising! But shortly thereafter, when Mörner returned to the Maldives to make a film, he found the torn-down tree, still green, and placed it in the ground to take this photo.

I'll tell you another thing: When I came to the Maldives, to our enormous surprise, one morning we were on an island, and I said, "This is something strange, the storm level has gone down; it has not gone up, it has gone *down*." And then I started to check the level all around, and I asked the others in the group, "Do you see anything here on the beach?" And after a while they found it too. And as we had investigated, and we were sure, I said we cannot leave the Maldives and go home and say the sea level is not rising, it's not respectful to the people. I have to say it to Maldive television.

So we made a very nice program for Maldive television, but it was forbidden by the government (!) because they thought that they would lose money. They accuse the West for putting out carbon dioxide, and therefore we have to pay for our damage and the flooding. So they wanted the flooding scenario to go on.

This tree [see photo], which I showed in the documentary, is interesting. This is a prison island, and when people left the island, from the '50s, it was a marker for them, when they saw this tree alone out there, they said, "Ah, freedom!" ... I knew that this tree was in that terrible position already in the 1950s. So the slightest rise, and it would have been gone. I used it in my writings and for television.

You know what happened? There came an Australian sea-level team, which was for the IPCC and against me. Then the students pulled down the tree by hand! They destroyed the evidence. What kind of people are those? And we came to launch this film "Doomsday Called Off," right after that, and the tree was still green. And I heard from the locals that they had seen the people who had pulled it down. So I put it up again, by hand, and made my TV program....

They call themselves scientists, and they're destroying evidence! A scientist should always be open for reinterpretation, but you can *never* destroy evidence. And they were being *watched*, thinking they were clever.

Question: How does the IPCC get these small island nations so worked up about worrying that they're going to be flooded tomorrow?

Because they get support; they get money, so their idea is to attract money from the industrial countries. And they believe that if the story is not sustained, they will lose it. So, they *love* this story. But the local people in the Maldives—it would be terrible to raise children—why should they go to school, if in 50 years everything will be gone? The only thing you should do, is learn how to swim....

Yes, and it's much better to blame something else. Then they can wash their hands and say, "It's not our fault. It's the U.S., they're putting out too much carbon dioxide."

Question: Which is laughable, this idea that CO_2 is driving global warming.

Precisely, that's another thing.

And like this *State of Fear* [book], by Michael Crichton, when he talks about ice. Where is ice melting? Some Alpine glaciers are melting, others are advancing. Antarctic ice is certainly *not* melting; all the Antarctic records show expansion of ice. Greenland is the dark horse here for sure; the Arctic may be melting, but it doesn't matter, because they're already floating, and it has no effect.

A glacier like Kilimanjaro, which is important, on the Equator, is *only* melting because of deforestation. At the foot of the Kilimanjaro, there was a rain forest; from the rain forest came

moisture, from that came snow, and snow became ice. Now, they have cut down the rain forest, and instead of moisture, there comes heat; heat melts the ice, and there's no more snow to generate the ice. So it's a simple thing, but has nothing to do with temperature. It's the misbehavior of the people around the mountain. So again, it's like Tuvalu: We should say this is deforestation, that's the thing. But instead they say, "No, no, it's global warming!"

Question: Here, over the last few days, there was a group that sent out a power-point presentation on melting glaciers, and how this is going to raise sea level and create all kinds of problems.

The only place that has that potential is Greenland, and Greenland east is not melting; Greenland west, the Disco Bay is melting, but it has been melting for 200 years, at least, and the rate of melting *decreased* in the last 50-100 years. So, that's another falsification.

But more important, in the last 5,000 years, the whole of the Northern Hemisphere experienced warming, the Holocene Warm Optimum, and it was 2.5 degrees warmer than today. And still, no problem with Antarctica, or with Greenland; still, no higher sea level.

Hitachi-sk

One example of an environmentalist campaign to save island nations from mythical sea-level rise: "Save submerging Tuvalu," a poster by Hitachi-sk, which warns employees about "the impending danger of global warming."

Observations Vs. Computer Models

Question: These scare stories are being used for political purposes.

Yes. Again, this is for me, the line of demarcation between the meteorological community and us: They work with computers; we geologists work with observations, and the observations do not fit with these scenarios. So what should you change? We cannot change observations, so we have to change the scenarios!

Instead of doing this, they give an endless amount of money to the side which agrees with the IPCC. The European Community, which has gone far in this thing: If you want a grant for a research project in climatology, it is written into the document that there *must* be a focus on global warming. All the rest of us, we can never get a coin there, because we are not fulfilling the basic obligations. That is really bad, because then you start asking for the answer you want to get. That's what dictatorships did, autocracies. They demanded that scientists produce what they wanted....

You frighten a lot of scientists. If they say that climate is not changing, they lose their research grants. And some people cannot afford that; they become silent, or a few of us speak up, because we think that it's for the honesty of science, that we have to do it.

Question: In one of your papers, you mentioned how the expansion of sea level changed the Earth's rotation into different modes—that was quite an eye-opener.

Yes, but it is exceptionally hard to get these papers published also. The publishers compare it to IPCC's modelling, and say, "Oh, this isn't the IPCC." Well, luckily it's not! But you cannot say that....

When I became president of the INQUA Commission on Sea-Level Change and Coastal Evolution, we made a research project, and we had this up for discussion at five international meetings. And all the true sea level specialists agreed on this figure, that in 100 years, we might have a rise of 10 cm, with an uncertainty of plus or minus 10 cm—that's not very much. [See Figure 3, p. 32.] And in recent years, I even improved it, by considering also that we're going into a cold phase in 40 years. That gives 5 cm rise, plus or minus a few centimeters. That's our best estimate. But that's very, very different from the IPCC statement.

Ours is just a continuation of the pattern of sea level going back in time. Then you have absolutely maximum figures, like when we had all the ice in the vanishing ice caps that happened to be too far south in latitude after the Ice Age. You couldn't have more melting than after the Ice Age. You reach up to 10 mm per year—that was the *super*-maximum: 1 meter in 100 years....

People have been saying, 1 meter, 3 meters. It's not feasible! These are figures which are so large, that only when the ice caps were vanishing, did we have those types of rates. They are absolutely extreme.... We are basing ourselves on the observations—in the past, in the present, and then predicting it into the future, with the best of the "feet on the ground" data that we can get, not from the computer.

Question: Isn't some of what people are talking about just shoreline erosion, as opposed to sea-level rise?

Yes, and I have very nice pictures of it. If you have a coast, with some stability of the sea level, the waves make a kind of equilibrium profile—what they are transporting into the sea and what they are transporting onshore. If the sea rises a little, yes, it attacks, but the attack is not so vigorous. On the other hand, if the sea goes down, it is eating away at the old equilibrium level. There is a much larger redistribution of sand.

We had an island, where there was heavy erosion, everything was falling into the sea, trees and so on. But if you looked at what happened: The sand which disappeared there, if the sea level had gone up, that sand would have been placed higher, on top of the previous land. But it is being placed below the previous beach. We can see the previous beach, and it is 20-30 cm above the current beach. So this is erosion because the sea level fell, not because the sea level *rose*. And it is more common that erosion is caused by a falling sea level, than by a rising sea level.

THE SUN RULES THE CLIMATE

There's No Danger of Global Sea Level Rise

by Nils-Axel Mörner

After 35 years of measuring sea levels worldwide, a Swedish expert reports that observational data seriously contradict the global warming scare scenario of rising sea levels.

Courtesy of Permanent Mission of the Republic of Maldives to the United Nations

The Maldives, a group of nearly 1,200 tiny islands in the Indian Ocean, have no signs of any ongoing sea level rise, and in the past have survived higher sea levels of at least +60 cm.

Aristotle presented the first global model: his model of the planetary system. It was totally wrong. Still, it ruled the world for 1,800 years until Copernicus presented an observationally based solution. To leave observational reality behind and to hang on to models and model predictions seems utterly dangerous and basically unscientific, but today we are still victims of many ruling models. The climate-modelling of the Intergovernmental Panel on Climate Change (IPCC) now totally rules the entire world. Still, it is based on very shaky ground including errors, falsifications, and misinterpretations. Sea level, for example, is by no means in a rising mode, and we can free the world from the condemnation of becoming flooded in the near future.

In about 40 years we will be in a new Solar Minimum and are hence likely to experience a new Little Ice Age. All this reveals the danger of ruling models, and calls for a return to basic observational facts. Scientific integrity has become vital.

In true natural science, we have always worked with a basic three-part scheme, *viz.* Observation, Interpretation, and Conclusion. In the case of more unified schema, we talk about a chain of Hypothesis, Theory, Paradigm. This is our scientific base; so it has been, and so it ought to be.

In recent years of computer modelling, a new and very dangerous scheme has entered the scientific scene, *viz.* Idea, Models, "the Truth."

Modelling is a powerful tool assisting us

Nils-Axe Mörner is Professor Emeritus of Paleogeophysics and Geodynamics, at the University of Stockholm, Sweden. He is past president (1999-2003) of the INQUA Commission on Sea Level Changes and Coastal Evolution, and leader of the Maldives Sea Level Project. He can be reached at morner@pog.nu.

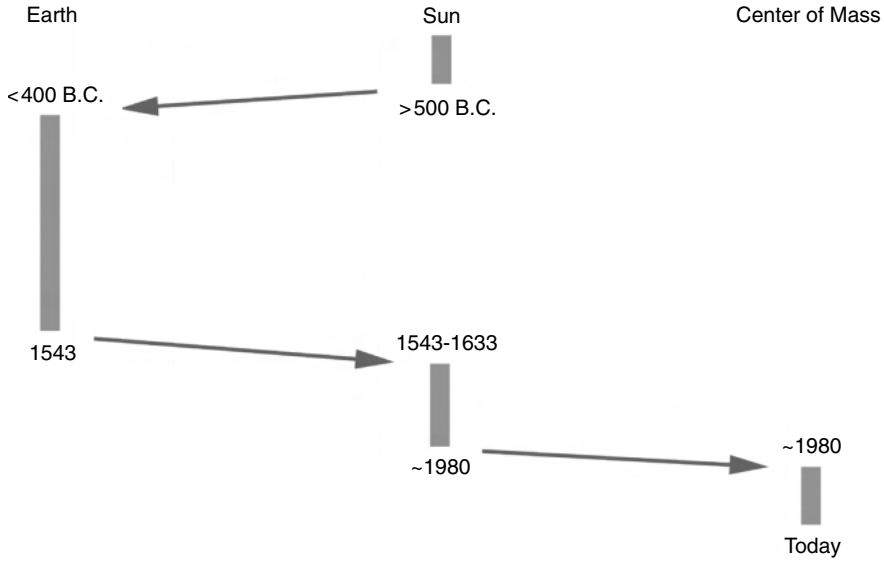


Figure 1
CHANGING VIEWS OF THE SOLAR SYSTEM
This represents the changing opinion of the center of our planetary system during 2,700 years. It took some 1,800 years before the ruling model of Aristotle could be dismissed by the observationally based results of Copernicus in 1543.

in our search for connections and interacting variables. It should never grow to become a subject in itself. There are bad cases of this in the past as well as at present (Mörner, 2006a, 2006b).

The First Model Ever Presented

In the Ionic settlement with the cities of Ephesos, Miletos, and Kos (today's southwest Turkey), a wonderful, free, natural philosophy flourished. In their understanding of the planetary system, the Sun was where it should be, that is, in the center (Figure 1), no questions about that. Especially with Aristotle, things changed. The Earth was placed in the center, and the Sun was proclaimed to move around the Earth. Aristotle presented a unified model—the first ever model of the planetary and celestial mechanics. Everything was explained by movements of the planetary and celestial bodies along 56 independent circular paths. No

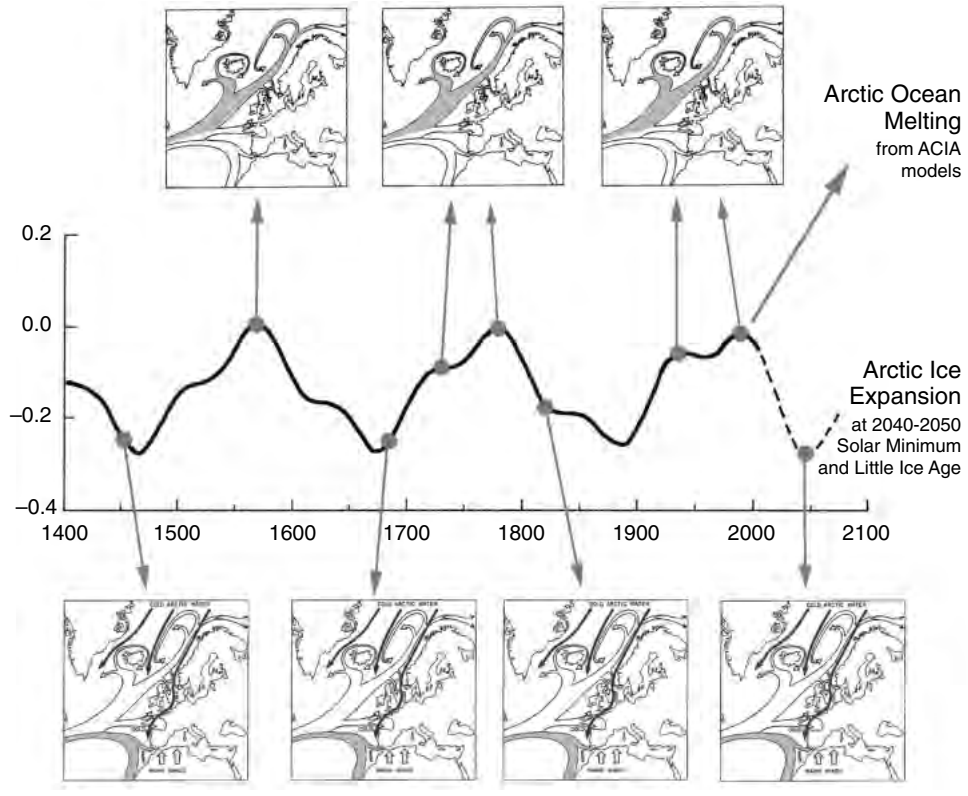
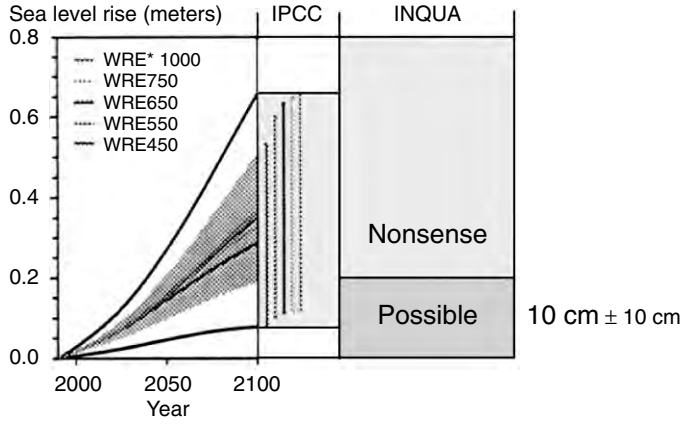


Figure 2
SOLAR CYCLE AND OBSERVED OCEAN CIRCULATION
A graph of the main solar cycle in the last 600 years with observed ocean circulation pattern at maxima (up arrows) and minima (down arrows), and the expected extension into the future (dotted line).
At solar minima, northwest Europe, the North Atlantic, and the Arctic have experienced cold phases known as Little Ice Ages. By 2040-2050, a new Solar Minimum is to be expected, and with it a new cold phase over the Arctic and northwest Europe.

Source: Mörner 2005a

objections were permitted to this masterly final solution, which was later updated by Ptolemy around 170 B.C.

It took about 1,800 years until reality caught up with the model illusion, and in 1543, Nicolaus Copernicus presented his outstanding observational facts proving that the Sun was in the center and the planets, including the Earth, were forced to circle around the Sun (Figure 1). Still, the Church refused to accept the truth. For this reason, Giordano Bruno was burned to death in 1600, and Galileo Galilei had to deny the facts in 1633.



* WRE refers to Wigley, Richels, and Edmonds and their various assessments of atmospheric carbon dioxide levels.

Figure 3
ESTIMATES OF SEA LEVEL RISE BY 2100
This compares the projections of the IPCC for sea level rise by the year 2100, to the evaluation of INQUA, based on observational reality.

The Global Warming Scenario

The IPCC's climate-modelling now totally rules the entire world, despite its errors. Sea level, for example, is by no means in a rising mode, as discussed below.

Climate is becoming increasingly warmer, we hear almost every day, in what has become known as Global Warming. The idea of the IPCC (2001) is that there is a linear relationship between CO_2 increase in the atmosphere and global temperature. The fact, however, is that temperature has constantly gone up and down. From 1850 to 1970, we see an almost linear relationship with Solar variability, not CO_2. For the last 30 years, our data sets are so contaminated by personal interpretations and personal choices that it is almost impossible to sort out the mess in reliable or unreliable data.

In the IPCC's scenario, we will face a rapidly increasing temperature in the near future, which will cause an opening of the Arctic Basin (ACIA 2004). Such a view implies that we neglect the Solar influence (Mörner 2005a). It is as if the IPCC and Kyoto Protocol enthusiasts want to switch off the Sun itself.

The fact is that the climatic changes during the last 600 years include cold periods around 1450, 1690, and 1815, which all correlate with periods of Solar Minima (the Spörer, Maunder, and Dalton Solar Minima). The driving cyclic solar forces can easily be extrapolated into the future (Figure 2). This would call for a new cold period or Little Ice Age to occur at around 2040-2050, in total contrast to the IPCC scenario. The solar influence is simply kept out of the Global Warming concept. It is high time to bring the Sun back into the center.

Prior to 5,000-6,000 years before the present, all sea level curves are dominated by a general rise in sea level in true glacial eustatic resonse to the melting of the continental ice caps. In the last 5,000 years, global mean sea level has been dominated by the redistribution of water masses over the globe. In the last 300 years, sea level has been oscillating close to the present level, with peak rates in the period 1890-1930 (Figure 3).

The Sea Level Nonsense

In the global warming concept, it has been constantly claimed that there will be a causal rise in sea level: a rise that is allegedly already in the accelerating mode, which in the near future will cause extensive and disastrous flooding of low-lying coastal areas and islands. Is this fact or fiction? What lies behind this idea? And, especially, what do the true international sea level specialists think? (INQUA 2000; Mörner 2004a, 2005a)

The recording and understanding of past changes in sea level, and its relation to other variables (climate, glacial volume, potential gravity variations, rotational changes, ocean current variability, evaporation/precipitation changes, and so on.) are the keys to sound estimates of future changes in sea level (Mörner 2004a). The international organizations hosting the true specialists on sea level changes are to be found with the International Union for Quaternary Research (INQUA) commission on sea level changes, and the International Geoscience Program (IGCP) special projects on sea level changes. When I was president of the INQUA Commission on Sea Level Changes and Coastal Evolution, 1999-2003, we paid special attention just to this question; that is, the proposed rise in sea level and its relation to observational reality. We discussed the issue at five international meetings and by web-networking (INQUA 2000). Our best estimate for the next century was +10 cm ±10 cm (INQUA, 2000, Mörner 2004a), later revised by myself to +5cm ±15 cm (Mörner 2004a, 2005a, 2005b).

It is true that sea level rose in the order of 10-11 cm from 1850 to 1940 as a function of solar variability and related changes in global temperature and glacial volume. From 1940 to 1970, it stopped rising, and perhaps even fell a little. In the last 10-15 years, we see no true signs of any rise and, especially, no signs of any accelerating rise (as claimed by the IPCC), only a variability around zero (Mörner, 2004a, 2005b).

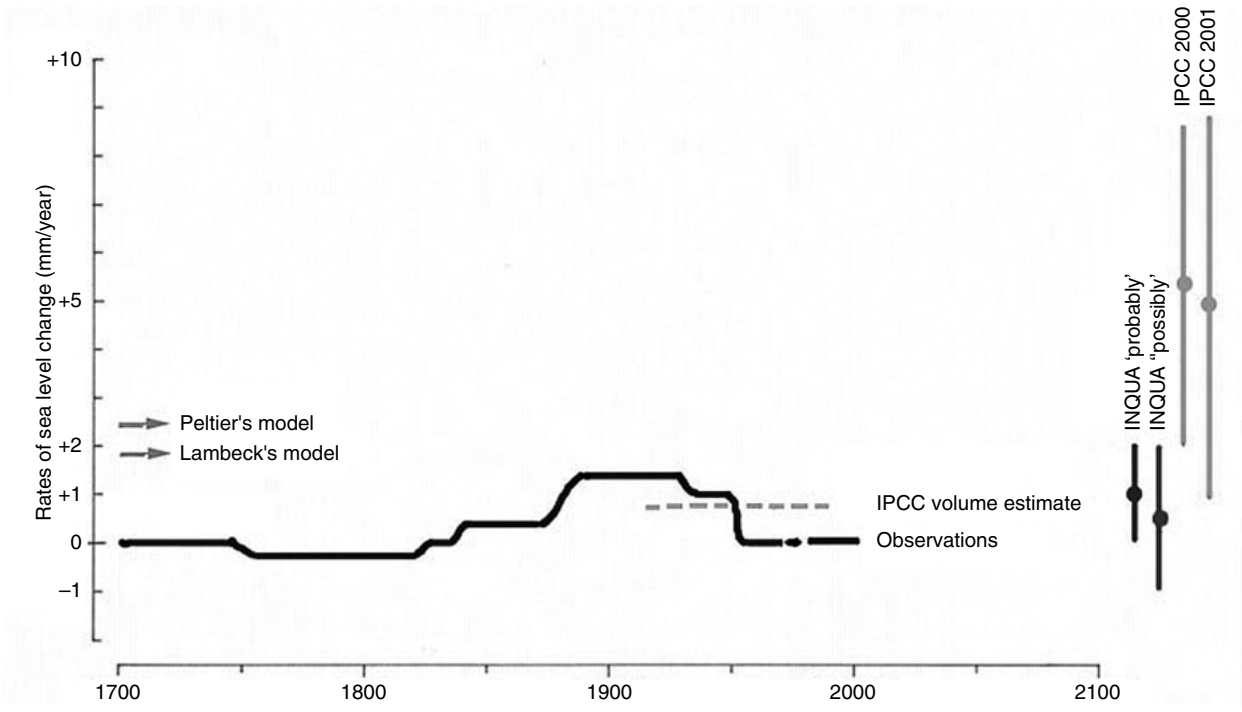


Figure 4
SEA LEVEL CHANGES 1700-2100

These are observed sea level changes for the past 300 years, and estimated changes by year 2100.

Source: Mörner 2004a

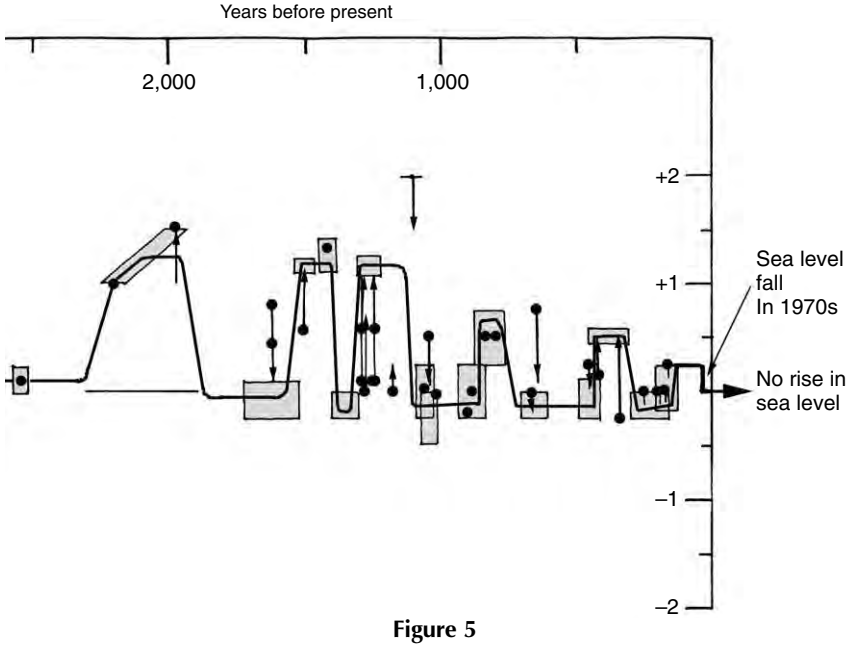


Figure 5
SEA LEVEL RECORD FOR THE MALDIVES (600 B.C. to present)

This sea level record of the past 2,600 years from the Maldives shows a significant sea level fall in the 1970s and a lack of signs of any ongoing rise.

Source: Mörner 2007

This is illustrated in Figure 4.

From 2000, we have run a special international sea level project in the Maldives (Mörner et al. 2004, Mörner 2007) including six field sessions and numerous radiocarbon dates. Our record for the last 2,600 years is given in Figure 5. There are no signs of any ongoing sea level rise. It seems all to be a myth. In fact, the people of the Maldives survived higher sea levels of at least +60 cm.

The same result is obtained if one examines other regions; for example, the records of the famous sites of Tuvalu and Venice, and the fundamental new data set from satellite altimetry (Mörner 2004a, 2004b, 2005a, 2005b).

It is claimed that the island of Tuvalu in the Pacific is in the process of being flooded by a rapid global sea level rise. The fact, however, is that the tide-gauge record of the last 25 years does not support this scenario. On the contrary, it shows a quite stable

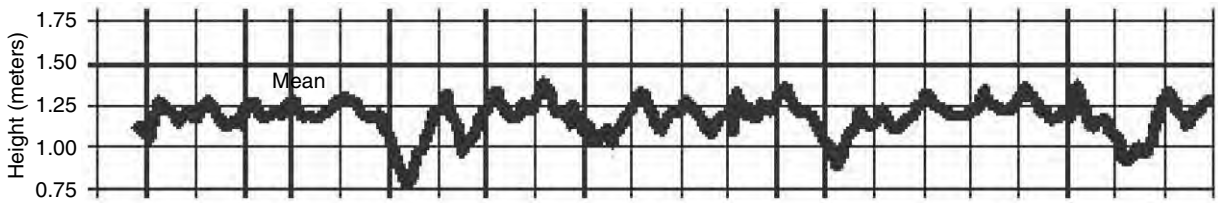


Figure 6
MEAN TIDE-GAUGE RECORD FOR TUVALU, 1978-2003
The Tuvalu tide-gauge record for 1978 to 2003 shows stability around a zero level, plus three negative ENSO events.

sea level for the last three decades, as shown in Figure 6 (Mörner 2004b, 2005a). The truth seems to be that a Japanese pineapple industry had withdrawn too much freshwater from the surface, thus forcing saltwater to invade the subsurface.

Venice, on the Po delta in northern Italy, represents a slowly subsiding area. Its sea level history is, therefore, dominated by a slowly rising relative sea level factor caused by local tectonics and sediment compaction. If global sea level were in a rising mode, it would have increased the rate of relative sea level rise significantly. This is not the case, however. On the contrary, the relative sea level rise decreased and even stopped in the 1970s, partly as a function of engineering work (Mörner 2005a).

The island of Tegua in the Vanuatu islands in the Pacific was recently told that it would be the first place where people would have to be relocated because of a rising sea level (Vanuatu 2005). But the background to this seems rather to be political than truly scientific.

Satellite altimetry is a powerful new tool for the recording of global sea level changes. Whilst the first record shows no signs of any rising trend, a later version has a strong rising trend. This trend, however, is imported from subjective analyses of tide-gauge records and does not refer to a true satellite altimetry record (Mörner 2004a, 2005a, 2005b). Whether this should be classified as misunderstanding or falsification, I leave for the readers to decide.

There is also the question of the contribution from melting glaciers. The Arctic ice doesn't matter in this case because it is a thin sea ice and because it is already floating in the sea. Small glaciers have very little effect on global sea level. Furthermore, a glacier, like the one on Mt. Kilimanjaro, is melting, not for climatic reasons but because of deforestation of its slopes and the surrounding area. A contribution from the Greenland ice cap would affect sea level. But sea levels do not record any such effects. Also, some areas melt while others expand, and it changes with time: increasing, decreasing, and changing sign. The huge Antarctic ice cap is expanding rather than melting. The best thing we can do is to continue recording and analyzing sea level. Up to now, there is nothing alarming to be reported, but rather the opposite—stability.

In conclusion; observational data do not support the sea level rise scenario. On the contrary, they seriously contradict it. Therefore, we should free the world from the fear of becoming extensively flooded in the near future. Furthermore, in about 40 years, we will be in a new Solar Minimum with a related cold period.

Scientific Perspectives

Scientific progress has always been driven by hard work, sharpness, and unbounded curiosity. This is our true scientific resource, and it must be the driving force also in the future. This calls for increased independence of individual scientists and scientific organizations. Ruling models must not take over as guiding tools. Even ruling scientific paradigms must be questioned and tested. In view of this, I predict a total collapse of the global warming and sea-level-rise scenarios in the near future when observations have caught up with modelling.

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A New Approach to The Ordering Principle Of the Stable Isotopes

by Laurence Hecht

July 27-30, 2007

Three distinct systems describe the ordering of the key experimental singularities associated with the atom and nucleus: electron, proton, and neutron.

(1) The first in historical order describes a system of electron shells which close at 2, 10, 18, 36, 54, and 86 electrons. The shells are composed of subunits of 2, 6, 10, and 14 electrons, each capable of two states, known as positive and negative "spin." This system conforms to the spectral patterns of the elements, chemical combining properties, valences, and ionization potentials.

The ordering is consistent with the periods of the Mendeleyev table of the elements. However, it in no way sheds light upon Mendeleyev's almost forgotten starting hypothesis, that, contrary to the ideas of Galileo and Newton respecting mass, the ordering of the elements by atomic weights gives evidence of a periodicity.

Christopher Sloan, 1988

A new interpretation of the meaning of Planck's constant suggests a solution to the yet-unsolved question of the ordering of the stable isotopes.

The Moon Model of the nucleus, shown here in a drawing of two of the shells, employs a nesting of four of the five Platonic solids, similar to that conceived by Johannes Kepler to describe the Solar System. The 92 protons of all the naturally occurring elements fill the 46 vertices of two nested dodecahedra in the Moon Model.

(2) The study leading to the shell model of the nucleus, proposed by Maria Goeppert-Mayer in 1948, was undertaken at the prompting of Dr. Robert Moon and his friend the Nobel chemist James Franck, then collaborating at the Argonne National Laboratory. The hypothesis brings together a mass of evidence respecting the nuclear properties of the isotopes, to establish the existence of shells containing 2, 8, 20, 28, 50, 82, and 126 nucleons. The shells may consist of either neutrons or protons with no clear reason for the choice of one or the other.

The correspondence of the hypothesized shells with such widely varying properties as isotopic abundance, nuclear spin, neutron capture cross section, quadrupole moment and emission properties, are convincing evidence of its, at least partial, validity. However, no reason is offered for the ordering principle. The hypothesis relies upon a variation of the conventionally accepted orbital model for the electron shells. In place of cause, statistical methods associated with attempts to resolve the *n*-body problem of nucleon attractions are substituted.

(3) Moon's nuclear model, formulated in 1986, was, intended in part, as a corrective to the shortcomings of Goeppert-Mayer's work. Moon's model describes proton shells corresponding to a nested sequence of Platonic solids, with singularities at 8, 14, 26, 46, 56, 64, 70, 81, 86, and 92 protons.

The first three members of the series correspond to the elements that seem to be of greatest abundance in the Solar System. Moon's system describes the reason for the 14-member

Figures 1 and 2
STABLE ISOTOPES BY MASS NUMBER

This proved to be the most convenient way initially to organize the data of the stable isotopes. It is a useful reference for any discussion of the topic. The charts consist of boxes numbered from 1 to 238, representing the mass number, and arranged for convenience in rows of 16. The stable isotopes are identified by chemical symbol, the most abundant denoted in bold; the other distinctions as noted in the legend.

An accompanying chart (Figure 2, link only) presents only the most abundant isotope of each element in the same format. Some of the basic features are seen at first glance: Two boxes, 5 and 8, are empty. Up to chlorine-35, no two isotopes share the same mass number. Following that, doublets and triplets occur. But, all triplets and many doublets contain radioactive species of very long half-life, (which are thus considered stable).

The tendency to ordering is indicated by coloration. For example, for mass numbers from 11 to 56 the most abundant isotopes of consecutive elements tend to form in couplets of odd-even. After 74-75, this changes to even-odd. When the couplets are separated by a pair of yellow boxes, the members of consecutive pairs are related by an alpha particle.

lanthanide series, and provides an explanation for the fission of the uranium nucleus. The filled shells 8 (oxygen), 26 (iron), 46 (palladium), 64 (gadolinium), and 92 (uranium) correspond to elements of high absolute or relative magnetic susceptibility. The shells tend to fall near the minima of periodic properties such as atomic volume, melting point, and so forth. Certain classifiable properties of the stable isotopes are associated with each of the Moon nuclear shells.

81 Br 3/2	82 Se 2_- Kr 0	83 Kr 9/2	**84** Kr 0 Sr 0	**85** Rb 5/2	86 Kr Sr	87 Rb _- Sr 9/2	**88** Sr 0	**89** Y 1/2	**90** Zr 0	91 Zr 5/2	92 Zr 0 Mo 0	**93** Nb 9/2	94 Zr 0 Mo 0	95 Mo 5/2	96 Zr 2_- Mo 0 Ru 0
97 Mo 5/2	**98** Mo 0 Ru 0	99 Ru 5/2	100 Mo 2_- Ru 0	101 Ru 5/2	**102** Ru 0 Pd 0	**103** Rh 1/2	104 Ru 0 Pd 0	105 Pd 5/2	**106** Pd 0 Cd 2ec	107 Ag 1/2	108 Pd Cd 2ec	109 Ag 1/2	110 Pd Cd	111 Cd 1/2	112 Cd Sn
113 Cd _- In 9/2	**114** Cd 2_- Sn	**115** In _- Sn 1/2	116 Cd 2_- Sn	117 Sn 1/2	118 Sn	119 Sn 1/2	**120** Sn Te 2ec	**121** Sb 5/2	122 Sn Te	123 Sb 7/2 Te ec	124 Sn Te Xe 2ec	125 Te 1/2	126 Te Xe	**127** I 5/2	128 Te 2_- Xe
129 Xe 1/2	**130** Te 2_- Xe Ba 2ec	131 Xe 3/2	**132** Xe Ba 2ec	**133** Cs 7/2	134 Xe 2_- Ba	135 Ba 3/2	136 Xe 2_- Ba Ce 2ec	137 Ba 3/2	**138** Ba La ec_- Ce 2ec	**139** La 7/2	**140** Ce	**141** Pr 5/2	**142** Nd Ce 2_-	143 Nd 7/2	144 Nd 0 Sm 0
145 Nd 7/2 Pm 5/2	146 Nd	147 Sm 7/2	148 Nd Sm	149 Sm 7/2	150 Nd Sm	151 Eu 5/2	**152** Sm Gd	**153** Eu 5/2	154 Sm Gd	155 Gd 3/2	156 Gd Dy	157 Gd 3/2	**158** Gd Dy	**159** Tb 3/2	160 Gd 2B- Dy

161 Dy 5/2	162 Dy Er	163 Dy 3/2	**164** Dy Er	**165** Ho 7/2	**166** Er	167 Er 7/2	168 Er Yb	**169** Tm 1/2	170 Er Yb	171 Yb 1/2	172 Yb	173 Yb 5/2	**174** Yb Hf	**175** Lu 7/2	176 Yb Lu 7 Hf
177 Hf 7/2	178 Hf	179 Hf 9/2	**180** Hf Ta W	**181** Ta 7/2	182 W	183 W 1/2	**184** W Os	185 Re 5/2	186 W Os	**187** Re 5/2 Os 1/2	188 Os	189 Os 3/2	190 Os Pt	191 Ir 3/2	**192** Os Pt
193 Ir 3/2	194 Pt	**195** Pt 1/2	196 Pt Hg	**197** Au 3/2	198 Pt Hg	199 Hg 1/2	200 Hg	201 Hg 3/2	**202** Hg	203 Tl 1/2	204 Hg Pb	**205** Tl 1/2	206 Pb	207 Pb 1/2	**208** Pb
209 *Bi* 9/2	*210* *At*	211	212	213	214	215	216	217	218	219	220	221	222 *Rn*	223 *Fr*	224
225	226 *Ra*	227 *Ac* 3/2	228	229	230	*231* *Pa* 3/2	*232* *Th*	233	234	235	236	237	*238* *U*		

The neutron capture cross-sections of the elements making up closed shells are low. The electric quadrupole moments of the closed shells are low and tend to rise to either side. The maximum number of neutrons in the stable isotopes in the first four shells are 10, 16, 32, and 64.

* * *

None of the three orderings can completely describe the system of 280 stable isotopes. Why a particular element exhibits a characteristic number of stable isotopes, falling within a defined mass range, and the reason for the abundance distribution of the isotopes, remain unexplained by any of the three hypotheses. In short, an ordering principle of the stable isotopes, equivalent in conceptual power to Mendeleyev's periodic system of the elements, is still wanting.

My efforts over the past year have caused me to examine a large amount of data related to the atomic and nuclear properties, in the hopes of finding a synthesis, with aid of the more

Shell 1: Cube (first 7 vertices)

Characteristics: N = 1 to 8, (8)
Odd elements: Odd Z/Odd N = 1/1, 3/3, 5/5, 7/7, unique to this shell. 2 stable isotopes (exc. Be-9)
Even elements: All exhibit 2 stable isotopes.

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Odd Z/ Odd N
1	**0**	**H-1**	**99.98%**	**1/2**	2.79285	
1	1	H-2	0.02%	1	0.85744	1/1
2	1	He-3	0.01%	1/2	-2.12762	
2	**2**	**He-4**	**100.00%**			
3	3	Li-6	7.42%	1	0.82205	3/3
3	**4**	**Li-7**	**92.58%**	**3/2**	3.25642	
4	**5**	**Be-9**	**100.00%**	**3/2**	**-1.17790**	
5	5	B-10	19.78%	3	1.80065	5/5
5	**6**	**B-11**	**80.22%**	**3/2**	2.68864	
6	**6**	**C-12**	**98.89%**			
6	7	C-13	1.11%	1/2	0.70241	
7	**7**	**N-14**	**99.63%**	**1**	0.40376	**7/7**
7	8	N-15	0.37%	1/2	-0.28319	

(Z = protons; N = neutrons; A = mass number)

Table 1
PERIODIC TABLE OF THE STABLE ISOTOPES
This is an extension of the one prepared for my previous report ("Neutron Octaves in the Moon Nuclear Model," May 18, 2007). The distribution of neutrons by powers of 2, when the isotopes are arranged according to the shells of the Moon model, may be seen here. It provides the data for Figure 3.

powerful tool of the Moon nuclear model. (Some of these are summarized in the form of appended charts and graphs.) Although I seem to get close with various approaches, I have reached nothing that would unite the three, apparently mutually contradictory, systems summarized above.

Moon vs. Bohr

A recent rethinking of the assumptions behind Moon's efforts has led me to suspect a methodological error in my approaches thus far. My analysis would lead to the conclusion that the conventional picture of atomic electrons, despite its apparent fit to the Mendeleyev table and the data of spectroscopy, is fundamentally flawed. This goes to the question of the relationship of electromagnetic propagation and matter, the emission of radiation by electrons and so forth.

Recall that in Moon's conception, what we have called the Moon model, the Keplerian shells of the nucleus derive from a principle of ordering of space (space quantization), which also governs the configuration of electrons associated with electromagnetic propagation. The ratio of the impedance of free space to the maximum quantum Hall resistance in the solid state (25,812.8 ohms) is twice the fine structure constant (taken as 1/137). Moon interprets this as evidence of a configuration of 68

(Text continued on p. 50)

Shell 2: (Cube, last vertex), Octahedron

Characteristics: N = 8 to 16, (8)
Odd elements: All have 1 isotope; mass number = 2Z+1.
Even elements: All have 3 isotopes; mass numbers = 2Z, 2Z+1, 2Z+2. Most abundant is 2Z.

Z	N	Nuclide	% Abundance	Nuclear Spin	Mag. Moment	Number of Isotopes
8	**8**	**O-16**	**99.76%**			**3**
8	9	O-17	0.04%	5/2	-1.89380	
8	10	O-18	0.20%			
9	**10**	**F-19**	**100.00%**	**1/2**	2.62887	**1**
10	**10**	**Ne-20**	**90.92%**			**3**
10	11	Ne-21	0.26%	3/2	-0.66180	
10	12	Ne-22	8.82%			
11	**12**	**Na-23**	**100.00%**	**3/2**	2.21752	**1**
12	**12**	**Mg-24**	**78.70%**			**3**
12	13	Mg-25	10.13%	5/2	-0.85546	
12	14	Mg-26	11.17%			
13	**14**	**Al-27**	**100.00%**	**5/2**	3.64150	**1**
14	**14**	**Si-28**	**92.23%**			**3**
14	15	Si-29	1/2	-0.55529	4.67%	
14	16	Si-30			3.10%	

(Z = protons; N = neutrons; A = mass number)

Shell 3: Icosahedron

Characteristics: N = 16 to 32, (16)
Odd elements: Prime atomic number species have 2 isotopes; non-prime have 1.
Even elements: Mass number range is 5, (except Ca). After calcium, most abundant isotope is 2Z+4.

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)
15	**16**	**P-31**	**100.00%**	**1/2**	1.13160		
16	**16**	**S-32**	**95.00%**				
16	17	S-33	0.76%	3/2	0.64382		
16	18	S-34	4.22%				
16	20	S-36	0.01%				
17	**18**	**Cl-35**	**75.53%**	**3/2**	0.82187		
17	20	Cl-37	24.47%	3/2	0.68412		
18	18	Ar-36	0.34%				
18	20	Ar-38	0.06%				
18	**22**	**Ar-40**	**99.60%**				
19	**20**	**K-39**	**93.26%**	**3/2**	0.39147		
19	21	K-40	0.01%				
19	22	K-41	6.73%	3/2	0.21487		
20	**20**	**Ca-40**	**96.95%**				
20	22	Ca-42	0.65%				
20	23	Ca-43	0.14%	7/2	-1.31727		
20	24	Ca-44	2.08%				
20	26	Ca-46	0.01%				
20	28	Ca-48	0.19%			(2β-)	6E+18
21	**24**	**Sc-45**	**100.00%**	**7/2**	4.75648		
22	24	Ti-46	7.93%				
22	25	Ti-47	7.28%	5/2	-0.78848		
22	**26**	**Ti-48**	**73.94%**				
22	27	Ti-49	5.51%	7/2	-1.10417		
22	28	Ti-50	5.34%				

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)
23	*27*	*V-50*	0.24%	6	3.34745	(EC, β-)	1.40E+17
23	**28**	**V-51**	**99.76%**	**7/2**	5.15140		
24	26	Cr-50	4.31%			2EC	1.30E+18
24	**28**	**Cr-52**	**83.76%**				
24	29	Cr-53	9.55%	3/2	-0.47454		
24	30	Cr-54	2.38%				
25	**30**	**Mn-55**	**100.00%**	**5/2**	3.45320		
26	28	Fe-54	5.82%				
26	**30**	**Fe-56**	**91.66%**				
26	31	Fe-57	2.19%	1/2	0.09062		
26	32	Fe-58	0.33%				

Shell 4: Dodecahedron

Characteristics: N = 32 to 64, (32)
Odd and even elements: Mass number of lightest isotope is one less than that of heaviest of preceding element—or three less when radioactivity is present (except Y-89 to Zr-90).

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)
27	**32**	**Co-59**	**100.00%**	**7/2**	4.62700		
28	**30**	**Ni-58**	**68.27%**				
28	32	Ni-60	26.10%				
28	33	Ni-61	1.13%	3/2	-0.75002		
28	34	Ni-62	3.59%				
28	36	Ni-64	0.90%				
29	**34**	**Cu-63**	**69.09%**	**3/2**	2.22330		
29	36	Cu-65	30.91%	3/2	2.22330		
30	**34**	***Zn-64***	**48.89%**			**2EC**	**2.80E+16**
30	36	Zn-66	27.81%				
30	37	Zn-67	4.11%	5/2	0.87548		
30	38	Zn-68					

Z	N	Nuclide	% Abun-dance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)
30	40	*Zn-70*	0.62%			2β-	1.30E+16
31	**38**	**Ga-69**	**60.40%**	**3/2**	2.01659		
31	40	Ga-71	39.60%	3/2	2.56227		
32	38	Ge-70	20.52%				
32	40	Ge-72	27.43%				
32	41	Ge-73	7.63%	9/2	-0.87947		
32	**42**	**Ge-74**	**36.73%**				
32	44	*Ge-76*	7.76%			2β-	
33	42	**As-75**	100.00%	3/2	1.43947		
34	40	Se-74	0.87%				
34	42	Se-76	9.02%				. . .
34	43	Se-77	7.58%	1/2	0.53506		
34	44	Se-78	23.52%				
34	**46**	**Se-80**	**49.82%**				
34	48	*Se-82*	9.19%			2β-	1.08 E+20
35	**44**	**Br-79**	**50.54%**	**3/2**	**2.10640**		
35	46	Br-81	49.46%	3/2	2.27056		
36	42	*Kr-78*	0.35%			2EC	2.00E+20
36	44	Kr-80	2.27%				
36	46	Kr-82	11.56%				
36	47	Kr-83	11.55%	9/2	-0.97067		
36	**48**	**Kr-84**	**56.90%**				
36	50	Kr-86	17.37%				
37	**48**	**Rb-85**	**72.15%**	**5/2**	1.35303		
37	50	*Rb-87*	27.85%	3/2	2.75124	β-	4.75E+10
38	46	Sr-84	0.56%				
38	48	Sr-86	9.86%				
38	49	Sr-87	7.02%	9/2	-1.09283		
38	**50**	**Sr-88**	**82.56%**				

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)
39	**50**	**Y-89**	**100.00%**	**1/2**	-0.13742		
40	**50**	**Zr-90**	**51.46%**				
40	51	Zr-91	11.23%	5/2	-1.30362		
40	52	Zr-92	17.11%				
40	54	Zr-94	17.40%				
40	56	*Zr-96*	2.80%			2β-	3.8 E+19
41	**52**	**Nb-93**	**100.00%**	**9/2**	6.17050		
42	50	Mo92	15.84%				
42	52	Mo-94	9.04%				
42	53	Mo-95	15.72%	5/2	-0.91420		
42	54	Mo-96	16.53%				. . .
42	55	Mo-97	9.46%	5/2	-0.93350		
42	**56**	**Mo-98**	**24.13%**				
42	58	*Mo-100*	9.60%			2β-	1.00 E+19
43	54	*[Tc-97]*				EC	2.60E+06
43	56	*[Tc-99]*				β-	2.12E+05
44	52	Ru-96	5.51%				
44	54	Ru-98	1.87%				
44	55	Ru-99	12.72%	5/2	-0.64130		
44	56	Ru-100	12.62%				
44	57	Ru-101	17.07%	5/2	-0.71890		
44	**58**	**Ru-102**	**31.61%**				
44	60	Ru-104	18.58%				
45	**58**	**Rh-103**	**100.00%**	**1/2**	**-0.08840**		
46	56	Pd-102	0.96%				
46	58	Pd-104	10.97%				
46	59	Pd-105	22.23%	5/2	-0.64200		
46	**60**	**Pd-106**	**27.33%**				
46	62	Pd-108	26.71%				
46	64	Pd-110	11.81%				

Shell 5A: Twin Dodecahedron

Characteristics: N = 60 to 82, (22)
Odd and even elements: Mass number of lightest isotope is 3 less than that of heaviest of preceding element.
Even elements: Large number of isotopes from 7 to 10. All show radioactivity (except tin).

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Isotopes
47	**60**	**Ag-107**	**51.82%**	**1/2**	-0.11357			2
47	62	Ag-109	48.18%	1/2	-0.13069			
48	58	*Cd-106*	1.22%			2EC	2.60E+17	7
48	60	Cd-108	0.88%					
48	62	Cd-110	12.39%					
48	63	Cd-111	12.80%	1/2	-0.59489			
48	64	Cd-112	24.07%					
48	65	*Cd-113*	12.75%	1/2	-0.62230	β-	9.30E+15	
48	**66**	**Cd-114**	**28.86%**					
48	68	Cd-116	7.58%					
49	64	In-113	4.28%	9/2	5.5289			2
49	**66**	***In-115***	**95.72%**	**9/2**	5.5408	**β-**	**4.41E+14**	
50	62	Sn-112	0.96%					10
50	64	Sn-114	0.66%					
50	65	Sn-115	0.35%	1/2	-0.91884			
50	66	Sn 116	14.30%					
50	67	Sn-117	7.61%	1/2	-1.00105			
50	68	Sn-118	24.03%					
50	69	Sn-119	8.58%	1/2	-1.04729			
50	**70**	**Sn-120**	**32.85%**					
50	72	Sn-122	4.72%					
50	74	Sn-124	5.94%					
51	**70**	**Sb-121**	**57.25%**	**5/2**	3.3634			2
51	72	Sb-123	42.75%	7/2	2.5498			

Z	N	Nuclide	% Abun-dance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Isotopes
52	68	Te-120	0.09%			2EC	2.20E+16	8
52	70	Te-122	2.46%					
52	71	*Te-123*	0.87%	1/2	-0.73679	EC	9.20E+16	
52	72	Te-124	4.61%					
52	73	Te-125	6.99%	1/2	-0.88828			
52	74	Te-126	18.71%					
52	76	*Te-128*	31.79%			2β-	2.2E+24	
52	**78**	***Te-130***	**34.48%**			**2β-**	**5E+23**	
53	74	I-127	100.00%	5/2	2.81328			1
54	70	*Xe-124*	0.10%			2EC	1.6E+14	9
54	72	Xe-126	0.09%					
54	74	Xe-128	1.92%					
54	75	Xe-129	26.44%	1/2	-0.777977			
54	76	Xe-130	4.08%					
54	77	Xe-131	21.18%	3/2	0.69186			
54	**78**	**Xe-132**	**26.89%**					
54	80	Xe-134	10.44%					
54	82	Xe-136	8.87%			2β-	2.4E+21	
55	**78**	**Cs-133**	**100.00%**	**7/2**	2.582024			
56	74	Ba-130	0.10%			2EC	3.50E+14	7
56	76	Ba-132	0.09%			2EC	3E+21	
56	78	Ba-134	2.42%					
56	79	Ba-135	6.59%	3/2	0.837943			
56	80	Ba-136	7.81%					
56	81	Ba-137	11.32%	3/2	0.937365			
56	**82**	**Ba-138**	**71.66%**					

Shell 6: Inner Cube

Characteristics: N = 81 to 96, (15)
Odd and even elements: Mass numbers in sequence for Z = 57-60.
Even elements: Radioactivity in every even element. 7 isotopes (except Ce). Alpha emission at Z=62, 64

Z	N	Nuclide	% Abun-dance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Isotopes
57	81	*La-138*	0.09%	5	3.7139	EC, β-	1.05E+11	
57	**82**	**La-139**	**99.91%**	**7/2**	2.7832			
58	78	*Ce-136*	0.19%			2ec	7.00E+13	4
58	80	*Ce-138*	0.30%			2ec	9.00E+13	
58	**82**	**Ce-140**	**88.40%**					
58	84	*Ce-142*	11.10%			2β-		
59	**82**	**Pr-141**	**100.00%**	**5/2**	4.136			
60	**82**	**Nd-142**	**27.20%**					**7**
60	83	Nd-143	12.20%	7/2	-1.065			
60	84	Nd-144	23.80%				2.29E+15	
60	85	Nd-145	8.30%	7/2	-0.656			
60	86	Nd-146	17.20%					
60	88	Nd-148	5.70%					
60	90	*Nd-150*	5.60%			2β-	1.1E+19	

Z	N	Nuclide	% Abun-dance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Isotopes
61	84	*[Pm-145]*	0.00%					
61	86	*[Pm-147]*	0.00%					
62	82	Sm-144	3.10%					7
62	85	*Sm-147*	15.10%	7/2	-0.8149		1.06E+11	
62	86	*Sm-148*	11.30%				7.00E+15	
62	87	Sm-149	13.90%	7/2	-0.6718			
62	88	Sm-150	7.40%					
62	**90**	**Sm-152**	**26.60%**					
62	92	Sm-154	22.60%					
63	88	Eu-151	47.80%	5/2	3.4718			
63	**90**	**Eu-153**	**52.20%**	**5/2**	**1.5331**			
64	88	*Gd-152*	0.20%				1.08E+14	7
64	90	Gd-154	2.20%					
64	91	Gd-155	14.73%	3/2	-0.2591			
64	92	Gd-156	20.50%					
64	93	Gd-157	15.70%	3/2	-0.3399			
64	**94**	**Gd-158**	**24.80%**					
64	96	*Gd-160*	21.80%			2β-	3.10E+19	

Shell 7: Inner Octahedron

Characteristics: N = 94 to 106, (12)
Odd and even elements: ***No radioactivity.***
Even elements: 6 or 7 isotopes. Odd Elements: only 1 isotope.

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Istotopes
65	**94**	**Tb-159**	**100.00%**	**158.925**				
66	90	Dy-156	0.06%	155.924				7
66	92	Dy-158	0.10%	157.924				
66	94	Dy-160	2.34%	159.925				
66	95	Dy-161	18.90%	160.927				
66	96	Dy-162	25.50%	161.927				
66	97	Dy-163	24.90%	162.928				
66	**98**	**Dy-164**	**28.20%**	**163.929**				
67	**98**	**Ho-165**	**100.00%**	**164.930**				
68	94	Er-162	0.10%	161.929				6
68	96	Er-164	1.60%	163.929				
68	**98**	**Er-166**	**33.40%**	**165.930**				
68	99	Er-167	22.90%	166.932				
68	100	Er-168	27.00%	167.932				
68	102	Er-170	15.00%	169.936				
69	**100**	**Tm-169**	**100.00%**	**168.934**				
70	98	Yb-168	0.10%	167.934				7
70	100	Yb-170	3.10%	169.935				
70	101	Yb-171	14.30%	170.937				
70	102	Yb-172	21.90%	171.937				
70	103	Yb-173	16.20%	172.938				
70	**104**	**Yb-174**	**31.70%**	**173.939**				
70	106	Yb-176	12.70%	175.943				

Shell 8: Twin Icosahedron

Characteristics: N = 104 to 124, (20)
Odd elements: Two isotopes (except gold). - emission at Z = 71, 73, 75.
Even elements: 5 to 7 isotopes. Alpha emission at Z = 72, 74, 76, 78.

Z	N	Nuclide	% Abundance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Istotopes
71	104	Lu-175	97.40%	174.941				2
71	105	*Lu-176*	2.60%	175.943		β-	3.73E+10	
72	102	*Hf-174*	0.20%	173.940			2.00E+15	6
72	104	Hf-176	5.20%	175.942				
72	105	Hf-177	18.50%	176.944				
72	106	Hf-178	27.10%	177.944				
72	107	Hf-179	13.80%	178.946				
72	**108**	**Hf-180**	**35.20%**	**179.947**				
73	107	Ta-180m	0.01%	179.942		β-	1.20E+15	2
73	108	Ta-181	99.99%	180.948				
74	106	*W-180*	0.10%	179.947			1.80E+18	5
74	108	*W-182*	26.30%	181.948			8.30E+18	
74	109	*W-183*	14.30%	182.950			1.30E+19	
74	**110**	***W-184***	**30.70%**	**183.951**			**2.90E+19**	
74	112	*W-186*	28.60%	185.954			2.70E+19	
75	110	Re-185	37.40%	184.953				2
75	**112**	***Re-187***	**62.60%**	**186.956**		β-	**4.35E+07**	
76	108	*Os-184*	0.02%	183.953			5.60E+13	7
76	110	*Os-186*	1.58%	185.954			2.00E+15	
76	111	Os-187	1.60%	186.956				
76	112	Os-188	13.30%	187.956				
76	113	Os-189	16.10%	188.959				

Z	N	Nuclide	% Abun-dance	Nuclear Spin	Magnetic Moment	Decay Mode	Half Life (years)	Number of Istotopes
76	114	Os-190	29.40%	189.959				
76	**116**	**Os-192**	**41.00%**	**191.961**				
77	114	Ir-191	37.30%	190.961				2
77	**116**	**Ir-193**	**62.70%**	**192.963**				
78	112	*Pt-190*	0.01%	189.960			6.50E+11	6
78	114	Pt-192	0.79%	191.961				
78	116	Pt-194	32.90%	193.963				
78	**117**	**Pt-195**	**33.80%**	**194.965**				
78	118	Pt-196	25.30%	195.965				
78	120	Pt-198	7.20%	197.968				
79	118	Au-197	100.00%	196.967				1
80	116	Hg-196	0.20%	195.966				7
80	118	Hg-198	10.10%	197.967				
80	119	Hg-199	16.90%	198.968				
80	120	Hg-200	13.20%	199.970				
80	121	Hg-201	13.22%	200.970				
80	**122**	**Hg-202**	**29.70%**	**201.971**				
80	124	Hg-204	6.80%	203.974				
81	122	Tl-203	29.50%	202.972				2
81	**124**	**Tl-205**	**70.50%**	**204.975**				

(Text continued from p. 39)

paired electrons, plus one unpaired, operative in the propagation of electromagnetic radiation. The 137 electrons fill the 69 axes (3 × 23) of three saturated palladium structures.

Moon's conception is susceptible of the following interpretation, which gives an intelligible representation for Planck's law. The Planck constant is a measure of *action*, that is, of a quantity of *work* over a period of *time*, or the work exerted by a given *mass* acting at a certain velocity over a given length. The value of the Planck quantum is equivalent to the product of the *mass* of the electron, the *velocity* of light, and the Weber critical *length* into the inverse fine structure constant (137). $h = 137\ m_e \cdot c \cdot \rho$, where h is the action constant, m_e the mass of the electron, c the velocity of light *in vacuo*, ρ the Weber critical length ($= e^2/m_e \cdot c^2$).

The physical interpretation is that each of the Weber-paired electrons in the configuration of 137 described by Moon, completes one oscillation at a mean velocity c. The result is the minimal measurable action in the extranuclear domain. The Planck energy ($E =$

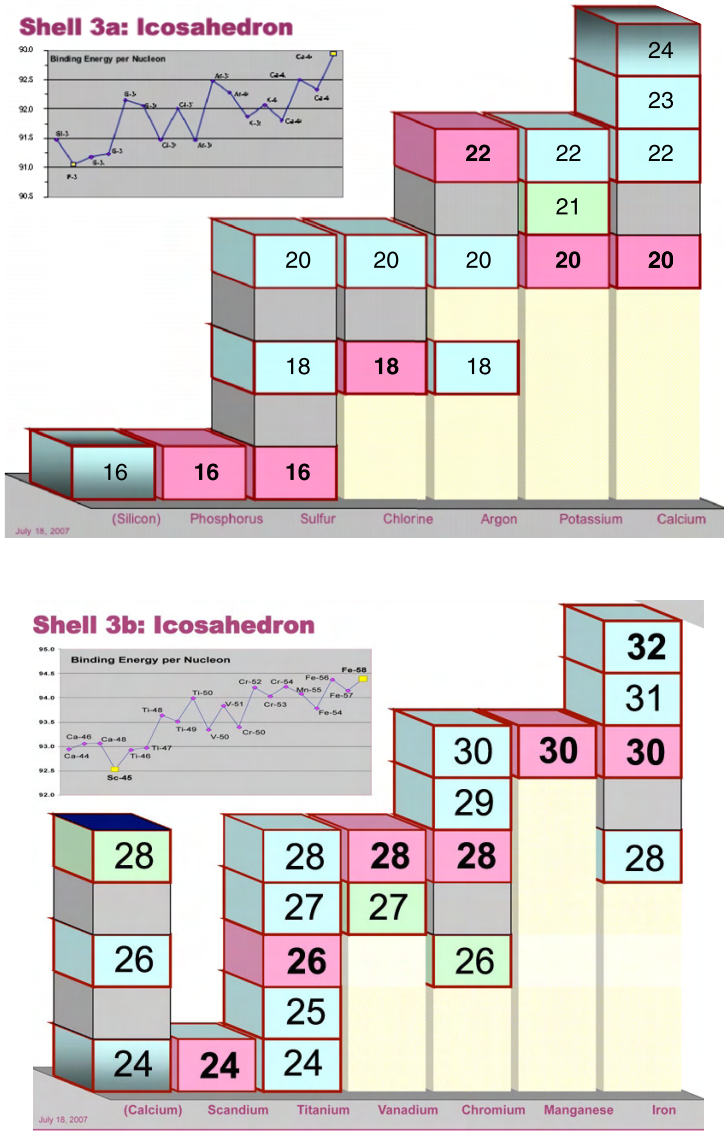


Figure 3
STABLE ISOTOPES BY NEUTRON NUMBER

The chart is an attempt to illustrate the neutron octaves and make evident other features of the ordering by neutrons, rather than mass number. The so-called magic numbers, actually unexplained anomalies in the ordering of neutrons, 20, 28, and 50, are quite evident as extended horizontal displays. The number of isotopes per element, and their mass range, both absolute, and in relation to the other elements is visually apparent.

One unexplained feature is a tendency for the isotopes, above oxygen and of even neutron number, to occur in groups of three; an odd-numbered element is surrounded by two evens, as in Ti-20, V-28, Cr-28 (the numbers here denoting the neutron number).

The Binding Energy per Nucleon graphs were inserted to see if there was a relationship of binding energy to the shells. Shells 2 and 3 begin at valleys in the curve, and end at peaks. Shell 4 might be thought of the same. But the relationship does not hold consistently.

The series is not extended beyond barium. Shells 1, 2, 4 and 5 are links only.

hν) thus becomes intelligible as the measure of the work done by a configuration of 137 free electrons in the Moon configuration, vibrating at any given frequency.

What must now be considered is the relationship of electromagnetic radiation to its source in the atom or nucleus. For example, since Niels Bohr, the emission of light or other radiation from an excited atom has been explained as a shift in electron orbitals. The orbits were constructed to fit the energy equivalents of the observed radiation. The *ad hoc* assumption was introduced that the orbits must occur in quantized units of angular momentum to suit the Planck law.

In Moon's hypothesis, the radiation is quite intimately connected with the work done by a configuration of 137 electrons. To comprehend the atom, where it appears that a lesser number of electrons are bound in connection with the nucleus, we would like to know the relationship of these to the 137. It appears that the singularities we know through atomic and nuclear chemistry are a modification of what we might suppose as a potential within space for the joining of the electron singularities into three dodecahedra. The excitation of an atom which produces radiation, therefore, must have something to do with the relationship of that spatial potential to its reconfigured form in the atom.

So we overcome the a*bohr* ent.

Figure 4 (Click for figures)
ELECTRIC QUADRUPOLE MOMENTS

The quadrupole moments of the elements at closed proton shells in the Moon model occur at low points in the graph. The elements are indicated in yellow. Barium is the completion of the first half of the twin dodecahedron. Ytterbium (Yb) is the completion of the inner cube and octahedron of the lanthanide series. Thallium (Tl-205) marks the completion of the second icosahedron. (The closing of the dodecahedron occurs beyond the range of stable isotopes.)

Figure 5 (Click for figure)
LOG OF MAGNETIC SUSCEPTIBILITY

Oxygen, iron, palladium, gadolinium, and uranium show very high magnetic susceptibility. This chart is revived from studies reported in 2004, as it points to an anomaly expressed by the Moon model respecting a characteristic which is not normally considered nuclear.

It's Time for Next-Generation U.S. Nuclear Plants

by Marsha Freeman

While dozens of nations start building their first nuclear power plants, a parallel effort is under way to deploy more advanced, next-generation nuclear technology to supplement, and then replace, today's light-water fission reactors. The United States is decades behind in this effort, upon which future economic survival depends. Although there is an acknowledged lack of skilled manpower and industrial infrastructure, the greatest obstacle to moving forward has been the lack of political will.

Next-generation nuclear reactors include an array of technologies. The most immediately necessary is a family of high-temperature reactors (see p. 55). Through the production of outlet temperatures up to three times that of today's power plants, high-quality heat can be applied to create desperately needed freshwater, through desalination, and to produce synthetic fuels, like hydrogen.

Efforts in Russia, China, India, Japan, and South Africa to carry out research, build prototypes, and deploy fourth-generation nuclear technologies, are under way. In the United States, although there are small-scale concept development and design activities, there is no plan to *build* anything for more than a decade. How could there be? Adjusted for inflation, the budget for nuclear energy R&D today is *11 percent* what it was in 1980.

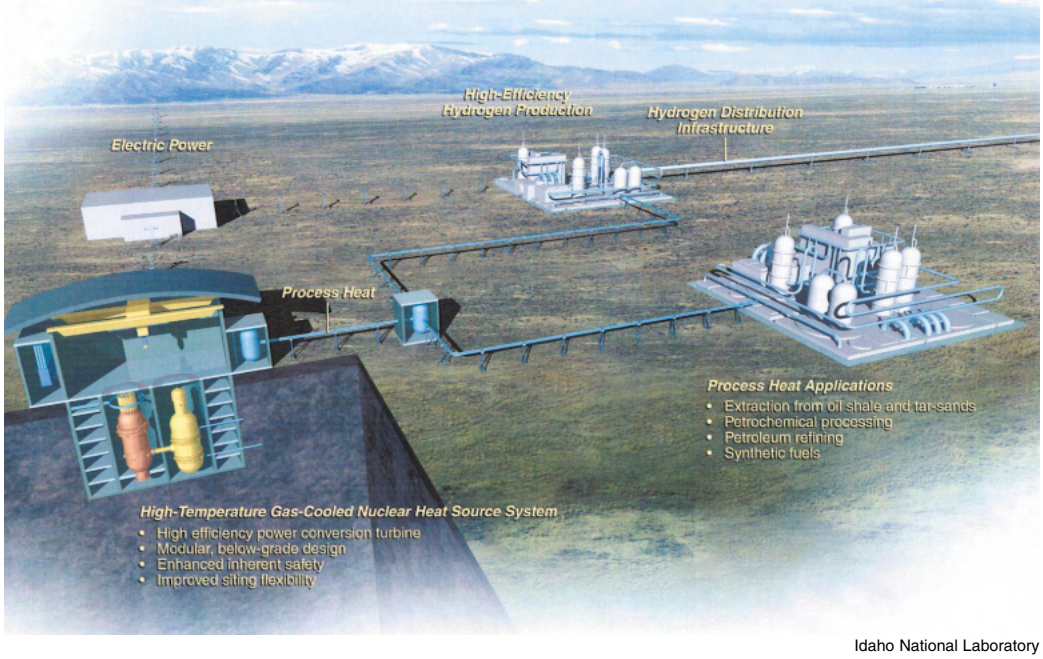
Congress has recently taken a small step to reorient the Bush Administration's nuclear R&D program, which is geared not toward economic development, but toward "nonproliferation," in order to get the next-generation reactor program moving. We need a crash effort, with the massive infusion of resources, which characterized President Eisenhower's Atoms for Peace program.

A Budget-Driven 'Strategy'

In 2002, the Department of Energy started a new program to design and demonstrate a Next-Generation (also referred to as a fourth-generation) Nuclear Plant project. In 2004, the Department approved the development of a full-scale nuclear plant that would be combined with a facility for producing hydrogen. The very-high-temperature reactor was chosen as the power source, to operate at about 950°C, or 1,742°F, nearly three times that of today's commercial nuclear power plants. Recognizing that it was years behind other nations in nuclear R&D, a Generation IV International Forum was initiated by the United States, to "cooperate" with other nations already engaged in advanced nuclear R&D.

But from the beginning, the program had no sense of urgency, too little funding, and a schedule that was determined not by the pace of technical progress, but mainly by the budget-driven strategy of spending smaller amounts of money, over a longer period of time.

The roadmap for a $2.4 billion demonstration program has construction on the very-high-temperature reactor scheduled to begin in 2016, and the plant to be operational by 2021. The Department of



Idaho National Laboratory

The Idaho National Laboratory's conception of the Next Generation Nuclear Plant, which would be used to produce electricity and high-quality heat for the production of synthetic fuels, like hydrogen, and for process heat applications in industry. This artist's drawing is similar to the Nuplex concept, nuclear centered agro-industrial complexes, designed by Oak Ridge National Laboratory in the 1960s.

Energy proposes commercial introduction by 2030! Even were this a revolutionary new technology, never before engineered, this schedule would be a bit conservative.

But consider the following: The United States operated two higher-temperature gas-cooled reactors in the past—the Peach Bottom Unit One reactor (1969-1974), and the Fort St. Vrain reactor (1979-1989); Japan and China have operated small high-temperature gas-cooled reactors, demonstrating the feasibility of the concept; and South Africa is building a fuel fabrication facility and completing the R&D to begin mass producing small, modular, high-temperature gas-cooled reactors, using the pebble bed design, in the next decade.

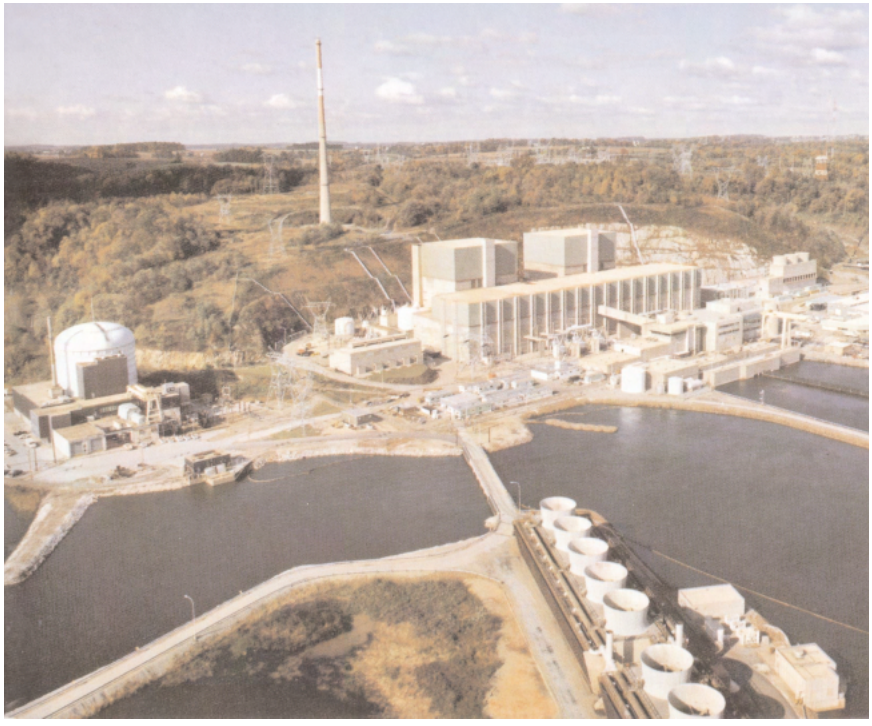
To make matters worse, in February 2006, President Bush announced his Global Nuclear Energy Partnership (GNEP). This program is a *25-year* effort to engage other nuclear-energy nations to develop "proliferation-proof" nuclear designs. The purpose is to limit access by the new nuclear energy nations to the full nuclear fuel cycle, including uranium enrichment to produce fuel, and reprocessing of spent fuel. When GNEP became the Administration's focus, the Next-Generation Nuclear Reactor became a lower priority.

Concerned that this next-generation nuclear program was floundering, Rep. Darrell Issa (D-Calif.), chairman of the Subcommittee on Energy and Resources of the Government Reform Committee, asked the General Accountability Office (GAO) to examine the progress of the program.

Moving Forward, Faster

In its September 2006 report, "Status of DOE's Effort to Develop the Next Generation Nuclear Plant," the GAO reviewed the progress made, and the recommendations by two independent advisory groups. A group of experts gathered by Idaho National Laboratory, where the next-generation reactor will be built, and the DOE's Nuclear Energy Research Advisory Committee (NERAC), both recommended that the DOE accelerate its schedule for completing the plant. As the GAO notes, what good will an "even more advanced" reactor be in 2030, when other countries already have high-temperature systems for sale?

The Idaho group suggested that three years could be trimmed off the schedule, by scaling back some of the technology advances planned for the project, and taking a more incremental approach. The reactor could be designed to incorporate more advanced fuels and materials as they are developed, rather than waiting for the "best" to be ready before building anything.



Peach Bottom Unit 1 (far left), in York County, Pennsylvania, was a 40-megawatt experimental high-temperature, helium-cooled reactor that gave the United States experience with this type of reactor, during its 1967-1974 operation.

NERAC pointed out that accelerating the schedule will make the project more "attractive to industry," which is supposed to pay a share of its development. In testimony before the Senate Committee on Energy and Natural Resources on June 12, 2006, NERAC member Dr. Douglas Chapin stated that a "completion date of 2021 greatly decreases the chances of substantial industry and international contributions." NERAC recommended that a reactor facility "that can be built soon, to gain experience, and then upgraded as the technology advances," would be preferable. It could be a "technology demonstrator," and a smaller machine.

As it now stands, the very-high-temperature reactor needed to meet the Department of Energy's design criteria would require a pressure vessel (which houses the nuclear reactor core) that is more than twice the size of that of a conventional nuclear power plant. There is only one company, Japan Steel, that could even scale up production to manufacture such a vessel, the GAO notes.

In Senate testimony on June 12, 2006, Dr. Regis Matzie, senior vice president of Westinghouse, stressed that the U.S. program could also be accelerated by leveraging the large-scale testing facilities developed in South Africa, enabling the program here to be "demonstrated within a 10-year period."

The GAO states that in addition to the efforts in China, South Africa, and Japan, the General Atomics company in the United States, and the French nuclear giant Areva, are advancing their own designs. General Atomics has started activities with the Nuclear Regulatory Commission, that could lead to an application for design certification, and has a research reactor design that could lead to a commercial prototype.

South Africa's Eskom, in partnership with Westinghouse, has also started pre-design-certification activities with the Nuclear Regulatory Commission. If the U.S. program stays on its current track, one or both of these fourth-generation nuclear reactors could be on sale to U.S. utilities, years before the U.S. demonstration reactor is up and running.

The Idaho National Lab group estimated that completing the plant three years earlier would reduce the total cost, but would

require more funding in the near term. In FY2007, the Lab states, funding for design work would need to be increased from $23 million, the Administration request submitted to Congress, to $100 million. The Department of Energy's response was that although the current design work could support doubling the department's FY07 request of $23 million ... DOE has limited funding for nuclear energy R&D and has given other projects ... priority over the Next Generation Nuclear Plant."

Congress was not satisfied with this response.

In a June 11, 2007 report on the FY2008 Department of Energy budget, the House Committee on Appropriations states that its bill includes an increase to $70 million for the Next-Generation program. The money for the increase was taken from the ill-conceived GNEP program. The Committee directed the Department of Energy to make the Next-Generation program a higher priority than GNEP.

Highest priority and sufficient resources would put the next-generation nuclear reactor on the right pathway.

INTERVIEW: PHIL HILDEBRANDT

INL Plans to Put Next-Generation Nuclear Plant Online by 2018

Phil Hildebrandt is the project director for Idaho National Laboratory's Next-Generation Nuclear Plant, and is Special Assistant to the Laboratory Director for Prototype Reactors and Major Projects. He has more than 39 years of experience in the nuclear and power industries, including in the Naval Nuclear Propulsion Program.

Hildebrandt was interviewed by Marsha Freeman on Aug. 2, 2007.

Question: In June, the House Appropriations Committee increased the budget for the Next-Generation Nuclear Plant to $70 million, and urged that it become a priority for the Department of Energy.... How far does the $70 million the Appropriations Committee voted on go toward reducing the schedule?

I think it's a very important starting point. The amount of money in the budget that you'd like to have in FY|08, to keep on the schedule that we'd like to stay on, would be considerably more than that—a factor of three to four more than the $70 million. However, the $70 million makes a very important first step in putting the Next-Generation Nuclear Plant, and the demonstration plant for high temperature reactor gas technology, on the road. Let me give you the context for that.

The Next-Generation Nuclear Plant and the commercialization of the gas reactor is, in practical fact, going to be driven by private industry, not by government. We are putting together a commercial alliance. It will have members including end-users and vendors, and will be a partnership with government to help share costs.

That commercial alliance is pressing very heavily toward completing, and making operational, the Next-Generation Nuclear Plant as a demonstration plant, by 2018. That is the press of the private sector. That is a different schedule than what comes out of the Energy Policy Act [passed by Congress in 2005].

Question: Is the drive to get industry involved due to the fact that you don't see the government putting the level of funding into it that it requires?

That's correct. The government would start it off the ground, but as it's practically starting to occur, the private sector will be the driving force behind this.

Question: What industries do you see participating in the commercial alliance?

The private sector membership for the commercial alliance has end users that are considerably different than the traditional nuclear industry. In this case, they are the broader energy industry—the petroleum industry, the petrochemical industry. This involves the use of process heat; process heat, and hydrogen being one of the energy carriers from that process heat, is the primary focus here. Industry wants the capability to exist as soon as possible, but no more than a decade out.

With what has been provided by the Congress, we still could achieve a 2018 start-up, with the House Appropriations Committee budget mark. It just means we're pushing a bow wave of funding ahead of us.

Question: What level of contribution will be required from the private sector?

I would expect that by the end of the project, the government and industry would share it about equally. There would be 20/80 split early on, when we're in the developmental aspects of the program, and it flips around the other way as you get into construction of the demonstration unit.

Question: What kind of interest have you had from industry?

The broader end-users in the petroleum and petrochemical industry are beginning to be interested, based on the prices of premium fuel, like natural gas and oil. In the petroleum industry, they use a large amount of hydrogen, and depending upon which company it is, they use a tremendous amount of natural gas. Natural gas is used as a source to

make heat, and they're looking at what their options are.

There is some interest in the traditional nuclear industry in this technology. A couple of utilities are showing interest in the high-temperature gas reactor. Some of that interest is in producing hydrogen and selling it into the pipeline that exists along the Gulf coast. Other interest is in being the owner-operator of the nuclear facility that supplies process heat to industry. The company that has been most vocal about that is Entergy.

Question: There is quite a bit of international interest in this technology—in South Africa, and General Atomics has worked with the Russians. It has been proposed that the U.S. program could advance more quickly by taking advantage of this work.

The Westinghouse interests and the South Africa Pebble Bed Modular Reactor (PBMR) people participate in this emerging commercial alliance. There's an ongoing conversation as to how we can achieve the benefits from the work that has already been done in South Africa. You have a competitive marketplace, and other vendors have interests in this. There are three teams: the Westinghouse team, which includes the PBMR group; an Areva team; and a General Atomics team. About 26 international companies are involved, and we are discussing how we use work that has already been done—by the South Africans and also the Russians, in their plutonium burner work with General Atomics—how we bring in the experience that goes back decades, and also the current work, that has been done.

Question: One of the suggestions to accelerate the program was to start with a smaller reactor, at a lower temperature, which is not so challenging from a materials standpoint.

In fact, irrespective of the size, we will start at a lower temperature, because technically we need to step our way up. We are starting at a lower temperature than originally conceived of for the very-high-temperature reactor, which was in excess of 1,000˚C. In the range of 950-1,000˚, you get to the point where conventional metals will not work. The review group said to get below that temperature, and we have taken that step.

The second step in that discussion is, what temperature do we need for the process applications? The third step, is, at what temperature should we start the demonstration activity, so we are technologically successful, and to what extent can that reduce the time required? This is a very active conversation. I would not be surprised that when that is complete, in about a year, that we'll be lower than 950˚C, in the range of 850-900˚, which makes a big difference.

The three teams of companies will have their pre-conceptual design reports done in the September time frame, with opinions and recommendations. But temperature alone is not the only issue. The other is licensing time by the Nuclear Regulatory Commission, also being actively discussed.

Figure 1
ARTIST'S ILLUSTRATION OF A PBMR PLANT
The first prototype PBMR is expected to be online by 2013, and a plant to fabricate the fuel pebbles is now under construction. The first reactor will be built at Koeberg, near Cape Town, and the pilot fuel plant is being built at Pelindaba, near Pretoria. South Africa has an ambitious program planned for the mass production of PBMRs for domestic use and export.
Source: Courtesy of PBMR

Fourth-Generation Reactors Are Key to World's Nuclear Future

by Marjorie Mazel Hecht

By 2050, the world will need 6,000 more nuclear reactors in order to keep up with population growth and electricity demand. We will need all kinds of reactors: large advanced reactors for industrialized nations, fast reactors (breeders) that can create more new fuel than they burn, floating nuclear plants, thorium-fueled reactors, and other innovative designs. But the workhorse of the next generation of nuclear reactors will be the modular high-temperature gas-cooled reactor, both the Pebble Bed Modular Reactor (PBMR) and the Gas-Turbine High Temperature Reactor (GT-MHR), because of their inherent safety and versatility.

The PBMR, originally a German design (a 30-megawatt prototype operated there from 1967-1989), is being built in South Africa (Figure 1). The GT-MHR, designed by San Diego-based General Atomics, is being engineered in prototype in Russia, with the aim of burning excess plutonium from decommissioned weapons. Also, China has had a small (10 megawatt)

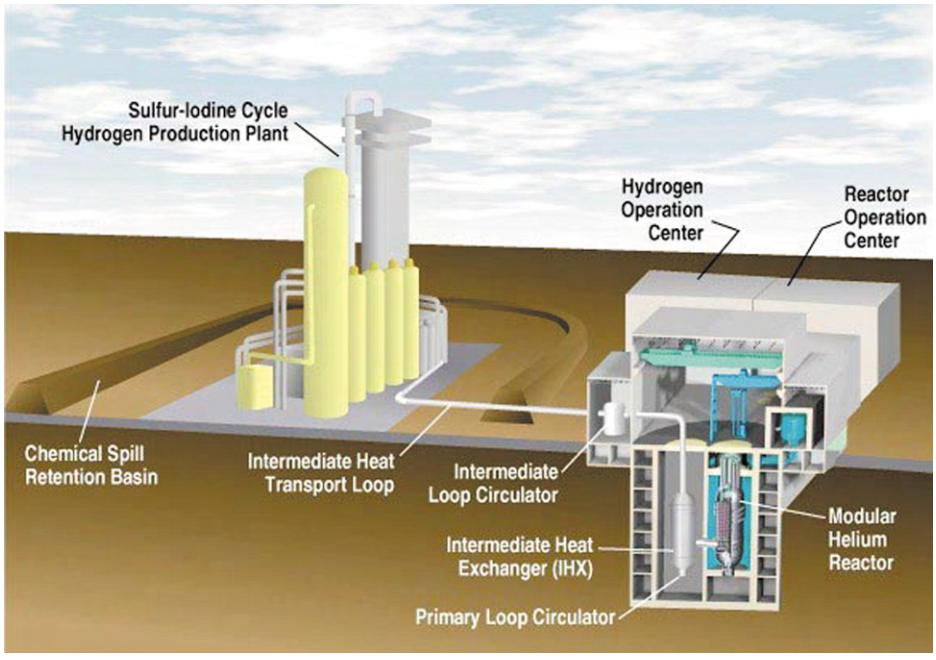


Figure 2
GT-MHR HYDROGEN PRODUCTION

This General Atomics design couples a modular helium reactor, the GT-MHR, to a sulfur-iodine cycle hydrogen production plant. The sulfur-iodine cycle, which uses coupled chemical reactions and the heat from the high-temperature reactor, is the most promising thermochemical method for hydrogen production.

Courtesy of General Atomics

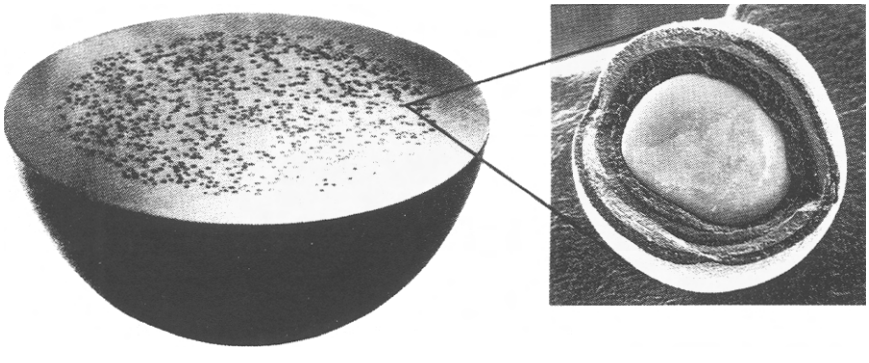
high-temperature reactor of the pebble bed design in operation since 2000, with plans for a large-scale demonstration reactor by 2010. Japan also has a high-temperature test reactor.

One advantage of these reactors is that they are small enough to be modularly produced on an assembly line and shipped to the plant site for assembly, thus cutting the production costs. The nuclear site can be configured to start with one or two units and built up to six or eight, as needed, making use of a single control building. Thus a developing country, where the electricity grid is small, can start off with one unit, and build up as the country develops.

Another advantage is their high-temperature output. For the GT-MHR, output is almost three times hotter than today's conventional reactors—1,560˚F, compared to 600˚F. (The PBMR output is about the same.) These high temperatures can be coupled with a wide range of industrial processing, from steel-making to hydrogen production for fuel (Figure 2).

The PBMR is a 165-megawatt plant, while the GT-MHR is a 285-megawatt plant. Both have passive and inherent safety features that make a meltdown impossible. The reactors can shut down without any operator intervention.

These reactors are meltdown proof because of their unique fuel design (Figure 3). Tiny uranium fuel particles are encased in ceramic spheres (0.03 inch or 0.75 millimeter for the GT-MHR), which serve as "containment buildings" for the fission process. The several concentric layers of temperature-resistant materials—porous carbon, pyrolytic carbon, and silicon carbide, "contain" the fission reaction of the uranium, even at very high temperatures. The overall design prevents the reactor from ever getting hot enough to melt the



Courtesy of PBMR

Figure 3
CROSS-SECTION VIEW OF FUEL PEBBLE

A cutaway view of a coated PBMR fuel particle is at right. Each particle has a 0.5 mm kernel of uranium dioxide surrounded by several concentric layers of high-temperature-resistant ceramics that "contain" the fission reaction. The coated fuel particles are then embedded in a graphite matrix and formed into fuel spheres the size of tennis balls, about 60-mm diameter, which circulate in the reactor core.

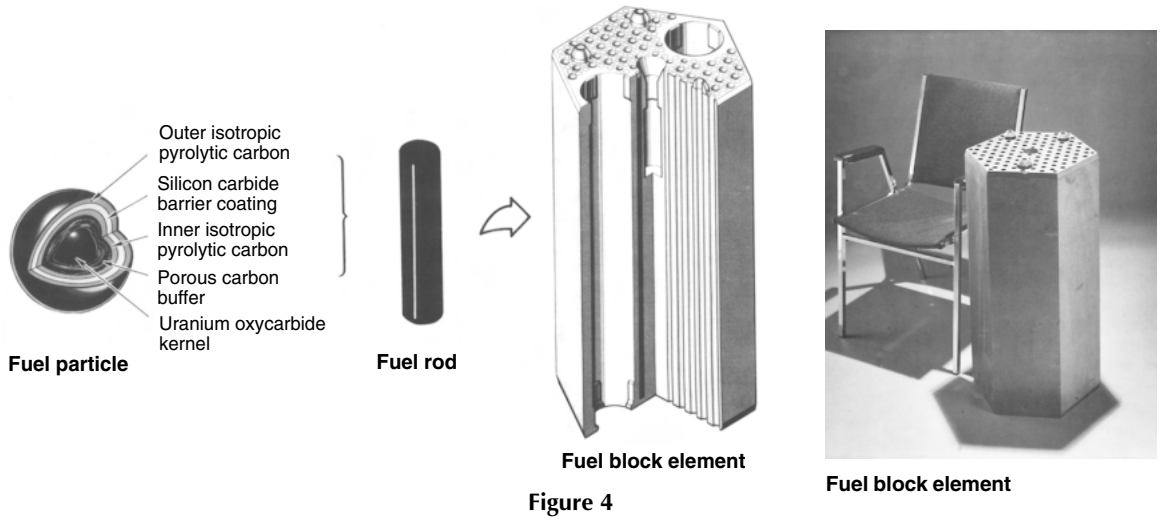


Figure 4
GT-MHR FUEL COMPONENTS

The tiny fuel pellet (a) is about 0.03 inch in diameter. At the center is a kernel of fissile fuel, uranium oxycarbide, which is coated with a graphite buffer and then surrounded by three successive layers of carbon compounds. The fuel particles are mixed with graphite and formed into cylindrical fuel rods, about 2 inches long (b). These rods are then inserted into holes drilled in the hexagonal graphite fuel element blocks (c) and (d). These are 14 inches wide and 31 inches long. The fuel blocks, which also have helium coolant channels, are then stacked in the reactor core.

ceramic spheres that surround the nuclear fuel.

The fuel particles can withstand heat of 3,632˚F, and the reactor core temperature remains below 2,912˚F. In fact, the fuel pebbles can withstand temperatures at which the metallic fuel rods in conventional light water reactors would fail.

In the GT-MHR, the spheres are mixed with graphite and shaped into cylindrical fuel rods, which are then inserted into hexagonal fuel blocks that make up the reactor core (Figure 4). General Atomics pioneered this fuel particle design in the 1950s, and operated two high-temperature reactors in the United States.

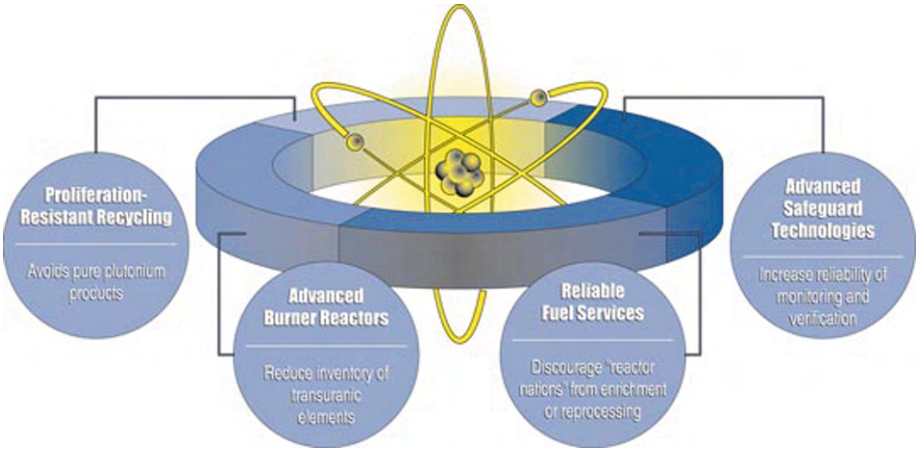
The PBMR fuel design is similar. Tiny nuclear fuel particles are coated with layers of ceramics. But unlike the GT-MHR, the fuel particles are then embedded into fuel balls the size of tennis balls. Each of these balls contains about 15,000 fuel particles and about one-quarter ounce of uranium. The balls, 456,000 of them, circulate around the reactor core. One advantage of this design is that the reactor can be continuously refueled, adding new fuel pebbles at the top, and removing spent fuel pebbles from the bottom of the reactor.

Efficiency and Safety

The high-temperature output of these reactors gives them greater generating efficiency, in addition to allowing a wide range of industrial applications. Both use a direct-conversion gas turbine, with no steam cycle—a big improvement. The heat is carried by the helium gas, which is also the coolant. This simplifies the system, reducing material requirements, and increases efficiency. Other technological breakthroughs have also contributed to simplifying the design and making the reactors more efficient. The GT-MHR is 50 percent more efficient than conventional light-water nuclear reactors.

Both the GT-MHR and the PBMR are located underground, with the auxiliary systems and control room above ground. The overall design of the reactor contributes to its safety. In addition to the usual control rods, which can slow down the fission process, there are two coolant systems, a primary system and a shutdown coolant system. If both of these were to fail, the reactor is designed to shut down on its own. There is a passive back-up system, whereby the heat from the reactor core is transferred by natural conduction to the reactor walls, which naturally convect the heat to an external sink. The concrete walls of the underground structure are lined with water-cooled panels to absorb the core heat from the vessel walls. Should these panels fail, the concrete of the structure alone is designed to absorb the heat.

In any type of loss-of-coolant accident, the reactor can withstand the heat without any operator intervention.



DOE

GNEP: "Cradle-to-grave" U.S. control over the world's nuclear fuel cycle?

Bush Nuclear Program, GNEP, Is Technology Apartheid

by Marjorie Mazel Hecht

The Bush Administration's Global Nuclear Energy Partnership, or GNEP, is a program of technological apartheid dressed up as nuclear development. Unveiled in 2006, it is the civilian side of the British geopolitical strategy, first put forward by Bertrand Russell and H.G. Wells in the first half of the 20th Century, to consolidate power in a single or small group of states, and deny technological development to most of the world. Like the global warming hoax, behind it lies a Malthusian program for checking population growth, especially of non-white populations.

Under GNEP, the United States would provide selected nations with all aspects of the nuclear fuel cycle—in a "black box." The recipient countries must agree not to develop those technologies on their own, thus denying those nations knowledge of uranium enrichment, fuel fabrication, and reprocessing, as well as nuclear applications like desalination or medical isotopes. The program aims to control the nuclear fuel cycle "from cradle to grave," as U.S. Energy Secretary Samuel Bodman said. Recipient nations will have only a leased black box—as long as they stay on the good side of the supplier.

GNEP is thus an attack on the national sovereignty of recipient nations, which must give up control over their energy resources and over the training of nuclear scientists and engineers.

From the beginning of the civilian nuclear age, just after World War II, there were two views of the nuclear future. One faction saw nuclear energy as a boon for all mankind, providing virtually unlimited energy to develop industry and raise living standards. The other were the proponents of the Bertrand Russell/H.G. Wells policy, who aimed to prevent Third World development and population growth, by keeping the nuclear genie bottled up. Their program was conveyed in the 1946 Baruch Plan, an earlier version of GNEP, which intended to put a United Nations agency in control of all nuclear fuel.

This policy was carried forward from the 1950s by a school of truly mad strategic analysts centered for a time in the Rand Corporation. The leading figure was Albert Wohlstetter, the real model for Stanley Kubrick's fictional "Dr. Strangelove," whose students included the prominent neo-con strategists, Richard Perle and Paul Wolfowitz.

Selling Points vs. Reality

GNEP was sold to the U.S. nuclear community on the basis that it will fund research and construction of three new facilities: (1) a nuclear reprocessing facility using new methods that will make it harder to divert nuclear fuel for bomb making; (2) a nuclear fast reactor, which would be geared not to breed new fuel, but instead just to burn up the long-lived radioisotopes (actinides) in spent fuel; and (3) an advanced fuel cycle research facility, to look into new methods of reprocessing and new fuel cycles.

Eleven sponsors for potential sites for the first two facilities have been selected to receive grants to prepare "detailed siting studies." One is the Hanford Site in Washington State, where, in 2005, the Bush Administration shut down the Fast Flux Test Facility, a working research fast reactor that was perfectly suited to perform the R&D proposed by GNEP, and to burn up actinides.

There is no question that the United States needs an advanced nuclear program, which will include recycling, enrichment, fuel cycle research, and development of the fast reactor and other advanced reactors. But GNEP is a go-slow program, which may (or may not) produce a new reactor or new technologies in the next 10-15 years. It is not a crash development program to build the research facilities and the advanced reactors the nation—and the world—need. GNEP's focus is nonproliferation enforcement, at home and abroad.

The Department of Energy's funding for GNEP is up to $60 million in the next two years, for conceptual studies, scheduling, and design. It has managed to hook in the nuclear community, as well as all the national laboratories, because it is the only Federal nuclear show in town.

As for the initial foreign countries participating, most of them—Russia, China,

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Energy Secretary Samuel Bodman (center) at a GNEP press conference with energy officials from China, France, Japan, and Russia at the DOE-hosted ministerial meeting to discuss GNEP international cooperation.

and Japan, for example—already reprocess their spent fuel, and have ambitious programs for research and construction, including fast breeder reactors. They have nothing to lose by participating in GNEP—unless they get so tangled in the web of bureaucracy that they stop forging ahead with their own programs.

U.S. No Longer a Nuclear Leader

Although the United States now has nearly one-fourth of all the world's nuclear reactors (104 out of 435), more than any other country, it has taken a back seat to other nuclear nations in the development of nuclear technology. The U.S. shut down its commercial reprocessing (recycling) capability in the 1970s, although its PUREX reprocessing facility was working well. Since then, the United States has had a once-through nuclear fuel cycle, instead of recovering the 97 percent of the spent nuclear fuel that could be turned into new fuel.[1] The reason for the shutdown was ostensibly to prevent "proliferation," because reprocessing spent fuel separates out plutonium (about 1 percent of the spent fuel), which might be stolen and used for bomb-making.

The real reason is that by allowing reprocessing, nuclear energy becomes fully "renewable" and therefore fully able to supply increasing amounts of energy for a growing world. This is what the Russellites wanted to prevent, using the banner of nonproliferation to do it. Meanwhile, spent fuel rods—containing a valuable resource—are sitting in storage.[2]

In addition to the shutdown of reprocessing, there was a virtual shutdown of enrichment technology. Enrichment involves increasing the ratio of fissionable uranium (U-235) to unfissionable uranium (U-238) from the 0.7 percent found in natural uranium to 3-4 percent required for fission reactors. The U.S., which had pioneered uranium enrichment methods for nuclear fuel, now must import more than 80 percent of the enriched uranium for its 104 nuclear plants. The nation also shut down its fast breeder program, though fast reactors are essential to the future of nuclear.

GNEP has captured the allegiance not only of the nuclear community, but of the national laboratories, which historically have been leaders of U.S. nuclear research, both civilian and military. When this writer posed the question of GNEP and its coercive nonproliferation function to Dr. Robert Rosner, the director of the Argonne National Laboratory, he replied, "I'll give you the reason why it's a good thing. It's not so much proliferation, it's economic." In Rosner's view, countries that want to develop nuclear power plants will choose the GNEP way because it's cheaper. As for the political control, Rosner said that countries could choose a supplier from among the seven or so advanced nuclear nations—including Russia and China.

As for proliferation, Rosner said: "The key point here is that what GNEP does, if you really put this regime in place—then if someone refuses to be part of it, it's perfectly clear why. It could only be one reason. So at least there's this wonderful element of clarity. With GNEP, if you don't participate, then you basically are interested in proliferation."

And so, we do have clarity: GNEP is about policing nonproliferation, removing national sovereignty, and ensuring technological apartheid, not about advancing nuclear technologies for the benefit of mankind. Much of the U.S. nuclear community has bought into it, along with the fraud of global warming, thus crippling their capability to fight for the kind of nuclear development program that will build the 6,000 nuclear power plants the world needs by the year 2050.[3]

Instead of siding with Prometheus, the giver of fire (the atom) to mankind, these supporters of GNEP are working with Zeus to keep Promethus bound.

Notes

1. See "The Beauty of the Nuclear Fuel Cycle," www.21stcenturysciencetech.com/2006_articles/NuclearFuel.W05.pdf
2. The spent fuel from one 1,000-MW nuclear plant, operated over 40 years, is roughly equivalent to 130 million barrels of oil, or 37 million tons of coal.
3. See "How to Build 6,000 Nuclear Plants by 2050," by James Muckerheide, State Nuclear Engineer of Massachusetts, http://www.21stcenturysciencetech.com/Articles%202005/Nuclear2050.pdf

An update on the GNEP program appears in this issue's editorial, page 2.

Courtesy of *VirtualPRO*

Panelists at the Biofuels workshop sponsored by VirtualPRO and the Manuel Beltrán University had nothing to say to Maximiliano Londoño Penilla's exposé of the bad economics of biofuels and his support for nuclear energy as Colombia's future. Londoño is second from left.

REPORT FROM COLOMBIA

LaRouche Movement Organizes For a Nuclear Renaissance

by Miriam Nelly Redondo

The way an audience can be transformed from today's pervasive pessimism, to technological optimism, was beautifully demonstrated at a July 28 forum in the capital of Colombia. Two hundred people attended the First Biofuel Workshop and Seminar in Bogotá, organized by the publication, *VirtualPRO*, and the Manuel Beltrán University. There they heard a presentation given by the guest speaker invited by Colombia's Lyndon LaRouche Association, Marjorie Mazel Hecht, managing editor of *21st Century Science & Technology*, who spoke on the theme "The World Nuclear Renaissance Is in Progress! Will Colombia Join In?"

Hecht's address infected the audience with the optimism generated by the revived worldwide turn to nuclear power as a source of energy that can replace today's fossil fuels, oil, coal, and natural gas.

In the afternoon, Maximiliano Londoño Penilla, president of the LaRouche Association, followed up Hecht's polemic during his participation in a panel discussion which also included Mauricio Rojas Quintian of Cenipalma, Carlos Fernando Márquez of the Colombian Automobile Association (SCA), Marcela Bonilla of the Environment Ministry, and Carlos Díaz of Brazil's oil company Petrobras.

During the forum, the majority of the questions were focussed on how to solve Colombia's energy crisis, which opened the way for Londoño to elaborate on the idea—first developed in the morning by Hecht—that nuclear energy in Colombia is inevitable, while attacking the fraud of both global warming and of biofuels as a viable energy source. The other panel members were left with nothing to say.

Not to develop nuclear energy would pose for Colombia a serious risk of cutting itself off from opportunities that would mean an unlimited energy source for the country, Londoño argued. Since the era of U.S. President Dwight D. Eisenhower (1952-1960), Colombia has already received benefits from the U.S. "Atoms for Peace" program, which put atomic energy, the most valuable area of scientific-technological knowledge at the time, at the disposal of the underdeveloped countries of the world.

Colombia's Nuclear History

In Colombia, the institutionalization of nuclear technology followed directly from the Atoms for Peace policy. It was initiated by President Gen. Gustavo Rojas Pinilla, who established the first nuclear institution in the country, the Colombian Institute of Nuclear Affairs (ICAN), which operated from 1956-1959, later replaced by the Institute of Nuclear Affairs (IAN). Rojas proposed collaborative efforts between the state and national industry, for the purpose of industrializing the country, taking advantage of the use of man-made nuclear radioisotopes in medicine, agriculture, and industry.

In the field of medicine, Colombia cooperated with France, which had been working since 1934 through the Radium Institute—now known as the National Institute of Cancerology—on the application of nuclear radioisotopes. Unfortunately, investment has been inadequate to meet the demand for application of this technology, with the result that there has been no program of modernization and expansion of equipment for urgent programs in the treatment of cancer patients in Colombia.

As director of ICAN, Maj. Gerardo Cabrera Apraez (ret.) signed a bilateral agreement with the United States in June 1955, for the peaceful use of nuclear energy, which was considered the first

Miriam Nelly Redondo is the General Secretary of the Lyndon LaRouche Association, Bogotá, Colombia.

agreement of its kind. One year later, Colombia was visited by a geological mission of the U.S. Atomic Energy Commission, led by Glendon Collis and William Isaclasen, who reported on the possible exploitable reserves of uranium in Colombia's Santander province. Toward that end, the company Minuraniu was created.

In October 1959, the Institute of Nuclear Affairs was created under the direction of Tulio Marulanda, a chemical engineer, who specialized in metallurgy and nuclear energy at the University of Colorado. Four ministries made up the directorship of the Institute: Development, Health, Education, and War. Unfortunately, the role of the institute in education was marginal. There was no formal link with the National University, and the Institute operated initially with chemical engineers and agronomists who were to specialize in nuclear material, through scholarships abroad.

Here is where one can perceive a notable difference between the Institute and the National Atomic Energy Commission (CNA) of Argentina, which took on the challenge of higher education in the field of nuclear science from the very beginning, thereby guaranteeing its continuity and its current resurgence.

In July 1961, the Argentine nuclear chemist Sonia Nassif, representing the International Atomic Energy Organization, and in cooperation with the Institute's Marulanda, proposed the construction of a regional nuclear center, to carry out joint research. This was on the occasion of the arrival in Colombia of the IAN-R1 reactor, which, at the time, was considered the first in a series of developments that would keep the country up to date in nuclear technology.

But political nearsightedness killed Colombia's nuclear program when, in 1958, President Alberto Lleras Camargo labelled the nuclear commission a project of the Rojas Pinilla dictatorship, thereby freezing all budget transfers to the Institute, without any understanding that material development and human welfare urgently requires ongoing scientific research.

Time for a Nuclear Revival

It is time to correct these errors of the past. As *21st Century* editor Hecht explained, the world today is experiencing a nuclear renaissance, and it is urgent that Colombia join in. Bilateral U.S.-Colombian relations need to be re-established on the basis of principles of cooperation for development, such as that seen during the period of Eisenhower's Atoms for Peace.

Colombia's first nuclear reactor, the IAN R-1, operated in the early 1960s. But shortsighted political leaders sidelined Colombia's nuclear program.

Hecht documented how the Asians have become the pioneers in nuclear development. China has 10 operating nuclear plants, producing 8.6 gigawatts of energy, and intends to produce 40 gigawatts by 2020, and between 120 and 160 gigawatts by 2030. Taiwan is producing 22 percent of its energy with six nuclear reactors, and has two more under construction. India has 17 nuclear plants producing 3.5 gigawatts of energy. South Korea has 20 nuclear reactors that provide 40 percent of its electricity, 26.6 gigawatts. Japan has 55 reactors, which provide 30 percent of that nation's energy needs, or 47.5 gigawatts.

Colombian President Gen. Gustavo Rojas Pinilla, who established the first nuclear institution in the country, which operated from 1956 to 1959.

And the revival is not only going on in Asia. Russia has 31 nuclear plants which provide 16 percent of its energy, and it is planning to reach 25 percent by 2030. South Africa has two conventional nuclear plants in operation, which generate 6 percent of its electricity, and is carrying out an intensive program to develop the German-designed PBMR (pebble bed modular reactor) nuclear plant model.

The United States, on the other hand, although it has more than 100 plants generating about 20 percent of the nation's electricity, has not built a single new reactor since the 1970s, and its nuclear program is still struggling to escape from the barrage of environmentalist and deindustrialization propaganda.

In the rest of Ibero-America, Argentina and Brazil are returning to nuclear energy, after a long period of inactivity. Argentina will finish the Atucha 2 nuclear center by 2010, and has plans to build a

small reactor, CAREM, an Argentine design developed in the 1980s, which could be used to generate electricity and to desalinate water. Recently, one of the CAREM models was sold to Australia.

In Brazil, the government has made the decision to build a third nuclear plant, Angra 3; the three Angra plants combined will produce 1.896 gigawatts, nearly 4 percent of Brazil's electricity. Mexico has two nuclear reactors at Laguna Verde, and these produce 5 percent of its electricity. Chile and Peru have also shown interest in conducting nuclear research and are working toward that end.

What Colombia Must Do

We should remember that it was the narco-government of Ernesto Samper Pizano in Colombia which shut down the Institute of Nuclear Affairs, preventing our country from advancing in this field. Colombia should join with other nations that have begun or reactivated their nuclear programs. And since we have restarted the research reactor, we should promote anew the development of nuclear energy. We should reopen the Institute of Nuclear Affairs as an autonomous body, functioning directly under the executive branch, with the participation of the Ministry of Agriculture on its board of directors, and with total financial autonomy. Further, the nation should call on all Colombians and others who have specialized knowledge in the nuclear field, to come forward and join this national initiative.

The author (center) at a pedagogical exhibition sponsored by the LaRouche Association at Villamar College in Bogotá.

Faculties of nuclear physics and nuclear engineering should be immediately created in the National University, so that Colombia can join the programs of Argentina, Brazil, and Mexico. There should also be efforts to establish a Regional Nuclear Institute, and this could be one of the challenges undertaken by President Alvaro Uribe, as part of a larger Ibero-American integration initiative.

Down with Biofuels

In Colombia, the lobbyists for biofuels seek to create a financial bubble, similar to the housing bubble which is currently blowing out in the United States, because biofuels could never be profitable without the huge subsidies that governments provide.

For example, it was for that purpose that Law 693 of 2001 was created in Colombia, which established that, by September 2005, all cities with more than 500,000 inhabitants—like Bogotá, Cali, Medellín, and Barranquilla—would have to use gasoline with at least 10 percent ethanol content. Law 788 of 2002 introduced exemptions to the Value-Aded Tax for the ethanol component of oxygenated fuels, and introduced tariff exemptions for the import of equipment necessary to mount ethanol refineries. Together with this law, the Ministry of Mines and Energy put out Resolution 1080836 of July 25, 2003, to establish the price structure for oxygenated regular gasoline.

If one does the calculations, it becomes clear that to satisfy the mix of 10 percent ethanol in gasoline required by law, they will have to build at least 10 to 12 ethanol refineries to produce 2.5 million liters a day. According to Agriculture Minister Andrés Felipe Arias, the idea is for Colombia to become the leading biofuel producer in Latin America, which would require an investment of half a billion dollars. But it appears that the Minister has not considered how this will directly affect the price of food, because he is not simultaneously projecting the preparation of new lands, with infrastructure and agricultural technology, to bring more food under cultivation—with the result that foods will dramatically rise in price.

He also is not considering the reduced tax revenues implied by this strategy, given the exemptions of 98.1 million pesos a year. Over the long term, this bubble too will burst, creating a new source of frustration for Colombians.

In sum, considering the ongoing global nuclear renaissance, and the failure of biofuels, the only solution to the high cost of fuel, and to the eventual exhaustion of oil reserves, is nuclear energy.

American Nuclear Society Annual Meeting

Why Is the ANS Tolerating Malthusianism?

by Cloret Ferguson

"Precisely, because we face dangers that go far beyond what we readily imagine, the spectre of global warming still remains, for many people, too nebulous to contemplate. But what is not nebulous is the human condition that lies behind global warming....

"This crisis, it bears emphasis, originates not in human evil, but in *human success*.... It is this success taking the form in agriculture, industry, commerce, and medicine that has spawned the growth in human population and the gathering *threat* to our environment."

—John Ritch, Director General of the World Nuclear Association, in his speech to the ANS President's Plenary session, in Boston, June 25, 2007

* * *

The President's Plenary panel, titled "It's All About the People: The Future of Nuclear," opened the American Nuclear Society's Annual Meeting, held in Boston June 24-28. This panel also included similarly sophistical arguments delivered by U.S. Department of Energy Secretary Samuel Bodman, and the expressly pessimistic views of Building and Construction Trades, AFL-CIO President Edward Sullivan.

Why did the American Nuclear Society lend top-billing to a message which constructs a *Feindbild* (enemy image) of population growth and human progress? Why is it banking on fear of "global warming" to sell nuclear energy to the general public? Will such an unscientific posture derail the full-steam-ahead nuclear energy, and high-technology infrastructure projects currently under way around the world?

From day one of the ANS conference, it was evident that a vortex of epistemological contradictions existed between the published objectives of both the ANS and the WNA, and the ideological underpinnings of the speeches made by their designated representatives in the keynote panel.

British Nuclear Energy Society

John Ritch: A Malthusian who should know better.

Yet, in private discussions, few individuals readily denied the need for action to be taken in the direction of these aims, and many expressed interest in the organizing activity of Lyndon LaRouche's political movement to achieve the appropriate results.

Two LaRouche associates, representing *21st Century Science & Technology,* were at the ANS conference as reporters, and talked to many of the conference participants. We found a curious interest, especially among the graduate and undergraduate students in attendance, about the scientific work of the LaRouche Youth Movement. Several students had presented aspects of their own research projects before smaller groups attending the technical sessions.

Renaissance Vs. Malthusianism

The ANS conference was convened as a constellation of newly emerging opportunities unfolded, set into play only months earlier in Russia. These initiatives seek to tilt the political, economic, and strategic configuration of power toward the course of strategic partnership for mutual infrastructure development and war-avoidance. The proposed Bering Strait Tunnel project, part of the LaRouche proposal for a Eurasian Land-Bridge, is one example of this. Another is Russian President Putin's proposals for a joint Russian-U.S. sharing of ABM systems.

Under the World Nuclear Association-World Nuclear University umbrella are gathered the national research labs of sovereign governments, government energy agencies, government-sponsored universities, private energy consortiums, research facilities, individual scientists and engineers. These interests are representative of the nuclear energy and nuclear energy-related industry in 30 nations on four continents, which account for 90 percent of the world's activity in mining and production of nuclear fuel and two thirds of the world's nuclear-generated electricity, according to WNA's public literature.

But the overriding atmosphere of the conference, despite reports of a nuclear renaissance, was WNA John Ritch's carefully designed attack on population growth, laying bare his own personal outlook respecting the nature of human beings. He judges mankind entirely as a biological creature.

Quite the contrary, the history of civilization instructs us to employ a qualitatively distinct yardstick in measuring the upward progress of humankind. The measure of man resides in the realm of cognition. Upon mankind's creative progress, within Vernadsky's Noösphere, the repetitive aping behavior of animals, and the sun-worshipping of plants both depend. In pitching the overpopulation myth in this Wellsian mode, even to scientists, these nuclear associations betray an allegiance to the anti-science mafia's militant policing of the scientific community, and its stranglehold over science, in general.

1975 'Endangered Atmosphere' Conference

Where the Global Warming Hoax Was Born

by Marjorie Mazel Hecht

"Global Warming" is, and always was, a policy for genocidal reduction of the world's population. The preposterous claim that human-produced carbon dioxide will broil the Earth, melt the ice caps, and destroy human life, came out of a 1975 conference in Research Triangle Park, North Carolina, organized by the influential anthropologist Margaret Mead, president of the American Association for the Advancement of Science (AAAS), in 1974.

Mead—whose 1928 book on the sex life of South Pacific Islanders was later found to be a fraud—recruited like-minded anti-population hoaxsters to the cause: Sow enough fear of man-caused climate change to force global cutbacks in industrial activity and halt Third World development. Mead's leading recruits at the 1975 conference were climate scare artist Stephen Schneider, population-freak biologist George Woodwell, and the current AAAS president John Holdren—all three of them disciples of Malthusian fanatic Paul Ehrlich, author of *The Population Bomb*.[1] Guided by luminaries like these, conference discussion focussed on the absurd choice of either feeding people or "saving the environment."

Mead began organizing for her conference, "The Atmosphere: Endangered and Endangering," shortly after she had attended the United Nations Population Conference in Bucharest, Romania, in August 1974. She had already bullied American scientists with her Malthusian view that people were imperiling the environment. She wrote in a 1974 *Science* magazine editorial that the Population Conference had settled this question:

> At Bucharest it was affirmed that continuing, unrestricted worldwide population growth can negate any socio-economic gains and fatally imperil the environment.... The earlier extreme views that social and economic justice alone can somehow offset population increase and that the mere provision of contraception can sufficiently reduce population—were defeated.[2]

The North Carolina conference, which took place Oct. 26-29, 1975, was co-sponsored by two agencies of the U.S. National Institutes of Health: the John E. Fogarty International Center for Advanced Study in the Health Sciences and the National Institute of Environmental Health Sciences. (Mead had been a Scholar in Residence at the Fogarty Center in 1973.)

It was at this government-sponsored conference, 32 years ago, that virtually every scare scenario in today's climate hoax took root. Scientists were charged with coming up with the "science" to back up the scares, so that definitive action could be taken by policy-makers.

Global cooling—the coming of an ice age—had been in the headlines in the 1970s, but it could not easily be used to sell genocide by getting the citizens of industrial nations to cut back on consumption. Something more drastic and more personal was needed.

Jack Manning/NYTimes Pictures

Anthropologist Margaret Mead gave global warming its start, as part of a movement to curb population growth. Here she poses at the Museum of Natural History in front of an Easter Island stone figure. Mead is famous for saying, "Instead of needing lots of children, we need high-quality children."

Eugenics and The Paradigm Shift

Mead's population-control policy was firmly based in the post-Hitler eugenics movement, which took on the more palatable names of "conservation" and "environmentalism" in the post-World War II period. As Julian Huxley, the vice president of Britain's Eugenics Society (1937-1944), had announced in 1946, "even though it is quite true that radical eugenic policy will be for many years politically and psychologically impossible, it will be important for UNESCO to see that the eugenic problem is examined with the

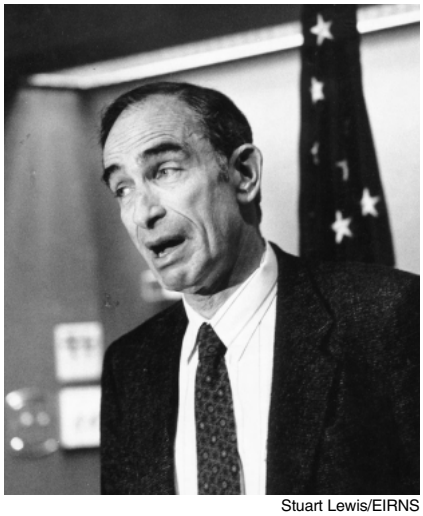
greatest care and that the public mind is informed of the issues at stake so that much that now is unthinkable may at least become thinkable." Huxley was then director-general of the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

By the 1970s, the paradigm shift that obliterated the optimistic development policies of Franklin Roosevelt and of Dwight Eisenhower's "Atoms for Peace" program, was in full swing. The Club of Rome's *Limits to Growth*, which removed the role of scientific advances, was drummed into the public consciousness. Nuclear energy, in particular, was under attack, because of its promise of virtually unlimited cheap energy to support a growing population. In the guise of protecting the world from potential terrorism, the Nuclear Non-Proliferation Treaty prohibited developing countries from acquiring civilian nuclear technologies.

In the United States, where nuclear plant construction was poised for takeoff, the dream of a nuclear-powered economy was under ferocious attack from the top down. The real "Dr. Strangelove," RAND nuclear strategist Albert Wohlstetter, counseled U.S. Presidents on his strategy for winning a nuclear war, at the same time that he advocated an end to civilian nuclear energy. In one report after another, "experts" paid by the Ford Foundation, among others, argued that nuclear power was not economical, not safe, and just plain no good. Thus was scientific optimism ushered out.

The rock-sex-drugs counterculture of the '68ers lapped it up. Man was seen as just another animal, but an exceedingly greedy one, using up Mother Nature's resources and making a mess in the process. The unique cognitive ability of the human being, with its power to create new resources, to develop more advanced science and technology, and thus to provide better living standards was trashed.[3] Scientific pessimism invaded the scientific organizations.

Mead played a central role in this degeneration, from her obsession with spreading the "free love" message, to her participation in mind-control projects (the Cybernetics group at MIT) with her third husband, Gregory Bateson, intellectual author of the infamous MK-Ultra drug-brainwashing program.



Stuart Lewis/EIRNS

Paul Ehrlich, a 20th Century Malthus, author of the prophetically wrong book, The Population Bomb. *Ehrlich's ideology is shared by the leading global warming scientists who attended Mead's 1975 conference.*

The Endangered Atmosphere?

Mead's keynote to the 1975 climate conference set the agenda: Mankind had advanced over the years to have international laws governing the sea and the land; now was the time for a "Law of the Atmosphere." It was a naked solicitation of lying formulations to justify an end to human scientific and industrial progress.

Mead stated:

> Unless the peoples of the world can begin to understand the immense and long-term consequences of what appear to be small immediate choices—to drill a well, open a road, build a large airplane, make a nuclear test, install a liquid fast breeder reactor, release chemicals which diffuse throughout the atmosphere, or discharge waste in concentrated amounts into the sea—the whole planet may become endangered....
>
> At this conference we are proposing that, before there is a corresponding attempt to develop a "law of the air," the scientific community advise the United Nations (and individual, powerful nation states or aggregations of weaker states) and attempt to arrive at some overview of what is presently known about hazards to the atmosphere from manmade interventions, and how scientific knowledge coupled with intelligent social action can protect the peoples of the world from dangerous and preventable interference with the atmosphere upon which all life depends....
>
> What we need from scientists are estimates, presented with sufficient conservatism and plausibility but at the same time as free as possible from internal disagreements that can be exploited by political interests, that will allow us to start building a system of artificial but effective warnings, warnings which will parallel the instincts of animals who flee before the hurricane, pile up a larger store of nuts before a severe winter, or of caterpillars who respond to impending climatic changes by growing thicker coats [sic].

Mead deplored the fact that some scientists might be so cautious to "protect their reputations" that they would not act. She described this as the "modern equivalent of fiddling while Rome burns." As for the thinking population, she deplored "those who react against prophets of doom, believing that there is not adequate scientific basis for their melancholy prophecies, [for they] tend to become in turn prophets of paradisical impossibilities, guaranteed utopias of technological bliss, or benign interventions on behalf of mankind that are none the less irrational just because they are couched as 'rational.' They express a kind of faith in the built-in human instinct for survival, or a faith in some magical technological panacea."

What Scientists Need to 'Invent'

Here's what Mead wanted the atmospheric scientists to do:

> What we need to invent—as responsible scientists—are ways in which farsightedness can become a habit of the citizenry of the diverse peoples of this planet. This, of course, poses a set of technical problems for social scientists, but they are helpless without a highly articulate and responsible expression of position on the part of natural scientists. Only if natural scientists can develop ways of making their statements on the present state of danger credible to each other can we hope to make them credible (and understandable) to social scientists, politicians, and the citizenry.
>
> ...I have asked a group of atmospheric specialists to meet here to con-

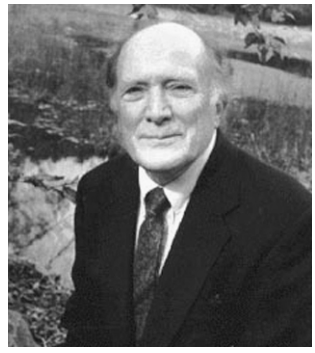
sider how the very real threats to humankind and life on this planet can be stated with crediblity and persuasiveness before the present society of nations begins to enact laws of the air, or plan for "international environmental impact statements."

IISD

Stephen Schneider

Three of Mead's scientists who have preached global warming and population control since the 1975 conference. All have worked closely with Paul Ehrlich, who thinks the the U.S. population should be cut in half (not starting with his family and friends, of course).

John Holdren



George Woodwell

Throughout her presentation, Mead stressed the need for consensus, an end-product free from any troubling "internal scientific controversies" that might "blur the need for action."

Mead and her co-organizer William W. Kellogg (a climate scientist from RAND and later NCAR, the National Center for Atmospheric Research), edited a report on the proceedings of the conference into a little book published a year later.[4] (The Mead-Kellogg team also came up, in 1976, with the idea that carbon dioxide emissions should be controlled "by assigning polluting rights to each nation"[5]—an early version of the cap-and-trade program of Al Gore.)

The conference proceedings identify the presenters and the rapporteurs for the sessions, but there is no list of all the participants. Some discord is reported in the audience (more than is "allowed" today in climate change circles!), and Margaret Mead steps in to push for "consensus." The editors note in their initial comment on the proceedings, "... we believe that we have captured something very close to consensus."

Mead's Propagandist Scientists

A few of the 1975 conference presenters stand out today as leading spokesmen for global warming:

• Climate scientist **Stephen Schneider**, who was promoting the global cooling scare scenario in the 1970s, made himself notorious by telling *Discover* magazine in 1989: "To capture the public imagination, we have to offer up some scary scenarios, make simplified dramatic statements and little mention of any doubts one might have. Each of us has to decide the right balance between being effective, and being honest."[6]

Schneider has been one of the most visible and voluble scientist-lobbyists for global warming, testifying to Congress, playing a prominent role in the Intergovernmental Panel on Climate Change (IPCC), and setting the standards by which it presents its opinions to the public without any hint of uncertainty. At Stanford University he has trained new generations of climate scare clones. He is also a close friend of *The Population Bomb*'s Paul Ehrlich and wife, Anne Ehrlich, both at Stanford, whose anti-population philosophy he fully shares. He and Paul Ehrlich co-authored articles on the "limited carrying capacity" of the Earth, and challenged population advocate Julian Simon with a bet on how fast man would exhaust certain resources.

• **John Holdren,** another Ehrlich collaborator at Stanford, is now a Harvard-based energy specialist, and the president of the AAAS. Holdren has co-authored several articles and books with Paul Ehrlich, elaborating on their formula (I = PAT) that the impact of an increase in population and consumption (affluence), although modified by technology, is degrading the environment. Therefore, population growth should stop. Their underlying assumption, like Mead's, was that technology cannot solve the problems created by "limitless" population growth. (Ehrlich's view, in fact, is that the United States can sustain only 150 million people; there are now 302 million of us.)

In December 2006, Holdren shepherded a radical global warming resolution through the AAAS board of directors, which was announced at the organization's annual meeting in February 2007, the first ever of such resolutions.[7] Its conclusions, the AAAS stated, "reflect the scientific consensus represented by, for example, the Intergovernmental Panel on Climate Change...."

Holdren is one of a small group of anti-nuclear "nuclear experts" who push technological apartheid—the doctrine that poorer nations cannot be allowed to gain knowledge of nuclear science.

• **Dr. George Woodwell**, a member of the National Academy of Sciences and a Fellow of the Academy of Arts and Sciences, is a global warming fanatic whose stated beliefs indicate that he abhors human beings in general, and whose zealousness in this cause leads him to bend the truth. Woodwell works closely with John Holdren at the Woods Hole Research Center, which Woodwell founded and of which Holden is a director.

To get the flavor of Woodwell's views: In a 1996 interview, he proclaimed: "We had an empty world that substantially ran itself as a biophysical system, and now that we have filled it up with people, and the sum of human endeavors which is large enough to affect global systems, it no longer works properly."[8] He attributes climatic changes and warming to "the crowding of people into virtually every corner of the Earth." "How will his plan for a 50 percent cut in [carbon dioxide] emissions happen?" the interviewer asks. Woodwell says it will require "a concerted effort on the part of the scientific and scholarly community; the public will have to be sufficiently enraged...." He stresses that the scientific community is going to have to exert pressure on the government to act.

Woodwell's 1989 article on global

warming in *Scientific American* was illustrated with a drawing that showed seawater lapping at the steps of the White House.

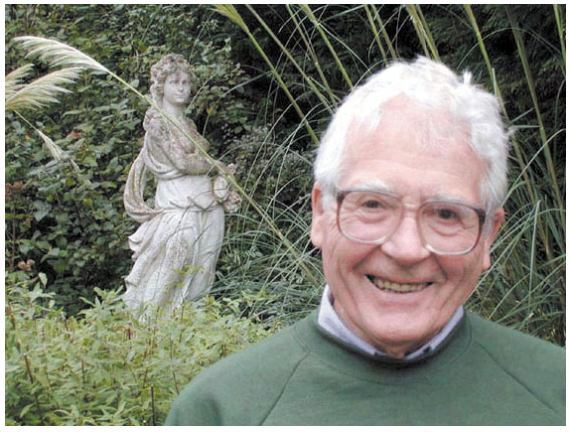
Another example of his "bending" the truth: During the environmentalist campaign against DDT, Woodwell wrote a technical article for *Science* magazine in 1967 purporting to show that there were 13 pounds of DDT per acre of soil. He neglected to mention, however, that he measured the soil at the spot where the DDT spray trucks washed down! This detail came out in his sworn testimony at the official EPA hearings on DDT in 1972, but neither Woodwell nor *Science* magazine issued a retraction.[9]

• **Dr. James Lovelock** is best known as the inventor (in the 1970s) of the Gaia thesis, which views the Earth as a whole as a living biological being. Lovelock's worry about global warming has led him to make dire predictions about what will happen: "Before this century is over, billions of us will die, and the few breeding pairs of people that survive will be in the Arctic where the climate remains tolerable," according to one of his scenarios.[10]

But unlike the three other scientists above, who attended the 1975 Mead conference, Lovelock has called for nuclear power to slow the disaster that he warns is coming. Again, unlike the three others, Lovelock sees mankind as a "resource" for the planet, its "heart and mind."

During the 1975 Mead conference, Lovelock occasionally pooh-poohed some of the more hysterical suggested disasters of man-made warming. In a discussion on ozone depletion, for example, Lovelock strongly criticized the National Academy of Sciences report of the coming danger of skin cancers from increased ultraviolet radiation. "To speak of ultraviolet radiation as analogous to nuclear radiation is most misleading," he said.

(During this discussion, the report of the proceedings says, Mead called for a "'ceasefire' in an attempt to avoid a premature polarization of the participants." Referring to the uncertainty of potential effects, she stated, "The time interval required before we begin to see clear evidence of a particular manmade effect on the environment may be long compared to the time in which society has to act.... A decision by policy-makers *not* to act in the absence of scientific information or expertise is itself a policy decision, and for scientists there is no possibility for inaction, except to stop being scientists.")



James Lovelock, a global warming alarmist, has advocated nuclear energy as a preventative measure, which has grieved his fellow greens. Behind him is a statue of Gaia, the Earth goddess for whom he named his theory of the Earth as a biological being.

'Anticipating' Global Warming

Mead's co-editor of the proceedings, climatologist William Kellogg, notes that "the main purpose of this conference is to anticipate the call that will be made on scientists and leaders of government regarding the need to protect the atmospheric environment *before* these calls are made."

Kellogg outlines the difficulties of computer modelling of climate change and man's role because of the nonlinearities involved in climate, but he concludes that climate models "are really the only tools we have to determine such things." He then states, "The important point to bear in mind is that *mankind surely has already affected the climate of vast regions, and quite possibly of the entire earth,* and that its ever escalating population and demand for energy and food will produce larger changes in the years ahead."

Kellogg reviews the potential global warming disaster scenarios, which are actually what then became the scientific research agenda for the next 30 years. He himself had put forward arguments that the release of the energy necessary to support a "large, affluent world population could possibly warm up the earth excessively."

The issues Kellogg laid out are all too familiar today: warming that will melt "the Arctic Ocean ice pack and the ice sheets of Greenland and the Antarctic." "What will happen to the mean sea level and the coastal cities around the world?" Kellogg asks.

Increased carbon dioxide was high on the list of man-related climate change disasters. It was admitted that there might be other factors involved, but, "It is concluded that, in cases where the societal risk is great, one should therefore act as if the unaccounted-for effects had been included, since we have no way of dismissing the very possibility that the calculated effect will prevail."

In the Conference summary of recommendations, Kellogg's thrust is repeated: Scientists and policy-makers must act now on man-caused climate change. "To ignore the possibility of such changes is, in effect, a *decision not to act.*"

John Holdren repeated this idea: "How close are we to the danger point?" of ecological collapse, he asked. But then he went on to say that it doesn't matter, because we need to act now. He stated:

> We already have reached the scale of human intervention that rivals the scale of natural processes.... Furthermore, many of these forms of intervention will lead to observable adverse effects only after time lags, measured in years, decades, or even centuries. By the time the character of the damage is obvious, remedial action will be difficult or impossible. Some kinds of adverse effects may be practically irreversible....

Should We Feed People?

One of the most telling discussions concerned the view of man as just another species competing for resources. The report of the summary session of the first day of the conference stated "that we as a species are trying to maintain ourselves at the expense of other species; there seems to be a conflict between preserving nature and feeding the rapidly increasing population. Is our major objective really to feed the population, or do we realize we cannot continue to feed the world *at any price*? Where do we strike a balance between preserving nature and feeding

the world?"

Stephen Schneider's presentation, "Climatic Variability and Its Impact on Food Production," sounds the alarm:

> There is a further fear that mankind's industrial and energy production activities may affect the climate and lead to enhanced probabilities of extreme variability. Thus the food-climate crisis could be very near-term and of major significance.... The smallest impact, and one we have already seen, is the triggering of higher prices for food by crop failures in one nation, such as the USSR in 1972, which had to be made up by North America.... Simultaneous crop failures in North America and the USSR could lead to even higher prices and widespread starvation throughout the world. Some estimates predict that upwards of 100 million people in developing countries could starve, while the more affluent countries would be just inconvenienced by a significant crop failure in North America.

As a gauge of the immorality of the conference participants, Schneider felt compelled to assert that "national energy and food policies must start with the assumption that population control by mass starvation or nuclear war is untenable"!

Like the other presenters at the conference, and the global warming faction today, Schneider fails to see how curbs on science and industry will kill people by preventing the economic development that permits a higher relative potential population density. Advances in science and technology are mentioned, but usually in the context of better energy savers and conservation, not in allowing more people to be supported at a better standard of living on a given amount of land.

Woodwell's presentation, "The Impact of Environmental Change on Human Ecology," is even more alarmist. He writes:

> A careful analysis of the extent to which the earth's net primary production is being used directly in support of man leads to the conclusion that, at present, as much as 50 percent of the net production is being used in support of human food supplies.... The fact that the toxic effects of human activities are spreading worldwide and reducing the structure of the biota is an indication that human activities at present exceed the capacity of the biosphere for repairing itself.

The Noösphere to the Rescue

Thirty-two years after this 1975 conference, the world's population, its science and technology, and its industry are dangerously in the grasp of Margaret Mead's minions, including those on the IPCC. A good part of the population is scared, as planned, by the potential effects of human-caused global warming. They are ready to react, as Mead demanded, to "warnings which will parallel the instincts of animals who flee before the hurricane," and in the process tear down the very institutions and technologies that can obviate the perceived "limits to growth."

In the intervening 32 years, most of our scientific institutions have been taken over by an anti-science ideology, typified by the views of a Stephen Schneider or a John Holdren. How can there be a science when the mind and its capacity for creativity is denied, when man is put equal to beast, and when man's advancements are perceived as ruining the pristine confines of a limited world? Such pessimism is a formula for a "no future" world.

The question remains, will the reservoir of sanity, in particular in today's youth, who did not live through the greenwashing of the 1970s and 1980s, be able to force reality—climate reality and financial reality—on the rest of the population? Will the Noösphere, man's creative ability to change the Biosphere, prevail?

Notes

1. *The Population Bomb*, published in 1968, was a campus bestseller among the 1968er generation. Ehrlich employs the repeatedly discredited argument of the British East India Company's Parson Thomas Malthus (1766-1834) that population increases geometrically while food supply increases only arithmetically. Malthus was proved wrong in his own lifetime by the development of fertilizers and scientific farming, and repeatedly thereafter by the application of successive advances in mechanization, chemistry, and biochemistry to agriculture.

   Describing the spirit of "gloom and misanthropy" into which the English population had fallen following the dashing of their hopes for progress in the French Revolution, Malthus's opponent Percy Bysshe Shelley wrote: "Inquiries into moral and political science, have become little else than vain attempts to revive exploded superstitions, or sophisms like those of Mr. Malthus." (Author's introduction to "The Revolt of Islam," 1818.)
2. Margaret Mead, "World Population: World Responsibility," *Science*, Sept. 27, 1974 (editorial), Vol. 185, No. 4157. The only opposition to the Rockefeller/Club of Rome policy presented at the Bucharest conference came from Helga Zepp-LaRouche.
3. See, for example, "The New Environmentalist Eugenics," by Rob Ainsworth, *EIR*, March 30, 2007, www.larouchepub.com/eiw/public/2007/2007_10-19/2007-13/pdf/36-46_713_ainsworth.pdf
4. *The Atmosphere: Endangered and Endangering*, Margaret Mead, Ph.D. and William W. Kellogg, Ph.D., eds. Fogarty International Center Proceedings No. 39, 1976 (Washington, D.C.: U.S. Government Printing Office, DHEW Publication No. [NIH] 77-1065).
5. Cited in P.C. Sinha, *Atmospheric Pollution and Climate Change* (Anmol Publications PVT, 1998).
6. Schneider made this statement in an interview with *Discover* magazine, October 1989.
7. The text of the shamefully unscientific AAAS resolution, which closely follows Mead's 1975 prescription, reads in part: "The scientific evidence is clear: global climate change caused by human activities is occurring now, and it is a growing threat to society. Accumulating data from across the globe reveal a wide array of effects: rapidly melting glaciers, destabilization of major ice sheets, increases in extreme weather, rising sea level, shifts in species ranges, and more. The pace of change and the evidence of harm have increased markedly over the last five years. The time to control greenhouse gas emissions is now.

   "The atmospheric concentration of carbon dioxide, a critical greenhouse gas, is higher than it has been for at least 650,000 years. The average temperature of the Earth is heading for levels not experienced for millions of years.... As expected, intensification of droughts, heat waves, floods, wildfires, and severe storms is occurring, with a mounting toll on vulnerable ecosystems and societies. These events are early warning signs of even more devastating damage to come, some of which will be irreversible.

   "Delaying action to address climate change will increase the environmental and societal consequences as well as the costs.... Developing clean energy technologies will provide economic opportunities and ensure future energy supplies.

   "The growing torrent of information presents a clear message: we are already experiencing global climate change. It is time to muster the political will for concerted action. Stronger leadership at all levels is needed. The time is now. We must rise to the challenge. We owe this to future generations."
8. www.annonline.com/interviews/961217/
9. Woodwell's original article is "DDT Residues in an East Coast Estuary: A Case of Biological Concentration of a Persistent Insecticide," *Science*, May 12, 1967, pp. 821-824. His admission that there was only 1 pound of DDT found per acre appears in the transcript of the EPA's 1972 hearings on DDT, p. 7,232. He also managed to measure DDT in the forests at a site near an airstrip where crop-dusting airplanes tested and calibrated their DDT spraying equipment.
10. Lovelock's commentary in the *Independent*, Jan. 16, 2006, summarizes his views. http://comment.independent.co.uk/commentators/article338830.ece

Global Warming Update

Continued from page 8

major funder of climate research, indicated that solar cycles have a big effect on climate—a fact denied by Al Gore and other warming maniacs. Thrope added that he thought that solar cycles have played a lesser role in the last 30 years.

Russian Scientist Defends Noösphere —From Al Gore

The vice president of Russia's National Geocryological Foundation, Sergei Golubchikov, criticized the politicians who "win Nobel prizes" with their "impassioned calls to fight global warming and shift national economies to sustainable development" in a commentary published in *Novosti* Nov. 8: http://en.rian.ru/analysis/20071108/87175828.html

Golubchikov, an environmental expert, warned against "panic" about climate change, and raised Vernadsky's concept of the "noösphere" in considering environmental issues. He wrote: "Anxiety over climate change is carried too far, to my mind.... Humanity is focusing environmental efforts on the bogeyman of global warming. Why not shift the emphasis to protecting the oxygen-producing environment?"

Greater concentrations of CO_2 would actually be positive, he wrote, helping plant life to flourish, while the real problems are serious polluters like sulfur dioxide and other toxic substances, which are polluting vital regions of the Earth.

"Nothing deserves closer attention from scientists and political leaders than the ocean, the Arctic and Siberia," Golubchikov wrote. "Politicians and experts win Nobel prizes with impassioned calls to fight global warming and shift national economies to sustainable development. To be honest, promises of a radiant noöspheric future sound baffling to me, for there are no objective criteria to the noösphere [the Earth as altered by the human mind, the third stage of development after the geosphere and the biosphere]. It cannot be measured, weighed or otherwise evaluated, and there is no way to establish its borders in time and space. But please don't think I shrug off the doctrine of the noösphere. On the contrary, I have the utmost respect for it, just as for those who stood at its cradle—brilliant Russian scientists Vladimir Vernadsky and Nikita Moiseyev."

New NASA Study Gores Climate Scare

A team of NASA and university scientists has detected an ongoing reversal in the Arctic Ocean circulation triggered by atmospheric circulation changes that vary on decade-long time scales. The results of this new study suggest that not all of the large changes seen in Arctic climate in recent years are a result of long-term trends associated with global warming www.jpl.nasa.gov/news/news.cfm?release=2007-131.

Led by James Morison of the University of Washington's Polar Science Center Applied Physics Laboratory, the study used data from an Earth-observing satellite and deep sea pressure gauges to monitor Arctic Ocean circulation from 2002 to 2006. "The team measured changes in the weight of columns of Arctic Ocean water, from the surface to the ocean bottom. That weight is influenced by factors such as the height of the ocean's surface, and its salinity. A saltier ocean is heavier and circulates differently than one with less salt."

Changes in the sea surface pressure and salinity cause the Arctic Oscillation to switch from a cooling trend to a warming trend. It is of note that when the Arctic Oscillation is in warming mode, the winters in the southeastern United States are warmer, like last year's winter.

Morison said that the new data indicate that the winter of 2006-2007 was a high Arctic Oscillation (Warming mode) year which produced the conditions that led to this year's record Arctic sea ice melt. This decadal-scale change in the Arctic Oscillation is one of the main factors that determine sea ice melt—not Al Gore's man-made CO_2 hoax.

Freeman Dyson Book Challenges Global Warming 'Fluff'

The latest book by Freeman Dyson, Professor Emeritus of Physics at the Institute for Advanced Study in Princeton (*Many Colored Glass: Reflections on the Place of Life in the Universe,* University of Virginia Press) affirms his pride in being a heretic and challenges the "fluff" of global warming.

Dyson included similar remarks in a commencement address at the University of Michigan in 2005 http://www.umich.edu/news/index.html?DysonWinCom05.

"The first of my heresies says that all the fluff about global warming is grossly exaggerated. Here I am opposing the holy brotherhood of climate model experts and the crowd of deluded citizens that believe the numbers predicted by their models. Of course they say I have no degree in meteorology and I am therefore not qualified to speak.

"But I have studied their climate models and know what they can do. The models solve the equations of fluid dynamics and do a very good job of describing the fluid motions of the atmosphere and the oceans. They do a very poor job of describing the clouds, the dust, the chemistry and the biology of fields and farms and forests. They do not begin to describe the real world that we live in.

"The real world is muddy and messy and full of things that we do not yet understand. It is much easier for a scientist to sit in an air-conditioned building and run computer models than to put on winter clothes and measure what is really happening outside in the swamps and the clouds. That's why the climate model experts end up believing their own models.

"There's no doubt that parts of the world are getting warmer, but the warming is not global. The warming happens mostly in places and times where it is cold, in the arctic more than the tropics, in the winter more than the summer, at night more than the daytime.

"I'm not saying the warming doesn't cause problems. Obviously it does. Obviously we should be trying to understand it. I'm saying that the problems are being grossly exaggerated. They take away money and attention from other problems that are much more urgent and more important—poverty, infectious diseases, public education and public health. Not to mention the preservation of living creatures on land and in the oceans."

Exploring the History and Science Of the Telescope

by Charles Hughes

The Telescope
by Geoff Anderson
Princeton, N.J.: Princeton University Press, 2007
Hardcover, 248 pp., $29.50

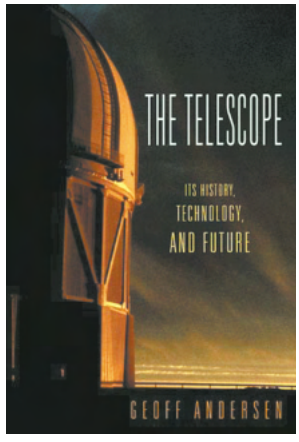
This book not only covers the history of the telescope but, more important, it describes the most recent breakthroughs in optical technology and engineering. It also describes the nature of light in detail, without having the disadvantages of a textbook on physics.

On the question of who exactly invented the telescope: Most books on telescopes say that Hans Lippershey, a Dutchman, was granted a patent by the Dutch government in 1608 for an instrument consisting of two lenses of glass which magnified distant objects. But author Geoff Anderson cites a reference by an Englishman, Thomas Diggs, who claimed that his father, Leonard, in 1571 had used a device to bring distant objects closer, saying that he could see what was taking place in private places. (Perhaps this was history's first spy glass?)

It is a popular misconception that the telescope was invented by Galileo Galilei of Pisa, Italy, born in 1564. According to Andersen, the story of how Galileo came to make his first telescope is as follows: Galileo was shown a telescope by a friend who happened to be a government official, who had custody of a telescope given to him by an inventor who wanted to be granted a patent for the device. Galileo borrowed the device and copied it, making some improvements in the instrument.

Galileo is well known for many original observations, such as the discovery of the four major satellites of Jupiter. But although he observed sunspots, he was not the first to report them; the ancient Chinese had beaten him to it.

At least one of Galileo's findings, Anderson reports, is suspect. His illustration published in a woodcut shows the Moon at the half phase, with the shadow splitting the lunar surface in half, and there is a large crater right in the middle, where no such large crater can be seen now. This crater is possibly Albattegius, but may also be a mistake, a fabrication, or perhaps the fault of the printer.



The Telescope and Light

Anderson does a thorough job of explaining the wave nature of light, and how it causes problems in precise telescope observations of the stars and celestial sights, in the two main categories of telescope, the reflector and refractor.

One major problem is that the wave nature of light causes light to be disrupted whenever it encounters an edge or obstruction in the light path. The edge of the telescope tube is such an obstruction, as is the diagonal mirror in a reflecting telescope, which directs the image to the side of the tube to bypass the observer's head.

The reflecting telescope has a mirror at the base of the tube to gather light and direct it up the tube to the ocular, which magnifies the image.

The early telescopes were refractors, in which the main light-gathering mechanism is a glass concave lens at the front of the telescope, which forms a real image. The light goes down to a small lens in front of the observer's eye, where the image is enlarged, and then to the eye.

Another problem is the non-homogeneous character of the atmosphere, which distorts light passing down from the star to the telescope.

Since the very beginning of the telescope, astronomers have attempted to enlarge the objective, either the front lens or the rear mirror to obtain a larger, unobstructed area of the main optic and thereby increase the resolution of the telescope; that is, the ability to see large, sharper details of a celestial object. That is the reason for the race in modern astronomy for ever more gigantic mirrors to gather more light from the celestial objects being observed.

As for the unsteadiness of the air, the only remedy (until the discovery of the technique of adaptive optics, which I will describe below) was to observe on those, often few, nights of the year when the atmosphere, or the seeing, was good.

Another recourse was to locate the observatory on a high mountaintop where the telescope was above most of the atmosphere, the most favorable sites also being near the ocean. (Two such prime sites are Chile and Hawaii.) With bad, turbulent air, however, the chances of someone at such an observatory seeing an object at sharp resolution, and with the limitations imposed by the diffraction effects of the light waves hitting the edges of the telescope tube, are little improved over those of an amateur instrument.

To see the wonders of the heavens, accepting the limitations of air turbulence and diffraction, Anderson states that a telescope of about 6-inches diameter is all that is needed. A refractor type is slightly superior, although more costly, with a long focal length that is, say, 15 times the diameter of the objective

lens or mirror.

Of course, a third method of eliminating bad air is to put the telescope where there is none—in space. The Hubble has given us fantastic clear images of the universe, to the very limit that the 90-inch mirror is allowed by the laws of physics. The problem here is the size of the load in the Space Shuttle and the extreme cost of putting a telescope in space.

New Techniques

Chapter 10 and those following are the most interesting part of the book, as they explain the new techniques that have caused a revolution in telescope imaging.

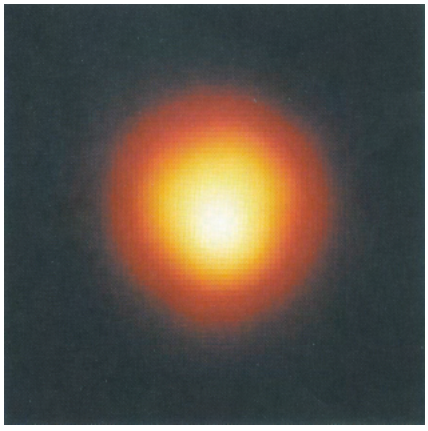
These new advances have come about through the use of advanced laser and light techniques linked to the ability of supercomputers, which were developed out of the "beam defense" technology of the last 10 years, and declassified at the end of the Cold War in the 1990s.

How these advances work require understanding how light forms images. Huygens and other scientists in the 17th Century proved that light was a wave, and not a particle, but this idea was contested by Newton. (Newton had many erroneous ideas about the nature of light, as noted below.)

One problem with early refractor telescopes was chromatic aberration, the tendency for different colors of light traversing the telescope objective to fail to focus at the same point. (Mirrors do not have this problem; all colors focus at the same point.) Newton taught that it was impossible to correct the objective of a refractor for this problem.

To correct this chromatic problem somewhat, telescope makers increased the focal length of the telescope while keeping the diameter of the lens small. But this method of correction caused telescopes to assume grotesque lengths. No doubt readers have seen illustrations of early instruments, such as the telescopes at the Paris Observatory in the 17th Century, that were 100 feet long, supported on high towers with ropes and pulleys.

In 1759, John Dolland proved Newton wrong by inventing the achromatic objective for the refractor, using two different types of glass sandwiched together to get most of the light to focus at a single point with only a moderate focal length. Unfortunately Newton's authority had kept the development of the refractor back 50 years or more.



Hubble Space telescope (STSci/AURA)

Betelgeuse, a red giant in the Orion constellation, in the first image resolving the disk of a distant star. The star is 20/1,000ths of an arc second in diameter.

Getting back to how the wave nature of light causes trouble for astronomers: If you observe a bright star through a telescope on a night that has good air transparency, or good seeing, you can not see the star's disc because it is too far away to be resolved unless you make use of the advanced laser techniques.

Instead, you will see a ring like a bull's-eye made up of light and dark concentric rings. The dark rings are caused by light waves interfering with each other, a wave crest cancelling out a trough. The bright rings occur when the waves coincide and reinforce each other. This is termed a diffraction spot or an Airy ring.

Without the boost in resolution provided by the new beam technology, even a large Earth-bound mirror cannot resolve the disc of a distant star. This type of telescope can resolve an angle of about 1 arc second.

To get an idea of what this means: A circle is divided into 360 parts, each part called a degree. The degree is divided into 60 parts, each one called a minute. The minute is split into 60 seconds. The Moon is about 1,800 seconds wide, and Mars is about 24 seconds, when it is closest to the Earth.

One of the largest stars closest to us is about 20/1,000ths of an arc second, which is why the disc cannot be resolved even in a giant telescope. The star in question is the famous red giant Betelgeuse in the constellation of Orion, 400 light years away. Astronomers did finally obtain an image of Betelgeuse, which is illustrated as a color plate in this book (see photo).

Optical Breakthroughs

One breakthrough was the discovery that if two or more telescope mirrors were separated, the lateral distance separating them acted as single mirror with amplified resolution. For example, two 100-foot mirrors separated by 1 mile and connected together electronically would be equivalent to a mirror with the resolving power of one mirror that was 1 mile plus 200 feet in diameter.

I say here "mirror," because large refractors were abandoned as an option in observatory telescopes a hundred years ago. The largest refractor ever built was the 40-inch refractor at Yerkes Observatory in Williams Bay, Wisconsin, in about 1890. Large, heavy glass lenses could not be mounted on the front of a tube beyond this size.

More recently, however, improvements in mirror fabrication to make telescope mirrors light, thin, and deformable have made it possible to make huge mirrors, which can be fitted together like tiles to build up a large mirror out of small, thin, very well figured segments. The overall optical properties of the whole can be controlled by computer-operated mechanical fingers behind each segment.

Several of these monsters can be interconnected electronically to make a super mirror, increasing the size of the diffraction spot for the observer. Thus it could give the observer the excessive resolution needed to image a star like Betelgeuse. However, the rough air is still a problem.

Anderson explains how the new technique known as adaptive optics solves the problems of turbulent air. It uses a laser aimed into the field of view of the telescope, which probes the air mass, feeding information into a very advanced computer. This produces a map or model of the air turbulence and feeds this model to actuators behind each mirror segment, so that the mirror shape is coincident with the air wave front, thus producing a well defined image of the star.

I recommend this book for anyone wishing to understand the latest advances in astronomical science, as well as telescope history.

Wilhelm Weber Defended

by Laurence Hecht

The Electric Force of a Current: Weber and the Surface Charges of Resistive Conductors Carrying Steady Currents
by Andre Koch Torres Assis and Julio Akashi Hernandes
Montreal: Apeiron, 2007
Paperback, 237 pp., $20.00 (Available in pdf format at http://www.ifi.unicamp.br/~assis)

Prof. Andre K.T. Assis of the State University of Campinas in Brazil is a fierce defender of Wilhelm Eduard Weber, the collaborator of Carl Friedrich Gauss in the determination of the absolute value of the Earth's magnetic force, and the author of the Universal Law of Electrical Action. On this orientation, we wholeheartedly agree. On other matters, related to the deeper significance of the Gauss-Weber-Riemann electrodynamics, we have maintained a friendly disagreement for some years.

In this new work, I find our points of difference reduced to a minimum, and have discovered much new material of interest. Dr. Assis has focussed this work on refuting the charge levelled by Clausius, Maxwell, and others, that the alleged failure to detect a force between a current-carrying wire and a nearby stationary charge invalidates Weber's fundamental law.

In a sharply formulated summary of the current dogma in Chapter 1, Dr. Assis answers the argument against Weber's force law, following the discovery at the turn of the 20th Century that the positive charge seems to remain connected to the lattice of a conducting wire, while the negative charge is put into relative motion.

In Chapter 3, "Experiments," the work of a great number of investigators, establishing the existence of the Weber force in the case in question, is brilliantly summarized. I found here material that was new to me, despite having paid close attention to developments in the area.

While the evidence shows that there are no grounds for denying the existence of a force between a conductor and a static charge, it remains a shame that, after all these years, a more decisive experimental demonstration of the existence of the force has not been achieved. Dr. Robert Moon's 1958 proposal, never funded by the University of Chicago Physics Department, remains exemplary of the sort of procedure that could provide a decisive proof (cf. *21st Century,* Fall 2004, p. 46).

Later chapters in the book are devoted to theoretical calculations related to the Weber force, including an original treatment of the resistive spherical shell. An appendix, "Wilhelm Weber and Surface Charges," contains a penetrating study of Weber's important paper in the *Electrodynamic Measurements* series, devoted to resistance measurement.

A second appendix, on Gustav Kirchoff's derivation of the telegraphy equation, in which he demonstrated that the propagation of current in a wire would be limited by the velocity of light, sets the record straight that both Weber and Kirchoff had preceded Maxwell by several years in this discovery. It might usefully have been added that Bernhard Riemann, in a paper dated 1858, had already recognized that the propagation of the electrical potential in free space is retarded at the same rate as the propagation of light. Riemann was the closest friend of Wilhelm Weber and prized student of Gauss.

What Is Left Out

Which brings us to our criticism. It is in matters relating to the historical development of the subject where the book's shortcomings appear, not so much in what is stated as in what is left out.

Weber's electrodynamic studies began as an effort, as chief assistant to Gauss, to establish the existence of the Ampère angular force. As Gauss had noted explicitly in his 1839 paper "General Propositions Relating to Attractive and Repulsive Forces Acting in the Inverse Ratio of the Square of the Distance," the existence of the Ampère angular force meant that the entire edifice of potential theory built upon the Newtonian structure would collapse.

It was no accident that Gauss devoted more than 10 years of his life to inquiring as to the existence of the angular force. The publication of the experimental proof under Weber's name in 1846, appeared, appropriately, in a volume marking the 200th anniversary of the birth in Leipzig of Gottfried Leibniz, Newton's opponent on matters underlying this fundamental point.

It was James Clerk Maxwell who first introduced into the field of electrodynamics the false dichotomy between theories of *action-at-a-distance* and theories of *propagation in a medium.* Under this false categorization, Ampère (who was virtual co-author with his dear friend Augustin Fresnel of the modern wave theory of light), Gauss (the untiring, if also circumspect, champion of Kepler against Newton), and Gauss's students Weber and Riemann, are all classed as defenders of the *action-at-a-distance* theory!

Unfortunately, most among that small circle of modern defenders of Weber and Ampère have allowed themselves to be trapped into Maxwell's false dichotomy. To oppose Maxwell, is thus, supposedly, to uphold Newton.

The proper treatment of the matter revolves around a crucial point made by Gauss in the 1845 correspondence with Weber, respecting the need for a rigorous *constructible representation* of the electrodynamic propagation, a representation which Maxwell failed to provide, despite what has been drilled into the heads of generations of physics and engineering students.

A rigorous solution to that problem still awaits discovery. The difficulty does not lie in the realm of formal mathematical representation, where most, including Maxwell, have looked. The solution revolves around the issue, identified by Lyndon H. LaRouche, Jr., of the real existence of the *ontological transfinite.*

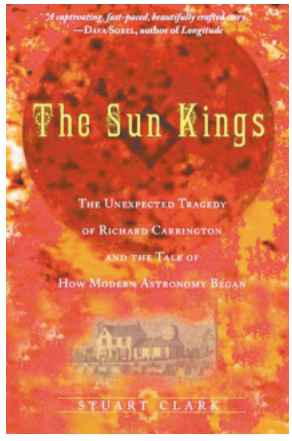
Riemann's remarks on the Newton problem in the posthumously published "Philosophical Fragments," and his attempts at formulating a theory of propagation of the *retarded potential,* come closest to the direction of a solution. A thorough familiarity with the work of Ampère, Gauss, and Weber is an essential prerequisite to fully comprehending those efforts.

Despite the noted shortcoming, this new work of Drs. Assis and Hernandes may usefully assist in that endeavor.

The Sun Rules the Planet

by Manuel K. Oliver

The Sun Kings: The Unexpected Tragedy of Richard Carrington and the Tale of How Modern Astronomy Began
by Stuart Clark
Princeton, N.J.: Princeton University Press, 2007
Hardcover, 211 pp., $24.95



What a delight! This is an enthralling account of the personal lives of the scientists who first demonstrated the Sun's dominant influence over Earthly affairs and laid the foundation for modern astronomy and astrophysics.

And what timing! Just when the attention of the world is focussed on global climate changes, Stuart Clark's book reminds us that the Sun is King of the Solar System, controlling events on planet Earth in ways that extend far beyond the daily benefits of visible sunlight, and its reflection at night from the Moon and other objects in the Solar System.

Stuart's book is rich in personal details of the pioneers who discovered that planet Earth remains closely linked with eruptions on the Sun, billions of years after this star gave birth to the Earth and its sister planets. This is a fast-moving, accurate, and fascinating story of diverse personalities, their families, ambitions, hopes, and struggles, their passion for knowledge, for awards, positions and recognition, and the inevitable roles that pride, greed, jealousy, and resentments played in deciding the tragedies, fame and fortune of the founders of modern astronomy.

The story covers a 209-year period, from William Hershel's lectures on Dec. 18, 1795, about the strange, planet-like features that he had observed on the surface of the Sun, until the eruption of a neutron star on Dec. 27, 2004 blasted Earth and the rest of the solar system with deadly, high-energy radiation from the supposed dead heart of a distant star.

It is probably no coincidence that Clark uses historical events closely related to a current controversy about the Sun as bookends for this gripping story. Clark is a master storyteller and, as the author of several astronomy books and the former editor of *Astronomy Now,* he knows how very little the scientific community really understands about the erratic star that controls most events on planet Earth.

The story is built around the seemingly good fortune of a 33-year-old astronomer, Richard Carrington, who was following a highly disciplined routine of observing and recording events on the Sun, when, at 11:18 AM on Thursday morning, Sept. 1, 1859, Carrington witnessed blinding white light from a monstrous solar eruption. At about the same time, the Kew Observatory had the good fortune to record a sudden recoil of the Earth's magnetic field, a finding that suggested an almost instantaneous link across the 93 million miles of void that separates Earth from the Sun.

(The personal tragedy that befell Carrington, which is mentioned in the title, I leave to readers of the book to learn.)

The Kew Observatory recorded an even larger disturbance in Earth's magnetic field the next day, when the full force of the solar storm reached the third planet after travelling about 5 million miles per hour from the Sun, and engulfed the Earth in a blood-red aurora, wreaking havoc worldwide as "telegraph systems crashed, machines burst into flames, and electric shocks rendered operators unconscious."

The story unfolds, not in simple chronological order, but with an event that is still fresh in the memory of many readers: A series of violent solar eruptions that occurred 44 years later near Halloween of 2003, soon after the *Journal of Fusion Energy* had published a paper on "Superfluidity in the solar interior: Implications for solar eruptions and climate."

The most obvious theme of *The Sun Kings* is this: Earth is intimately connected to the rest of the universe and our destiny is closely tied to that of the violent and unpredictable star that illuminates our tiny corner of the cosmos and sustains life itself.

I do not know Stuart Clark personally, but I gladly give *The Sun Kings* my highest recommendation, not only for its entertainment value, but also for the insight it provides into the foundations of modern astronomy and the fragility of our very lives on planet Earth.

Dr. Manuel is Emeritus Professor of Nuclear Chemistry, University of Missouri, Rolla, Mo.

The Joy of Fighting Dogma with Ideas

by Gregory Murphy

The Virtue of Heresy: (Confessions of a Dissident Astronomer)
Hilton Ratcliffe
Central Milton Keynes: AuthorHouse UK Ltd., 2007
Paperback, 409 pp., $22.95

Hilton Ratcliffe's book is a breath of fresh air in the stale confines of popular science. His book is full of ideas, which he does not ask you to believe on face value, but to read, study and, discuss. The current trend in science-based books, in contrast, is to focus on certain "facts," as opposed to ideas. The only thing that such books can by used for is as a preparatory text for competing on Jeopardy, or for for trying to sound smart at a cocktail party.

The Virtue of Heresy uses a great deal of humor to attack the current dogmatic ideas plaguing astronomy, such as dark matter, dark energy or force, Hawking radiation, and everybody's favorite formalism: the Big Bang. Ratcliffe comments on the notion of Hawking radiation, which is believed to be the radiation emitted from black holes, by saying that it only occurs in Stephen Hawking's head!

Ratcliffe's main target in the book is the Big Bang theory. This idea of the beginning of the universe, he says, is not true and could not have happened that way. Furthermore, he says, the Big Bang theory does not even come close to explaining how the really big stuff got out there in space. He also attacks the stranglehold of the Big Bang theory on the funding for astronomical research, which prevents any dissenting scientists from getting telescope time or funds.

One gets a healthy impression from the book that it is necessary to question current theories—a refreshing outlook, given that the current prevailing wisdom is to "go along to get along." Ratcliffe's book also encourages discovery, which goes well with his position as a fellow of the Institute of Physics in Britain, where he is in charge of getting high school and university students interested in science. In particular, he encourages youth to work through the orginal discoveries of science.

There are parts of Ratcliffe's book that I disagree with: those that concern his clinging to Isaac Newton's mechanics. I prefer the more pro-human mechanics of Gottfried Liebniz. Even with this disagreement, I found Hilton's book enjoyable, and so far it is one of the only science books published this year that really asks you to think about ideas, as opposed to repeating facts like a trained parrot.

An Ocean of Airheads: The Gossip Column Approach to Science

by Gregory Murphy

An Ocean of Air: Why The Wind Blows and Other Mysteries of the Atmosphere
Gabrielle Walker
Orlando, Fla.: Harcourt Inc., 2007
Hardcover, 272 pp., $25.00

If one were to read the book jacket for Gabrielle Walker's latest work, one would find promise of a interesting book dealing with the Earth's atmosphere. In reality, the reader finds a book that consists of seven discrete chapters that are in no way connected, giving the reader the impression that the atmosphere is made up of only discrete features and does not work as a whole—which any grade schooler knows is not the truth.

My main complaint about *An Ocean of Air* is that it seems to be written more as a gossip column than a popular science book. Walker reports more about the personal lives of the scientists that she is writing about, than about their scientific discoveries. This was also the case for her first book, *The Snowball Earth,* in which the reader learns more about the running shoes of Dr. Paul Hoffman of Harvard, than about his discovery of the snowball Earth (the theory that the Earth was once covered from the poles to the equator in ice).

The real failure of this book, however, is that instead of uplifting and educating her readers with a real discussion of ideas behind the discoveries she writes about, Walker has chosen to present these discoveries as secondhand facts that might be the answers for one of President Bush's standardized tests. The only people who might learn anything from Walker's presentation, in fact, are those who think that Al Gore and President Bush are geniuses.

This book is a real disservice to the youth of today, who are thirsty for ideas and want to work through real discoveries. As an example to Walker on how to present ideas, I point her to the LaRouche Youth Movement website on Johannes Kepler: http://wlym.com/~animations/. She should visit the site and see that in this time of crisis people need big ideas not spoon-fed factoids.

Climate Blunders

In *An Ocean of Air,* the only two chapters in which Walker even attempts to explain anything scientific are those that deal with the global warming and ozone hole swindles—two of the most politically charged science frauds in the past three decades. (The reader should know that Walker is the Climate Change Editor for the British journal *Nature*.)

But in her rush to proclaim that the greenhouse effect is real and very dangerous, Walker makes a big mistake in her discussion of the work of Svante Arrhenius (1829-1957), the first scientist to calculate how much temperature would rise in relation to increasing carbon dioxide. She portrays Arrhenius as a wild-eyed global warmer, like Al Gore or James Hansen. But the truth is that Arrhenius miscalculated the temperature rise, saying that temperature would rise 3 to 6 degrees Celsius with the doubling of CO_2, and furthermore that he didn't think this was a negative event.

It is interesting to note that Arrhenius's miscalculated value is the same temperature rise quoted by the Intergovernmental Panel on Climate Change. In reality, the amount of temperature rise is only about .3 to .5 degrees Celsius for a doubling of CO_2.

Walker also doesn't mention that Arrhenius believed that the increasing CO_2 would be a *benefit* to mankind, by producing the warmer climate that would be needed to grow the food for an increasing human population.

At every point in Walker's book, she chooses to focus on the most nonsensical or irrelevant facts of the subject's life, instead of the ideas and discoveries of the scientist. The question Walker needs to be asked is, is her writing simply incompetent, or is this a deliberate effort to dumb down science.

At present Walker's book should be referred to as "bimbo science."

A History of Chemical Compounds

The 100 Most Important Chemical Compounds: A Reference Guide
Richard L. Myers
Westport Conn.: Greenwood Press, 2007
Hardcover, 326 pp., $85.00

Intelligently presented with effective graphics, the author succeeds in his stated intention of presenting the social and economic impact of chemical discoveries on human history. However, the concessions to green fascism on such controversial entries as carbon dioxide, DDT, dichlorodifluoromethane (freon), and even THC (the active ingredient in marijuana), are disappointing.

Not so long ago, chemistry was a required course in American high schools, because of the recognition of the subject's importance to an industrial society. Today, when we are no longer an industrial but an imperial/importer society, the attempt to teach an understanding of physical economic processes has given way to instruction in rules and procedures—even in our science courses.

The author has brought a thorough grasp of chemistry, as well as considerable knowledge of its history and present applications to bear on the subject. Had he also stuck to truth rather than popular opinion on the controversial areas, he would have produced a less flawed work. Nonetheless, it would probably make a net positive contribution to any school or personal reference library.

—Laurence Hecht

Enrico Fermi on Film

"The World of Enrico Fermi" and "People and Particles"
DVD format, 2007
Distributed by the American Association of Physics Teachers, www.aapt.org , $19.99

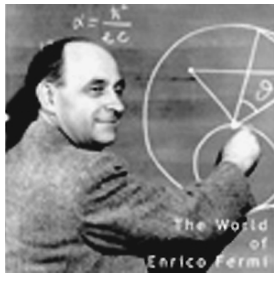
This DVD, distributed by the American Association of Physics Teachers, was originally created for use in high school classrooms in the 1960s, as part of Project Physics, a Harvard University program involved in curriculum planning. This is the first time the films have been made available to the public.

The Fermi film is very well done, with intelligent commentary and fascinating footage of Enrico Fermi, his wife, and his students (many of them eminent physicists). Unlike many of today's films for students, the music is unobtrusive and the presentation presumes a thinking viewer.

Fermi comes to life in photos and through the comments of his wife and colleagues. You also hear Fermi's own voice explaining a point in a lecture.

The films give a taste of what it was like to be a scientist at a time when there was more enthusiasm for ideas and science, and when a national mission, the Manhattan Project, pushed individuals of all ages to come up with new solutions to technical problems—in a hurry. My only complaint is that this film was not longer!

"People and Particles" is a very different sort of film. It chronicles a Harvard Physics Department team at the Cambridge



Electron Accelerator that designs and builds an an electron beam experiment over a two-year period. The objective of the project is to see how electrical charges interact at close distance. The camera follows the people on the team candidly as they talk about the equipment they will need, make a floor plan, build a large spark chamber, write the computer program for analyzing the results, put the equipment in place (including an enormous magnet, which is dubbed the "Green Giant"), talk with a visiting Armenian scientist, and, finally, break out the champagne, after the first shot shows that the experimental design works.

This film is also a slice of history, this time from the late 1960s, and it gives a good sense of scientists at work on a problem to see if the evidence matches the theory. It is telling that in the film notes, physicist James Rutherford mentions that the Accelerator later had to be dismantled for lack of money to run it.

—Marjorie Mazel Hecht

BOOK NOTES

Geographic Family Reference Atlas of the World
Washington, D.C.: National Geographic, 2006
Hardcover, 384 pp., with 510 maps and 430 illustrations, $65.00

National Geographic's *Family Reference Atlas* is lavishly illustrated, as you would expect from a publisher known for its photographs and illustrations.

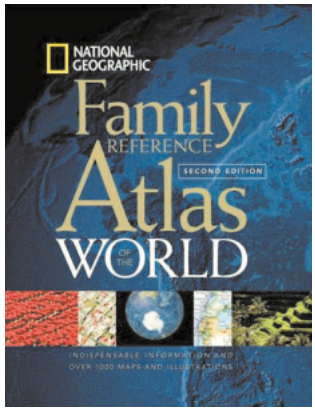
It provides detailed maps—geographical, topological, political, mineral, and agricultural. Like the atlases I remember from elementary school, it has little symbols for the agricultural products that characterize each area. But unlike the atlases of my childhood, it provides maps of political "hotspots," so that you can easily find Abkazia or Chechnya, to name two such hotspots in the news.

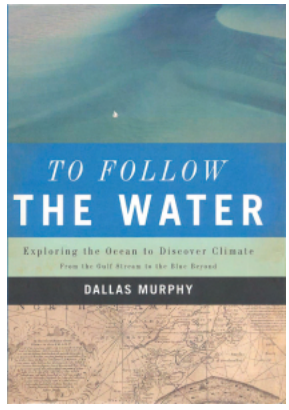
And like most "educational" items today, it provides the same conventionally "correct" opinions about global warming, biodiversity, and other such environmental issues in its topical introductions.

There are also some telling omissions and bloopers. In the energy descriptions, for example, there are symbols for other forms of energy—but not for nuclear plants. There is no map of world railroads, or even U.S. railroads, a standard infrastructure item and a crucial measure of economic development. In the blooper department, the Atlas's section on the poles makes mention of the British expedition to Antarctica, but, remarkably says nothing about the monumental U.S. Exploratory Expedition, 1839-1842, headed by John Wilkes and promoted by John Quincy Adams, which got to Antarctica first!

With these caveats in mind, this is a usable atlas.

—Marjorie Mazel Hecht





To Follow the Water, Exploring the Ocean to Discover Climate
Dallas Murphy
New York: Basic Books, 2007
Hardcover, 278 pp., $26.00

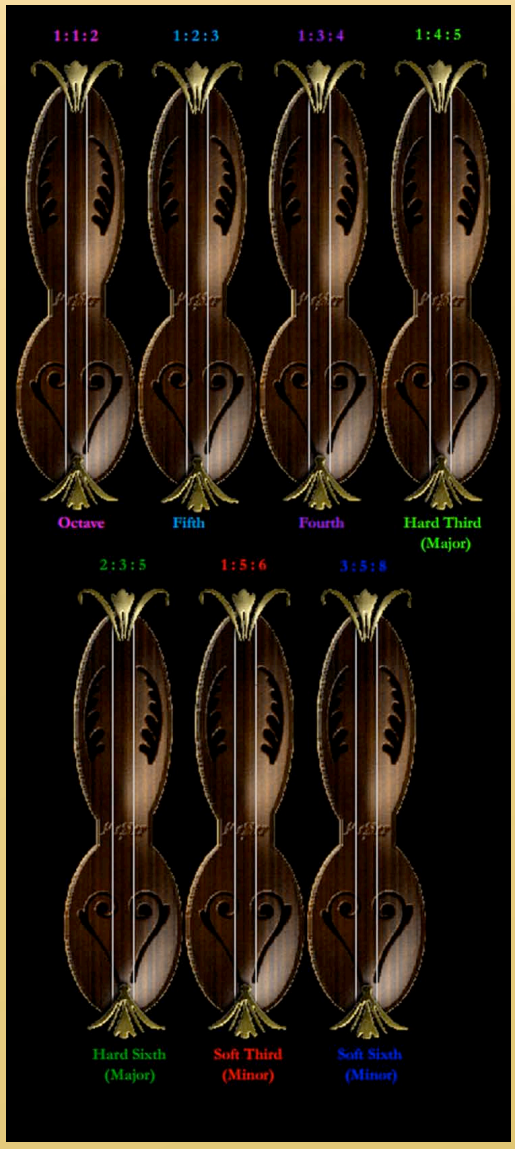
This is a cynical and sophistical book, trying to ride the wake of Al Gore's global warming hoax. Don't waste your time or money, unless you want to read a book by someone who says that Chaucer taught astronomy to John of Gaunt's daughter, Philippa, who was to become the mother of Henry the Navigator, because he needed a "survival gig to make ends meet before he hit it big with the *Canterbury Tales*."

—Rick Sanders

In This Issue

THE SCIENTIFIC METHOD OF KEPLER AND GAUSS

Sky Shields of the LaRouche Youth Movement introduces readers to the concept of sufficient harmony, which, Kepler notes, "is in no way outside the soul." In this animation, the seven divisions of the string, are shown to have the "harmonic" characteristic of self-similarity. The smaller divisions of whole and half steps are constructed by means of intersection of the larger harmonic ratios.



ORDERING THE STABLE ISOTOPES: A NEW APPROACH

A new interpretation of the meaning of Planck's constant suggests a solution to the yet-unsolved question of the ordering of the stable isotopes. Laurence Hecht shares his idea of how the Moon model's space quantization explains observed radiation, and provides an organization of data for the isotopes.

STABLE ISOTOPES BY MASS NUMBER

This reference graphic for discussion shows boxes numbered from 1 to 238, representing the mass number, and arranged for convenience in rows of 16. The stable isotopes are identified by chemical symbol; the most abundant are in bold face.